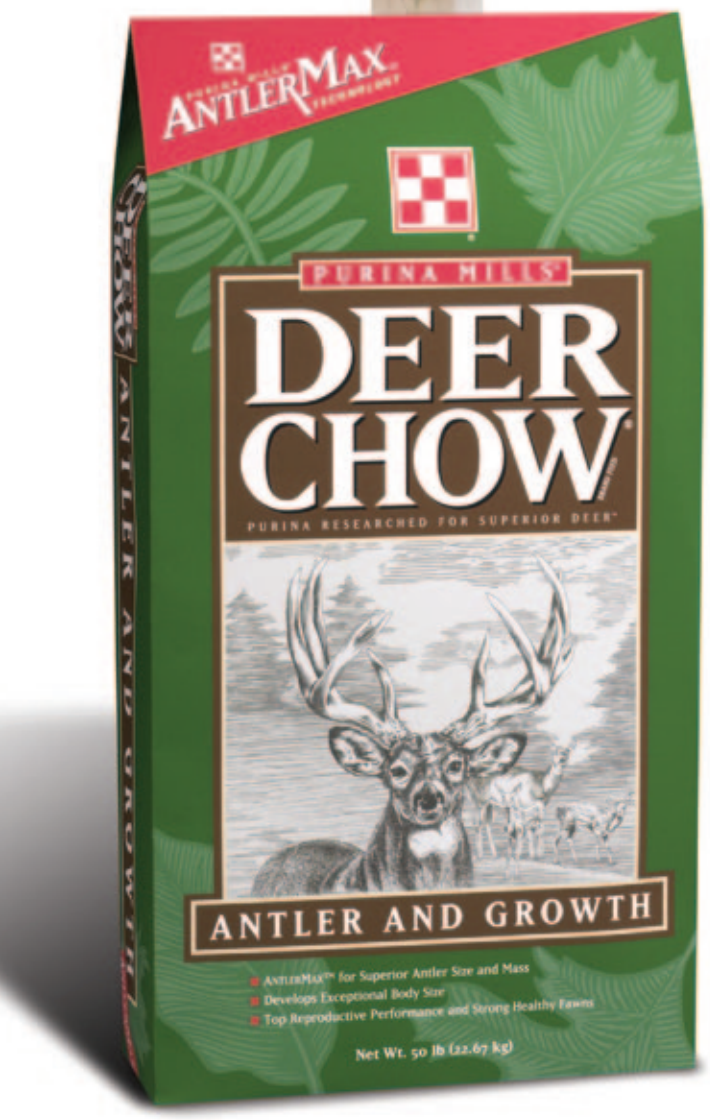
PRACTICAL WILDLIFE MANAGEMENT INFORMATION

Wildlife Trends JOURNAL

MAY/JUNE 2012 VOLUME 12, ISSUE 3

INSIDE THIS ISSUE



"I'm so confident in the performance of Purina® AntlerMax®, it's the only deer feed we use at Realtree™ Farms. Add the research-proven results of AntlerMax® to your management program."

~ Bill Jordan

1 (800) 227-8941

TO FIND YOUR LOCAL PURINA® CERTIFIED EXPERT DEALER

www.AntlerMax.com

BILL JORDAN'S REALTREE™ Family, Friends and the Outdoors

A DIFFERENCE YOU CAN SEE™

ONLY AVAILABLE IN SELECT MARKETS AND AT SELECT DEALERS. REGULATIONS FOR FEEDING OF BIG GAME CAN VARY FROM STATE TO STATE. PLEASE CHECK WITH YOUR LOCAL GAME AND FISH DEPARTMENT FOR THE PROPER USAGE OF THE BIG GAME FEEDS.
DEER PHOTO OF BLADE AT TOP OF AD COURTESY OF HWH WHITETAILS.
PURINA MILLS® AND REALTREE™ HAVE ENTERED INTO A SPONSORSHIP AGREEMENT.

Earl Says...

We're going to try an experiment this year on our deer hunting lease. This summer, we've decided to add a supplemental feeding program for our deer. Earlier this year we discussed it with a couple of other adjoining hunting leases and with their help we should be able to control around 5,000 acres. Hopefully this means that we're helping with the antler growth of our bucks and nutrition needs of the does and fawns. And I especially look forward to seeing the game camera pictures from the food trough!

And just a reminder to look for us at a Hunting and Fishing show near you this summer. It's always a lot of fun to meet subscribers and other folks at these gatherings and learn what kinds of new information you want to see in the future. I know that wild pig control is a hot topic almost everywhere we go these days as well as bringing back wild quail. We're especially looking forward to this year's **Land & Wildlife Expo in Nashville, TN August 9-11**. Last year was awesome with anyone you could think of exhibiting products and services specifically for landowners and land managers. And the show is tied in with the QDMA National Convention which brings a lot of serious minded folks looking for new ideas and products. Please make plans to attend and hopefully we'll see you there.

On a personal note, I just got home from Jacksonville, FL where my son, Trey, returned from a seven month Navy deployment overseas. It is such an inspiring sight to see that huge ship coming into port after such a long a successful trip. I've always respected and admired anyone serving in our military but when I see the sacrifices these sailors and their families go through to protect our freedoms, my heart fills with pride. Take the time to thank someone in the military today. We are truly blessed to have them watching out for us.

Andy Whitaker
Publisher/Editor

Wildlife Trends JOURNAL

101 MARKET PLACE, SUITE 500
MONTGOMERY, ALABAMA 36117

www.wildlifetrends.com
800-441-6826

PUBLISHER/EDITOR
Andy Whitaker

DESIGN
Kim Koellsted/Craftmaster Printers, Inc.
Craftmaster Printers, Inc.
687 North Dean Road, Auburn, AL. 36830
(800) 239-3293

CONTRIBUTING AUTHORS
Dave Edwards
Dana Johnson
Brant C. Faircloth
Kedric Nutt
Brian Sheppard
Wes and Leslie Burger
Dr. Wes Wood
Theron Terhune
Marion Barnes
Ted DeVos
Bryan Burhans
Keith Gauldin
Rodney Dyer
Dr. Keith Causey
Gary Springer
Dr. Stephen Ditchkoff
Anna Huckabee Smith
Tes Randle Jolly
Kevin Patterson
Ryan Basinger
G. Ryan Shurette
Matt Euten
D. Clay Sisson
Kent Kammermeyer
Allen Deese
Scott Brown

For Wildlife Trends editorial, advertising, or change of address:
1-800-441-6826
info@wildlifetrends.com

Wildlife Trends Journal is published to provide landowners, land managers and wildlife enthusiasts the latest research-based information in wildlife and game management. Article authors are carefully selected for specific expertise in their respective fields.Subscribers receive six bi-monthly issues and a handsome library binder to save their past issues.

FSC
www.fsc.org
MIX
From responsible sources
FSC® C071993

Cover photo by Scott Brown

Pig Trapping: 10 Biggest Mistakes (Numbers 10 - 6)

By Stephen S. Ditchkoff

Trapping and removing boars from an area does nothing to reduce or eliminate a population of wild pigs, and requires effort that could be put towards trapping females.

Stephen Ditchkoff is an associate Professor at Auburn University. At Auburn, Steve teaches both undergraduate and graduate courses in Wildlife Science and conducts research with white-tailed deer and wild pigs. He can be contacted at 334-844-9240 or ditchss@auburn.edu.

With growing populations of wild pigs across the Southeast and other regions of the country, there is an increasing demand for hard, scientific data on pig biology and pig control techniques. With this surge in pig research has come an improved understanding of those pig trapping strategies that are most effective at reducing pig populations. Two of my graduate students have spent the majority of the past four years working on wild pigs at Fort Benning, Georgia, and they have compiled a plethora of data that shed some interesting light on pig trapping. In general, what they have found indicates that, for the most part, we (myself included) have been making a lot of mistakes when trapping pigs. The following is a list of what I consider to be the 10 biggest mistakes that pig trappers make, after taking into account what my students have learned. If you will consider these issues when implementing a pig trapping/eradication program, you will improve your efficiency

in trapping, reduce the amount of time and cost per pig trapped, and increase the total number of pigs removed.

MISTAKE #10 - Trapping Boars: For some reason, many of us are enamored with the idea of catching a big boar. The idea of a 350-pound boar rattling the cage and popping its teeth when we walk up to the trap is a huge thrill. We post pictures of the big boars we trap, and talk about them with everyone who is interested. I guess we all naturally feel that bigger is better when it comes to removing a pig. But, I will argue that this isn't true in the case of pigs. Boars don't produce piglets. Yes, they are involved in the reproductive process, but removing a boar from the population will do nothing to decrease a pig population or the rate of growth of a pig population. Considering this, I contend that any effort expended in trapping boars is wasted effort. It is difficult enough to commit the time and resources necessary to effectively reduce or eliminate a pig population, so anything that can be done to improve efficiency will increase the chances of having success.

If only boars are using a potential trap site, don't even bother to set a trap, because you're just wasting time and money that could be applied to females and juveniles (See MISTAKE #3 in the next issue of *Wildlife Trends Journal* to determine if boars are using the trap site). If you know that a sounder (group of related females and young) is using the trap site but you catch a boar, carefully consider if killing that boar is going to reduce your potential to catch the pigs. In some cases, killing a pig inside of a trap causes other pigs to become trap shy and less willing to enter the trap. In other cases it doesn't really seem to have an impact. I believe that there is nothing to be gained by killing the boar, and it might help your cause to actually release it. In reality, the only reason you have boars in the area is because there are females (potential mates). You'll find that if you eliminate the females from an area, there will be little use of the area by boars.

MISTAKE #9 - Door Size: One common mistake with trap design is the size of doors. We conducted a study to determine if there were differences among different classes of pigs (juveniles, adult sows, adult boars) in their willingness to enter a trap. This study involved setting up traps and monitoring the use of the traps with game cameras. While we didn't actually collect data to compare the willingness of an animal to enter a trap relative to the size of the door, we had ample opportunities to observe large animals (both sows and boars) that exhibited considerable hesitation to enter doors that were not much taller than the top of their back. If the top of the door was considerably higher than the top of the back of a pig, there didn't seem to be much hesitation before entering. Individual animals that previously demonstrated a willingness to enter a trap with a large, tall door often would not enter a trap with a small door. When constructing traps, be sure to do everything you can to maximize the size of the door, as this will increase the willingness of pigs to enter the trap, increase the number of pigs you catch, and decrease the amount of time it takes to catch all of the pigs using the trap site. If you already have traps with doors that are small, I wouldn't stop using them. Just understand their limitations, and employ them more strategically. Maybe use those traps in combination (at the same trap site) with traps that have large doors. Using multiple traps at a single site increases the potential to catch an entire sounder and not leave any survivors (see MISTAKE #1 in the next issue of *Wildlife Trends Journal*).

