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Earl Says…

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Many of our authors have been writing for us for over a decade. They bring their experiences from years in the field and on the water. I am amazed to hear their stories and what has worked for them as well as what has not. That's why I always tell prospective subscribers that my goal is to give our subscribers new ideas as well as learn from other people's mistakes. This can lead to saving money and improving your wildlife habitat.

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Cover Photo by Dave Edwards

BURN BLOCK SIZE
Are you burning too much or too little?

By Ted DeVos

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Burning at different seasons can be used to create a mosaic as well. Here longleaf was burned in February and the older pine stand was burned in May. The longleaf may not have nesting cover but is good brood habitat and is greened up enough to provide protective cover.

Even though our burn season is mostly over, there are still some burning days available when the weather permits and fall burning is just around the corner. Prescribed fire and its wildlife benefits is well researched but there are often some concerns about the potential negative impacts. In this article, we will discuss the costs and benefits of burn block size.

First off, as a certified burner that has been doing this for decades, my opinion is that nearly any fire is better than no fire in most habitats. We tell our clients regularly that if there is pine in the stand, it needs to be burned, at least occasionally. In the deep Southeast, fire has been an integral part of the evolution of our woodlands. From East Texas to Virginia, from the Gulf of Mexico to the Appalachian Mountains, the natural ecosystem has been driven by regular fire. Much of this area was forested in Longleaf pine and, historically, a burn interval of 2-5 years was the norm. Lightning or native American set fires burned vast acreages and the habitat it created was described by early explorers like William Bartram in the 1770's. He described "a vast forest of the most stately pine trees that can be imagined", "which continued for many miles". Another description – "passing through a level, open, airy pine forest, the stately trees scatteringly planted by nature, aris-

ing straight and erect from the green carpet, embellished with various grasses and flowering plants". Fire benefits nearly every wildlife species in the Southeast and some are nearly dependent on occasional fire

Remember though, if you have a pine site that has never been burned and is choked up with midstory hardwood saplings, one burn will NOT make a significant impact. However, regular burning, especially in conjunction with mechanical or chemical control of the hardwood saplings, will clean up and maintain a beautiful and productive pine woodland.

Even after greenup, the difference between burned and unburned is obvious. The area on the left still has good grassy nesting cover and the area on the right is excellent brood habitat.

By the descriptions of the early explorers and settlers, it seems that large burn areas were common and probably the norm. However, since most of these fires burned for many days or weeks in areas of varying terrain and environmental conditions, these fires were most likely highly variable and created of a mosaic of burned and unburned areas. There were no firelines except for hardwood drainages, creeks and rivers so fires could continue moving relatively unimpeded across the landscape. Areas of hot daytime fires were mixed with areas of cooler "night" burn areas, etc., one day it was windy and dry, the next cloudy and still. One day the wind was light out of the southeast and the next windy out of the northwest. Historically, burn block size was therefore, variable and mostly irrelevant.

In today's environment, much less of the Southeast is burned in a given year, objectives are different and we are managing on local scales on, mostly, private property. The National Forests have the unique opportunity to manage large acreages with landscape sized burn blocks, while most private landowners do not. The question is, are landscape-sized burns good for wildlife?

In addition, property lines need to be protected with firelanes and, often, pine stands are separated from hardwoods with firelanes as well. Naturally, fires moved from the pine areas into the hardwoods, sometimes fast and sometimes slow. If we have the ability, we have a preference to allow fires to move into hardwood stands on their own depending on conditions. In winter with dry conditions, fires will burn down to the creeks and be stopped by water. In summer, you can rarely get a fire to burn in hardwoods due to higher humidities and shade factors. This often allows a nice "soft edge" along these drains and a more natural transition. This transition, or ecotone, is often where wildlife travel and is used extensively by many critters. Care must be taken to not allow fires to burn aggressively into the hardwood however, since they can be damaged with hot fires.

Managing and burning private lands is mostly focused on particular objectives. Burn type, season and block size is different depending on which wildlife species is being managed for or the predominant habitat type. For instance, on quail managed properties, burn block size must be small, however 40-60% of the pine woods need to be burned each year. In addition, most of the managed habitat in this scenario would be open pine woodlands. Managing for deer and turkey takes a difference approach as these creatures are more mobile and a more significant amount of hardwood is usually managed for. Turkeys utilize hardwoods more than quail and often a mixed stand of pine/hardwood is beneficial.

As noted in past articles, burning in pine stands vs. hardwood or mixed pine/hardwood stands needs different techniques and season. You can burn an open pine stand with a relatively hot head fire in winter and do little damage but burn with the same technique in a mixed pine/hardwood or hardwood stand and you can do a lot of damage. In addition, quail do fine with a pine dominated landscape and they probably do better with less hard-

Disked firelanes can be used to break up burn blocks when soil and terrain allow.

wood on the landscape due to predator issues. Turkeys however, strongly favor pine stands with hardwoods mixed in and often prefer a more well stocked stand of timber provided the understory component is still intact.

Regarding burn block size, the variable is home range size. With most wildlife species that are not highly mobile, all efforts must be taken not to burn their entire home range. For mobile or migratory bird species like woodcock, sparrows, doves, chuck wills widow, etc., that nest on the ground or low shrubbery, burn block size doesn't matter much since they will simply move to and nest in another area. For ground nesters like turkeys and quail that have well established home ranges, burn block size is highly important. If their entire (or the majority) of their home range is burned in a given year, they may not nest or are put at an extreme disadvantage to try to hatch off a successful nest. They will often not move out of their known core area to find better conditions.

For quail as an example, home range size can be as much as 200 acres year-round but seasonally, home range may be only 30-40 acres. Wellendorf and Palmer found greater nest success, survival, and reproduction and smaller home ranges on sites that had burn block size of 6 acres vs. block size of 20 acres. Other studies have noted higher mortality, especially from hawks, in areas that had large burn blocks compared to smaller block burning. In the case of quail management, burn blocks of 10-30 acres is probably optimal from a practical standpoint.

Looking at wild turkeys, their home ranges can be as much as 3,000 acres or more annually and hens can have ranges of several hundred acres in spring when nesting. Similar to quail, burning out all of a hens' home range prior to nesting is ill advised. It leaves them without nesting cover in their home range and may leave them susceptible to higher mortality. However, having some of their range burned each year providing fresh burned habitat is beneficial. It provides exceptional bugging ground for turkey poults after hatch and is heavily used by foraging hens. Regular burning also helps create and maintain superior nesting cover in the following years. Sullivan et al 2020, using modelling of telemetry data, found that turkey

use of burn areas was greatest in blocks of 60 acres and least at the top end of the burn block scale of 3,000 acres in a research project using data from across the Southeast. For turkeys, burn blocks in the range of 50-150 acres is probably acceptable with the smaller scale being better.

