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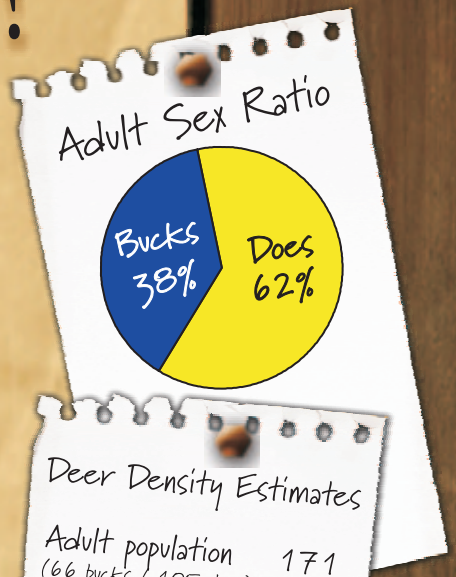

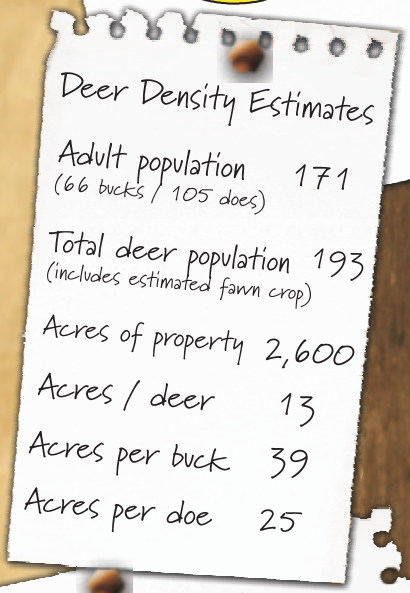

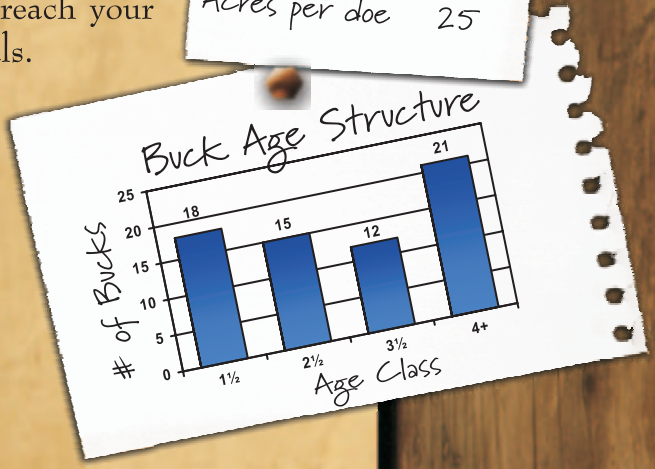

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800-441-6826

PUBLISHER/EDITOR
Andy Whitaker

OPERATIONS
Heather Hartley

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

For Wildlife Trends editorial, advertising, or change of address:

1-800-441-6826
info@wildlifetrends.com

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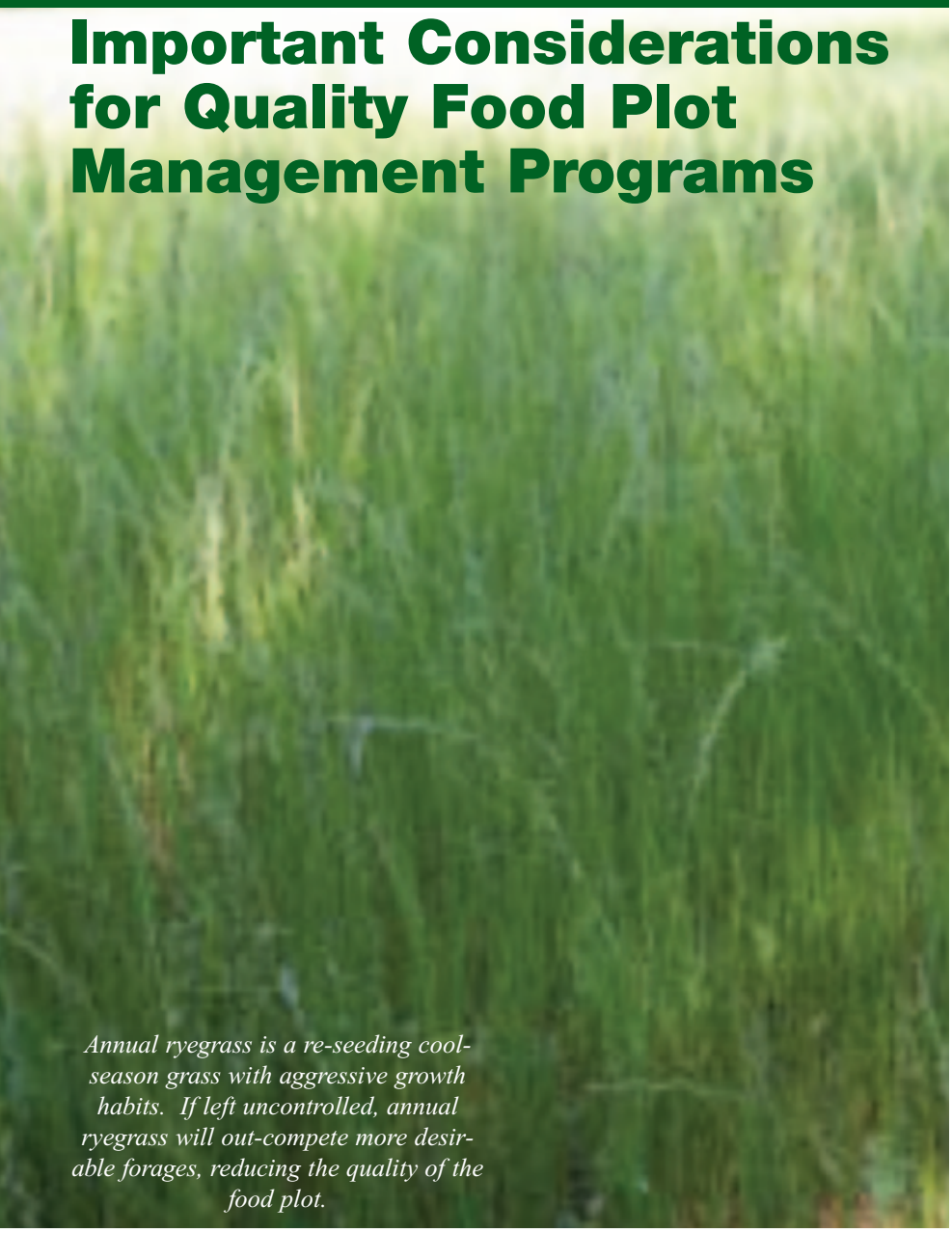
Cover photo by Southeastern Pond Management.

Applications for Controlling Annual Ryegrass – Important Considerations for Quality Food Plot Management Programs



Annual ryegrass is a re-seeding cool-season grass with aggressive growth habits. If left uncontrolled, annual ryegrass will out-compete more desirable forages, reducing the quality of the food plot.

By Ryan Basinger

Ryan Basinger is a wildlife biologist and manager of Westervelt Wildlife Service's wildlife consulting business where he assists private, industrial, and corporate landowners throughout the Southeast in reaching their property management goals. Ryan holds a bachelor's degree in wildlife science from Mississippi State University and a master's degree in wildlife science from The University of Tennessee.

It is late September and rain and deer season (depending on which state you hunt in) are in the forecast. The time to plant has finally arrived!! You had your food plots limed the previous spring to allow adequate time to raise the soil pH for productive plots in the fall. Countless hours have been spent on your tractor fighting the late summer heat to create a quality seedbed in preparation for this fall's plantings. Fertilizer just set you back about three times as much this year than last season (for the same amount).

While daydreaming about the upcoming deer season, you broadcast the fertilizer followed by a mixture of wheat and oats and lightly disk them into the rich soil. Finally, you broadcast crimson and arrowleaf clovers and make a final pass with a cultipacker to ensure good seed-to-soil contact and a smooth, firm seedbed. As the afternoon fades and all of your equipment has been loaded and secured, you notice

dark rain clouds approaching on the horizon…the timing couldn't be better. Surely you will have successful food plots this season with a combination of highly attractive and nutritious cereal grains and annual clovers…you've done everything right, right?

Throughout fall and winter, your food plots are green, lush, and appear to be doing well. After a long and intense deer season, the next time you see your food plots will likely be turkey season (at least that's how long it takes me to build up enough points with my wife to hunt again!). As you make your way across one of your favorite food plots in pursuit of a hot gobbler sounding off on the next ridge, you notice that very few of the high-quality forages you planted the previous fall exist. In fact, the entire field is almost completely covered with annual ryegrass…and you didn't even plant it!!

Unfortunately, this is a common scenario many food plot managers face… and it is even more common than realized. Many landowners and deer managers just don't know what they're looking for when evaluating the success of their plantings. In fact, I have visited very few properties in the South, where food plots are actively planted and managed for deer and other wildlife, that didn't have serious problems with annual ryegrass. Hopefully the information below will help you realize the negative impacts annual ryegrass can cause in a quality food plot program and assist with making careful decisions when establishing and managing successful food plots on your property.

What is Ryegrass?

First, to be clear, I'm referring to "ryegrass" and not "rye" as many hunters and food plot managers refer to these synonymously. Rye should not be confused with ryegrass as it is a cereal grain and is not considered a pest when included in wildlife food plots. Annual ryegrass was introduced from Europe and is considered a bunchgrass. The leaves of ryegrass are shiny, smooth, slender, and dark green. However, without a trained eye, it can be difficult to differentiate ryegrass from cereal grains during the fall and winter. Annual ryegrass generally reaches 2-3 feet tall at maturity, depending on soil fertility. Ryegrass is tolerant of a wide range of conditions (e.g., wet soils, low-moderate pH, low soil fertility), which is one of the primary reasons it became popular as a deer forage as it requires little to no effort to establish. It also is an aggressive re-seeding grass and can re-establish itself naturally each year if allowed to mature and produce seed. The easiest time to identify ryegrass is when it matures and produces a seed head, which is considered a "spike". Annual ryegrass usually has 9-15+ seeds/spikelets on the seed head and the seed has "awns", which are small, hair-like structures.

