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Wildlife Trends JOURNAL

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Cover Photo by Dave Edwards

Dealing with Pests and Nuisance Wildlife

By Ryan Shurette

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One of the most common predators of penned chickens is the Virginia opossum. They have a keen sense of smell and are strong enough to tear into wire pens and through screens. Fortunately, however, individual problem possums are almost never trap-shy, and can be easily caught in live traps and any type of foothold trap, whether it is a long-spring or coil-spring, concealed or not. Photo: Orsulak, USFWS, no changes made.

Most readers of this publication undoubtedly have a passion for nature and the wild creatures that inhabit the forests and fields around their home, farm, or property. Many of us just can't live without the wild creatures that we love. On the other hand, sometimes our feathered and furry friends can really get on our nerves. Whether it is a persistent pack of armadillos systematically destroying your lawn, or a hungry eastern cottontail eating down the container garden on your patio, sometimes wildlife can be a nuisance that must be dealt with. The level of frustration will of course vary from person to person, and each individual situation will dictate just how much grief a critter might cause you. Sometimes the inconvenience is minor and no drastic action is warranted. Take my resident Eastern phoebes, for example. A phoebe is a species of flycatcher that, in my opinion, deserves some respect. Like most all other flycatchers, phoebes are flying insect eaters, typically plucking gnats, flies, lacewings, and other winged delicacies out of the air in mid-flight. But instead of retreating to the warm and bountiful tropics of the Caribbean and Mexico like other flycatchers, when the weather turns chilly in the fall, my denizen phoebes stick it out here and endure the Alabama winter. As insects get more and more scarce in the cold wet months, they turn to berries and whatever else they can find to survive. They seem to be tough and tenacious birds that don't mind working for a living. So, when they begin to build their untidy nest each (and every) spring under my deck porch, I tolerate this minor inconvenience. I wipe their droppings off my grill and from the log walls of my house, and I seldom even utter a curse word. Generally, after the first brood fledges, our phoebes will even construct a brand-new nest on the other side of the deck, again tucked safe and dry under the porch and way back next to the walls, to raise yet another brood, and create yet another huge mess. After the second brood fledges, I generally pull the nests down, sweep up all the nesting debris on the deck, and tip my hat to the new and now large assembly of phoebes that swarm the yard. In the back of my mind, I know that another winter will be right around the corner and I am aware of the hard times this means for the hard-working phoebes. I guess this is the reason I don't mind the annual bedlam and tolerate the inconvenience until they have raised all their young. I do not share the same truce with Southern flying squirrels, however. They like to chew into wooden eaves and damage things that can be expensive and therefore they are met with all-out war. You basically have two options… tolerate or

eliminate! I am obviously making light of these situations, but in reality, animal damage can be a pretty serious subject and often it can result in costly repair bills, or at the very least some of your time, energy, and frustration. In this article we will take a look at some of the most common nuisance wildlife species and scenarios, along with some potential control options, and legal considerations when appropriate.

When it comes to the subject of animal damage there are certainly some species that have widespread significance regarding agricultural and public health systems. Feral pigs for example are estimated by the USDA to cause $1.5 billion in damages to our crops, livestock, infrastructure, and natural resources. And they can certainly compete with the native game species on your property. Japanese beetles, locusts, aphids, and other insect pests can be even more destructive, costing untold amounts in crop losses and control efforts. But these are not the species we will focus on in this discussion. Pigs and their control have been discussed in detail in previous articles and therefore we will not beat a dead horse. Nor will we delve into the world of largescale agricultural pests and their control. We will instead focus on those critters that you might find yourself dealing with from time to time around your home or farm. By understanding the biology of the animals that are causing the problems, we can often find an effective solution for their control.