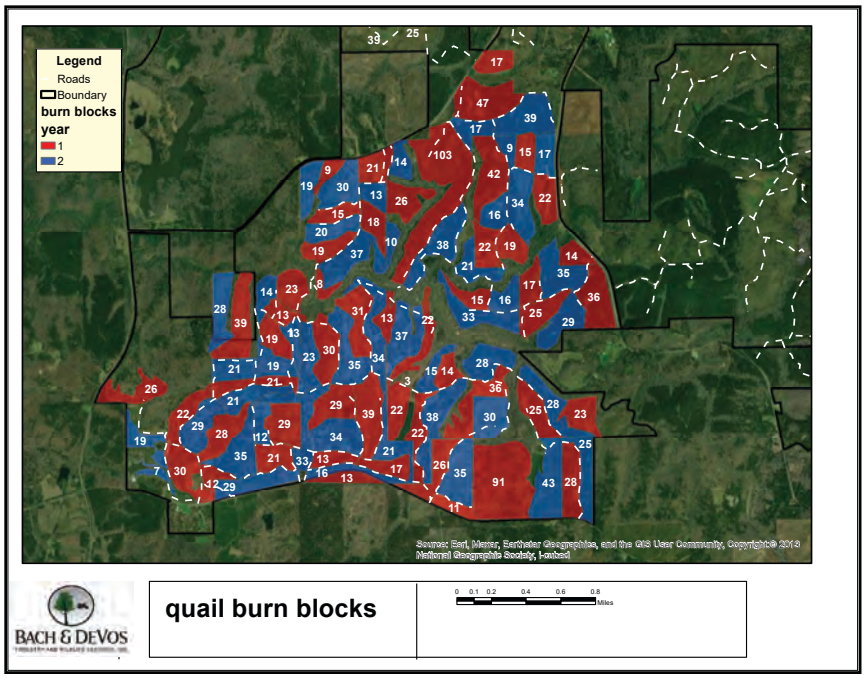
While deer do not "nest", they do need good cover for hiding fawns and the habitat type that is best is the same as for turkey nesting – broomstraw pineywoods with scattered shrubs and saplings. This habitat type is characterized by a stand that is burned every 2-3 years in upland, open pine or mixed pine/hardwood stands and good fawning/nesting cover is in the year or 2 that it is not burned. Their home ranges are also similar to turkeys so burn block size recommendations are probably similar.

Obviously, when managing for a particular species, concessions must be made between the best burn block size and the practicality of burning multiple, variable sized blocks. On 2,000 acres of private quail land for instance, it is practical to burn 1,000 acres in 50 blocks of 20 acres each separated by unburned blocks. This would also be beneficial to both deer and turkeys. On a national forest, for instance (let's say 84,000 acres), where landscape scale management is occurring for longleaf ecosystem restoration and red-cockaded woodpeckers this may not be practical. Assume about 70 "compartments" averaging 1,200 acres per block. Undoubtedly, even these blocks are broken up with roads and creeks so compartment burn size is smaller, these are still huge blocks from a wildlife perspective and even if one "compartment" were to be managed for quail, it should still be broken up into 50 smaller burn blocks.

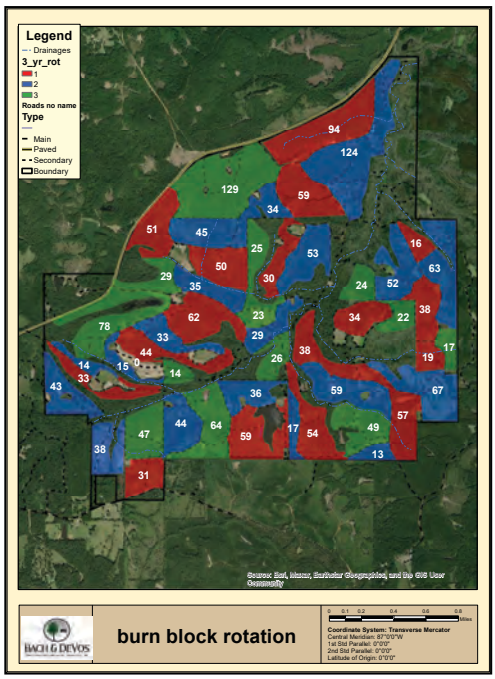
The issue in any of these scenarios is that any burn over 40 acres isolates quail in an area with complete lack of cover. Any burn over 200 or 300 acres isolates turkey hens or does in complete lack of cover. This is probably most important for a species like quail that have inherently high mortality already and removing cover in the spring not only removes nesting cover but protective cover at a time when migratory hawks are at near annual highs.

Size is important but shape can make up for large blocks. A narrow 200-acre block that is 150 yards wide at maximum makes up for its large size. Mixing in smaller blocks, burning at different seasons and making sure to leave unburned blocks next to burned blocks is the best way to make sure to provide not only protective cover after a fire but to make sure that nesting cover is available for nesting hens.

In addition, personnel and time have to be considered. On a private property where a manager and a couple staff are handling a single property of 2,000 acres of quail woods, it can be practical to burn a lot of days through the burn season. Over a few weeks, the 50 blocks of 20 acres each can easily be completed even if you can only get 5 or 10 blocks a day. Getting a private contractor to complete



An example of a heavily dissected property with a lot of small burn blocks. It can be hard to juxtapose burned against unburned evenly. Numbers are acres.



An example of a property with multiple wildlife objectives and varying burn block size on a 3 year burn rotation. Numbers are acres.

Under the right conditions, grassy roads can be used as firebreaks as well.

Main gravel roads make excellent firebreaks.

these, achieving only 100 or 200 acres a day would be expensive. Getting a national forest burn crew that has to complete 20-30,000 acres in a burn season to burn only 100-200 acres in a day is highly unproductive.

Typically, we try to use easily defendable borders to our burn blocks. Main roads, creek bottoms and hardwood drainages can make up the bulk of burn block boundaries and create a mosaic of sizes and shapes of blocks. These drains also allow a more "natural" shapes and transition between burned and unburned areas. On flat land, disked firelanes can define pretty regular shapes and sizes but most land is not flat nor sandy so using natural features and road systems is often the best way to define blocks.

The take home message is that burning is important for food, cover and reproduction in the species we usually manage for and, in general, all pine stands should have regular fire used in its management. Mixing it up with season of burn, size and shape of burn blocks and intensity of fire is the best way to mitigate any negative effects of burning.