MISTAKE #8 - Bait Type: There are a plethora of baits used for trapping pigs, and all can be successful. Some pig trappers keep it simple and use baits that can be easily purchased, transported into the field, and applied at the bait site, while others have homemade concoctions that have been "perfected" through years of trapping. Through the studies of my graduate students, we have learned that whole corn is about as affective as anything you can use. In one study, we compared whole corn to soured corn (often used to deter deer use of a trap site). We had hypothesized that soured corn, due to its rather

Although this pig considered entering the trap, it ultimately did not because the door height was too low.

Whole corn is about the most effective bait available for trapping wild pigs.

strong, malodorous nature, would be much more effective at initially attracting pigs to a bait site. However, soured corn did not attract pigs to a site any faster than whole corn. But, once a group of pigs arrived at the bait site, they tended to stay at the sites baited with whole corn approximately 50% longer. The pigs were much more interested in consuming whole corn than soured corn. Considering how difficult it can be to get

a pig in a trap at times, I think it's best to use the bait type that pigs have a greater affinity like best.

We also experimented with baits that were high in sugar content and high in protein. We had hypothesized that the addition of greater amounts of either of these nutrients to whole corn would increase the affinity of pigs for the bait. However, we found that the addition of sugar only served to increase use of the bait by fire ants, and the addition of protein had no impact. Experiments with other baits and combinations of baits did not generate positive results. When it's all said and done, it's tough to beat whole corn. It's easy to purchase, easy to haul, and doesn't require any "preparation" prior to use. But, if you've found something else that works for you…keep using it.

MISTAKE #7 - Trigger Type: There is definitely an art to setting a trigger when you trap wild pigs. It's not just as simple as running a trip line across the middle of the cage or burying the trigger in a pile of corn. The type of trigger that you use should be dictated by what you are trying to catch. If you have a whole sounder coming to the trap and are trying to catch the entire sounder, the trigger should be designed so that it only gets tripped after a large group of pigs has entered the trap. This may mean burying the trigger in a hole under a pile of corn, such that the trigger is tripped only after the pigs have fed for a considerable period of time. Another approach is to put the trigger near one wall of the trap away from the central pile of corn. Then it will be triggered

Notice the trigger line on the right side of the image leading to a buried trigger. Buried triggers are an effective way to get multiple pigs in a trap before the door closes.

by pigs that come into the trap later and are spread out feeding in different areas of the trap. My point is, you don't want to set the trigger so that it is tripped by the first pig in the trap, thus leaving a large group of pigs outside of the trap. In other cases, you want the trigger to be tripped by a lone pig. For example, if you have caught most of a sounder on another occasion, and now only have a pig (or two) that is hesitant about entering the trap remaining, you want to set a hair trigger for the trap. One method is to use fishing line attached to a mouse trap, such that when the fishing line is bumped, it trips the mouse trap and the trap is tripped.

MISTAKE# 6 - Trap Style: There are two primary styles of traps used for catching pigs (box traps and corral traps). Box traps typically have four sides, a bottom, and a top. They are normally constructed so that they cannot be dismantled, and typically are about the size of a bed of a pickup truck so that they can be transported easily by a vehicle. Corral traps must normally be constructed at the trap site, and are then dismantled after completion of use. They are composed of side panels (horse panels or other materials 4-5 feet in height and of considerable strength) that may vary in number from 3 to 6. The side panels are wired together (you must be sure that you wire the traps together with strong materials to be able to withstand the force of a group of pigs), and then a separate "panel" with a door is included in the construction. There is no floor or roof with this type of trap.

Corral traps are much more effective at capturing pigs than box traps. The greater internal area of a corral trap allows more pigs to enter the trap and space themselves comfortably, and usually results in a greater number of pigs being trapped at one time. This is very helpful when trying to capture an entire sounder (see MISTAKE #1 in the next issue of *Wildlife Trends Journal*). Because corral traps are constructed in the field of multiple panels, they can be built around trees (there is no roof to the trap), resulting in a trap set up that looks much more natural to a pig. Also, the fact that there is no floor to the trap means that pigs are not alarmed by walking on the floor of a cage (as with a box trap). Data collected by my students in their research indicate that the costs associated with catching pigs with corral traps are much less than with box traps. They found that the cost to trap pigs with box traps were approximately 5 times as great as when using corral traps, which was due to lower trap success with the box traps.

If you have the option of trap types, choose corral traps. The initial cost may be a bit more (but not necessarily), but they will pay for themselves in terms of number of pigs captured, the time it takes to complete your trapping objectives, and in dollars (money spent on gas to continually monitor traps longer than needed). If you already have box traps, use them. But, understand their limitations. You can also use box traps in combination with corral traps by using both at the same trap site, thereby increasing the number of pigs that can be captured at once.

In the Next Issue of *Wildlife Trends Journal*: In the next issue of *Wildlife Trends Journal* I will describe the top 5 mistakes made by pig trappers. Some of the topics I will describe include recent data collected by Auburn University researchers regarding myths about multi-catch doors, and methods to ensure that you don't unnecessarily scare the pigs away before you catch them.

Corral traps result in more pigs caught than box traps, and also allow for larger doors.

We Finance the Land.

...you build the memories.

Financing long-term land investments for you and your family.
First South – the Land Experts.

First South
Farm Credit

Serving Rural America in
Alabama, Louisiana & Mississippi

(800) 955-1722

FirstSouthLand.com

EQUAL HOUSING LENDER

A Review of Bobwhite Quail Morphology, Physiology, and Behavior: Strategies for Surviving Life on the Ground

By G. Ryan Shurette

G. Ryan Shurette is a Certified Wildlife Biologist.

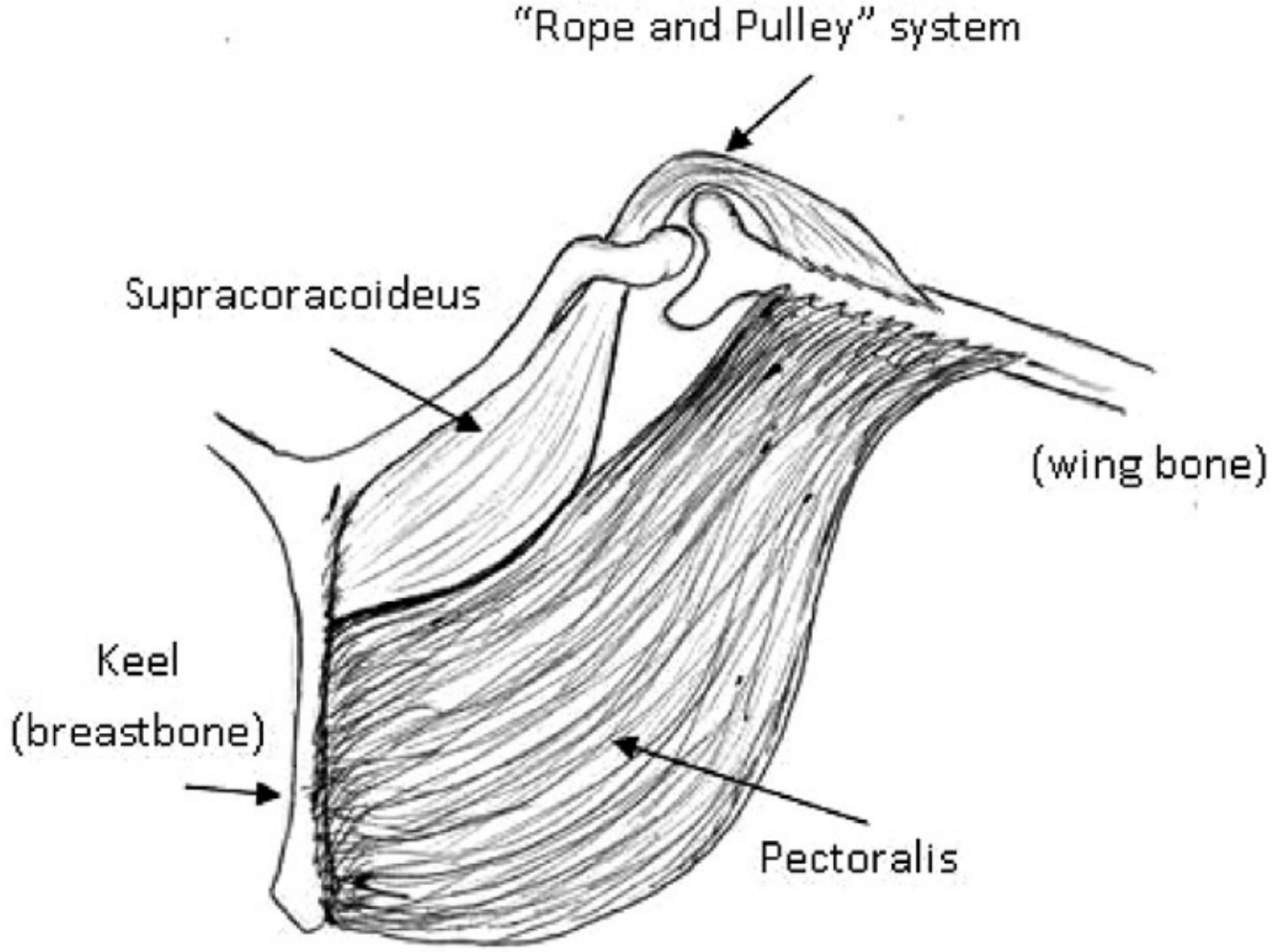
The northern bobwhite's niche is on the ground. There it eats, sleeps, and nests. It can be a risky place to live when virtually every predator species is in pursuit, but the bobwhite, provided the correct mix of habitats, can survive. Photo by USFWS.

Since prehistoric times it seems hunters and anglers have always tried to learn the habits and inner workings of their prey; partly because humans are curious animals, but mostly because it helped them to more frequently kill or catch their quarry. By understanding the morphology, physiology, and behavior of any wildlife species, a manager can also make better decisions about its habitat modification and maintenance. This article will review some of the more important aspects of these biological characteristics in the northern bobwhite quail, as they relate to surviving a life spent almost entirely on the ground. But before we begin, let's review the definition of each of these three biological terms. *Morphology* is the study of the physical structure (or physical appearance) of an organism, while *physiology* refers to the "function of living systems" (Wikipedia, 2012). In other words, morphology relates to the internal and external features of a species, and physiology relates to how the

cells, tissues, and organs work (both physically and chemically) to sustain a living organism. And finally, *behavior,* of course, simply refers to the way a living species responds to the different stimuli in its environment. As one might expect, these three facets of biology are much different in the ground-dwelling bobwhite than in species of birds that spend most of their life high in the trees (like a vireo), or on the wing (like a swallow). Life on the ground has different risks and challenges, but it provides a living for the bobwhite. And thanks to a great deal of research over the past seventy-five years, we now a have a pretty good understanding of what to do to the landscape to make life easier on our friend the bobwhite… until of course our bird-shot hits it in the back in November.