Although ryegrass is easy to establish and is consumed regularly by deer and other wildlife, the costs of using this forage in a quality food plot program far outweigh the benefits. If fact, I can't think of a single situation where annual ryegrass should be favored over other forages when the primary goal is to provide deer and other wildlife with productive, attractive, and nutritious food plots.

Problems Associated with Annual Ryegrass

One of the primary disadvantages of planting annual ryegrass in wildlife food plots is its ability to re-seed itself year after year and out-compete more desirable forages that are planted. If annual ryegrass is planted in the fall and allowed to seed out in the spring/early summer, it will develop naturally each fall as food plots are prepared for planting. The density of ryegrass within a field can vary depending on site characteristics, but typically becomes worse each successive year because more and more seed accumulates within the seed bank.

Another undesirable quality of ryegrass is its level of attraction to deer. Although some may argue that ryegrass is a "choice" food source that deer prefer, many forage selection and preference studies have shown otherwise. Ryegrass is not a preferred food source of deer when compared side-by-side to other forages. Furthermore, the amount of time ryegrass provides suitable forage is short-lived compared to many other plantings, as nutritional quality and palatability rapidly declines in late winter/early spring as plants mature. A limited source of attraction and nutrition is not a desirable characteristic of a quality deer forage.

Annual ryegrass also can reduce the quality of food plots for wild turkeys and quail as it can completely take over the plot, reducing food diversity and insect abundance and availability. Insects and other invertebrates are a primary component in the diets of turkey poults and quail chicks. Furthermore, in extreme cases, annual ryegrass can become so dense within a food plot, turkey poults are unable to penetrate the vegetation in search of grasshoppers, spiders, leafhoppers, and other invertebrates.

Annual ryegrass not only adversely affects the quality of cool-season forage plots, it also makes preparing for summer plantings more difficult. If you have ever tried to mow and/or disk a food plot containing a dense stand of ryegrass, you know what I'm talking about. When ryegrass matures (about the time summer plots should be prepared), the vegetative parts (i.e., stem, leaves) are very tough, making conventional field preparation techniques (disking, tilling, mowing) less effective and efficient.

Techniques for Controlling Annual Ryegrass

First and foremost, a soil test should be conducted to determine soil pH and nutrient levels within your food plots. It is critical that food plots are amended

with the recommended amounts of lime and fertilizer to ensure optimum soil pH and fertility. Doing so will allow your planted forages to grow and develop rapidly, giving them a better chance of competing with annual ryegrass and other potential weeds.

Chemical Control – Because landowners and hunters typically plant seed mixtures containing cereal grains (e.g., wheat, oats) and legumes (e.g., various clovers, winter peas), controlling annual ryegrass within food plots containing these mixtures can be tricky as herbicide options are limited. Although many herbicides exist that effectively control ryegrass, including wheat and/or oats within the seed mixture makes it impossible to use a grass-selective herbicide (e.g., Poast®, Arrest®, Select®) to kill ryegrass and not harm wheat or oats. Considering this, if ryegrass is known to be a problem, one strategy is to only plant a mixture of broadleaf forages within your plots (i.e., crimson clover, arrowleaf clover, ladino clover, durana clover, winter peas, chicory, etc.) to allow the use of a grass-selective herbicide to kill ryegrass but not harm planted forages. When using this strategy, ryegrass should be sprayed in the fall (with a grass-selective herbicide of your choice and applied at the appropriate rate) when it reaches 3-4 inches high.

Alternatively, if you wish to include wheat (in conjunction with broadleaf forages – clover, etc.) in your fall plots for quick germination and attraction, the herbicide Hoelon 3EC® can be used to control ryegrass. This herbicide is used extensively by wheat farmers to control annual ryegrass and other annual grass weeds in wheat fields. However, annual ryegrass may develop resistance to Hoelon 3EC® over time. Hoelon 3EC® does not harm wheat or broadleaf forages (clovers, chicory, winter peas) but will damage or kill oats if they are planted. Thus, if using this technique, do not include oats or other cereal grains within the seed mixture...use wheat instead.

When attempting to establish perennial clover in fields where ryegrass is problematic, chemical control is almost always necessary for successful establishment and plot longevity. Because ryegrass establishes very quickly following soil disturbance and perennial clovers are very slow to establish, ryegrass will undoubtedly out-compete clovers and reduce the quality of the plot. If this is the case, simply apply a grass-selective herbicide (e.g., Poast®, Select®, Arrest®) in the fall when ryegrass reaches 3-4 inches in height to give clover a fighting chance to establish successfully.

Note – be sure to carefully read and follow all herbicide labels before use.

Mechanical Control – For landowners and hunters who do not own or have access to spraying equipment, one technique that can minimize ryegrass competition without the use of herbicides is repeat-tillage. Repeated tillage will kill ryegrass that germinated from the previous tillage and reduce the amount of

ryegrass seed available to germinate thereafter. However, this process must begin at least one month prior to planting.

When using this technique, simply disk/till your plots approximately one month prior to your desired planting date (typically late August/early September depending on your geographic location) to stimulate natural germination of ryegrass from seed contained within the seedbank. A couple weeks later (or when ryegrass has become established), disk the plots again to kill ryegrass that germinated from the initial disking. Next, wait a couple more weeks until planting conditions are favorable (i.e., rain is in the forecast, adequate soil moisture) and apply the appropriate amount of fertilizer (based on a soil test) and disk the fields again to incorporate fertilizer into the soil and smooth the planting surface to prepare for planting. This will kill ryegrass that germinated from the second disking. Next, broadcast large seeds (wheat, oats, winter peas, etc.) and *lightly* disk (about 1 inch) to cover the seed. Finally, broadcast small clovers and then cultipack. If you don't have a cultipacker, simply allow rainfall to work the seed into the soil – do not disk clover seed into the soil. **Note** - I have found this technique to be most effective using **annual crops** (i.e., wheat, oats, crimson clover, arrowleaf clover, berseem clover, etc.) that are quick to germinate and establish to "get ahead" of ryegrass when it comes back. This strategy is not as effective when planting perennial forages (white clovers, etc.) because perennials are slower to establish, giving ryegrass enough time to re-establish and take over the plot. Be prepared to use herbicides to establish perennial clover fields successfully (see recommendation above).

Another effective technique to minimize ryegrass competition within your fall plots is to plant your fields using a no-till drill. If you do not own or have access to a no-till drill, they can be rented from many local co-ops or county NRCS offices. No-till drilling minimizes soil disturbance, thus, reducing the ability for ryegrass to germinate. This technique also conserves soil moisture, which is important during drought conditions or in areas that receive low rainfall.

It is also important to note that annual ryegrass (and other weeds) can become inadvertently established in food plots and other areas on your

The photos above were taken in March 2008 of two different food plots on the same property, both planted with the same mixture - wheat, oats, crimson clover, and arrowleaf clover. However, the field on top had been planted in annual ryegrass sometime in the past. Notice that ryegrass germinated naturally from seed within the seedbank and is about to take over the entire plot, choking out valuable clover that would otherwise be available for a few more months. The field below was a newly established plot where ryegrass had never been planted. Notice the absence of ryegrass and the abundance of clover with sparse wheat and oats!!

The field above was planted in perennial clover in the fall of 2007. Shown here is the same field the following spring - notice the field was completely taken over with annual ryegrass. Although ryegrass was not planted, it had been planted sometime in the past and germinated naturally from seed within the seedbank.

property from your equipment (e.g., bush hog, disk, etc.). Weed seed and thatch can accumulate on equipment and become established in other areas when traveling throughout the property. Thus, to reduce the chance of spreading ryegrass and other weeds, thoroughly clean your tractor and implements before taking them to other parts of the property.

Conclusion

Unfortunately, despite known problems associated with annual ryegrass, it continues to be a recommended deer forage by many deer biologists and it continues to be included in some commercial seed mixtures. Thus, if planting commercial seed blends, be sure to check the contents on the seed tag before planting if you want to avoid dealing with the issues listed above. If you don't already have problems with annual ryegrass within your food plots, you're lucky. I don't recommend planting it in food plots managed for wildlife. Too many other desirable and more practical options exist. If you are one of many who do experience problems, hopefully the above mentioned management techniques can be applied on your property to control annual ryegrass competition and improve the quality of your food plots. Doing so will allow the time, money, and effort you've spent managing your food plots to provide more benefit to deer, turkeys, quail, rabbits, and other wildlife on your property.

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Bobwhite Quail: Propagation, Translocation, or Habitat Restoration?

Quail release
Photo credit: Quail Restoration Technologies

Everyone agrees that Northern bobwhite (*Colinus virginianus*) populations have drastically decreased, especially in the heart of their range, the South. However, many disagree on what to do to bring them back. Wildlife biologists will tell you that having good habitat is the key and that if nesting and brood-rearing sites are not available, the quail won't be there either. Despite this fact, many landowners still look for something else to blame for the loss of quail on their property and try to find a quick-fix like releasing birds to enhance the population. Then there are those landowners who truly have great habitat and still do not have quail. Are pen-reared quail then justified as a management tool? To better understand what works best to correct the problem of quail decline, we need to take a look at the world through a quail's eyes. Then, perhaps, we can make a judgment call.

There are so many factors that limit populations of species in general that many

By Anna Huckabee Smith

Anna Huckabee Smith is a TWS certified Associate Wildlife Biologist with Innovative Wildlife Management Services, LLC out of Mt. Pleasant, SC. She has worked for both South Carolina and North Carolina state governments, first as the SC Department of Natural Resources' Forest Stewardship Biologist and the Comprehensive Plan Coordinator. She then became the NC Wildlife Resources Commission's first Urban Wildlife Biologist. Smith has a BS degree in Biological Sciences, a Minor in Anthropology, and a Masters in Zoology all from Clemson University. She is also a 2007 Fellow of the Natural Resources Leadership Institute (North Carolina State University, Raleigh). For more information on services provided by her family-owned and operated consulting business, contact her at IWMS_Smith@comcast.net.

are still being studied by natural resource professionals. Quail, being prey for many species, is no exception. From the egg to the adult bird, quail are consumed at some stage or another by snakes, opossums, raccoons, owls, hawks (especially Cooper's hawks), coyotes, foxes, armadillos, squirrels, bobcats, rats, and even the occasional white-tailed deer. (Yes, there is video evidence of a doe eating eggs one by one out of a nest, and this isn't the first time it has been documented!) Coyotes are opportunistic feeders but have not been shown to take a significant number of quail. Other natural causes of mortality include exposure during winter, low food supply (due to weather patterns such as drought), and disease outbreaks such as avian pox and ulcerative enteritis. Unnatural or man-made causes of mortality include indirect effects from "clean" farming (no areas of rough for weed seeds or insects), possible environmental contamination from organophosphates (found in agrochemicals), conversion to densely stocked pine plantations, urbanization of once rural areas, and the introduction of non-native invasive species (e.g. cool season pasture grasses). Interestingly, recent research has defended the red imported fire ant from accusations that it has a significant detrimental affect on quail populations. Others have countered this argument with reports of fire ants even ascending into the branches of trees to take songbird nestlings, much less ground nesters.