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Physical Adaptations and Hunting Strategies of Southern Meso-Mammal Predators

By Ryan Shurette

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Although they do hunt and kill fawns and sometimes adult deer, bobcats have been shown through various studies in the Southeast to feed primarily on cottontails and cotton rats. Photo by Becker, public domain, no changes made.

In the world of wildlife ecology, perhaps nothing is more fascinating than the ancient relationship and incessant contest between predator and prey. For the prey species, they have everything to lose in this real-life cat and mouse game. For the predator, the price for too many failures over any given span of time means individuals will starve, or young will perish, and with death goes their chance for future genetic transfer. Because this high-stakes interaction is so vital to both parties, wild animals invest a lot of energy (anatomically, physiologically, and behaviorally) to capture, or avoid being captured by, other animals. In the South, predator management, either directly through shooting and trapping, or indirectly through habitat manipulation and enhancement, is a popular topic among gamebird enthusiasts and other wildlife managers. Prior to a successful predator control plan being implemented, it can sometimes be helpful to understand the species-specific nuances of predator-prey interactions, so that the scale can be effectively tipped in the balance of the prey species you wish to benefit.

Before we delve into the physical adaptations and behavioral strate-

Ward (2017) studied the diets of 25 coyote packs in Alabama, Georgia, and South Carolina, and found that their diets were comprised mostly of white-tailed deer, rabbits, small mammals, and fruit. Photo by NPS, public domain, no changes made.

gies of our local predators, let's take a step back and briefly examine an exotic but well-known example of a classic predator-prey relationship. We are all familiar with the standard scene from those National Geographic documentaries where the ever-watchful Thompson's gazelle is being stalked by the lightning-fast African cheetah upon the dry savannahs of Tanzania and Kenya. For effect, you might imagine these next few sentences being read in the voice of David Attenborough. Cheetahs are fascinating predators. They have large forward-facing eyes set high on the head. Their retinas are fitted with a much higher percentage of color cones (as opposed to rods which are typical of nocturnal animals) relative to other large cats, allowing them to hunt in the bright African daytime, undoubtedly to avoid competition with their larger, nocturnal feline cousins. They even have black malar stripes below the eyes to reflect the bright sun's glare, similar to a football player's smudges. Extraordinary eyesight allows them to clearly see prey movement three miles away. The inner ear (vestibular system) of the cheetah is also special. It is large and engineered so that the cat can maintain stability of the head and perfect visual acuity when stalking and even when running at blinding speed. They also have a keen sense of smell and sensitive hearing, but their vision is definitely their most valuable means of gathering intelligence. A cheetah's anatomy is sleek and trim, and their quick muscle fiber and tendons are arranged to push and pull long leg bones quickly through an extended stride, harmonizing with the spring-like rhythm of their flexible spine, producing a perfectly engineered running machine able to sprint at an incredible 75 miles per hour. The gazelle is no slouch either and can bolt at 50 miles per hour or more, and it can also cut and turn sharply to evade the cheetah. Usually, one or two bursts of blistering speed is all the cheetah can sustain and so sometimes one-party wins, sometimes the other. The gazelle is very wary, often spoiling the chase before it begins. On their native Serengeti Plains, the gazelle is the chief prey of the cheetah (up to 85% of its diet), and the cheetah is the main predator of the gazelle. Over the eons these two species have honed each other's skills, with each party trying to gain the evolu-

tionary upper hand. Their plight is an example of a specialized predator-prey relationship. I realize the ranges of these two species lie half a world away from us, but I wanted to illustrate how sometimes two species' interactions with one another, especially over long spans of time, can drive their anatomy, physiology, and hunting strategy and behavior. And this concept is easiest to portray using an example where the predator and prey species are tightly and specifically bound to each other.

One slightly closer-to home example of this classic two-species relationship can be seen between the Canada lynx and the snowshoe hare. In the boreal forests of Canada and the northern US, in some years the snowshoe hare makes up 95% of the lynx's diet. These species are so closely linked to each other that their population cycles predictably drive each other's abundance. When hare numbers are plentiful (approximately every 10-11 years) the lynx population increases to a point where it, in turn, reduces the snowshoe hare population. Then, after a couple of seasons with sparse hare availability, the lynx numbers continue to also dwindle until the hare can make a rebound. This classic two-species cycle only happens when the predator species strongly favors the prey species. Just as in the initial example of the cheetah and gazelle, the lynx and hare have specialized offensive weapons and defenses that have been refined over time, allowing this long-standing cycle to repeat itself over and over again. In the South however, this type of two-species relationship is not so common. Our upper-level food webs are typically messier with several predator species feeding on many species of prey. With milder winter temperatures and enough annual rainfall to support a diversity of green habitats, our mammalian predator list in the Southeast is made up of species that are typically more generalist than specialist. Most of our meso-mammal predators actually fall into the omnivorous category, seasonally shifting to a semi-vegetarian strategy as opportunities arise and conditions dictate. Red and grey foxes, coyotes, raccoons, skunks, and opossums are considered meso-predators, rather than apex predators, and they all seasonally utilize insects and other invertebrates, fruits, acorns, and other vegetative plant parts as a significant part of their dietary needs. Furthermore, the number of potential prey species often varies greatly for most of our predatory mammals. Of our common terrestrial meso-predators, the bobcat is the most carnivorous.

Whereas the African cheetah specializes almost exclusively on gazelles, the **North American coyote** is at the other end of the spectrum. They are generalists and therefore very adaptable in a changing environment. Although their eyes are not as keen as the cheetah's, the coyote also has a good sense of vision, and it is quick to pick up on movement. However, like most canids, its eyes are engineered for the dark and their retinas are loaded up with rods instead of cones. This means they are color-blind but in nocturnal settings they can still effectively see sharp images and movement clearly. Like most other canids, the coyote also has an excellent sense of smell. The part of the coyote's brain that is used to analyze odors is about forty times larger than in humans. This allows them to follow minute scent residues left from prey items, and their nose is obviously a critical tool for hunting. The coyote's olfactory system is also very important for avoiding danger and communication with other individuals. A coyote's hearing is also considered very good relative to a human.