The Musculo-skeletal System of a Quail

Most of the folks reading this article have probably cleaned (dressed) a quail to eat, following a scenario like the one above. Picture then, in your mind, the skinned quail with the outer breast and leg muscles exposed. The large, plump breast muscles of the quail (like most other species of bird) are the most massive of the muscles, collectively contributing to about a third of the bird's total body weight. These are the primary flight muscles and they consist of the *pectoralis* (which pulls the wing down) and the *supracoracoideus* (which draws the wing back up using a "rope and pulley" system, see Figure 1). The pectoralis is the breast muscle you can see while dressing the quail and is much larger. The supracoracoideus appears as a separate layer of muscle under the pectoralis, and is not usually visible until we are eating the bird. Both of these large muscles are anchored to the breastbone, or keel. Many other muscles, including the tail muscle (called the *pygostyle*), several smaller wing and forearm muscles, and hundreds of skin muscles (attached to almost every feather follicle) are critical for controlled flight. And like most all other birds, the bobwhite has thin hollow bones to help reduce weight. When it comes to flying however, the bobwhite pales in comparison to other species of birds like pigeons, falcons, and hummingbirds. Although a quail's flight muscles are



Although the bobwhite spends virtually all its time on the ground, it still retains the ability to fly. The primary flight muscles in a quail consist of the pectoralis (which pulls the wing down) and the supracoracoideus (which draws the wing back up using a "rope and pulley" system). Line drawing based on diagram by P. Noll.

large, its morphology and physiology are such that the breast muscles are not well-supplied with nutrients that make sustained flight possible. The heart is also relatively small, and so the bobwhite quickly runs out of steam and is capable of only short-distance flight. One study measured 300 bobwhite flights and found the average distance was 47 yards (Kassinis and Guthery, 1995), although Stoddard (1931) has reported flights of 350-450 yards (Guthery, 2000). These latter distances would be very unusual however. All in all, the musculo-skeletal features associated with flight are not used as frequently as in other birds, of course, but they are still critical for predator evasion and survival of the species. These limited abilities on the wing illustrate the importance of abundant quality foraging and escape cover on the landscape.

As we have established, the bobwhite, like other members of the Phasiantidae family (including chickens, turkeys, pheasants, and partridges) does its traveling around on foot. Therefore they have strong, well-developed leg muscles and tough padded toes. Being precocial and mobile from pretty much the time it pips from the egg, the bobwhite invests much more of its muscle development and aerobic capability in the leg muscles during the first two weeks of life, than do altricial birds, as indicated by enzyme activity studies performed by Choi et. al., (1993). Using this strategy, bobwhite chicks can forage and get around much quicker after hatching than species like bluebirds, starlings, or sparrows. It won't be until they are about 3-5 weeks old until they are able to fly. Bobwhite chicks are also able to thermoregulate (control their body temperature) earlier than those altricial species. Even so, a few consecutive days of cold rainy weather is often enough to kill them.

Bobwhite Digestion

As we know, the bobwhite's diet is variable, but is heavily based on the seeds of annual and perennial plants the quail finds on the ground (for detailed discussion of the bobwhite's diet see the previous Wildlife Trends article *Life Cycle and Seasonal Influences on Bobwhite Quail Diet, Volume 9, Issue 4*). To deal with the extraction of energy from seeds, the bobwhite utilizes a digestive system somewhat different from our own. The esophagus is relatively large in virtually all birds and most species, including quail, have an enlarged esophageal pouch (or *crop*) that stores and later propels food items in to the two stomachs. The first stomach in quail is the glandular stomach (*proventriculus*) which secretes acid and other biochemicals similar to our own. Birds have no teeth and must therefore grind the rest of their food in the second stomach, which of course is called a gizzard. The gizzard is the disc-shaped muscular organ that involuntarily grinds food. Interestingly, it was shown by R. B. Nestler in the 1940's that (unlike in some other species of birds) grit and small rocks are not required for the bobwhite gizzard to effectively break down seeds and other food items, although they are still sometimes found there (Guthery, 2000). What is important is the availability of quality seeds that can be accessed within the home range of a given quail. Quality quail seeds are those that provide high levels of metabolizable (usable) energy. In a study conducted by V. C. Michael and S. L. Beckwith during the 1950's, the most preferred seeds (including wild and crop varieties) were those that were highly metabolizable (Guthery, 2000). Milo was by far the most preferred seed in the study. Interestingly, partridge pea was not highly preferred. Partridge pea is not very digestible by quail, but it is still important in many areas because of its persistence in the environment and availability late in the winter when other seeds have degraded. Sometimes abundance can make up for quality when it comes to energy return, but the bobwhite must weigh these options with respect to the time it takes to scratch out poor quality seeds. In winter, much of

the energy derived from seeds is used in the thermoregulation process, and a bird that is unable to find enough food on the ground over two or three consecutive cold, wet days can starve.

Avoiding Predation

The bobwhite has been repeatedly referred to as a "walking hors d'oeuvre", due to the number of predators that will prey upon the species. In fact, a major part of bobwhite management involves providing adequate amounts of the various types of cover required for a viable quail population. With everybody out to eat him, a bobwhite has honed some of its senses and behaviors to detect and avoid predators on the ground. Like virtually all bird species, the quail has an excellent sense of vision. The morphology and physiology of the avian eye is very advanced and the retina - brain interaction is processed by an incredible network of nerves and connections that makes for extremely fast reaction times (for more on avian vision see previous Wildlife Trends article *Death from Above: Avian Predators Every Quail Manager Should Know, Volume 11, Issue 6*). In fall and winter a bobwhite will have the benefit of having others watch his back, as they are typically in covey at this time. Most often, predators are seen by at least one member of the bobwhite covey before they are within striking distance, even though those eyes are only about six inches off the ground. Quail also have a well-developed sense of hearing. However it is believed that most birds are restricted to a range of 1-4 kHz, which is slightly less sensitive than humans (Cohen et. al., 1977). A few bird species (including several vulture species) are believed to possess a keen sense of smell. It has been suggested that even bobwhites use their sense of smell during the early stages of imprinting and development and that the olfactory system of quail may be more advanced than we had once thought. However, as it relates to predator avoidance, the bobwhite does not appear to use its nose to detect danger and the importance of this sense in adult quail is probably negligible.

Once a predator is detected by the bobwhite, behavioral defenses take over and the bird will decide whether to remain motionless, crouch, run, or take flight. The resulting choice will of course depend on the situation, the surroundings, and the species of predator

Being precocial and mobile from pretty much the time it pips from the egg, the bobwhite invests much more of its muscle development and aerobic capability in the leg muscles during the first two weeks of life, than do altricial birds. This bobwhite is one day old. Photo courtesy of Cackle Hatchery.

The perspective of a bobwhite chick looking up at the world (from three inches) is much different than ours (at five or six feet). During brooding, the parent(s) will attempt to keep a close eye out for predators while the developing chicks pick aphids, lacewings and larval grasshoppers (shown above at right off the low vegetation.

that is closing in. While detection of predators does play an important role in surviving life on the ground, the most important defenses of the bobwhite are related to its ability to remain undetected. Bobwhites are masters of camouflage partly due to their plumage pattern and coloration. Feather characteristics are discussed in more detail below.

Feathers and their Importance

When it comes to bobwhite survival, feathers are much more than mechanisms required for flight. They are important in several ways. As mentioned above, feathers provide a natural camouflage. The biological foundation for this camouflage in ground dwelling birds like quail and woodcocks is quite complex. The coloration of a bird's feather can be formed in two main ways, through pigmentation within the feather, or through light refraction that is determined by the structural makeup of the feather. Typically black, brown, yellow, and reddish colors are derived from different kinds of pigments that are deposited into the feather as it develops. These pigments include melanins or porphyrins (typically black or brown), which are made within the body, or carotenoids (typically red or yellow) which are plant pigments obtained from eating fruits or other plant materials. Feather color can also be produced by light-refracting air bubbles laid down during development of the feathers in some birds. These are generally expressed as bright blue or green, and can be seen in the bright iridescent gorgets of hummingbirds or in the deep blue hue of a male indigo bunting. Bobwhite coloration is however attributed mainly to the melanin pigments deposited according to the genetic blueprint of the species, resulting in the collective plumage pattern that resembles the brown senescent vegetation of its winter environment. The hen of course is slightly more cryptic than the male. In summer the vegetation of the understory helps conceal the bobwhite as it forages or roosts. By remaining still and silent (a behavioral response), a bobwhite can often go unnoticed as a vision-oriented predator (such as a Cooper's hawk) passes over. Flying is not the preferred option when evading accipiters. Mammalian predators usually rely more on their sense of smell for hunting however, and the behavioral response to a predator such

as a coyote (or a pointer) will likely ultimately result in flushing.

Besides flying and camouflage, the bobwhite's plumage is critical for insulation and weathering the elements. Therefore, feather maintenance is very important. The feather, once developed, is a dead structure somewhat like our hair or fingernails. The bobwhite, like all birds, must shed (or molt) its feathers to replace those that are worn. Molting is a complicated process and varies greatly among the different species and families of birds, but in the case of the adult bobwhite it takes place as a primary (complete) molt each year (usually starting in late summer) and a partial molting of the head in spring (Thompson and Kabat, 1950). Between molts, the adult bobwhite cleans and oils its plumage in a process called *preening*. Preening is a big deal in birds. During this process oil is gathered onto the head or beak from a gland (called the uropygial gland) located at the base of the tail. The oils (uropygiols) are made of diester waxes, and are deposited onto the reachable feathers by rubbing them with the head or by passing them individually through the beak. This process seals the plumage with a waterproof coating and is also believed to protect the bird from lice. The bobwhite spends a good portion of an average day preening and dust-bathing, re-emphasizing the importance of quality loafing habitats.