With all of the things that could affect quail populations, including hunting pressure, it's no wonder that the "natural" annual mortality rate of wild quail is 80%. Hens incubating nests are especially vulnerable to predation events, and therefore the quail population usually persists at a 60:40 ratio favoring males. Most wild quail live less than a year with the record being 6 years for a single banded bird. To offset such losses, quail typically raise more than one brood a season, being quick to re-nest if the first

Quail chicks in The Surrogator™ propagation system
Photo credit: Quail Restoration Technologies

nest is disturbed. In addition, quail populations are cyclical in nature. They may increase for a few years only to plummet the year after. These rhythms are seen in other species too with changes in predator-prey base dynamics, disease outbreaks, and climate shifts.

The pen-reared quail debate

As bobwhite quail have decreased in the wild, farms have been set up to raise quail for release. Many landowners have supplemented their wild populations with pen-reared birds so that there would be something to hunt, basically turning their hunting preserve into a shooting preserve. Pen-reared birds, in this case, are used on the shooting course to train bird dogs (or conduct field trials) and almost guarantee a kill for the hunter. There are two types of programs: "put and take" where the birds are dumped out the day of the hunt, and the "pre-season release" where birds are released a month or two before the hunting season and given time to adjust to their new environment. Some landowners even employ the use of recall pens (Johnny houses) to gather up their birds until the next release. For some landowners, this is precisely what they desire and do not aspire to increase their wild population of quail at all. For others, pen-reared birds seem to be the last option despite their best efforts.

Pen-reared birds were once thought to be carriers of diseases into the wild population, but with the potential monetary losses to the quail farm breeders if their birds were sick, most pen-reared stock are now inoculated against certain viruses. However, new viruses are discovered every day so caution should be taken in choosing a reputable breeder with healthy birds for release onto the property. If an outbreak did occur, there exists the potential to genetically track the origin of the virus back to its source (wild birds or game farm stock).

Game farm stock is also often blamed for displacing local, wild quail. Instead, research has shown that pen-released quail often intermingle with wild coveys, and that the wild quail do not alter their home ranges. However, it is still debatable whether social structures are disrupted since, for example, relatedness of individuals within coveys is unknown. Also, if the habitat cannot support a higher density of birds, all will suffer from lack of resources. It is believed that predators are attracted to the sudden abundance of prey. The pen-reared birds are often igno-

The Surrogator™ set up in quail habitat. Photo credit: Quail Restoration Technologies

rant to predators and how to evade capture, thus making them easy targets and drawing attention to their wild counterparts as well.

Although pen-reared birds are often seen as essential for a successful hunt, they aren't without their drawbacks. Many hunters complain that pen-reared birds are more "tame" and are therefore reluctant to flush, and when they do fly, don't fly far (< 50 yards). In addition, these birds are often found in more open cover where they are usually quickly removed by predators and have poor post-release survival in general. Many new propagation systems are coming on the market that seek to remedy that through raising chicks in isolation to improve their "wildness." The Surrogator™ propagation system by Quail Restoration Technologies claims that their birds are raised with minimal human contact and imprint on the habitat in which they are placed. The birds are released at 5 weeks of age before they supposedly have a chance to become "tame" and not physically fit enough to elude predators. [Note: Pen-reared birds average 200g while wild quail are typically 165g with body size increasing as you go north. Quail are considered fully grown at 16 weeks of age.] The system consists of an all-in-one heating, feeding, and watering unit. A study by the Georgia Department of Natural Resources in Monroe County, Georgia tested the effectiveness of The Surrogator™ in regards to hunter returns and perceived flight behavior. They found that, compared to older (12-16 weeks) birds that were "dump released," the Surrogator™ 5 week old chicks, raised in isolation through remote rearing procedures, performed better. The catch was that the hunters bagged more "dump released" birds because of their inferior flight behavior!

Despite the possibility that flight behavior may be corrected by some rearing methods, there is much debate whether the survivability of pen-reared birds, which is well-known to be lower

Sorghum, a great supplemental quail food
Photo credit : Blair Fannin, Texas Agricultural Experiment Station

than wild birds, can be increased. Not only would this make the birds more attractive to hunters hoping for higher survival over the hunting season, but it would increase the likelihood that some pen-raised quail may reproduce the following year and help increase the population. Some studies that followed pen-reared birds that survived the hunting season reported a wide range of survivorship from 7% (Kentucky) to as much as 58% (Florida) with habitat quality obviously a variable. To understand what is going on, we have to revisit predator avoidance behavior, or lack thereof, in pen-reared quail as well as basic food procurement skills.

Birds in general learn the songs of their species by listening to and imitating their parents, even taking on the regional dialect of the song. Both parents feed and defend the young against threats. In doing so, the young learn specific calls and what they mean. In bobwhite quail, both parents often accompany the brood, pointing out edible insects and other food items to their precocial chicks through "food-finding calls." While foraging, chicks often give a "lost call" so that the parents can guide them back to the group. Additionally, the young birds learn the distinctly different calls given to alert the group to ground versus aerial predators and the "all clear" call when danger passes. Calls also relate to other behaviors. As the birds prepare to roost for the night in their typical "rosette" pattern on the ground, they give contact calls to bring the covey together. A covey may consist of 3 to 20 birds, and more eyes mean less of a chance that a predator will catch any one bird unaware. If a predator approaches a brood of chicks, one parent may do a distraction display to try to lure the predator away. These types of anti-predator displays are considered learned behavior and are often absent in pen-reared birds. In fact, Tall Timbers Research Station in Florida has demonstrated that if chicks are allowed to be raised by their parents before release, they survived better than the typical communally reared chicks. Apparently, there is more to raising a chick than providing thermoregulation, food, and water. Caution should therefore be taken when considering investing in a costly communal chick-rearing system that promises high survivability in the wild.

However, some released quail that do manage to survive the hunting season, predators, and unfamiliar surroundings have been known to reproduce the following year. Some banding studies in South Carolina have demonstrated that released quail have clutch sizes and percent survival of the chicks comparable to wild birds. Many landowners are also concerned with making sure that those pen-reared birds that do happen to survive to reproduce stay on their property. Imprinting is important in many bird species and bobwhite quail are no exception. When reared without an adult to share home range knowledge (where to find food, water, and shelter), it is unknown how these chicks will be affected as adults or if they will wander more than the average quail. For those birds that integrate themselves into a wild covey, their chances for survival may increase.

An often overlooked component of survival is genetic makeup. There are 22 subspecies of Northern bobwhite in the United States. Each is accustomed

to its site-specific foods, predators, and climate. The genes that define each as a subspecies also help these birds survive best in their specific environments. Pen-reared quail often lack genetic diversity. When these birds are introduced into the native wild population and do manage to breed, there is a risk that local adaptation traits could be lost. Back in the 1920's Mexican quail were released throughout the Southeast. Over time, this handful of foreign genes became diluted in the overall population, supposedly rendering them insignificant to quail populations in existence today. Still, caution should be taken with introducing a different set of genes into an established population because we simply don't know what the future ramifications may be. If a large number of pen-reared birds are constantly released in an area, swamping of the local genotype may occur.

In an attempt by some quail enthusiasts to make their pen-reared birds behave more like wild birds, they have reintroduced wild type genes into their breeding stock. (Which of the locally adapted subspecies genes they use is unknown!) An Illinois study decided to test the validity of this practice by observing the behavior of released wild, semi-wild, and game farm bobwhite quail on known covey ranges where the residents had been removed for the study. The wild quail were 10-21 week old transplants while the semi-wild birds (> 21 weeks old) had one parent that was a pen-reared quail and the other was a wild quail. Results showed that despite the influx of wild genes, the semi-wild quail behaved more like the farm-reared birds when released. However, the semi-wild birds were the least mobile of the test groups, mostly remaining within the study area. The wild transplants survived the best of all but less than the resident population had been surviving before being artificially removed. Again, rearing procedures (imprinting and learning) may trump genetics in this case. However, there have been some experiments that have reported that when rearing procedures were identical, semi-wild quail would move away from a human entering their pen while true farm-reared birds actually approached, albeit tentatively. That doesn't bode well for a bird trying to make it in the wild with predators all around!

Translocation of wild quail to new sites

In the same Illinois study, it was obvious that the transplanted wild quail were the best survivors, prompting many to think that this is the answer to re-establishing populations in areas where quail once were or hastening the recovery of quail in general. However, trapping wild quail is time-consuming, expensive, and often limited by law to research professionals. Most states restrict the trapping and relocation of any native species without a permit. Remember, though, that "empty" habitat is usually missing some component or has other undetected problems. Some landowners struggle to attract quail because they are simply too far away from a recruitment source. Quail home ranges are typically small in decent habitat, and many don't travel farther than ½ mile from their birthplace. Dispersal distance is equally short. In such cases, it may be justifiable to utilize semi-wild quail for stocking purposes even though their survivorship is less. However, local genotypes should be used whenever possible.