The fossil record indicates coyotes persisted for hundreds of years within a relatively stable range across the American West and Midwest until around 1920. About then, their range started expanding. This species is still relatively new to most of the Southeast (arriving from the 1970's to the 1990's in most areas of the region). Why coyotes suddenly expanded into the Southeast (as well as into the Northeast, new portions of Canada, and Central and South America) is still somewhat of a mystery. Mammalogists attribute the expansion to a variety of potential causes ranging from changing land use and forest fragmentation, the extirpation of wolves and cougars which therefore meant less interspecific competition, genetic mixing with wolves and dogs which promoted a larger body size and modified hunting behaviors, a rebound in native game species following the North American Wildlife Model (better game conservation which meant more prey), increased opportunistic feeding opportunities associated with modern humans (roadkill, garbage, hobby poultry, livestock and pets), or a combination of any or all of these factors. Regardless, the coyote is now firmly a part of southern ecosystems. And after a few decades of saturation biologists and land managers are re-examining the impacts coyotes may have on certain prey species, as well as how far north and south they might end up going. There are concerns with them moving into tropical regions where there are many species of wildlife that are still completely naive to them. Besides berries, persimmons, watermelons, peaches, sweet corn, grass, ketchup packets and other garbage, pet food, and pets, coyotes are known to also

consume a wide variety of native wildlife species. Snakes, frogs and other amphibians, birds, cottontails, mice, chipmunks, squirrels are common in their diet. Some of these small animals, especially mice or other small rodents in grassland environments are captured by using their senses of smell and hearing in a "trail and pounce" strategy. Research by Jensen et al. (2022) suggests coyotes prey on rodents and other small mammals all year but lagomorphs (rabbits and cottontails) are significant in winter and spring. In addition to many small animals, we know coyotes also readily take deer fawns in the South. A field study by Saalfeld and Ditchkoff (2007) in the Auburn, Alabama area suggests most fawn mortality (42-63% in the study) can be attributed to coyote predation in some regions. Adult deer predation is obviously not as common; however, it does occur. I have personally seen coyotes use the strategy of running adult deer to the point of fatigue, on at least three different occasions (one buck and two does) in late winter in Alabama. The deer were visibly near exhaustion and only moments ahead of the pursuing single coyote, or in one case a pair of them. Had the coyotes sensed some weakness in these adult deer? Is this strategy more common than we might know? Chitwood et al (2014) observed adult doe predation by coyotes during a fawn survival study at Fort Bragg in North Carolina. Of the 28 does that were darted, collared, and implanted for the study, four were killed by coyotes within approximately 6 months. Ward (2017) studied the diets of 25 coyote packs in Alabama, Georgia, and South Carolina (164 collared individuals) and found their diets were comprised mostly of white-tailed deer, rabbits, small mammals, and fruit. Deer appeared to be an important food resource year-round although a large percentage of these statistics is undoubtedly from roadkill and carcasses from hunters. Research by the Tri-State Coyote Project (AL, SC, and GA) suggests a percentage (around a third) of southeastern coyote population is transient (roaming), while the majority of the population is considered resident. Each of these two groups was shown to utilize different aspects of the habitat, travel corridors, which is likely to result in different types of prey encounters. The details of how these two population groups differ, if they do at all, in the way they impact deer numbers is still unclear. Coyotes are quick and fast, reaching top speeds of around 40 mph, which is significantly faster than the average dog or house cat. But they can also sustain speed (around 15-20 miles per hour) for a few miles depending on the terrain. This level of speed likely evolved, in part as a hunting strategy, but also very likely as a defense from wolves.

Since the coyote has reached saturation in the Southeast, many areas have seen significant declines in gray fox populations. Photo by V. J. Anderson, public domain, no changes made.

White-tailed deer (prior to being decimated in the 1800's and 1900's) were the chief food item of the **Red wolf**, one of the former apex predators of the South. In appearance red wolves look like a cross between a gray wolf and a coyote. As I mentioned earlier, its demise through the 1900's (mainly from predator-control programs, changes in its habitat, and coyote hybridization) allowed the expansion of coyotes into the Southeast. Just as coyotes persecute foxes, wolves will chase down and kill coyotes, so this helped prevent the coyote's range expansion when wolves were common. Similarly, mountain lions, which were also fairly widespread in the southern states, declined drastically as deer populations disappeared in the East, and as persecution by humans increased. Aside from the federally listed subspecies population in Southern Florida, only occasional mountain lions now show up in the East. We won't discuss red wolves or mountain lions any further as they are no longer a functional part of the majority of southeastern ecosystem.

Red and **grey foxes** are in the same family as coyotes and wolves (Canidae) they are also clever and effective predators. Red foxes are native and resident to Alaska, Canada, and the whole of the Midwest and the eastern US. Gray foxes occur in Mexico, the Southwest, and across the entire eastern US. Both species occur throughout the Southeast. Since the coyote has reached saturation in this region, however, many parts of the Southeast have seen significant declines in both foxes' populations, especially grays. Predator-prey relationships can and do change significantly over time, depending on environmental and population fluctuations. Webster et al (2021) examined and compared the diets of southeastern coyotes and foxes to those found in the Western Plains, where all three species have lived together for thousands of years. Their study results showed that red foxes and coyotes overlapped in their diets, but gray foxes did not overlap with the other two. This suggests competition between gray foxes in the Southeast and the relatively recent coyotes is likely high, and over time, partitioning of prey resources (selection of different primary foods) is expected to occur.

Adults of both southern fox species average 10-12 pounds in weight and 36-42 inches in length, including their long bushy tails (with the males being slightly larger). They are fairly similar in their ecology with a few interesting differences. The gray fox has sharp, curved, semi-retractable claws and rotating wrists. It's the only North American canid that can readily climb trees. This adaptation is used to catch prey, access shelter, and avoid being captured by coyotes and dogs. Gray foxes reportedly consume birds (and their eggs) and fruit more frequently than do red foxes (Saunders, 1988). Gray foxes are able to run at speeds of 20-28 mph (Saunders, 1988). In addition to chasing down prey outright they also employ an ambush tactic of sitting still and waiting for prey items to pass close. Their primary food items include deer mice, woodrats, voles, cottontails, reptiles, amphibians, insects, and fruits and seeds. Insects and their larvae are important food items in the warmer months. As summer progresses into fall, nuts, fruits, and seeds are consumed and may sometimes be cached (in the den or by burying) for a future meal. Both foxes regularly cache surplus food, and this behavior is believed to be due, in part, to their relatively high daily metabolic requirements, as each adult needs about a pound of food per day (Storm et al, 1976). Killing in excess for this purpose is common. The dominant senses (vision, hearing, and smell) of both fox species are comparable to those of the coyote. The gray fox dens in hollow trees or logs or rock shelters, and prefers forested habitats especially with some hardwood component. The red fox on the other hand typically inhabits fields, pastures, open woodlands, edges, and mixed grassland habitats, and generally dens in underground borrows abandoned by other animals. The red fox often hunts these open habitats by using a transect strategy, meandering back and forth over an area, detecting its prey by scent and sound. When it senses prey, depending on the species, it may dart immediately towards it and grab it, or quietly slip close enough to jump on it with its characteristic "mouse pounce". The red fox usually hunts alone but also sometimes in pairs or family groups to surround or overwhelm cottontails or other prey.