Nesting and Brooding Behavior

The bobwhite has a complex behavioral strategy for raising its young on the ground. Reproduction in the bobwhite usually begins around April in the Southeast, and is marked by the familiar two- or three note song sung by the male. Pair bonds between adult bobwhites are formed and broken throughout the summer, and an individual bobwhite may copulate with as many as three different mates in a single breeding season (Pierce, 2005). The breeding process is more complicated than researchers once thought and there is a lot of variability in what strategy an individual bobwhite may actually employ. As we know, the incubation and brooding duties are mixed between the sexes in bobwhites. However, there are lots of options for a given hen (Pierce, 2005). After she lays the eggs, and if all goes well for 23 days, the chicks will begin to pip from the eggs. If an early nest attempt is successful the hen may choose to commit to that first brood of chicks throughout the brooding stage, either alone or with the accompaniment of her mate at the time. An alternative that some hens choose however is to attempt to initiate another nest. These ambitious hens will either leave the brooding duties with their mates, or "short brood" the initial clutch, and abandon them early (at about one month old) to re-nest. The tradeoff is that the chances of survival, of course, decline with early abandonment. If the hen's initial nest fails, she may choose to give up for the year or attempt to re-nest. Studies in Missouri have shown that about 40 percent will choose to punt for the year and the remaining 60 percent will try to re-nest at least once after a failed nest. The success of the nests depends on many things, including luck, but the availability of quality bunchgrass nesting cover can drastically improve nesting success on a given piece of property.

Often the most limiting factor on the landscape however is, of course, quality brooding habitat. It is here that the parent(s) will lead the chicks to forage for small succulent insects. The perspective of a bobwhite chick looking up at the world (from three inches) is much different than ours (at five or six feet). Therefore good brooding habitat must not only produce abundant food but must also allow free movement under and through the vegetation. The parent(s) will attempt to keep a close eye out for predators while the developing chicks pick aphids, lacewings and larval grasshoppers off the low vegetation. Between foraging stints and all during the night, the chicks position themselves under the body and wings of the parent, which is the actual phenomenon known as "brooding". This is a dangerous time of life for a ground-dwelling species of bird and as many as half may die before they are able to fly.

Summary

The northern bobwhite's niche is on the ground. There it eats, sleeps, and nests. It can be a risky place to live when virtually every predator species is in pursuit. But the bobwhite, provided the correct mix of habitats, can survive. This is possible only through specific morphological, physiological, and behavioral adaptations in the species. In most cases, the habitat manager has only to provide the habitat and Mother Nature can handle the rest.

References

Cohen, S. M., W. C. Stebbins and D. B. Moody. 1978. Audibility Thresholds of the Blue Jay. The Auk, 95 (3): 563-568.

Choi, I., R. E. Ricklefs, and R. E. Shea, 1993. Skeletal muscle growth, enzyme activities, and the development of thermoregulation; A comparison between precocial and altricial birds. Physiological Zoology, 66: 455-473.

Guthery, F. S. 2000. On bobwhites. Texas A&M University Press, College Station.

Kassinis, N. I., and F. S. Guthery. 1996. Flight behavior of northern bobwhites. Journal of Wildlife Management, 60: 581-585

Michael, V. C., and S. L. Beckwith. 1955. Quail preference for seed of farm crops. Journal of Wildlife Management, 19: 281-296.

Moller, A.P., et al. 2010. Ectoparasites, uropygial glands and hatching success in birds. Oecologia 163 (2): 303-311.

Nestler, R. B. 1949. Nutrition of Bobwhite Quail. The Journal of Wildlife Management , Vol. 13, (4): 342-358

Pierce, R. A. 2005. Ecology of Northern Bobwhite Quail in Missouri, MO Dept. of Conservation. http://extension.missouri.edu/p/g9431

Stoddard, H. L., Sr. 1931. The bobwhite quail—its habits, preservation and increase. Charles Scribner's Sons, New York.

Thompson, D. R., and C. Kabat. 1950. The Wing Molt of the Bob-White. The Wilson Bulletin, 62 (1): 20-31

Aquascaping to Improve Your Pond

A variety of plant species makes your waterbody look more natural and less like a golf course lake.

By Scott Brown

Scott Brown started Southern Sportsman Aquatics & Land Management in Spring 2007 and now has clients from Texas to Florida. Scott can be reached at scott@southernsportsmanaquaticsandland.com or (214) 383-3223.

Fish like quality habitat! Our philosophy is provide an abundance of habitat and get fish species repopulating themselves so stocking expenses are reduced, while maintaining a quality fishery of whatever species your management goals are intended for. Shoreline habitat (vegetation) when planned out and managed properly reduces erosion, improves water quality, provides habitat for fish and wildlife, while also allowing access to bank fish and creates an aesthetically pleasing waterbody.

The same principal used in landscaping around your home can be performed around and in lakes and ponds, referred to as aquascaping. Besides maintaining good water quality, habitat is the next most important puzzle piece to developing a quality aquatic ecosystem that requires less maintenance and can provide both aesthetics and quality fishing for many years.

Plants in and around a waterbody help improve water chemistry. Plants filter sus-

pended dirt particles before they enter your waterbody improving water clarity and reducing the silting in process. They also put oxygen into the water when living. Once they are treated with herbicides and die, the decomposing vegetation removes oxygen from the water.

Besides providing hiding areas for fish, an abundance of fish food forms on plants like algae, which attracts small invertebrates that small and young fish require for food. Plants also provide nesting habitat for birds, reptiles and amphibians.

If you have a new waterbody, the canvas is blank and fairly easy to paint. If you want to improve an existing waterbody, identifying current vegetation and prioritizing them from most to least desirable is required. I also dislike exotic (non-native) plant species, but on rare occasions we leave them, only because it is the only habitat in the lake. But as soon as desirable plant species begin to fill in, the exotics need to be treated with herbicides or mechanically removed. Exotic plants tend to be a problem in that they grow in excess and require more maintenance (equates to money) to keep in check. Not to say there are not some native plant species that do the same (i.e. cattails under certain conditions).

There are three types of plants we deal with; **upper shoreline** (usually on dry ground, but can tolerate being near or in water for short periods of time), **emergent** (part of the plant is underwater and part is above water, but can usually tolerate short dry or being submerged periods) and **submerged plants** (the entire plant remains below the surface and can rarely survive any time being on dry land and short periods partially exposed). All can contribute to fish and wildlife habitat, reduce erosion and improve water quality. In many situations we may recommend a combination of two or all three types depending on the waterbody and management objectives. Planting submerged vegetation is pretty rare unless part of the waterbody is desired to attract waterfowl and then it might be employed. I have never prescribed any floating species, like used in a goldfish pond in the garden, which is where many exotic plant species got their start in this country from water gardens and the aquarium plant industry. However, floating islands of vegetation have become popular with some pond managers in northern areas and have proven initially to be beneficial. In the south where the growing season is very long, I would advise against it.

Do not get your plants and just start planting anywhere, using any method, in any depth of water. Planning it out will allow for greater plant survival and a better layout to reduce having to go back later and cut or spray something that was planted in a spot reserved for a

Some exotic species, although attractive, can quickly become an expensive nightmare to control or eradicate. On the left is Pickerelweed (Native) and on the right is Water Hyacinth (Exotic).

Even if you have not seen a beaver in your pond, we recommend using trunk guards to prevent damage like this to trees you definitely want to keep. This small island had over a dozen trees including three planted cypress cut down by beaver in a couple weeks.

boat ramp, swimming hole, dock or beach. Knowing the requirements of each plant is necessary to be successful. How deep of water does it thrive? What is the deepest water it can tolerate for how long or how long can it survive on dry land? How much light is required? Some aquatic plants like full sun; while others require a lot of shade otherwise they grow slow or die. What is the pH of the water/soil? Some plant species like low pH (acidic) and others prefer higher (basic), similar to agricultural crops. Some plant species like soft water, others do better in hard. Some species require flow, while others become uprooted or perish in flow. Think about planting multiple species together as you work your way up the bank, like tall plants behind short plants, or vise versa depending on where you are looking at them, water depth requirements of each species, or where you want which habitat. Do not plant tall plants or short trees between the house/cabin and the lake, which can obstruct your view. Never plant woody trees or shrubs on the dam or spillway, as they will compromise its integrity and can cause leaks or partial or complete dam failure over time.

A very important observation is the current water level at planting time - flood, drought or average? If in a flood condition, you need to plant some emergent plants as far out as possible, maybe even a couple of inches underwater, but yet are still receiving light underwater. So when normal water levels return, the plant is in the proper water depth and the top is above water level, as it should be. If it is drought conditions and you place some emergent plants underwater that need to be above, when water levels rise, they could get shaded out if the water is green or tannin stained and all the plants will perish.

Plants can be purchased from nurseries that specialize in aquatic plants and can either be shipped or picked up. Plants can be purchased as bare root or in various sized pots. Depending on species, size area to be planted, method of planting and available funds helps determine which is best for your situation. If picking up plants yourself, make sure they are wet and covered during transport to prevent drying or death by wind. Once arriving at the site, park in shade or uncover in sunlight and keep moist so they don't get cooked. Collecting plants from donor sites on your property or a neighbor's is a possibility, but please check with your state Fish & Game or Agriculture departments before you do so, because each state's rules are different on relocating vegetation. Also, make sure you know what you are planting. Some plants can look very similar, but have extremely different outcomes. I have seen many people miss-identify torpedograss (which is an evasive exotic grass-looking plant) for Maidencane, a native aquatic grass-looking species that needs a lot less work to keep in check than its exotic cousin. It is best to have a pro-

Planting techniques can be elaborate and time consuming or as simple as gently pushing the rooted end of a plant into the soil with a notched stick.

Cypress can be planted on the shoreline or in the water. Make sure all leaves will be above the waterline, stake up the first two years when in the water and always use trunk guards (even in water) to prevent damage from wildlife.

fessional identify the plant species if a donor site on your property or elsewhere is available to make sure you are not moving and introducing a problem.

Planting woody species prior to the growing season (winter) and soft tissue species after the growing season begins (spring) is advised. For soft tissue plants the earlier the better once a freeze is no longer possible, so they have an entire growing season to establish good roots prior to the next winter. Some plants can be planted with a post-hole digger, some with a small shovel, some with a forked stick, and we have even used a Dibble bar (which is normally used to plant pine trees) for planting emergent plants in sandy soil. Examine the plant species and root system (is it potted or bare root?) and come up with the best planting tool and method to prevent plant damage during the planting process and for quickness if a large area is being planted. Some plants can be cut at soil level and replanted because they have roots off their stalk, which makes gathering and replanting much quicker than digging up and digging holes to replant.

Once planted, give it some time. Various species will grow at different rates. To reduce costs I usually plant at a much lower density than recommended and allow it to gradually fill in and spread. If you plant so you have an instant filled in vegetated area, it will cost several times more in plants and labor than sparsely planting and allowing Mother Nature to do the rest. You can also create a few sites as donor sites, where you can come back to the area and transplant plants from there to other areas of the lake that species is desired, without leaving your lake or spending additional funds.