Covey Base Camp™ feeder/watering device. Photo credit: Quality Wildlife Services

Habitat restoration has its merits

It seems clear that the best approach to quail management is creating / maintaining appropriate habitat in hopes of holding and / or attracting wild birds. In woodlands, this means a basal area of < 60ft²/ac and a 50% or less canopy closure. This allows sunlight to stimulate the forest floor to produce a microclimate of beneficial forbs and legumes. Plants important to bobwhite quail for food, nesting, and cover include ragweed, oak mast, pine mast, legumes (e.g. partridge pea and butterfly pea), smartweed, beggarweed, clover, blackberries, native lespedezas, waste grain from agricultural fields, and native warm season grasses, just to name a few. Arthropods are important for developing chicks and can be made more available through compartmental burns across the property. Food plots can be planted specifically for quail and can include browntop millet, sesame (benne), and sorghum. Recently, supplemental feeding with "food trails" has gotten some attention as a possible way of increasing the survivorship of quail, especially during times of environmental stress such as drought. Suggested grains include sorghum (milo) for its resemblance to native foods and the fact that it is a nutritious grain. Tall Timbers Research Station found that if hens were given access to a readily available food source, their survival increased as well as reproductive rates that year. In addition, females on those test sites with food trails nested earlier in the season, had more nesting attempts, and nested late into the season

Supplemental feeding also decreases

Pen-reared quail. Photo credit: Adaledge Hunts, LLC

the mobility of the quail by up to 80%, thereby reducing the likelihood of a predation event or stress during weather extremes. The downside to supplemental feeding is that because quail are often less likely to wander in search of other foods, hunters have a hard time finding them during hunting season as the dogs cannot detect much scent. Another downside is the fact that the grain also attracts and concentrates mice, rats, and rabbits along with the quail so that predators are often attracted to these prey items. However, to give wild and released quail the best chance of survival through the hunting season and beyond, supplemental feeding can be helpful. There are all types of feeders on the market, including the Covey Base Camp™ by Quality Wildlife Services, Inc. This feeder/watering device advertises a 5 gallon container that locks out moisture that could ruin the wheat or milo. Additionally, it restricts squirrels, rats, and other small mammals from accessing the grain. The device is mainly used for establishing released birds.

Habitat structure has an effect on the rate of predation in that if there are only small patches of suitable cover or low cover, all patches can be checked by a predator. Many quail are taken by migrating raptors in fall and spring in areas where cover is scarce. Back before the Migratory Bird Treaty Act, landowners used to kill hawks as part of their intensive predator control programs in hopes of slowing the decline of quail on their property. Even today, some landowners carry out extensive trapping programs to rid their property of predatory mammals. Sadly, this often does more harm than good if not carried out correctly. One study found that with intensive predator removal, the rat population exploded and the quail population simultaneously crashed. Without larger predators to control the rats, nests were destroyed at higher rates than normal. In addition, the adult quail that were unfit to survive to begin with were not adequately culled from the population, essentially weakening it. Some predation is therefore good for the quail population. However, it is possible to have an unnaturally high concentration of certain predators in an area and some must be removed. Perhaps if the trapping industry had not declined so much,

we would not have this problem.

Even with good habitat and a healthy population of quail, care should be taken not to overharvest birds during the hunting season. A hunter hopes to take the surplus birds but if the population is struggling, there may not be enough juveniles to reproduce the next season. In general, 20% or less of each covey should be harvested at any one time. Conducting a quail census on the property before the hunting season will help the landowner regulate bag limits in addition to those mandated by the state. Public lands need the same intensive surveying done as well if quail populations are to persist on them. Most wildlife agencies use fall covey counts, spring whistling call counts, and quail hunter surveys to set bag limits and seasons.

Despite the fact that the Northern bobwhite is one of the most studied gamebirds in the world, there are still gaps in our knowledge. As new management strategies are developed, they should be thoroughly tested and peer-reviewed before taken as sufficient. Most biologists still agree that releasing pen-reared quail is not a viable option for increasing the population. The landowner will always have an uphill battle with predation and movement of released quail off of the property. Leonard Brennan, Chair for Quail Research at the Caesar Kleberg Wildlife Research Institute in Texas, put it best when he said, "Every dollar spent on producing pen-raised quail for release is a dollar that won't be put toward habitat management for wild quail populations." Our society wants instant gratification and looks for quick-fixes rather than doing the year-round habitat maintenance quail require such as burning, disking, and the preservation of grasslands and shrub-scrublands. Supplemental food plots can provide food for quail as well as a myriad of other birds and small mammals. It is true that habitat management can be expensive and time-consuming, but constantly dumping out pen-reared birds can get expensive too! Besides, think of all the other wildlife that will benefit from properly managed habitat besides just the quail. For example, quail readily utilize the same open pine savannahs the federally endangered red-cockaded woodpecker needs for its survival. Translocation of wild quail is too time-consuming and often illegal. Therefore, take what has been shown time and time again to be critical to quail survival—that is, habitat management—and implement it on your property. Natural resource professionals are willing and able to help guide you in this endeavor.

[NOTE: Mention of any trademarks in this article does not constitute an endorsement by the author or Wildlife Trends Journal.]

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Habitat Selection vs. Availability – Too Much of a Good Thing?

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.

Thick cover is often over abundant and needs to be opened up in some form or fashion.

The concept of what and how habitat is used by wildlife is poorly understood by many hunters and managers. You often hear anecdotal information about how particular animals utilize habitat types but rarely hear how much of that habitat type is available to these animals. Countless research papers describe "habitat use vs availability" or "habitat selection" in scientific literature and this is usually the realm of this information, with little filtering down to the landowner/manager in understandable terms.

Essentially, habitat selection is how much an animal uses the habitat types available to it (within it's home range) relative to how much of it is available. Habitat can be selected **for** or **against** and even though a particular animal or species might use a particular habitat type much of the time, they still may select against it if there is an abundance of this type.

A rough and NOT statistically valid example will illustrate. A hen quail and her brood live in 100 acres of open pineywoods interspersed with ragweed fields. Fifty acres of the pineywoods were burned in the spring and 30 acres were left unburned for nesting cover. There are 3 ragweed fields totaling 20 acres. Assume the brood might spend 33% of their time in the burned pineywoods, 33% in the unburned woods and 33% in the ragweed fields. They are selecting **against** the burned woodlands because there is so much available despite the fact that this habitat type is well used and an excellent habitat type for quail broods. Consequently, they are selecting **for** the ragweed fields because it is also well used but is available in more limited supply. They are neither selecting for or against the unburned woodlands because it is being used in the same proportion to it's availability. It would be a common mistake to manage all 100 acres of this area in one habitat type, such as ragweed because quail are selecting **for** it. However this would create a lack of good cover, nesting habitat and food resources by managing this one, good habitat type. Weekend managers often see usage of a habitat type and decide to manage strictly for this one need to the neglect of all other seasonal and daily needs.

This is the general concept, so how does this apply to land management? First and foremost, we try to manage properties within a framework and plan that sets management priorities regarding timber and wildlife. How a property is structured in habitat types will have a lot to do with whether timber is the main priority, wildlife is the main priority or there is to be some median where both are integrated. Habitat structure will also have a lot to do with which wildlife species are to be managed for or given priority. For instance, managing for grey squirrels will entail a lot of bottomland hardwoods and mixed pine/hardwood stands with occasional burning. Management for Fox squirrels, however, will entail a lot of open, burned mature pine stands with a smaller percentage of hardwood and mixed pine/hardwood and a lot of burning.

Managing to maximize timber on a property is fairly straight forward and if wildlife is a low priority, habitat structure will not need a whole lot of consideration. Habitat structure based on wildlife species, and especially multiple wildlife species, takes a lot of forethought and constant modification. The problem most often encountered is when landowners and managers try to manage for the types of habitat that they see particular wildlife in and forgetting those types they don't see them in. This often leads to having too much of what people think they need (or having too much of a good thing) and not enough of what they really do need. It also leads to an over-reliance on a few management practices and a lack of habitat diversity. Properties with a homogenous stand of mixed, unburned pine/hardwood and well managed fields are a common example. I think we have all been guilty of this, I know I certain-

Under-utilized habitat will not show much use but be of good quality.

Over-utilized habitat will be damaged and not provide much quality.

Diversity in both habitat types as well as plantings should be the rule and not the exception

ly have.

A common example is "deer need thick areas to bed in, especially bucks". While it is true that bucks will often bed in thick, brushy areas, they still need a higher percentage of their habitat that is managed for browse/weed production and deer *populations* need abundant, grassy bedding areas for fawns to ensure high survival and protection and this is not thick/brushy areas! We often look at properties that are managed for deer that are covered with rough, grown-up clearcuts, unburned, overstocked and shady pine or pine/hardwood stands that provide nothing for deer except "thick buck bedding areas". Inevitably, these properties have too many deer for the habitat quality (although they may not have a lot of deer) and are often too thick to hunt with anything but a bow since you can't see farther than 30 yards anywhere but open fields. Deer on these areas usually rely on agricultural plantings for the majority of their food except for winter acorns and the amount of deer this habitat type can support is usually low. Our recommendations are usually to thin the pine stands, burn all pine and pine/hardwood stands and generally "open" the place up. In essence, start creating more grassy woodlands for native food production and prime, highly selected bedding areas for does and fawns. Not only can you see and hunt the property better, but you then have the ability to carry a higher population of healthier deer while still maintaining scattered "thick bedding areas for bucks". In the initial scenario, even though managed for thick bedding areas, bucks would probably be selecting **against** thick areas, whereas after modifications, they would probably be selecting **for** these areas, which would also make hunting them near these thick spots more productive.

Hardwood stands are often a common habitat type that landowners manage in oversupply, especially in the uplands.