Raccoons acquire aquatic prey items by "dabbling" under submerged rocks and woody debris with their front paws, which are very sensitive and effective at tactile detection. Much of their cerebral cortex is devoted to this tactile sense, reportedly more than any other mammal studied. Photo by NPS, public domain, no changes made.

Raccoons are a completely different animal from the canids. For one they are much more versatile and omnivorous, happy to forage on fruits, seeds, nuts, acorns, berries, corn and other crops, grubs, insect larvae, worms, carrion, and snails. They are not completely bound to water, but they often select riparian areas, bottomland hardwood forests, wetlands, or swamps, and

they frequently meander along the shoreline of streams or other water bodies. Therefore, it is no surprise that their diet also often includes fish, frogs, snakes, crawfish, mussels, and aquatic insects. They acquire these aquatic prey items by "dabbling" under submerged rocks and woody debris with their busy little "hands", which are very sensitive and effective at tactile detection. Much of their cerebral cortex is devoted to this tactile sense, reportedly more than any other mammal studied. They have broad spectrum hearing range effective for detecting quiet close sounds, a fair sense of smell, and good night vision, but poorer long-range vision. They are quite comfortable in the water and can swim effortlessly and hold their breath for several minutes. Raccoons are also good climbers and spend a lot of time in trees, where they often sleep or den in hollows. They're equipped with sharp teeth and strong jaws and they do also prey on birds and small mammals when they can catch them. If you have chickens this is not news to you. For wildlife managers however, perhaps the most important aspect of their diet is their affinity for eggs. Raccoons have been shown to be important nest predators for ground nesting birds like northern bobwhites and wild turkeys (Dreibelbis et. al., 2008). Mesopredator trapping (mainly raccoons, opossums, and striped skunks) has been shown to benefit quail numbers in some studies (Jackson et. al., 2017). Raccoons are highly adaptable to urbanization and commonly live in and around cities and residential areas. They are sympatric with Virginia opossums across most of their range (from Canada down into Central America) and compete with them for many of the same foods.

The **opossum** is North America's only marsupial. Whereas raccoons often forage in complex social groups (coalitions), opossums are generally solitary. Bernasconi (2020) found opossums to also occur at higher densities in riparian and bottomland hardwood forests as opposed to drier upland pine habitats. Opossums tend to have much less structure and territoriality in their hunting patterns, meandering almost aimlessly through the nocturnal landscape looking for any opportunity of a meal. Opossums are even less selective than raccoons and they eat pretty much anything they can find. They have relatively poor vision and a dull sense of hearing, but they do have a keen sense of smell, allowing them to detect all sorts of plant and animal matter as they ramble about. This strategy allows them to make a living in almost every corner of the Southeast. Opossums breed relatively early (6 to 8 months), frequently (1-3 times per year) and have large litters (often more than 15). The female only has 13 nipples, however so not all born will necessarily survive. By being so proliferative and by being so versatile in their diet, they can keep their numbers high in most areas even though they are short lived in the wild (2 years or less on average). Since so many of them roam the landscape each night, it is common for them to find the eggs of turkeys and other ground nesting birds, especially in unattended nests prior to the start of incubation. Roosting birds, on the ground or in the trees, also sometimes fall prey. Opossums are not usually deterred by human scents or other out-of-place odors and are therefore typically easy to capture in live and foot-hold traps.

Striped skunks make up the third party of the southern egg-eater trio. The main importance of striped skunks to quail and turkey managers is related to nest raiding, and not so much as a true predator. Although some studies have observed mortality of hens (in turkeys and quail) while incubating, more often the hen is flushed from the nest and survives the raid, whether by skunk, opossum, or raccoon. But seldom is she able to deter at least partial losses, and usually the raider keeps coming back for more until the nest is

Striped skunks have an excellent sense of smell, moderately good hearing, and poor eyesight. The main importance of striped skunks to quail and turkey managers is related to nest raiding, and not so much as a true predator. Photo by USFWS, public domain, no changes made.

destroyed. Therefore, besides practicing predator control, providing an adequate amount and arrangement of nesting habitat is probably the next best thing you can do in a quail and turkey habitat management plan. Striped skunks have an excellent sense of smell, moderately good hearing, and poor eyesight. This species is fairly common in some areas of the South and quite uncommon in other local areas. Like opossums and raccoons, they are omnivorous and feed on fruits, carrion, small animals, fish, and insects and their larvae (especially bees).

Bobcats on the other hand are true predators, and they have all the classic adaptations for such. They have keen binocular vision (via light collecting rods and a highly developed tapetum lucidum for reflecting light back onto the retina) with the ability to see in low light as they are chiefly crepuscular and nocturnal. However, they also can and do hunt during the daytime. They have excellent hearing and a good sense of smell, although the latter is reportedly less important in hunting. And to complement their keen senses they possess the elite stalking and hunting skills common to virtually all wild felines. Stalking and ambushing are in fact their main hunting tactics. They sometimes use specific lookouts called "hunting beds" where they lie still and wait for prey to pass closely (Rollings 1945). These beds can vary by situation. For example, researchers have observed them patiently crouching beside prairie dog holes for extended periods, and also among dense vegetation along a deer trail. Chamberlain and Leopold (1999) examined the prey composition of scats (591 from bobcats and 592 from coyotes) in Mississippi, where the two species now overlap. They found that coyote diets were dominated by white-tailed deer, rabbits and fruits, while bobcats "consumed primarily rabbits and rodents". During this study, deer residues were consistently present in the scats of both species, but it was observed more frequently in coyotes. Although they do sometimes hunt and kill fawns and adult deer, bobcats have consistently been shown through various studies in the Southeast to feed primarily on cottontails and cotton rats (Davis, 1955; Kight 1962). The exclusivity of rabbits in their diet is not to the same degree that snowshoe hares serve for the lynx, but rabbits are a mainstay for bobcats. Their preference for and control of cotton rats is thought to serve as a benefit to quail, as these rodents are egg eaters. Wood rats have been observed to be semi-important prey, but our smaller native mice appear to be much less important, presumably because they are not worth the effort. Bobcats also prey on reptiles and birds of various species, sometimes including ground-nesting birds such as turkeys and quail. In a south Alabama study during the mid-1970's by Miller and Speake (1978) however, bobwhite quail was shown to be unimportant to the bobcat's diet. They've also been documented to take foxes, raccoons, skunks, and pets.

Although some studies have observed mortality of hens (in turkeys and quail) while incubating, more often the hen is flushed from the nest and survives the raid, whether by skunk, opossum, or raccoon. But seldom is she able to deter losses, and often the raider keeps coming back for more until the nest is destroyed. Photo by The Cosmonaut, public domain, no changes made.