You may find out for some reason certain plants didn't do well, or one species completely died-off, despite you doing everything right. We've had turtles come behind us and eat the plantings. If there are grass carp present they can consume some plantings depending on plant species, water depth and other available food. The most surprising to us was we once had deer find our pickerel weed around a lake and they literally walked the entire shoreline in a few nights and ate over 500 plantings we just put in. I didn't see that one coming, but those deer sure loved those tender leaves and didn't mind getting their feet wet to do it! If you see this type of activity after you plant, you may need to erect some type of temporary fencing until your plants have a chance to become established and can overcome grazing. Even if you have never observed a beaver in the lake, it is safer and cheaper to add trunk guards to the newly planted trees as opposed to buying more trees later due to depredation.

In your planting plan you can designate areas for no vegetation (other than grass to reduce erosion) for docks, boat ramp, bank fishing access points or swimming holes and keep those areas free of vegetation with mild herbicide use or manually removing plants as they begin to encroach. Leaving areas open for such activities is fine as long as the majority of shoreline has some type of habitat along and/or in the water. If all angling is done from a boat, even less shoreline can be manicured. Lake edges can be mowed in the dead of winter to knock back dead veg-

etation and allow for light to penetrate to begin another growing season.

Throughout the southeast, including east Texas, we recommend using a document put together by the Florida Department of Environmental Protection: *Plants for Lakefront Revegetation to Identify Desirable Plant Species for Your Lake or Pond*. It discusses the soil type, the amount of water and sunlight required for each species, and how far apart each plant should be planted to maximize plant survival and expedite growth. Other sources of information can be viewed at your particular state's County Extension Office, Agriculture Department, Fish and Game Department and State Plant Society web sites. Also the University of Florida and Texas A & M University web sites are considered some of the best in the country for aquatic vegetation information, regarding both native and non-native (exotic) plant species.

Eastern Wild Turkey Management

By Rodney M. Dyer

Rodney Dyer is a private wildlife biologist and consultant in Millbrook, AL. He received his B.S. degree from Auburn University and specializes in deer, turkey and small game management.

Notice the mid-story growth. This growth blocks out sunlight and does not allow beneficial plants to grow.

By now the 2012 spring turkey season is just a memory for us fellow hunters. The days of getting up well before dawn to chase a bird with a brain the size of a pea are over for now. And nine out of ten times he can out maneuver and outsmart us, yet we still get up the next morning to try our luck at him again. As spring comes to an end our minds turn from kill mode to protection mode. This article will break down the habitat needs for the Eastern Wild Turkey and give examples of habitat manipulations that can be achieved.

Nesting Habitat

Turkeys nest just about anywhere the hen chooses that makes her feel safe. Last spring I found a nest on the edge of a pond in the kudzu. It was the last place I thought I would find a nest but it turned out to be a place that was successful to

hatch 12 eggs. In a general sense, being near water is not usually a good choice to nest since raccoons, which are turkey nest predators, generally roam these areas. Most of the time hens nest in dense brush, old tree tops and tall grasses. Leaving areas fallow, unplanted or disturbed for a couple of years makes great nesting areas. Most of the time I will try to manage the areas along the field edges and habitat transitional zones near my brood habitat. Mowing these areas every three to four years works well. Just remember to have a schedule to mow so you don't mow all your nesting areas the same year. Do all of your mowing on a rotating schedule.

Brood Habitat

Brood habitat is crucial to managing wild turkeys. If you can't produce new turkeys on your property, your future hunting will be dependent on the adjoining properties. Don't rely on the surrounding areas to produce turkey poults. You want to keep the birds on your property all the year if possible.

Producing good brood habitat is pretty simple. All you need is an area that produces insects for food and protection from predators. Thinned pine plantations that are thinned back to around 50 basal area are perfect for the poults. Thinning the pines is just a small part of managing a plantation for turkeys. Once areas are thinned, they need to be burned every two to three years to keep mid-story trees like sweet gums from taking over and shading out the herbaceous plants on the forest floor that produce the insects. Burning will do the job, but to really take control of the mid-story, you will need to spray. Arsenal is an awesome herbicide that will kill the mid-story hardwoods and promote the herbaceous plant growth that is crucial in brood rearing.

Another way to promote brood habitat is to do some disking in the fall. In the months of October and November, disk areas and leave them unplanted. Partridge pea and ragweed germinate in the spring which make excellent habitat for the spring hatch. Plus the ragweed and partridge pea attract insects which the poults need. Young poults feed almost entirely on insects the first summer of their lives. Planting other plants that promote insects is beneficial also. Another option is to plant wild flowers. Not only will they attract insects but they add to the aesthetics of your property.

Breeding Habitat

Promoting breeding habitat is also a pretty simple process – open up some new areas. Spring gobblers like open areas to strut and gobble. They choose open areas for two reasons. One is so hens can see him in all his strutting glory. The second is so that he can see. Spring gobblers want to see every possible hen to breed, plus he becomes paranoid during this time of year and prefers to see all his surroundings. So, habitats you should look for are fields, thinned pine stands, mature hardwoods, and burned areas. The easiest habitat management tool is fire. Burned areas are excellent breeding grounds plus the new tender vegetation growth offers plenty of spring forage for both hens and gobblers. Plan pine plantation burning in February and early March in the south, focusing on a good head fire burn, targeting the mid story hardwoods and sweet gums. Steer clear of ring fires, they can create too much heat in the center of the fire and will kill trees. Gobblers will usually lose weight this time of year because most of their energy is spent on fighting and breeding, just as bucks do in the rut. These areas also add much needed forage for breeding toms.

Other Habitat Needs

Wild turkeys will range anywhere between a few hundred acres to over a thousand depending on the habitat that is offered. During the fall and winter months, turkeys key in on areas that provide the best seed forages. They consume acorns, beech nuts, dogwood seeds and most any other mast crop that can be scratched up and eaten. So a majority of your property, if available, needs to be managed for hardwood habitat. Not all hardwood forests are beneficial to turkeys. Keep in mind you need your trees to produce mast. Some of your old growth hardwood forests need to be thinned to decrease the competition to allow the better mast producing trees to flourish. In these cases I would consult a forester and/or a wildlife biologist to help you with these types of forest thinnings.

A power line managed for turkeys by mowing.

A wax myrtle re-sprouting after being burned. Notice the dead branches and the new sprouts coming out after the burn. This is why herbicides are needed in conjunction with a burning plan.

In the spring and summer months, turkeys eat forages such as vetch, clovers and other tender plants that are new and growing. Also in these months insects become plentiful, which is beneficial because these insects make up a majority of the turkey's diet. The diets of young poults are almost 100% insects their first spring and summer. Managing power lines, food plots, and pastures are very important this time of year. Pasture grasses are great insect attractors. Disked fields are an awesome source of insects in the summer. Power lines can be mowed several times during the growing season to promote new plant growth which in turn attracts insects. Well managed deer food plots with clover are other excellent options for bugging areas for turkeys.

Agriculture Plantings

Most serious turkey managers plant for turkeys. Chufa is probably the most common turkey planting there is on the market, because it by far is the most attractive planting for turkeys. I was talking to a recent wildlife graduate from Auburn University the other day. He told me about a study he read that turkeys will actually change their home range to areas planted in chufa. I believe it. There aren't any guarantees in turkey hunting, except maybe a chufa patch. Chufa is usually planted in mid May to July at the rate of 40 to 50 pounds per acre.

Turkeys benefit from other plantings such as corn, soybeans, sorghum, millets, clover, bahiagrass, oats, vetch, and wheat. See the chart for planting dates and rates. Note: Planting dates are for the South, if you are in another geographic region please check with your local seed supplier for dates.

Hunter Management

A couple of years ago my good friend, Steve Cotney, wrote an article in this publication talking about Quality Turkey Management (*Volume 5, Issue 3*) and I must say he was dead on in his thinking. He said we have evolved the wild turkey out of the stage of propagation and growth to a modern day conservation success story. Today we need to focus on the future of the resource. Yes, habitat management is a key factor, but the next step in management has to focus on the flock itself. We have to think about the way we hunt and what we want to get out of the hunt. Obviously what we all want is an abundance of long bearded birds to hunt. Don't get me wrong, I love fried turkey. But that's not what gets me out of bed early all spring. It's the gobble and the chase. We want to be able to watch

Crop	Seeding Rate	Dates to be planted
Oats	50 to 80 lbs	September – October
Wheat	50 to 60 lbs	September-October
Clover	8 to 10 lbs	September- October
Corn	7 to 12 lbs in rows	Mid March to the end of April
Soybeans	30 to 40 lbs	May to June
Sorghum	5 to 10 lbs	Mid April to mid June
Vetch	15 to 20 lbs	September – October
Bahiagrass	15 to 20 lbs	March to July
Brown top Millet	30 to 40 lbs	April to August
Chufa	40 to 50 lbs	Mid May - June

Power lines like this one make great locations for food plots like chufa or other agricultural plantings.

which turkeys we shoot. We definitely want to harvest mature long beards only and let the jakes walk! This is the same principle used in deer management. This year's jakes will be next year's hard gobbling two year olds that make the season exciting.

Hens on the other hand need to be protected. Hens are your gobbler factories. I've heard several people complain that they have too many hens. Well, I bet they have a bunch of gobblers as well but just don't know it. With proper habitat management these supposedly over populated areas should be awesome spring hunting areas. Protect your hens!

With any type of wildlife management, record keeping is very important. Keep poult counts as you are riding around your property, and ask anyone else on the property to do the same. After the summer, you can compare data to see your brood success. Do the same for gobblers and jakes. Keeping these types of records will help you make decisions on how many gobblers to take per season. The old rule of thumb I was taught was, you can kill one bird per 100 acres. These types of statements are horrible in the wildlife world. Over the last twenty years I have managed and hunted thousands of acres of properties. Each individual property is different and should have different harvest strategies based on data taken over a period of time and based on habitat conditions.

Conclusions

As of 2012, turkey populations all over the country are either growing or at stable levels. As hunters and managers we need to plan for the future of this great resource. The wild turkey was chosen by Benjamin Franklin as his choice for the national bird. I must agree with him. This animal is a survivor and a true national symbol. Our goals should now be to preserve this resource and make hunting it better by more intensive management.

Pine plantation with no mid-story problem.

Plantation Pine Management: Options and Opportunities

By Ted DeVos

Ted DeVos is co-owner of Bach and DeVos Forestry and Wildlife Services and a Certified Wildlife Biologist and Registered Forester. Contact him at 334-269.2224.

Thinning stands at a young age to 100 trees per acre is risky but provides the best wildlife value in the short term.