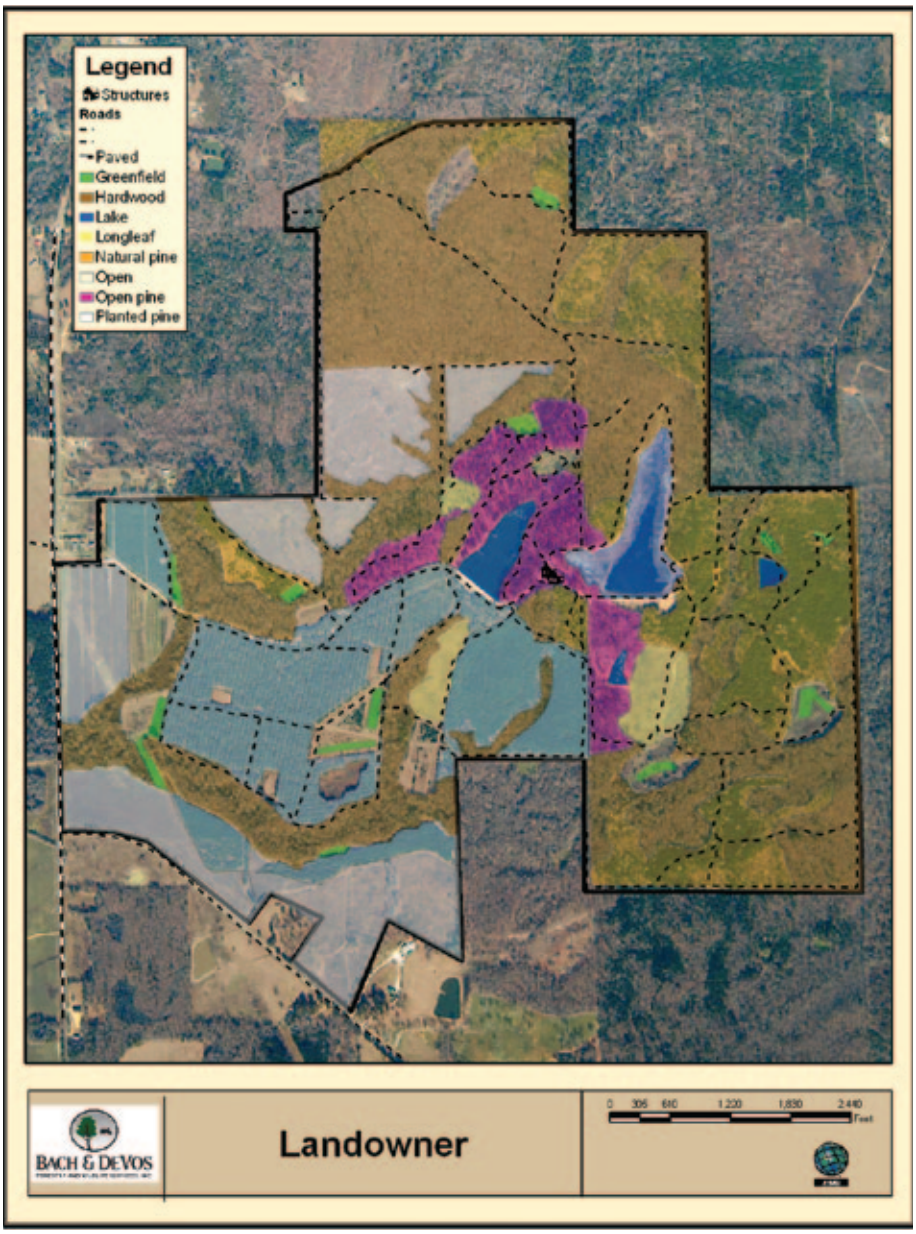
In a case like this, both habitat and availability need to be modified so that there is an opportunity for deer to exhibit selection and preference. When the habitat is too thick, and homogenous, there is a loss of diversity in habitat types. Any grassy openings would be highly selected by does with fawns for bedding as well as feeding on the weeds available there and overbrowsing is probable. Once a property is broken up and opened up, there is less pressure put on any one habitat type. The theoretical objective is to have all habitat

types used in proportion to their availability, although this is an impossibility considering the year-round needs of any one species like deer. It is especially impossible when considering multiple species management like deer/turkey/quail. It should still be a goal to provide all habitat types in proportion to their seasonal needs.

Another example we commonly encounter is that "turkeys like hardwoods". This often leads to us visiting properties that are solid hardwood and pine/hardwood. Quite often pines are allowed to either die out in the upland stands or are cut out in a thinning leaving the hardwoods to take over the site. Winter flocks of turkeys commonly frequent the property but, come spring, there is a lack of gobblers and few hens are encountered. The few nests that are found are in old fencerows or a small opening or beetle spot where there is a remnant patch of broomstraw and blackberry leading to the conclusion that turkeys like to nest on the "edge" near an old fencerow or beetle spot. Classic misinterpretation of habitat selection vs availability! In reality, turkey hens would prefer to nest in the middle of a grassy woodland near a small thicket or blackberry patch where their nest has a lower chance of being found and eaten by a coon. But in this case, that option was not available.

In a case like this, the reason the turkeys are not there in spring is that the hens left to find nesting cover somewhere else and the gobblers followed – the punishment for not providing available habitats of the type that turkeys need and managing for one aspect of turkey life history. The solution is to break up the habitat types and open up the property. Turkeys need grassy pine woods for nesting, hardwoods for loafing and winter food sources, open fields for breeding and strutting, etc. They tend to move to the uplands in spring anyway and often begin roosting in large pines in spring. Our recommendations in a scenario like this is often to restore the pine stands, either through thinning or planting and get upland woods open and burned to create good nesting cover. What is sometimes met with skepticism is the recommendation to cut most of the hardwood out of the upland pine stands! We do, however, tend to leave a nice mix of fire-tolerant hardwood (white, southern red, post oaks, etc) in burned pine stands.

The take-home message is that it is easy to create too-much-of-a-good-thing in wildlife management. Quail like Partridge peas and bicolor lespedeza, but 50 acres of Partridge peas or bicolor are terrible for quail. Turkeys like bahaia fields but a 100 acre bahaia field will get used very little in proportion to its availability. The concept must be to create a diverse structure of habitat and timber types scattered throughout the property. If you are doing optimal deer and turkey management and do not occasionally see a covey of quail, you are not doing as good a job as you could. We often use quail as an indicator of good habitat and, typically, what is good for quail populations is good for deer and turkey as quail require the most diverse and quality habitat of any species commonly managed. The grassy woodlands quail spend



Diversity of habitat types and stands is highly important to maximize wildlife value and use across the property, across species and seasons.

most of their life are optimal for deer bedding, fawn production, browse production as well as turkey nesting, feeding and spring strutting grounds when burned. The thicket cover quail require are often those areas bucks bed in and turkeys use to loaf in the heat of the day. Less than optimal deer and/or turkey habitat can often be void of quail, but optimal deer and turkey habitat WILL have quail in it and turkey and deer will have a variety of habitat types to select from depending on the season of the year.

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Planning an International Hunting or Fishing Trip

By Kevin McKinstry

Kevin McKinstry is the Manager for Westervelt Sporting Lodges (WSL). WSL owns and operates sporting lodges in the USA, Canada & New Zealand. Contact him at 800-281-7991.

No doubt, about it, the world has become a much smaller place with the advent of affordable international airline flights. Hundreds of flights leave the United States everyday heading to exotic destinations in South America, the South Pacific, Europe, Africa and many more. For the sporting traveler, this provides endless incredible hunting or fishing opportunities around the world. Contemplating an international trip can be intimidating to some sportsmen. However, for most destinations, the fine details have been already worked out to provide an easy and worry free travel experience. The following could be used as a checklist for traveling overseas:

Get your passport.

- Getting your passport is step number one. Changes in immigration laws for countries commonly frequented by American travelers have resulted in a back-

log of new passport applications. Even if you are only kicking around the idea of international travel, go ahead and complete the passport process, so when you are seriously ready, the trip will not be hinging on receiving your passport in time. International air should always be booked with your name exactly as it appears on your passport. This should prevent any unnecessary delays in clearing customs. For more information visit www.travel.state.gov/passport/passport.

- Be sure you have signed your passport and have filled in the emergency contact information.
- If you already have a passport, do not forget to check the expiration date. Definitely avoid being caught overseas with an expired passport.
- It is a good idea to leave copies of your trip itinerary and a copy of your actual passport with family or friends. If you lose your passport or have other problems, by leaving copies at home information could be sent to you in case of emergency.
- While overseas, always keep your passport on your person and insure it will not be lost during your trip.

Do your homework.

When planning a hunting or fishing trip overseas, always be sure of the outfitters reputation and ability to deliver a quality experience. The internet provides access to thousands of international hunting or fishing destinations. While a nice website can provide an impression of quality accommodation and experience, nothing is better then an actual client recommendation. Unsolicited reviews can be found in publications such as The Hunting Report, Safari Times or The Angling Report.

- Use a quality-booking agent. Good booking companies have first hand knowledge of all the destinations they market. They have all the intimate details worked out on the travel logistics, gun permits, taxidermy, etc. Most booking agents do not charge more then the normal retail price. Many of them have worked out all-inclusive packaging that can include airfare, touring and meet & greet services. Booking agents should also be able to provide references from past clients.
- Attend a sportsman's trade show where your outfitter will be exhibiting in order to have face-to-face conversations. There are several trade shows that are held in the United States each year that most of the major outfitting companies will attend and exhibit. At many of these trade shows, you can actually meet your future guide and outfitter in person. Nothing is better then face-to-face conversations to discuss the final details of your adventure and before writing a deposit check for your trip. Some of the larger trade shows that will have a strong international presence of outfitters are the Safari Club International Convention, The Fly Fishing Shows and the Dallas Safari Club.

Be prepared

- Organize your gear and paperwork well ahead of your departure date. Test and practice with your fishing or hunting gear to insure everything is in good working order. Many sporting destinations are very remote and spare parts or new gear may be hard to find. Get on the range and practice shooting at the distance needed for the game you are pursuing (your outfitter should be able to suggest probable shooting distance). If you are going fishing, check your waders and boots, practice casting and inspect your line and leaders. Have your required paperwork in a safe place and review your checklist at least two weeks prior to your departure.
- Review your packing list to be sure you have what will be needed, from trout flies to sunscreen. Be sure you have firearms in lockable hard cases and that you have the keys in an accessible safe place during your trip. Be able to unlock your gun case when traveling for inspection. Most important, be sure all your needed paperwork and permits are in a safe place that you will be able to access them during your journey.

Trip Insurance

- Check your medical insurance policy and understand that you will be covered while overseas. It is also wise to check and see if your policy will cover any emergency medical evacuation.
- Trip cancellation insurance policies are available that will protect you if a last minute emergency requires you to cancel your trip. For a small amount of money, you can be insured against losing airfare and trip deposits in the event of cancellation.
- Polices are also available that can insure against lost, stolen or delayed luggage.
- Think about purchasing a trip cancellation policy that would cover the expense of an air ambulance in case a medical condition requires you to return under doctor's care. Again, these policies are very reasonable and could save you a significant amount of money in the case of an unforeseen emergency.

Packing

Most sporting lodges will provide you a suggested packing list. Be sure to consider that seasons are opposite north and south of the equator.