Other native terrestrial southeastern meso-predators include the **long-tailed weasel** and the **spotted skunk.** Both species are now rare across the landscape, however, likely diminished in population size to the point that they have little effect on any single prey

species. Black bears do play a major role in some southeastern ecosystems, but they are considered apex predators and not meso-predators, so they are not included in this discussion. Minks and otters are vicious and effective mammalian predators in the South, but they are typically tightly associated with aquatic habitats and therefore weren't discussed in this article.

By understanding which prey species each of the meso-predators focus their daily and seasonal energy on, and how effective they are across different habitat types, a manager can sometimes make better decisions about habitat.

Predator profiles can illustrate the importance of maintaining good cover for game species (adequate in both quality and quantity) and not just providing them with food resources. These considerations might also inform when and how to implement an effective predator control program on your property.

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The Effects Flooding Can Have on Your Lake

By Scott Brown

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Occasional flooding on your lakes and ponds can be a good thing. But if the dam fails, it can require a total rebuilding. Even though this lake is 36 acres, there was still approximately two-to-three acres of water left. It will have to be determined what species are left and how many of each to estimate restocking. A flood as extensive as this is both a flood and excessive drought situation.

All lake owners experience flooding of their waterbodies at some time, and depending where you are located, you may be experiencing it this spring. Not all aspects of a flood are bad or detrimental to habitat and fish. I have frequently said fluctuating water levels are a good thing for a waterbody, and spaced out over time are highly beneficial. Obviously if the dam fails and breaks and water is lost, this is not a good situation, but not one you cannot recover from.

Effects of Flood

Occasional floods are good for lakes, as long as fish are not lost or new species of fish or plants are not introduced from nearby waterbodies. If this does happen, there are steps to take that will help minimize their effects on the existing fish population. An occasional flood can reduce submerged and shoreline vegetation. High water covers areas that once had just a couple of feet, now have several feet of possibly dirty water prohibiting vegetation growth, and shading out/killing plants if the water remains high for an extended period of time. It can increase acreage and depending on the time of year, it can increase acreage of quality habitat which increases all fish numbers, particularly forage species.

Water quality will initially decline during a flood. Either organics are washed in, or as the water rises it floods nearby uplands, the dead or dying vegetation in newly flooded uplands (woods, pastures, agricultural fields) will lower Dissolved Oxygen (DO) levels. When flooding occurs quickly, stress or a fish kill can occur due to excessively low DO levels. If it happens slowly over time, things will remain stable. Water washing in from nearby swamps, woods or pine forests, may begin to drop pH (become more acidic), and needs to be checked shortly after the event. Turbidity (muddy water) can also increase during flooding depending on bare ground surrounding and upstream of the waterbody or from water washing in dirt from excessive shoreline erosion. Temporary muddy water does not negatively impact fish.

Soil may be added to your lake and reduce water depth in certain areas if erosion is an issue. At the emer-

An ideal flood, with a slow drawdown would be in the spring, after the bream spawn so they can head into the flooded upland plants to hide from these small bass that just hatched.

gency outflow, soil and small gravel can be eroded and wash downstream. Organics (dead plants, fertilizers, animal waste) from nearby agriculture lands can both reduce pond depth and increase poor water quality during and after a high-water event. An extreme event can damage the dam or cause it to fail, in which water and soil can be transferred downstream, along with organics if the lake is older. A temporary period of low visibility may occur due to suspended dirt particles washing into the pond or forceful inflow disturbing what has previously settled on the lake bottom.

As water rises, aquatic plants may begin to die off from being in too deep of water, while upland plants may also start dying from being inundated with water for too long. If water stays up long enough, aquatic species may begin growing in the new shallows of flooded areas. Floods on smaller waterbodies generally last shorter periods of time than droughts, so aquatic and/or shoreline vegetation may not be affected at all by short term flooding.

If there are a lot of trees and woody growth on the dam, it could fail during a flood and the lake partially or completely dewater. In this scenario, a full restart will probably have to be done from rebuilding the dam, to rebuilding the fish population. We recently saw this, over the past year with a hurricane knocking down trees on a dam in August, then a flood in October that blew the weakened dam out, causing a full rebuild. This is why we always say, do not allow woody vegetation (bushes and trees) to grow on the dam. In this example the trees were already mature when the landowner bought the place. Do not allow them to grow from the start, and your dam will last a lot longer.

As stated earlier, fish are exposed to new high-quality habitat for hiding and feeding, if shorelines are not manicured. If the water stays up for an extended period, fry and fingerlings will benefit from the added feeding and loafing areas. A flood just prior or during a nesting species spawning time can have devastating effects on the year class the flood occurs. Water suddenly too deep may have adults abort spawning or cause water chemistry issues unfavorable for successfully hatching eggs or fry surviving the critical first few days of life. If the flood is short term, those species may still be successful or try and spawn again when water drops to normal levels. The best time for a flood is just after all species have spawned and hatched, so those fry and fingerlings may benefit from the newly flooded additional habitat for hiding from predators and the abundant food source of insects normally not available. During excessive flooding, fish can be lost downstream as they swim or wash over the dam or through the outflow. Also, fish from surrounding rivers, lakes and creeks can wash/swim into your lake and get trapped in your waterbody once water levels drop. Some may be undesirable and/or exotic species that can cause issues in the future depending on the size of your waterbody and your management objectives.

If near the coast, flooding from a hurricane can push saltwater into your freshwater lakes and ponds through drainage pipes, canals, creeks or sheet flow across uplands. A quick change in salinity can stress and/or kill fish. The salinity change will last long beyond the effects of the high water, as for it to change, fresh water is needed to dilute the salinity, lowering it to its normal levels.

If the flood occurs in the fall, waterfowl and wading birds may benefit from the addition of flooded food sources normally not present. Depending on the newly flooded habitat, you may see bird

species never observed before or in greater numbers than previously witnessed.

What Can Be Done During or After a Flood to Help Your Lake

The most important thing to monitor during a flood event is the dam, if your lake has one. Inspect periodically looking for leaks on the backside at top and bottom. Make sure the outflow doesn't get clogged with debris and clean as necessary. Do not cover outflow with a screen or fencing to save fish, as it will clog even faster with sticks, leaves and debris. Watch the emergency overflow and look for erosion. Should the dam look like it may fail, opening any valves, adding a pump run by a tractor, diesel engine trash pump or siphon to get additional water out may alleviate pressure on the dam. Consider any landowners downstream that may need to be notified prior to a dam breaking. Feeders, aeration or fountain pumps should be monitored and moved to higher ground to prevent water damage if necessary. If a dwelling is nearby, make sure drainage pipes, ditches and canals are clear around it to avoid water back up causing damage.