Planted pine stands are the backbone of southeastern forestry as far as timber production is concerned but with a well laid out plan they can also be the backbone of wildlife management in the south. More quality wildlife habitat can be created and enhanced in pine stands than any other habitat type. Well managed pine stands can provide the epitome of true wildlife habitat management while providing good, periodic income for the landowner.

Three major pine species are used in the southeast for forestry and wildlife management purposes. Loblolly, longleaf, and slash pine are the most popular. All can provide good timber income, good growth and good wildlife habitat if managed properly. Historically, longleaf pine occupied the drier upland ridges and slopes where well drained soils occur and natural fires burned regularly. In wetter flatwoods along the coast, both longleaf and slash pines occurred. Lower slopes and

bottoms where fires were less intense or sporadic, loblolly pine dominated. Changing forestry practices, burning regimes, genetic improvements, and reforestation techniques have made loblolly the dominant pine planted north of the coastal plain, while slash pine dominates south of the coastal plain because both of these two pines exhibit speedy growth rates and fast returns. Longleaf establishment has seen a resurgence in interest in recent years due to improvements in genetics, reforestation techniques, and therefore better survival and increased growth rates. Taxpayer funded cost-share programs have also infused billions of dollars into programs encouraging landowners to plant Longleaf within its native range. With these improvements and changes in pine product markets, longleaf has begun to appeal to landowners who are willing to forego short-term income (pulpwood rotations) for longer-term rotations like sawtimber and poles for which longleaf is well known as a superior producer.

As far as wildlife management goes, longleaf is more often selected because it is more tolerant of earlier and more frequent burning, and grows with a more "open" crown allowing ample sunlight through the canopy and therefore allows understory plants to flourish underneath. Any pine stand with a "closed canopy" and a groundcover made up of a thick layer of pine straw makes poor wildlife habitat. If timber production is the only goal, closing the canopy with pine needles is perfectly appropriate as this allows all the productivity on the site (sunlight, moisture, and nutrients) to be captured by the pines and turned into merchantable wood. As the degree of wildlife priority increases, more and more of the site productivity needs to be allowed to grow understory weeds, grasses, forbs, and legumes by opening up the overstory canopy . Similar to a garden, this is why full sunlight openings and open canopy pine stands are so important in a wildlife management scheme. The difference however is that many highly nutritious and beneficial plants and weeds grow better in an open, burned pine stand than in an opening. There is also the tendency for landowners to disturb openings regularly with mowers and disks, changing the species composition. For instance, Dollar weed (a high protein woodland legume and excellent deer browse and quail food) occurs primarily in burned pine woods, but does not occur commonly in fields, nor does it like soil disturbance or mowing.

Commercial thinning

Nearly all pine plantations are "row" planted, whether in a field or a clearcut. The following discussion is primarily related to first thin options in Loblolly and Slash pine which are typically planted at densities of 600 - 726 tpa (trees per acre). Assuming 90% survival and no natural seedlings in the stand, thinnings would be conducted on a stand of trees with a density of 540 – 650 tpa. Early thinning in commercial pine stands is important to maintain healthy growth rates, keep stands less susceptible to disease and insects, as well as promote understory plants. These thinnings also allow the landowner to remove diseased, poor growth form and suppressed trees from the stand. Thinning the stand back and leaving the best "crop trees" upgrades the value of the stand and concentrates growth on the best trees which will grow into higher valued products.

If maximizing timber productivity and fiber production is a priority, thinning needs to be conducted in a manner that allows the residual trees freedom to grow with less competition while still maintaining the canopy to capture nearly all the sunlight hitting the stand. Maintaining this "shady" condition also reduces competition from plants growing on the ground. Most forestry thins are conducted in this manner, leaving little for wildlife in the understory. Residual densities in the range of 250-350 tpa are common and these stands shade back in 1-2 years. Stands like this are common in the southeast with pine straw understories, sweetgum midstories and a 90% shade pine overstory.

Obviously, if wildlife habitat is the priority, thinning to a lower tpa range will be necessary. From a quail man-

Thinning to 200 trees per acre is a good compromise between wildlife and timber. Stands can be thinned to lower densities in second thins.

Standard forestry thins leave little for wildlife and are either pine straw or sweetgum dominated.

agement standpoint, 100 trees per acre is still a well-stocked stand, and 200 tpa is way too many! While lower density pines will grow faster and healthier, there is an opportunity cost because carrying less trees per acre will leave fewer harvestable trees in future thinning operations. If thinned to a low enough density, it may also adversely affect the quality of the residual timber by reducing the natural pruning that pine trees undergo in a more heavily stocked stand. In addition, there is a risk of losing residual trees to windthrow when a stand is thinned to a low density. Young trees grown at a high density become tall but the stems do not grow thick since they rely on their neighbors to help support them in windy conditions. Thinning to a low density leaves them to stand on their own and some trees bend over if a high wind hits before they grow some thickness and strength in their trunks. This

can be especially bad if a hurricane hits within 6 months or so of a thinning. It is wise to consult your forester/biologist for assistance in marketing your timber, monitoring the logging job and making recommendations on residual density.

Since the majority of plantations have been row planted, most thinnings are some variation of row thinning. Many variations on thinning are available from 3rd, 5th, and 7th row as well as corridor thinning in natural stands. The most common "forestry" thins are conducted with a 5th row thinning with additional trees removed in "leave rows". Fifth row thins start with cutting out one row, leaving 4 rows standing then cut out another row, etc. This allows the logger to access the stand in the cut row and thin trees from the adjacent 2 rows on either side of the cut row. This method initially removes or clearcuts 20% of the stand to start the thinning. Residual density after thinning is then dictated by what percentage of the remaining 2 rows are thinned.

For instance, with an initial stocking rate of 600 tpa, cutting every 5th row will leave 480 remaining. If the target density of a standard forestry thin is 350 tpa, 130 more tpa will need to be removed (27%), or approximately 1 out of 4 of the remaining trees. If only 200 tpa is the target density, 280 more tpa would need to be removed (58%), or slightly more than 1 out of 2 of the remaining trees.

Whether to use a standard 5th row thinning or a 2nd, 3rd, or 4th row is usually dictated by the target residual density and the condition of the stand prior to thinning. If the stand is homogenous, healthy and well stocked, any method is suitable and residual density will dictate which method is best. If the stand is patchy in survival, has an abundance of forked trees, cronartium knots, disease, insect problems, or other issues that will necessitate a more selective approach to thinning, more "leave rows" will be necessary. The concern is that with patterns like 3rd or 2nd row thinnings, a large amount of the stand is "clearcut" in the initial removal of rows, leaving less trees to select from while thinning. For instance, 4th row thinnings remove (clearcut) 25% of the stand, 3rd row thinnings remove 33%, and 2nd row thinnings start with removing 50% of the trees! If initial stocking is 600 tpa, a 4th row leaves you 450 tpa to select from, 3rd row leaves you 400 trees to select from and 2nd row leaves you 300 trees to select from for the residual stand. Obviously, if the stand has a lot of poor quality trees that need to be removed and only a small percentage of good quality trees remain, starting with a higher number of trees to select from is to your advantage.

As far as residual densities go, both short and long term objectives will dictate how far back to thin the stand. As noted above, if growing timber is the main objective, keeping the stand well stocked and mostly shady will be necessary. First thin residual densities on the range of 250 – 350 tpa will do well depending on stand and soil conditions. If maximizing wildlife is the objective (and timber is not really a consideration), first thinning to 100 tpa or lower may be worth the risk.

Obviously, the higher densities offer little for wildlife, however, future income and timber quality and quantity is maximized. With the lowest densities, understory wildlife habitat is maximized but future income and timber quantity and quality is compromised. Early thinnings tend to allow trees to develop branches lower on the trunk and retain those branches longer so the typical tall, straight and clean pines that typify "pineywoods" do not develop as well. Individual tree growth, however, typically is fast since these trees have access to all the resources of the site and receive full sunlight.

For many of our clients, we try to thin to a compromise between both extremes. Thinning to an approximate 200 tpa density still allows the establishment of understory vegetation as well as growing a quality tree. Stands thinned to this density will still shade out in a few years but once established, understories are easy to thicken back up. Bear in mind that the creation of these understory plants will require the removal of heavy hardwood midstories, especially sweetgum. Both burning and

Corridors are a necessity for accessing the stand and typically vary from 2nd row to 5th row thinnings.

Even natural pine needs to have corridors created for thinning access

With burning and sweetgum removal, even high density pine stands can grow some wildlife habitat as they get taller and sunlight begins to penetrate the canopy.

Second thins to less than 75 trees per acre creates good habitat and good timber.

herbicides are recommended to manage thinned stands. Without, at least, burning, midstory hardwoods will take advantage of the sunny conditions and choke out the midstory in short order and make wildlife habitat non-existent.

Age of these stands is another consideration. Most soils will grow loblolly and slash pines to a thinnable size in 13-15 years. However, if soils are poor or droughty, several more years of growth may be necessary. More advanced genetics may also affect the growth as will initial planting density. Trees need to have a diameter of approximately 4" to be cut and sent to a mill. Since thinning needs to remove the smallest trees and leave the largest as growing stock, nearly all the trees need to be 4" diameter or greater and 25' tall. This usually means that the stand needs to average 6" in diameter to be thinnable. If a large amount of natural regeneration has seeding in the stand or initial planting density was high, it may take 16, 17, or more years for a stand to get to thinnable age.

Future thinnings should be conducted as necessary to maintain the stand open enough to grow your target understory. Assuring that 50% or more of the ground under a pine stand has direct sunlight on it at mid-day is usually a target goal for quail management objectives. This usually equates to 30 to 50 square feet of basal area. Re-entering the stand for thinnings every 5 - 7 years also lightly disturbs the understory changing the plant community somewhat and promotes different, disturbance-dependent plants for a few years. The larger and older your pines, the more value each individual tree has, so quality logging and product merchandizing becomes extremely important. Timing of the sales to take advantage of markets as well as weather and soil conditions of the individual tract make a huge difference and the services of a professional forester can make a landowner money and give him peace of mind!

Nature's Nano Technology - Biochar

How biochar can help your food plots and tree plantings

Biochar Properties – A One-Time Soil Amendment

Biochar is a lightweight, highly porous organic material – produced from biomass for use in soil: farms, food plots, tree plantings & gardens.

Biochar's unique physical and chemical properties have the potential to permanently improve soil structure, enhance water circulation, improve nutrient availability and enhance beneficial microbial interactions with plants. Biochar can change the soil's structure to allow compacted soil to breathe, and create homes for microbes. Its durable, stable nature continues to maintain soil quality for centuries. Simply put, biochar can build better soils.

Adding biochar to a field or to each tree planted can cut input costs and improve the nutritional quality of crops grown on poor soil. While biochar has many different effects on soil chemistry and biology, only some of its physical effects are easy to see.