- Check bag weight limits for the specific air carriers that you will be flying. The number of bags allowed and weight per bag varies between airlines and is changing frequently. Once you have completed your international flight, keep your boarding pass or flight itinerary handy. If you have internal flight connections your bags could be overweight. Some airlines enforce a lesser bag weight for domestic flights. If you can provide evidence at the ticket counter that you are traveling with international connections, usually the domestic flight weight limits are waived.
- Find out what the electrical current is at your destination. You will probably need plug adaptors and electric power converters to keep your devices charged overseas.
- Pack as light as possible. Use light clothing that can be layered for different weather conditions. Most lodges offer laundry service and you will not need to pack new clothes for every day of your trip.
- Roll your clothes, rather then folding them. This will take up less space and allow you to get more

items in a smaller space. Pack larger items first and use smaller items to fill in the open places.

- If you are going to wear boots or heavy footwear, wear them on the airplane and pack your lighter shoes.
- Take a pre-paid phone card that will allow you to call home from international locations. Your cell phone may not work or cell service may not be available at your destination.
- Do not pack items in your luggage that you would not want to lose. Cameras, binoculars, computers, etc should always be packed in your carry on bag.

Departure

If you are well prepared, departing and beginning your journey should be a good experience filled with excitement and anticipation that you will soon be experiencing something incredible.

- Leave contact phone numbers for your family at home for the lodge that you will be staying with and the outfitter and booking agent you have used. When traveling to foreign countries where English is not commonly spoken, have your family contact your outfitter or booking agent if they need to contact you. They will be able to converse in the local language or know whom to contact to deliver your message.
- When traveling internationally, you will probably be flying for extended periods and sleeping on the aircraft. If you are not already an airlines club member, inquire about purchasing day passes for airport lounges. Many of the international air carriers have airport lounges that not only offer comfortable settings to wait on departing flights, but also have private shower rooms. After flying for hours and sleeping in your clothes, nothing feels better then a good hot shower and some clean clothes. If airport lounges are not available, some hotels nearby airports offer a "day rate" for travelers that just need a room for a few hours.

Traveling with firearms and/or fly rods

Taking your firearm or fishing gear internationally usually is a choice and not a requirement. Most lodges have quality firearms and fishing gear available for rent during your stay. Some cold-water fly-fishing lodges require you to use their waders as a bio-control against potential invasive algae, such as dydimo.

- For those that want to use their personal gear, check flight regulations for your specific airline. These rules can change frequently and you should check regularly for updates prior to your departure.
- Generally, fly rods may be checked as carry on luggage if they are in airline-approved break down cases. However, check for updated rules on your specific airline before departure.

- Sporting firearms are generally not difficult to travel with, as long as you have all the required paperwork completed and are prepared to pay necessary permit fees while clearing customs. Your booking agent or outfitter should be able to advise you of the requirements for your destination and if necessary, may even have a meet & greet service ready to take you through the gun clearing process. Always check with your specific airline for rule changes prior to your departure.
- Firearms will always need to be stored in a hard case that can be locked. They will be checked as luggage and will have to be rechecked and cleared for your international connections. Some airlines have baggage agreements that allow you to check your luggage all the way to your final destination. Do not do this with your firearms, as they will have to be cleared and rechecked for your international connection. The person working the airline counter may not be aware of this and allow you to check your firearm to your final destination.

Be sure you enjoy the experience. Now that you have completed your journey and checked in to your camp be sure to ask questions or let the staff know of any concerns you may have. New experiences can be stressful and everyone involved with your trip would want to help you erase any worries. When in camp or at the lodge, you should be the focus of attention from all attending staff. If you need something or would like to ask for a new hunting or fishing area, let the lodge staff know what you want. The staff working at quality destinations always want to insure that you're having an incredible experience during your visit.

With good preparation and arrangements, traveling internationally should be an incredible adventure. Almost anywhere in the world, the travel logistics and processes have already been worked out. International sporting activities are affordable and easy to reach, what are you waiting for?

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Pond Aeration

By Kedric Nutt

Kedric Nutt is co-owner and operator of Southeastern Pond Management. He lives and works in Auburn, Alabama.

Standard commercial grade electric paddlewheel aerator.

It is summer again. It is hot and dry and most ponds are, to one degree or another, going down. Unfortunately, it looks like we are going into yet another drought summer. It's time to think about options for aerating your pond or otherwise making it less likely that you suffer a fish kill.

First, we must define some terms so we all understand what we, or I, mean when we say 'aeration'. Now when most pondowners or casual observers say 'aeration', they usually mean, I have found, any device or method of moving the water or adding water to a pond. This includes decorative fountains, pumping well water into a pond, running a boat with an outboard motor around the pond to 'stir it up', running faucet water into the pond, using an irrigation pump to pump water from the pond and throw it up in the air, etc. etc.

I have found that what most people actually MEAN when they say aeration can be

defined thusly: some method of water movement which will prevent a fish kill, due to a lethally low oxygen level, in my pond. At least that is what they want when they call our company and say they want or need or think they need an aerator.

Technically, when well informed persons in the fisheries science or aquaculture world use the word "aeration", they usually mean "emergency aeration". It is simply shortened to "aeration" for convenience. However, what fisheries scientists, etc. mean when they say "aeration" I will define here as such, "the transfer of large amounts of oxygen into the water in a short period of time during an oxygen depletion or period of lethally low oxygen such that no or very few fish are killed". Basically, it means some mechanical contraption will save your fish if you have an oxygen depletion.

In addition to this, much research has been conducted over the years to determine the efficiency rating of various types of aerators so that aquaculturists can operate most efficiently and maximize profits. For example, a given aerator would not be good if it saved your fish but cost so much to operate that you actually lost money on the enterprise. Fortunately, for recreational pond owners, maximizing profit is not a concern.

By the way, this research found that surface agitator type aerators of the 'paddle-wheel' design are the best and most efficient aerators. This means they are most effective and have the highest efficiency rating.

I get asked frequently by pond owners, "Don't I need an aerator in my pond?". First, I know from experience, when a pond owner asks that question, he/she means "I need an aerator running all the time, 24 hours a day, to put oxygen in the water, otherwise there will be no oxygen in the water and my fish will die."

To answer that question, we have to revisit fish pond ecosystems 101. First of all, the vast majority of the time – and I mean 99.999% of the minutes in the year – your pond has plenty, more than enough oxygen in it's water. Especially in a managed, fertilized pond, your pond has far more than enough oxygen to support your fish. The phytoplankton –microscopic algae, produced by the fertilizer, are just like all other green plants: in the presence of light, they undergo photosynthesis – a process which produces oxygen. In addition, water has a fairly good chemical affinity for oxygen, particularly when it is cold or cool. Simply, diffusion of oxygen from the air keeps a goodly amount of oxygen in the water.

So, based on this, the short answer to the above question is, "No. Because your pond usually has more than enough oxygen in it. Why would you need an aerator running constantly to put something in the water which is already there, usually in excess abundance?"

However, if a pond owner wishes to install a system to prevent a fish kill from occurring or to save his fish in the event of an oxygen depletion, then we have a ball game. Of course, a pond

A large decorative fountain – it's very pretty but doesn't do much true aeration

A large industrial water pump being used as emergency aeration – better than nothing but not real, true aeration

Bubble boil of a desratifcation system at start up – the darker water is cold, low oxygen water from the pond bottom.

owner should realize an aeration system is like an insurance policy – you may never actually need it. But, if you need it – you REALLY need it and it will turn out to be well worth the expense. Trying to predict if a pond or which pond will actually experience an oxygen depletion fish kill is sort of like trying to predict where lightning will strike – it is mostly an issue of random chance and mother nature.

There are electric/mechanical systems available which aerate, circulate and/or destratify your pond such that fish kills can be completely eliminated or the chance greatly reduced. Let's look at a quick list of the most common systems available on the market for aeration, etc. and their effectiveness.

Decorative Fountains

Not true aeration. To be sure, a fountain will transfer some oxygen into the water, if there is an oxygen depletion, but it is not effective or efficient. Should be considered only decorative.

Well Water Pumping

Not aeration. Well water may actually be devoid of oxygen when initially pumped out. At the least, it is very low. Pumping well water into a pond does absolutely no good as far as aeration is concerned.

Pump Sprayer Type Aerator

Consists of a pump which draws water from the pond and sprays it at high velocity out of some opening back into the pond. Complex openings or nozzles are used to improve aeration by breaking up the water stream, thus increasing the surface area which contacts the air. Similar to decorative fountains, but more powerful. It is true aeration but not as effective or efficient as other types. Some pond owners employ a makeshift version of this type aerator with irrigation pumps but usually they aren't effective because they aren't large and powerful enough.

Destratification Systems

On the issue of aeration, this is the one which causes the most confusion. Such systems are NOT – I repeat NOT – real aeration. Some of these type systems consist of an on-shore air compressor and hoses with air diffusers at the end, which lie on the bottom of the pond – thus pumping water from the bottom to the surface. Others are floating unit large fans which 'blow' or force air down from the surface, pumping water from the surface down to the bottom and back again.

Regardless of the design, destratification systems keep the water in the pond moving, circulating so the pond cannot stratify – separate into distinct layers. This type system is designed to prevent a fish kill due to oxygen depletion caused by a classic 'turnover'. It is not true 'emergency aeration' and will not prevent a fish kill in the event of a lethally low oxygen condition. I know – I have seen it happen. These systems simply do not transfer enough oxygen into the water to save fish during a lethally low oxygen event.

These systems should probably be called 'water circulation systems' as that is what they actually do. They pump water from the bottom to the surface, or vice versa, where it outflows across the surface a long distance from the diffuser site. By keeping the water moving and circulating, they prevent the pond from becoming still and stratifying.

On this subject, I know full well that the manufacturers of destratification systems call their products 'aerators' and 'aeration systems' and they do a disservice to their customers and the general pond owner public by doing so. I suspect they simply gave up trying to explain the difference when the public insists on calling these things aerators. Still, it just ain't right.

Floating Propeller Vertical Pump Type Aerators

This is a popular, effective and fairly efficient type of true aeration. Several national brands are widely available. The basic design is a floating ring of some material with an electric motor in the 'donut hole' and a propeller on the shaft of the motor. The propeller stirs up and vigorously agitates the water, throwing it up into a spray above the pond surface. However, they are most appropriate and applicable for small ponds, in the 3 acre or less size. These are typically small only ½ to 1.5 Hp and they must be floated out in the middle of the pond. Therefore, you have the issue of an electric cord running out into your pond and some manner of rope or cable anchored to the bottom or tied to the bank. For a regularly fished pond, this may not be the most desirable setup. Also, since you generally need 1 Hp of aeration per acre of water, if you have a large pond or lake, it would require many of these to adequately aerate it.