Although some folks may not consider insects as wildlife, they most certainly are part of the wild animal kingdom just outside our doors. There are a great many beneficial insects and we have discussed the value of native pollinators and even how to manage for them in previous Wildlife Trends articles. However, insects and other invertebrates sometimes like to try to join us inside our homes. In fact, most pest calls to animal exterminators in the US involve insects. Therefore, we will quickly mention a few common insect problems and then move on to those issues involving mammals, reptiles, and birds. As opposed to offensively attacking insect populations to lower their numbers (as is commonly done by city and county governments to combat free-living mosquitoes), physical and chemical barriers are the two main categories of defense when dealing with most insects of the home and farm. Simple physical barriers like metal flashing, plastic sheeting, screening, foam insulation, and caulking can be extremely effective against many insect and arachnid pests like ants, roaches, and spiders. If they can't squeeze through the cracks, it stands to reason that they can't easily enter your dwelling. Chemical treatment is also obviously a very popular control strategy. With chemical control products, the biological and physiological investigation has been done for you. Years of research regarding the chemical toxicity of compounds and their effects on target and non-target species go into product design and testing. Most insecticides work by disrupting metabolic or neurologic processes in the target species. We simply apply them in accordance to the directions on the label (just like herbicides, animal pesticides have label directions that must be strictly followed by law) and they generally repel or kill the target outright.

Termites are one home-damaging pest that comes to mind. While chemical extermination is the go-to preventative practice and remedy, it is also worth noting that termite issues are usually linked to moisture, and more specifically, how close moist soil is to the wooden parts of your house or building. In nature, Eastern subterranean termites feed mainly on dead and downed logs and limbs, and these resources are typically moist and humid since they are in constant contact with the ground. Termites are soft bodied insects that are susceptible to desiccation in open dry environments. To mitigate exposure

The strong ammonia odor from the droppings is usually the first clue that bats might be roosting in a home or building. Since many bats are similar in appearance and some are federally listed as threatened or endangered, it is best to simply evict them via exclusion. Big brown bats are shown here. Photo: R. Shurette

Eastern carpenter bees are a common threat to wooden homes, barns, and out-buildings. They can be treated with an insecticide containing Lambda-Cyhalothrin, which disrupts the rudimentary nervous system of the bees and leads to paralysis. Photo: R. Shurette

when they venture out of the ground, they build mud tubes from the moist soil up to wooden structures (food), and so simply by maximizing the distance between the ground and any wooden features, you can effectively discourage them. **Eastern carpenter bees** are another common threat to wooden homes, barns, and out-buildings. This species can be commonly seen in spring flying around any wooden building. Males of this species do not sting and they can be distinguished from females in that they have a prominent whitish-yellow spot on their face. They tend to sit and hover in one spot, guarding a small patch of territory and hoping to mate with the solitary nesting females. Carpenter bees, although similar in their appearance to bumble bees, are much different in their ecology. Carpenters bore tunnels in wooden eaves, fascia boards, rafters, decking, fence posts, and pretty much any other dry wooden structure, especially in pine. In this network of tunnels and chambers, the female deposits the pollen they collect from nearby flowers into a chamber, and then lay a single egg in it. After hatching, the bee larvae feeds on the pollen and grows into an adult, before emerging from the nursery tunnels. Over time this boring and carving can skeletonize wooden components and lead to expensive repair. Control of carpenter bees can range from hanging bee traps (fake tunnels leading to a glass jar) to killing individuals with a tennis racquet (which can be great stress relief). However, one effective control product I have found is a controlled release Lambda-Cyhalothrin insecticide (like Cyzmic CS). Lambda-Cyhalothrin disrupts the rudimentary nervous system of insects and leads to paralysis. Just mix the product with water and apply to the walls and eaves of the building. The application seems to last for about three or four weeks, which is usually long enough to curb the initial wave of these damaging insects. It is also effective on other insect pests, including wasps. Wasps around the farm or property are a constant nuisance and they can be dangerous for young children or people with allergies. Besides preventative treatment with insecticides like the one we just mentioned, you can also inspect frequently used areas on a regular basis, and treat nests as needed. If you have no wasp and hornet spray, try mixing warm water with dish-washing soap (like Dawn) in a cup, and dousing the nest and its residents with it quickly. This homemade cocktail is non-toxic to humans and surprisingly deadly on wasps. Another trick when dealing with wasps in property gates, post locks, and other areas where you will need to blindly put your hands from time to time, is to place a mothball in the cavity in spring. This will usually keep wasps out all summer.