Biochar Field Trials with James Madison University, Shenandoah Gardens, Shenandoah Valley, VA
***Left side** is control strip - No Biochar.*
***Right side** w/Biochar - Crops performed better, had better color with higher yields.*

Biochar can improve soil structure by attracting and binding particles into larger structures—known as "aggregates". Soils with better aggregation are properly aerated, are better able to let rainwater infiltrate and are less prone to erosion. In short, soils with better aggregation have better tilth. Such an effect is, however, unlikely to be visible in the short term—biochar needs time to interact with other soil constituents and its effect improves over several years after application.

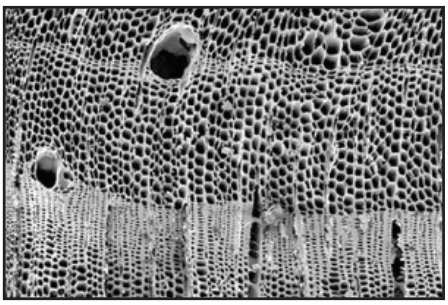
Biochar does not decompose like compost or manure, which disappear from soil within a few years, creating a steady need for annual re-application. Years after being incorporated into your soil, biochar keeps on working and some of its effects improve with time. As biochar matures to improve aeration, drainage, nutrient retention capacity and tilth, it fosters beneficial soil microbes that perform key roles in nutrient cycling. Biochar builds a permanent healthy soil.

Scientist studying Terra Preta in South American rainforest describe its teeming microbial communities as a "microbial reef." Like a coral reef does for sea-life, biochar does for the soil, supplying food and shelter. Instead of sheltering marine life, biochar supports an underground ecosystem of fungi, bacteria and other organisms—the base of the soil food chain. When times are lean, biochar is a reservoir storing bio-available nutrients. When times are full, biochar is a platform for microbes to launch a biological bloom of soil-enriching activities.

Can prescribed burns produce biochar?
In an oxygen-rich burn, only ashes remain after total combustion of biomass. Low temperature smoldering fires are a natural charring process in prairie and forest ecology. Pyrolysis (the process used to make biochar), develops wherever low - or no-oxygen conditions occur in fire's uncontrolled chaos.

Forest & prairie fires produce natural biochar though only at a rate of 1% due to the open-air environment that fuels it.

National Geographic called biochar a "soil within the soil." At plant scale, roots search the soil for water and nutrients. At a microbial scale, bacteria and fungi eat molecules retained in biochar pores to convert them into nutrients for plant roots. Biochar promotes resilience and diversity in this network of nutrient cycles.



Biochar's internal structure - magnified 1000x. Biochar consists of cavities that retain water & nutrients that are accessed when plants need them. What can be seen here are the larger pores of biochar, it also has pores that are too small to be visible at this magnification.

A land owner can let this "microbial reef" do the work of growing strong plants, while biochar also helps to buffer changing rainfall and water, unusual weather and fluctuations uncommon to soil. Land owners should see themselves as microscopic zookeepers—raising and sustaining vibrant communities of soil microbes. Growers should see soil as a complex living system—to be stewards of living microbial ecology.

"Despite their artistic pretensions, sophistication, and many accomplishments, humans owe their existence to a six-inch layer of topsoil and the fact that it rains."
~ Anonymous

Wildlife Trends Journal Management Calendar

By Dave Edwards

June/July 2012

Dave Edwards is a certified wildlife biologist and regular contributor to *Wildlife Trends Journal* and other hunting/wildlife publications. Dave was honored as QDMA's 2007 Deer Manager of the Year and nominated in 2011 as Alabama Wildlife Federation's Wildlife Conservationist of the Year. Dave is Hunting & Fishing Manager for Cabin Bluff Lodge and President of Tall Tines Wildlife & Hunting Consultants, Inc. Contact him at Dave.Edwards@CabinBluff.com or 912-464-9328.

Hogs can produce up to 3 litters of young per year. Aggressive strategies may be needed to control hog populations.

Plant chufa for turkeys.

Chufa can be planted in May or June in the Southeast, but most plantings occur in June when summer rains start. Monitor chufa plots for competing grasses and weeds and apply herbicide accordingly to control. Adding chufa to your planting program can be quite rewarding if you like to see or hunt turkeys. Turkeys primarily utilize chufa in the fall, winter and spring once the tubers have developed. If your turkeys have never seen chufas, you may need to lightly disk a strip through the patch in late winter to expose tubers. Once turkeys find them, you will not be able to keep them out. A word of caution – raccoons and hogs like chufas as well and can pose problems in some areas. Chufa patches can often be regenerated the following spring by lightly disking the areas. There has to be adequate chufa seed remaining to regenerate an adequate stand (there's often more left than you may think). To regenerate the stand, lightly disk the plots once in April, again in May, and once more in June. The key is to continue disking each month regardless of how nice your plot is growing with chufas – it's going to kill you, but do it. Be sure to rotate your chufa patches every 2-3 years to avoid nematode problems.

Control feral hog populations

"Control" may be the wrong word to

use here, but you get the point. Although removing hogs could be on your management calendar throughout the year, summer is a good time to put extra effort into this since it often causes a moderate disturbance on your property. Hog populations are rapidly growing in many areas and are causing significant damage to wildlife habitat, food plots, roads, etc wherever they live. One reason it is difficult to "control" hog populations is that they are very productive and may have up to 3 litters of young per year! Thus, exponential population growth can and does happen if resources are adequate. The most effective way to remove hogs is through trapping. Be sure to do some research before you simply throw a few traps out. Specific trapping techniques have proven to be more effective than just baiting a trap and catching a hog or two each time. Another effective strategy, but more costly, is hiring professional hog hunters that use either night vision equipment and/or dogs to harvest hogs. Simply shooting hogs when opportunities present themselves helps, but is not as effective as an "all out war" against them.

Take care of fruit trees or other tree plantings

Many landowners, wildlife managers, and hunters are beginning to incorporate fruit trees into their wildlife management program to provide additional food sources and aesthetics to their property. Many have taken great care in deciding where to plant these trees, dug the appropriate sized hole, loosened the surrounding dirt, added time released fertilizer and moisturmizer, firmly packed soil around the root ball, and added a tree tube to protect the tree and enhance growth – then walked away to later find the tree died. Due to the transplanting process itself, which causes a good bit of stress on a tree, some trees simply do not make it. However, in many cases the tree died from a combination of being stressed from transplanting *and* not being taken care of (TLC – tender loving care). Simply planting the tree is not enough in many cases. After planting a tree in late winter, tree survival is much higher if you ensure weed competition is eliminated (normally done via application of herbicide) in the immediate area of the

Chufa is an excellent planting for turkeys. Turkeys feed on tubers produced on the roots of chufa plants. Plant with caution if hogs are present as they can cause significant damage to chufa plantings.

tree. Weeds compete with the trees for nutrients and water. Speaking of which, it is important to monitor rainfall and water trees when needed during their first year after being transplanted. Most trees have been propagated and grown in a nursery where they grew in ideal conditions – adequate nutrients, water, and sun. Some trees do not fare well with the struggles of the "real world" where a sprinkler is not providing daily water. Thus, taking a little extra care of them during their first year will help them adapt and develop a root system that can better handle periodic droughts. Another helpful tip is to place 3-4" of mulch around the base of the trees. Mulching will reduce weed problems due to the unfavorable germination conditions under the mulch (no sunlight) and will also conserve soil moisture. I mention this in the June/July calendar because this seems to be when the highest mortality occurs, which makes sense due to the very hot and dry conditions during this time. With such a dry spring and early summer so far, newly planted fruit trees may require watering more often.

Identify and control invasive exotic plant species.

Exotic species are very competitive with native plants and can take over your property and compromise habitat quality. The best time to control or eradicate exotic plants is often during the growing season. Strategies to control these plants vary depending on the species at hand. However, herbicide (and fire in some cases) will likely be the tool of choice. It is much easier to control exotic species if you catch them in the early stages of colonization. Once they have a foothold, eradicating can be extremely challenging. Some of the common invasive exotics in the Southeast include Cogongrass, Chinese tallow tree, Kudzu, Chinese Privet, Chinese Lesedeza, and many others. A great field guide to keep on hand is "Nonnative Invasive Plants of the Southern Forest" by James H. Miller. You can get this publication from the USDA Forest Service – Southern Research Station at Auburn University or visit http://www.bugwood.org/weeds/forestexotics.html. This guide has information regarding identifying invasive exotics as well as methods of controlling them. Another resource is the Florida Pest Plant Council - www.fleppc.org.

Incorporating gravel on roads near dove fields may attract more birds to the area. Dove eat grit (small pieces of gravel) to assist in digestion

It is also wise to consult with a professional herbicide applicator before deciding which herbicide and method to use. Besides the complex world of herbicides themselves, mixing and applying them can be complicated as well.

Improve habitat edges.

Most game species of wildlife travel, feed, and thrive along habitat edges. Habitat edges or "ecotones" occur where two habitat types merge or join. The most noticeable are edges created where woods meet fields, but edges can be as subtle as the transition of a brushy creek to a stand of young hardwoods. Improving the quality of edges and the food they provide will increase the wildlife value of your property. Although "interior" edges are more difficult to manage due to access, improving the quality of edge habitat along roadsides, food plots, and fields is relatively easy. There are many methods used to enhance edge, but applying selective herbicides generally produce the best and longest lasting results. Application of herbicide can be made with a backpack, 4 wheeler, ATV, or tractor mounted sprayer. Simply apply herbicide along the edge spraying as far into the edge as you can. The goal is to remove undesirable mid-story woody species such as young sweetgum and ash trees

QDMA's Free *Whitetail Report* Loaded With Deer Info!

The Quality Deer Management Association (QDMA) recently released their 2012 *Whitetail Report*, the most comprehensive report on the status of white-tailed deer available anywhere.

Created to emphasize the critical position of whitetails as the foundation of the entire North American hunting industry, the *Whitetail Report* examines data from all parts of the whitetail's range to measure improvements in management of the whitetail resource and monitor threats to its future. Now in its fourth year, it is intended to be a useful resource for communicators, media members, industry leaders and hunters.

The 2012 *Whitetail Report* breaks down a variety of topics into four parts:

Part 1 focuses on state/provincial deer harvests during the past three seasons including the buck harvest by age class and other insights. Find which states are shooting the most bucks and does, and see that the percentage of 1½-year-old bucks in the harvest is currently at the lowest national percentage ever reported!