Propeller Aspirator Pump Type Aerators

This is an effective but not as commonly used design of aerator. It consists of a motor with a shaft angled down into the water and a propeller on the shaft, with the motor housing on a float above the water. When the propeller runs, it causes a drop in air pressure, basically draws air down into it and injects air into the turbulence of the 'propwash', thereby affecting a high degree of oxygen transfer. The setup looks like or resembles an outboard motor operating at a high angle of tilt. This type of aerator is effective and efficient, but the units are small, in the ½ to 1 Hp range. For a large pond, it would require many to provide thorough aeration and save your entire fish population.

Commercial Sized Paddlewheel Type Aerators

This is the real, true 'emergency' aeration aerator and the industry standard. If you were to visit a large catfish farm in west Alabama or Mississippi, for example, this is the type aerators you will see. They are the most effective and highly efficient, plus they are now mostly manufactured as electric, so they don't require a tractor and diesel fuel to operate. Where millions of dollars worth of fish are at stake, paddlewheel aerators are the standard. 'Nuff said.

Another thing to consider is when

Floating Vertical Pump type aerator – effective but small, typically applicable for only small ponds

A PTO powered paddlewheel aerator – very effective but somebody has to be there to turn it on.

and how long should the aerator run? If you install an aerator, should you turn it on and run it 24 hours a day, 365 days a year? Or 24 hours a day just in the warm season? Or just for the 3 summer months?

This question goes back to the definition of true aeration. Basically, you only need true aeration when your pond has an oxygen depletion or an oxygen level low enough to kill fish. This doesn't require a complete oxygen depletion (a condition of zero oxygen) since some fish, especially large fish, will die at 1.5 mg/l of oxygen while other fish and small fish will survive that concentration.

So, assuming you aren't going to be at your pond (or awake) 24 hours a day, 365 days a year to turn on your aerator in case of a fish kill, you need some sort of **electrical control unit or system.** Fortunately, these days electronic oxygen monitors are available that can measure the oxygen level in your pond's water and automatically turn on the aerator (s) if the oxygen gets too low. This is exactly like a thermostat system of the air conditioning system in your house. Of course, this assumes you will ALWAYS have electrical power – no chance for power outages.

Recently, some pondowners, and fish farmers, have adopted a different usage strategy with aerators. They are simply setting them to run every morning during the summer/warm months for several hours, regardless of the oxygen level. Some are doing this in conjunction with the oxygen monitor, so the monitor turns the aerators on in the event of an oxygen depletion at some other time of the day.

You may ask why run the aerators only in the early morning. Well, we have to go back to Pond Ecosystems 101….again. If a pond has a plankton bloom, this green algae produces oxygen during the day. However, like all green plants, the phytoplankton switches to respiration in the dark and actually CONSUMES oxygen during the night. In the instances where the plankton bloom is too dense, the plankton plus the fish will actually use up all the oxygen before the next day. Typically, such an oxygen depletion occurs in early morning – just before dawn until a few hours after dawn – until the sun gets up and shines on the water and the plankton can once again produce oxygen.

Still, the oxygen monitors are useful. If, for example, a pond has a paddlewheel aeration system installed but no destratification system, it could experience an oxygen depletion during the day. If the pond is stratified, it could experience a true, textbook 'turnover' in the middle of the day or afternoon. Thus, the oxygen monitors would be needed to activate the aerators.

Of course, no system is perfect and completely care-

free. The oxygen monitor does require some regular maintenance. The actual oxygen reading probe must be regularly cleaned of hard water deposits and other fouling to keep it reading accurately. The frequency depends on the water quality of the given pond, the density of the plankton bloom, etc.

On the subject of **destratification systems**, it is worth mentioning that there are definite and proven benefits to destratification and water circulation in fish ponds. First, it has been shown that water circulation can prevent the sudden die-off of dense blue green plankton blooms common in the late spring to early summer. Dr. Claude Boyd (Boyd, Davis, Johnston, 1978) found that blue green algae blooms are susceptible to sudden die-offs from the intense, bright sunlight of summer, as they have no cellular structure to protect them from the sun's ultraviolet rays. Other water quality factors associated with the onset of summer type weather contribute. This sudden and widespread plankton die off – a 'plankton crash' as it is commonly called – can and usually does lead to a lethally low oxygen level, maybe even a complete oxygen depletion, and massive fish kill. It has been found that water circulation prevents this from occurring.

In general, water circulation and destratification improves water quality and increases plankton production and, in turn, fish production. It thoroughly distributes oxygen from the surface to the pond bottom and makes the entire water column and pond environment available for fish usage. Oxygenation of the pond bottom aids in consumption and decomposition of organic matter and prevents the buildup of muck and sludge.

So, don't get me wrong, I don't mean to disparage destratification systems, they are greatly beneficial to your pond, your fish and you. We install them and recommend them widely. It is important for the pond owner to understand, however, that a destrat system is not true

Is an aeration system worth the expense? Maybe you should ask the owner of this pond..

aeration and will not save your fish in the event of a low oxygen event.

So, if you consider some type of aeration system for your pond, you need to think about these points outlined in this article. Be sure to purchase and install a system of an adequate size and capacity for your pond and one which actually does what you want it to do, whether that be true aeration or circulation or both. You can make your pond 'fish kill proof' with the right equipment and system, but it likely ain't gonna be cheap.

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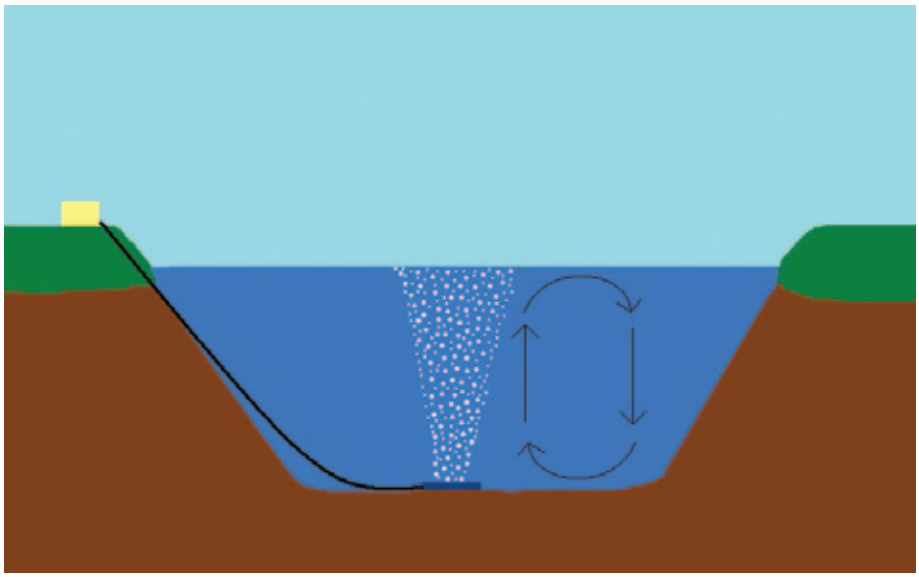


This diagram illustrates how a destratification system circulates and 'turns over' the pond volume

Management Calendar

By Dave Edwards
Westervelt Wildlife Services

August/September 2008

Removing undesirable trees will increase the health of desirable trees. The "hack & squirt" method is a great tool for this.

Start preparing and planting duck ponds.

Duck pond preparations should be underway by mid-July in most areas of the Southeast. Planting dates will depend on the soil moisture, crops you are planting, and the time required to produce seed. Common duck pond crops include Japanese millet, grain sorghum, corn, soybeans, and rice. Although not planted very often, chufa is an excellent crop for duck ponds, but must be planted in June. 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. If you are in a pinch or running behind on your planting, browntop millet is a good choice because it only takes about 50 days to produce seed. One trick that we often implement in duck ponds 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 sew the seed where you want hunting blinds to be. This will create small "islands" for hunters to use. Another benefit is that Egyptian wheat will often reseed the following year depending on the management applied to the soil.

Begin flooding duck ponds in early September – or once crops are established.

Teal are usually the first ducks coming down the flyways as they migrate south for winter. Although it depends on where your property is located, you should expect to start seeing teal in late August through mid-September. To accommodate these waterfowl and/or to attract them for the early teal hunting season, flood at least 30% of your duck pond. To be most attractive, make sure there are some open water areas within the flooded area. The main reason for not flooding the entire duck pond is to delay seed deterioration caused by flooding. Seed deterioration rates, or the amount of time it takes for a seed to breakdown after being flooded, vary among different plant species. Most native wetland plant seeds are well adapted to flooded conditions and will last up to 3 months under water. However, most agriculture crop seeds break down much quicker. Thus, you only want to flood enough of your pond to provide early arriving teal with a food resource. Begin flooding the remainder of the pond in late October for the main flight of ducks. This will ensure the seeds you've worked hard to produce will remain longer into the winter to provide food and attract ducks. If you have never shot early season teal, you're missing out. Teal respond to calling and work decoys well and they fly in fast, with tight flocks which makes for some fast and furious shooting – notice I said shooting and not killing!! – they are tough to hit!

Service tractors, ATV's, and other mechanical tools.

As you know, equipment such as tractors, ATV's, and chainsaws are required to implement your wildlife management program. Because late summer is somewhat of a slow period for equipment use, it is a great time to perform maintenance or service. I recommend developing a maintenance sheet that includes all your equipment and keeping records of service. This will insure that equipment is taken care of and will be in good working order for the fall activities such as food plot planting and preparing your property for hunting season. Don't forget about tractor implements such as grain drills, mowers, or harrows. We even keep a maintenance sheet for small tools like weedeaters and pressure washers.

Attend wildlife management seminars or deer management short-courses.

There is normally several wildlife management oriented seminars or short-courses happening during late summer and early fall. Attending these educational events are a great way to learn more about how to manage your property to enhance the recreational and wildlife value. These events also provide opportunities to speak with wildlife and fisheries biologists as well as other landowners. Check with your friends at *Wildlife Trends* to find out which events are in your area or which organizations you may need to contact. Another good resource for educational events is land grant universities that have Cooperative Extension Services.

Implement habitat enhancement plans.