During periods of excessively high-water, watch for escaping fish through outflows, over dam or sheet flowing across uplands. If excessive numbers of fish are observed washing downstream, restocking certain species or all species may be necessary. Fish entering the lake from nearby waterbodies will be observed in an electrofishing survey after the event is over and water subsides.

If during a flood you witness fish at the surface gasping for air and/or dying, the only thing that can be done is adding surface aeration. Aeration can be performed with large surface aerators run by tractor or electricity. Surface aerators agitate the water vigorously and raise dissolved oxygen levels to create areas where fish can congregate until the DO throughout the lake rises naturally. These are commonly used at fish hatcheries, but do work for temporary low DO fixes in a time of emergency. We have heard of commercial hatcheries loaning or leasing them out to landowners in an emergency. If the lake is too large, it probably will not help and you must let nature run its course and deal with the population change after the event. The only antidote for salinity intrusion is freshwater, usually from runoff after the event, and saltwater stops coming in, or from a well. When water begins to fall, flushing with fresh ground or well water can be done to help lower salinity on the back end to preserve more fish. This being feasible depends on the waterbody size and access to fresh water. The long-term fix is freshwater run off from rain.

This feeder stand was designed to allow the water to flood, and recede, while backing a truck up to it to fill no matter the water level.

This feeder is just high enough that water will flow over the dam before it floods the feeder.

Once the water recedes to normal levels, check water chemistry. Then recheck water chemistry in a month to document any changes and see if the parameters stabilize and return to previous readings. Salinity intrusion takes longer to subside than other parameters if relying with rainfall. Most parameters should return to previous levels quickly, but if pH does not, applying agricultural lime may be necessary to bring it to pre-flood levels if in an area where natural pH is low. Usually, only pH and salinity are affected long term from flooding, especially in the Southeast, or where a liming program has been initiated prior to a flood event. Turbidity should subside after the event and water should return to the clarity it was prior once surrounding shoreline vegetation fills back in where erosion occurred. Once the event is over, if muddy water persists, things can be done to reduce turbidity and increase visibility by dispensing gypsum, Alum or green hay.

Long term flooding may affect surrounding upland trees. They may become stressed and even lose leaves during or after a flood event, depending how long they were in water. Some trees can be in water for months without being affected, while others begin to stress in just a few days. However, do not cut down any trees that lost their leaves until they have had a chance to go through the following year green-up period. If after the following spring they do not get leaves, they can be considered dead and removed.

Continue to survey the vegetation after a severe flood. It is not uncommon besides fish to be introduced to your lake, for undesirable plant species to be fragmented (broken up) or uprooted from a nearby waterbody or upstream and transplanted in your lake after the water recedes. Particularly plants

When the water floods from another nearby lake, creek or river, you may get some new fish. This Bowfin (mudfish, grindle, cypress trout) would never be stocked into a manmade lake, but it got in from the recent flood from a nearby river.

Another flood prevention measure is to make sure any aeration pumps are above any possibility of being flooded.

Largemouth bass, for the most part stay in your lake, unless water gets really deep and easy for them to move into another water body, or the dam breaks and they wash out with all the water.

like Hydrilla, milfoil, Naiad and other submerged aquatic vegetation that can transplant from fragmentation (pieces breaking off and re-rooting elsewhere). As soon as any exotic or undesirable plant species are identified, treat them with herbicide or mechanically remove.

You should have an electrofishing survey conducted once water levels return to normal. Do not perform electrofishing surveys during above normal water levels, as the results may be less representative of what is actually present. During high water, fish are disbursed and render lower catch rates with electrofishing or angling. The electrofishing survey will help determine what species (new and old) are present, numbers and sizes of remaining fish. Stocking may be required. Grass carp are particularly susceptible to swimming/flowing out of a waterbody during a flood. Once water levels go down, surface sightings and electrofishing will help to determine how many should be added. If you feel numbers are adequate, no additional stocking may be needed. If a total restart is not needed, maybe just some forage species need to be added to help the remaining bass to keep growing.

If mostly undesirable fish species remain in your lake after a flood, starting the fish population over may be a necessity. A professional should be consulted to assess the fish population, possibly apply Rotenone (fish toxicant), create and implement a new stocking strategy. This is a rarity, but is required on occasions, especially when a nearby creek or river becomes part of your lake during the flood. After severe flooding, we have documented about every species from that particular region from nearby rivers in isolated private ponds hundreds of yards away with no connection.

After electrofishing, to see what is present, and each species' numbers. Stocking may be required of some species, or all species, depending on the flood severity. If some bass remain, stocking both small (2-inch) and large (4-inch) bream is advised. This way, some become immediate food and others begin reproducing and repopulating the lake.

And after a hurricane, we have had ponds temporarily flip from freshwater fish to exclusively saltwater species, until the salinity reverted back and the saltwater species perish. Then restocking with freshwater species is required. Do not restock any fish until water chemistry has been checked and all parameters fall within acceptable levels for the fish species being stocked.

An occasional flood or drought event is overall good for a waterbody. Waterbodies that never fluctuate develop water chemistry, sediment and vegetation issues more often than ones that experience occasional fluctuation. Flooding that occurs too often is detrimental to waterbodies and never allows them to reach their full potential, since they are always trying to recover. Floods and droughts can leave a lake owner feeling helpless, but doing the right things before, during and after help expedite the recovery and may even improve the waterbody.

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MEMBER FARM CREDIT

Wildlife Trends Journal Management Calendar

By Dave Edwards

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 President of Tall Tines Wildlife & Hunting Consultants, Inc. Contact him at TallTinesConsulting@gmail.com or 912-464-9328.

Plant chufa for turkeys.

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. Chufa can be planted in May or June in the Southeast, but most plantings occur in June when summer rain starts. Monitor chufa plots for competing grasses and weeds and apply herbicide accordingly to control. 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. Hogs can be so bad that I do not recommend planting chufa if you have high densities of hogs. They often demolish the area once they find a tuber. 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.

Identify and control invasive exotic plant species.

Many exotic species are very invasive and often outcompete native plants. This can result in undesirable exotic species taking over areas of your property which compromises 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

If adding more acreage in food plots is in your plans, summer is a good time to create new ones or expand existing plots.

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 Lesbedeza, to name a few. 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. 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 sometimes be complicated as well. However, properly applying herbicides is nothing to be afraid of. You simply need to understand how herbicides work, which plant species they control (or not control), and the techniques to apply safely and effectively. Efforts to remove exotic species is a never-ending process. As such, it is wise to continually monitor your property for exotic species and treat them as soon as possible.