Part 2 covers recent trends and the most pressing issues facing whitetails. View current antler restriction and crossbow regulation maps, and compare state/provincial fawn recruitment rates and coyote hunting seasons. See the trends in increasing female participation in hunting and increasing hunting license sales. Learn how record grain prices and increased agricultural crop planting in 2011 likely impacted white-tailed deer and your hunting opportunities.

Part 3 is an informative reference section that includes information on regionally important forages for deer, how to determine the proper number of deer to harvest annually, how long whitetails live, what Quality Deer Management (QDM) really is, and more.

Part 4 provides an overview of QDMA's REACH program and includes information on our exciting new Youth and Land Certification Programs. It also includes valuable directories for QDMA Branches and state/provincial deer project leaders.

To download a **free** PDF copy of the 2012 Whitetail Report, visit QDMA's website:

www.QDMA.com

Allowing wildflowers to mature and seed out often results in regeneration the following spring

to encourage increased growth of plants that will benefit deer, turkey, and quail, like legumes, forbs, and blackberry species. If possible, include these areas in prescribed burns the following year to remove "skeletons" of the trees and underbrush you killed via herbicide and to stimulate additional desirable plant species. Another tip is to include managed edges when you fertilize food plots or fields. In addition to removing undesirable trees/shrubs that compete for sunlight and nutrients, fertilizing these areas can significantly increase the amount of foliage the remaining desirable plants produce.

Start preparing and planting dove fields.

Dove field preparations should begin by June or July. Planting dates will depend on the soil moisture, crops you are planting, and the time required to produce seed. Common dove field crops include dove proso millet, browntop millet, Japanese millet, sunflowers, grain sorghum, corn, and wheat. For best results obtain soil samples and apply required lime and fertilizer before planting. Be sure to allow enough time for your crop to produce seed before dove season arrives. If you are in a pinch or running behind on your planting, browntop millet is a good choice for dove or ducks because it only takes about 50 days to produce seed. One trick that we often implement on dove fields to create hunting blinds is to plant strips of Egyptian wheat or sorghum Sudan. These plants can grow 8-10 feet tall and will provide adequate cover for hunters. Another option is to simply hand sow the seed where you want hunting blinds to be. This will create small "islands" for hunters to use. These tall crops also provide shade for hunters during the early part of dove season when temperatures can be hot.

While seed of planted grains offer attractive food sources for dove, maintaining a clean disked strip or two through the field offers dusting areas for dove. These are strips that you do not plant, rather simply keep plowed through the summer and into dove season. Dove find these bare dirt areas attractive which will keep them in and around your field until grain seed is mature. It also offers landing areas and access to seed once it matures as well. Another trick that I have used many times with great success is to include/spread pea gravel (very small gravel) along roads that are within the dove field area. Dove eat the smallest particles of gravel to assist in digestion

(used in their gizzard to break down seeds and other food parts). This is the reason dove are often seen "feeding" along roadsides.

Conduct summer quail call counts.

Call counts conducted in June provide an estimate of the number of males available for breeding and an evaluation of winter survival. This information allows you to monitor the quail population's response to habitat management efforts and quail production. To obtain an index of male birds, set up several "listening points" on your property that can be used each year. Listen for whistling males for the first 1-2 hours after sunrise. In June, nesting by females is at its peak in many regions, so males will be actively calling. To standardize the call count, arrive at the first station at sunrise, wait one minute to allow vehicle disturbance to settle, then listen for five minutes and record the number of male quail heard. Count the number of different individuals you hear. Continue until all stations have been monitored. You will need to conduct the call counts at least 5 different days for the most accurate estimates. The more counts you conduct, the more accurate your estimates will be (statistically speaking). We often conduct 10 call counts (10 different mornings) each June. After completing the call counts, calculate the average number of calling males heard per station. This is your "index" and the number in which you will compare against future call count data to assess increases or decreases. The key to accurate year-to-year counts is to be consistent about everything you can control: same people listening, same locations, same kind of weather (clear, windless days) same week of the year, and the same time of day.

Allow wildflowers to mature and go to seed before mowing.

Managing wildflower areas is a great addition to your property management strategies, particularly if one of your goals is improving habitat for turkeys and quail. They not only add aesthetics which adds to your outdoor experience, but the flowers attract an abundance of bugs and insects that are eaten by turkeys and other birds. If you have planted or are managing wildflowers on your property, avoid mowing these areas until seedpods have matured. Allowing the wildflowers to produce seed before mowing will ensure adequate reseeding for a good crop the following year. If you are not currently managing wildflowers on your property, but want to do so, do your homework to determine the best wildflower blend for your particular soil and climate, begin preparing seed beds well before planting time (fall) to create a smooth firm seed bed, and plan to plant them this fall. Due to the small seed size of many wildflowers, a smooth seed bed is critical to success. Rough seed beds often result in seeds getting covered too deeply and will result in low germination rates even if broadcast by hand. Once established, and with periodic management, such as mowing, wildflower areas can persist for many years.

Complete draining duck ponds and prepare for planting.

If you are managing a moist soil area/duck pond, (native vegetation vs. planting agricultural crops), you should have started the spring drawdown around 45 days after the last frost. Slow drawdowns, those that take 2-3 weeks, are desired because they result in a more diverse wetland plant community than rapid drawdowns. A diverse community of wetland plants will result in many different types of food sources (seeds and insects). By May or early June, your drawdown should be complete and native moist soil plants are starting to establish. Herbicides can be a useful tool to remove undesirable vegetation if it becomes a problem and is dominating the pond. Button bush and sesbania (wetland shrubs) can be beneficial, but should be kept in check and not allowed to comprise more than 25% of the pond.

If you plan to plant an agricultural crop rather than manage the native vegetation, leave the pond flooded until closer to planting time. That is, drain ponds you plan to "plow and plant" a few weeks before you start plowing and preparing the soil for planting. Leaving the pond flooded until this time will provide weed control and will reduce tractor time later. Drying time will vary depending on your soils. It is better to drain early than to wait and not be able to work the ground because it is too wet and chance running out of growing season. My personal favorite crop for duck ponds is rice. Rice, however, requires more time and effort to manage and takes about 120 days to produce seed (depends on variety used) so you need to plant early. For best results obtain soil samples and apply required lime and fertilizer before planting. Japanese millet is also a favorite of ducks and is easily grown by duck pond managers. In fact, Japanese millet can be top dressed or broadcast onto mud flats of a wetland or beaver pond. Japanese millet is a strong re-seeder, meaning that it will produce seed that will germinate the following year.

Conduct warm season or summer prescribed burns.

Warm season burns are an exceptional tool for managing quail habitat. Warm season burns are generally conducted from June through August. However, extreme caution should be used when conducting summer burns. Due to higher ambient air temperatures and low relative humidity, summer fires can get very hot and difficult to control. If the area you plan to burn has a heavy fuel load (understory shrubs, grasses, and thatch) or has not been burned in over 3 years, I recommend initially conducting a cool season burn (December – March) to reduce fuel loads before attempting a summer burn.

Fire rotations (interval of time between burning the same area again) for summer burns vary depending on your goals and habitat types but are generally every 1-2 years to promote quality wildlife habitat. Regular warm season burns will often promote native warm season grasses that are desirable for quality quail habitat. It is also a good idea to strategically plan your burns so that you always leave some areas unburned. This will help to maintain diverse habitat types which will enhance the wildlife value of the area. Always check local burning laws and consult with an experienced burn manager before lighting a woodland fire. The U.S. Forest Service or your state forestry commission are great sources for obtaining more information regarding burning in your area.

Establish mineral licks to photograph deer

While the nutritional benefits of providing mineral licks for deer have not been well studied, they are cheap to create, deer use them, and they do not appear to have any negative nutritional effects. In fact, most deer biologists think there are nutritional benefits of providing minerals for deer. Deer tend to use mineral licks the heaviest from summer through early fall. With the price of corn getting so high, mineral licks are a good alternative to attract deer to camera sites. The key however, is to establish the mineral licks early in the summer to allow deer time to find them and begin using them. My experience with mineral licks has been that the longer they have been established, the better they are. Rains dissolve the minerals and saturate the stump or area they are placed. Evidently "leftover" minerals or salt that attracts them lingers and deer often come back to the same site the following year. Having said this, corn is still the "go to" attractant if you are conducting a true camera census on a property, but mineral licks offer a cheaper way to get deer in front of cameras for "casual" photographing. Get them established now so that deer are using them during later summer/early fall when you want to photograph them.

Although winter burning is more common, summer burning is an effective strategy that can create exceptional wildlife habitat.

MAXIMIZE YOUR LAND, THE WILDLIFE & YOUR TIME!

AUGUST 9-11, 2012
NASHVILLE, TENNESSEE

PROTECT. PRESERVE. ENRICH.

Bass Pro Shops LAND & WILDLIFE EXPO
Presented By RAM

GAYLORD OPRYLAND® RESORT & CONVENTION CENTER Nashville

QDMA • IN CONJUNCTION WITH • 2012 NATIONAL CONVENTION

We all have that one special place where the morning commute and stacks of spreadsheets are forgotten. A slice of heaven where we can pursue memories not yet made and the wildlife we love. Whether it's your land, a lease, or property you manage, you have passion for it and a commitment to make it better.

The leading conservation groups come together for the Bass Pro Shops Land & Wildlife Expo's seminar series, offering the opportunity to meet and learn from the experts who share your enthusiasm for hunting and land management. Enjoy endless aisles featuring the latest in hunting and conservation tools and 105 acres of outdoor hands-on demonstrations.

This event is hosted at the world-famous Gaylord Opryland Resort & Convention Center, which provides a special venue and access to entertainment that your entire family will appreciate.

Maximize your land's potential and register today!

landandwildlifeexpo.com

CONSERVATION PARTNERS

USDA NRCS United States Department of Agriculture Natural Resources Conservation Service
NWTF Conserve. Hunt. Share.
DUCKS UNLIMITED
QDMA
RMEF
SCI FOUNDATION®
conserving natural resources for our future

101 MARKET PLACE, SUITE 500
MONTGOMERY, ALABAMA 36117

Presorted Standard
U.S. Postage
PAID
Auburn, AL
Permit No. 78

Because The Season Never Ends.

Wildlife Consulting • Hunting Lease Management • Recreational Property Development

Great hunting doesn't happen by accident. It is the result of strategic planning and proper management of wildlife populations and their habitats. Since 1951, Westervelt Wildlife Services has been committed to helping our clients optimize the wildlife and recreational value of their property and reach their land management goals.

Whether you need help tuning up your deer herd, enhancing wildlife habitats, developing your land into a dream recreational property, or someone to manage your hunting lease program, we are ready to put our talented staff of biologists and experience to work for you.

WESTERVELT
Wildlife Services

800.281.7991 • www.westerveltwildlife.com