Summer is a good time to implement habitat enhancement projects such as timber harvests, timber stand improvements via hack & squirt methods, Quality Vegetation Management (QVM) to stimulate desirable wildlife understory species via herbicide applications, roadside enhancement areas, and creating new food plots. All of these projects or activities will add wildlife value to your property. Although it has already gotten late in the growing season, I like to have these projects planned well ahead of time so that they can be implemented early in the growing season. This allows a longer time during the growing season for these areas to "recover". Timber harvests or dozer work that is done late in the growing season often results in poorer quality wildlife habitat during the first year because plants have not had time to re-colonize. Additionally, these areas are not as aesthetically pleasing during the following winter. However, if you are running behind, I recommend getting these improvements in when you can. I'd rather get the improvements implemented late than to not have them done at all. You can think of it this way – you will be early for next year!

Start preparations for fall food plots.

It is difficult, if not impossible, to establish successful food plots without preparation. Planting quality food plots is a process that may span over several months, not a weekend. There are several factors that influence the success of a food plot program. Among the most important are establishing a well thought out food plot plan, ensuring proper soil fertility and pH, preparing a firm, smooth seed bed, only planting under favorable conditions, and controlling weeds. Each of these activities plays an important role in the success of your food plots. Here are a few tips on planting this fall:

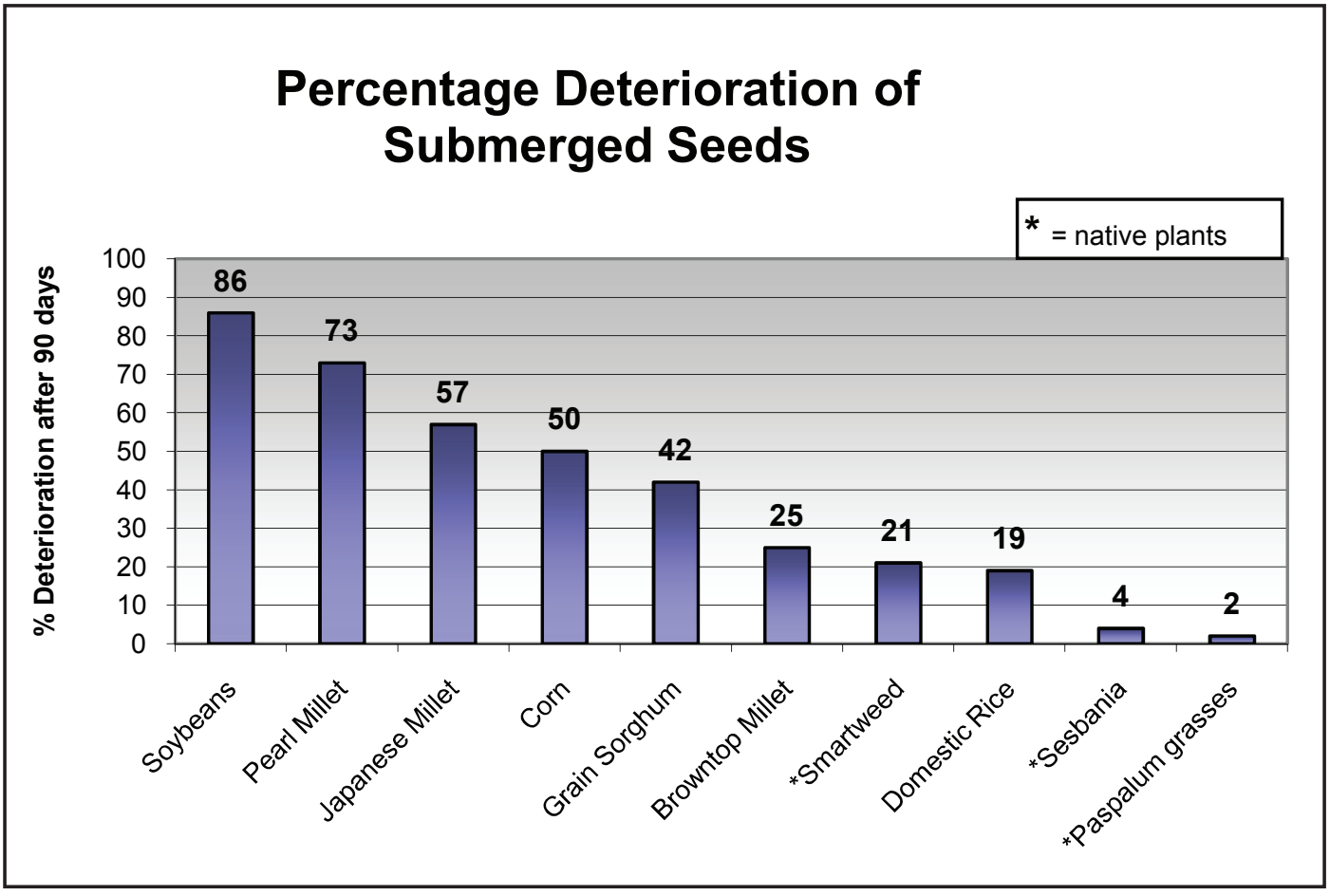
- Test soil early and apply required lime (preferably at least 6 months prior to planting). It takes time for the chemical process to take place and effectively change the soil pH. If you didn't lime in spring or

early summer, go ahead and apply it now…better late than never.

- Use the results of the soil test to create the best fertilizer blend for your specific soil needs. Many people use balanced fertilizers such as 13-13-13 because they are easy. However, with the rise in cost of fertilizer it is well worth your time to custom blend fertilizer to match your needs verses applying a balanced fertilizer that often requires applying extremely high amounts of some nutrients to compensate for the lack of others in the soil – which results in wasted fertilizer/ wasted money.
- Order seed and fertilizer as early as possible to ensure it is ready when you are.
- Ensure plots are relatively smooth. This takes time and should be done well ahead of planting dates. If you are broadcast planting, simply drag the field just before planting to provide good seed-soil contact. A cultipacker is very useful for this as well.
- Have your seed beds ready, but don't fall into the trap of planting too early. September is often a very dry month. Mid-October is ideal in most areas of the Southeast. This is when we start getting regular cold fronts that bring rain. Planting too early normally results in disease (mostly army worms), poor planting success due to droughty conditions, or if you receive adequate rain the food plot is knee high and less attractive to deer by the time gun season arrives.
- Adding annual reseeding clovers such as crimson or arrowleaf into your fall plantings will increase the quality and nutritional value of your food plots. With proper management, these clovers will regenerate again next fall which will save you money on seed costs.
- Use exclusion cages to monitor deer use and plot performance. An exclusion cage is a small "tube" of fence staked to the plot that is used to keep deer from eating the crop in a very small area. Cages are normally 2-3' foot in diameter and 3-4' tall. This prevents deer from eating the crop within the exclusion cage which allows you to assess plot growth and deer use of the plot.

If you have existing perennial clover plots, mow and fertilize them in early fall.

Perennial clover probably looks its worst in late summer. It has gone through the heat and often very dry periods. However, as fall approaches with cooler temperatures, the clover should start recovering from the stress associated with heat and drought. Mowing and fertilizing your clover plots will give it a boost and will ensure good growth through the fall. Do NOT mow the clover too low. Just above the clover plants is good (clipping the flowers and other weeds). Also, do not use



Properly amending the soil to achieve desired pH levels is more important than what you plant. Proper soil pH is required to make fertilizer available to plants. Without proper pH, much fertilizer is wasted. With today's fertilizer prices, how can you afford to not lime?

a fertilizer with nitrogen. Clover makes its own nitrogen. Adding nitrogen will only feed undesirable weeds. If needed, you can broadcast additional clover seed in areas that are not doing well.

Limb roads

Because the growing season is essentially over, late summer or early fall is a great time to trim over-hanging limbs from your property's interior roadways. Interior or secondary roads can become a jungle in just one growing season if not maintained. Have you ever ripped the exhaust pipe off your tractor with an over hanging limb, or had a limb slap you across the face while driving a tractor down an overgrown road? Trimming limbs will help prevent equipment damage and/or personal injuries while using these roads. Removing these limbs will help these roads dry out quicker by allowing sunlight and wind exposure on the road and in some cases will enhance natural wildlife foods along the roadsides due to the added sunlight.

Check, repair and place new hunting stands

While the best time of year to relocate or place new deer stands on your property is in late winter after the deer season has ended or very early spring (before green up), late summer or early fall is when you need to revisit these stands to tighten them back up, inspect for loose nuts/bolts, rotten or lose wood, or any other safety hazards. This is also a good time to check the shooting rails, padding, and trim shooting lanes where needed in preparation for hunting season. However, do not over do the shooting lanes. Small openings are all that is normally needed to identify and shoot deer.

Mow under and around fruit trees and orchards.

Mowing around fruit trees will not only enhance the growth of the trees, but will enhance the aesthetics of your property. Mowing will also help "clean" the understory around the fruit trees so wildlife can find the fruit as it drops (acorns, persimmons, apples, etc).

Assess the status of the deer herd and make harvest plans for this season.

Monitoring the status of your deer herd is the backbone to the success of your deer program. Hopefully, you have been collecting harvest data (weights, measurements, ages, etc), hunter observation data, as well as conducting spotlight counts or camera censuses. Collectively, this information is

Harvest data should be the backbone of your deer management program. Information gathered from harvested deer help managers make sound decisions.

used to make sound deer management decisions that will help you achieve the goals of your program. If you haven't already done so, ask a wildlife biologist to review your data or information and provide harvest recommendations before hunting season starts. Using trail cameras is a great way to assess buck quality and make buck harvest decisions before you head to the woods. Pictures from trail cameras will help reduce "mistakes" when judging bucks in the woods while hunting (where judgments are often made in seconds while your heart is racing 200 beats per minute!) While trail cameras are useful, a true camera survey is the most accurate method available to assess the status of your deer herd. September and October are normally the best months to conduct a camera survey (after bucks shed velvet but before the majority of acorns start to drop). If you plan to conduct a survey this fall, be sure to plan ahead. If you are doing it yourself, make sure you have all the equipment needed (cameras, batteries, digital cards, film, corn, etc). If you plan to hire a professional, get on their schedule early. With the popularity of camera surveys, most wildlife consulting companies are booked well in advance of camera survey season, (September – November).

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[1]Hurst, G.A. 1987. Vegetative responses to imazapyr for pine release. Proceedings of the Southern Weed Science Society. 40:247.

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