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 a variety of millets (e.g., dove proso, browntop, Japanese, pearl, etc.), sunflowers, grain sorghum, corn, and wheat. For best results obtain soil samples and apply required lime and fertilizer before planting. A mistake commonly made is planting too late. Most dove field crops generally take between 50 and 90 days for seed to mature. Know the maturity period for the crop you are planting and plant accordingly. Keep in mind that soil conditions and rainfall should play a role in when crops need to be planted. That is, don't hesitate to plant when conditions are right even if it's a little earlier than you planned. 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. These strips also offer landing areas and access to seed once crops matures. 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 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, in some conditions, may be difficult to control. If the area you plan to burn has a heavy fuel load (thick 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.

Plan now for late summer trail cameras – Create mineral licks.

Corn is still the "go to" attractant if you are conducting a true camera census on a property. However, some states prohibit "baiting". If this is the case where your property is, establishing mineral licks is another way to get deer in front of cameras. Though it is not a strong enough attractant to conduct true camera surveys with accuracy, it does provide enough attraction to capture deer on camera that can be used to help make management decisions. To be effective, mineral sites must be established well ahead of time. Getting mineral sites established now is important so that deer are using them during later summer/early fall when you want to photograph them. 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 believe there are nutritional benefits of providing minerals for deer. You can create a mineral lick using commercial blends of dry minerals and/or placing mineral blocks in desired locations around your property. I have had great success getting deer to use commercial mineral rocks, such Bio-rock or Trophy Rock, throughout summer and into early fall. Using a mineral lick or salt rock is also a good way to reduce bear or hog problems commonly experienced when using corn to get deer in front of a camera. Deer tend to use mineral licks the heaviest from summer through early fall. 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.

Complete draining duck ponds and prepare for planting.

For those managing moist soil areas/duck ponds (i.e., 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 provide many different types of food sources (seeds and insects). By May or early June, drawdowns should be complete allowing native moist soil plants to establish and actively grow. 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 plan to start 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 seeds that will germinate the following year.

Establishing mineral licks is not only a way to provide nutrients to deer, but also provides a great location to capture deer on camera to assist with management decisions.

Although turkeys typically utilize chufa most in the winter and spring, summer is when you should plant them.

Depending on your goals, summer burning is a great tool to create exceptional wildlife habitat.

Dove field planting takes place in the summer. Timing is often determined based on the crops you are planting and the time required to produce seed.

Road maintenance – "limb" roads through herbicide applications.

Summer is a great time to "knock back" vegetation along interior roads of your property. There are essentially two methods commonly used – physically removing limbs & brush mechanically or applying an herbicide to kill vegetation along roadsides. If aesthetics are important to you, using loppers, saws, and other tools to physically remove overgrown limbs and brush from roads is the way to go. However, this method is labor intensive. When manually "limbing" roadsides I often use a tractor with a bucket and a gas-powered pole saw. An efficient set up requires 3-4 people. One person drives the tractor, one is in the bucket cutting limbs with the pole saw, and the others are behind dragging limbs/brush into the woods and cutting smaller brush that the tractor misses. Applying herbicide along roadsides is a great way to accomplish the same results, but as vegetation dies it will be visible along the roads for a period of time. That is, once the vegetation (e.g. brush and limbs of larger trees) are sprayed they will die turning brown. Though it is unsightly for a couple months, the herbicide method produces better long-term results. When choosing the herbicide method, it is important to make sure you use an herbicide that will kill the intended species you are trying to control and one that it is not "soil active" meaning that it gets transported through the soil and will kill entire trees or shrubs (unless of course this is your goal). I often use RoundUp (glyphosate) to "limb" roads. This herbicide only kills the portion of the tree or shrub you spray. That is, it does not kill the entire tree. Parts that are sprayed generally die within a few weeks or a month after the application and limbs will drop shortly afterwards. The herbicide method generally results in a cleaner roadside because it gets sprayed on all the vegetation within the zone you are trying to control, whereas using the pruning method, only the limbs that are physically removed are taken out. It is very important to read and understand the label of any herbicide before application. Limbing roads not only removes limbs and brush that scratch your truck and equipment, but it makes traveling roads safer by increasing visibility, allows more sunlight to reach the road to reduce time needed to dry, and it results in better quality wildlife habitat along roads due to the regenerating vegetation.

Install new food plots or expand existing ones.

From a landscape level, actively managing nature habitats should be one of the highest priorities for landowners desiring to enhance wildlife value of a property. Having said this, we all know the wildlife value created by dedicating land to aggressively managed food plots. Because all properties are unique with various habitat compositions, forest ages, diversity, timber management strategies, agricultural practices, and management on

neighboring lands it is impossible to provide a "cookie cutter" amount of acreage that should be dedicated to food plots. However, if adding more acreage in food plots is in your plans, summer is a good time to create new ones or expand existing plots. I personally like to plan and mark/flag areas needing clearing during winter months while leaves are off allowing me to see the area better. Another advantage of doing this during winter is there are no snakes, ticks, and chiggers to worry about! I then come back in summer to do the "dirt" work. Through years of experience, I am a big fan of using mulching machines when creating new food plots, expanding existing ones, expanding roadsides, or creating new trails. A mulching machine, also referred to as a forestry mulcher, uses a rotary drum equipped with steel chipper tools (or teeth) to shred vegetation. Heavy duty forestry mulchers can clear up to eight or ten acres of vegetation a day depending on terrain, density, and type of material. However, 5-8 acres per day is more realistic for most applications where I've used them. The advantage of using a mulcher is only needing a single machine to cut, grind, and clear vegetation verses needing a dozer, backhoe and farm tractor to do the same job. Mulching is essentially a one-pass and done type process. Because the vegetation is grinded into chips there are no debris or root piles commonly associated with dozer type clearing. Another advantage is mulchers are capable of clearing land of unwanted trees and brush with limited disturbance to soils leaving more nutrient rich topsoil and reducing the risk of erosion. From a location and design standpoint, I always consider soil quality, hunting stand placement, preferred wind direction for hunting, hunter access, and obviously what the land, terrain, and habitat will allow. Where possible I try to create linear shaped food plots. Deer, particularly mature bucks, feel more comfortable and secure using linear plots which results in more sightings and harvest opportunities while hunting. Examples of this may include a "turkey foot", "V" shape, or "hub and spoke" – aka "wagon wheel" shape. When expanding existing rectangular food plots, I often add linear "ears" or "fingers" that extend from the core food plot area. In this situation, deer often enter the fingers first then work their way to the more open plot. Regardless of the methods used to clear the land or the shape you design, summer is a good time to conduct this work. Doing so allows plenty of time for working and amending the soil in preparation for fall plantings.

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