In addition to insect pests, there are a variety of mammals that can be a nuisance for landowners. **Rodents** can be especially annoying. Although they can carry diseases and spread potentially harmful germs, their pestilence is largely due to their insatiable habit of chewing and gnawing. Whether it's the plug wires on your bass boat or the injector wires on your wife's new car, they seem to have a taste for electrical components. Most folks are familiar with catching a house mouse with a rat trap and peanut butter or bit of cheese. Many small rodents can be outdoor pests also however, and sometimes their elimination requires strategic planning. Inside a home or barn, the most likely culprits will be the **common house mouse** (*Mus musculus*) or one of the two main species of imported rats (*Rattus norvegicus*, and *R. rattus*), all of which are native to Europe and Asia. If crimes occur well outside the home, the perpetrator is likely not a house mouse or imported rat, but probably a native species of **mouse,** a **squirrel**, or a **chipmunk**. Wire chewing in an automobile, for example, is often caused by a **native deer mouse** or **white-footed mouse** (*Peromyscus spp.*).

Outside the home, native deer mice or white-footed mice (Peromyscus spp.) can cause damage to automobiles and equipment by chewing electrical wires, fuel lines, and other components. Strong smelling odors (like peppermint oils, or fragrant dryer sheets) might be used to deter their mischief in some cases. This may or may not be effective, however, and trapping or baiting with rodenticide may be the only way to stop the problem.

These offenses typically occur in closed dry places where the animal attempts to construct a nest or cache food stores. By intentionally exposing these areas to the elements (like raising a car hood overnight for a few nights in a row, or even spraying the engine with water from a garden hose on a cold night) you can sometimes dissuade the rodent by showing it that this is not an ideal place to nest. Strong smelling odors (like peppermint oils, or fragrant dryer sheets) might also be used to deter their mischief in some cases. This may or may not be effective however, and trapping and baiting with rodenticide may be the only way to stop the problem. Anticoagulant baits and traps (both kill traps and sticky traps) are typically placed in the immediate vicinity of the affected areas. Anticoagulant poisons like Warfarin, Bromethalin, Difenacoum, and Chlorphacinone inhibit the liver enzyme that recycles vitamin K, which is vital in clotting blood and preventing vessel bleed-out. One obvious downside to rodenticides (other than the small risk they pose for pets and nontarget animals) is that the victim often dies somewhere in an inaccessible place in our automobile or home, causing an unpleasant odor, and us to go on a sniff search through vents and cover panels. Squirrels can chew into home ventilation and other systems, and chipmunks can tunnel under sidewalks and foundations causing flooding and masonry issues. Live trapping these rodents in small cage live traps can be effective, but it usually takes a lot of time and effort. Exclusion with metal flashing, heavy screening, or other chew-resistant materials may be a better strategy if the affected area is confined to a certain location. The same anticoagulant poisons mentioned above are also sometimes used for problem squirrels and chipmunks. Another type of rodenticide with the active ingredient, Zinc Phosphide, can used as a bait as well. When ingested, this compound reacts with stomach acid to produce Phosphine, a highly toxic gas that kills the mammal that ingested it, typically much faster than anticoagulate poisons. Some products containing Zinc Phosphide are marketed as "poison

Anticoagulant poisons like Warfarin, Bromethalin, Difenacoum, and Chlorphacinone inhibit the liver enzyme that recycles vitamin K, which is vital in clotting blood and preventing vessel bleed-out. Photo in Public Domain

Game cameras can provide valuable information about a problem animal, including its identity and habits. Sometimes just cleaning up trash and refuse, removing cat or dog food, and sealing grain or feed stores can make your property unproductive and boring for meso-mammal pests, and they will leave your area for a place that is easier to find a meal. Photo: R. Shurette

peanuts" and are also used in underground applications for moles and gophers. Many Zinc Phosphide products are restricted use pesticides and require a license to purchase or use. Use caution and common sense when dealing with any and all pesticides.

For larger nuisance mammals, using pesticides is less common, and employing deterrents, exclusions, and direct removal is more popular instead. **Beavers**, for example, are not typically a direct threat to homes or buildings but they can cause significant damage to culverts, piers and seawalls on lakes and ponds. Beavers can negatively affect roads and transportation routes on farms and properties. They can also effectively cause losses to timber resources by flooding pine plantations and other timber stands for long periods of time. They use the standing water as escape cover and are largely nocturnal. In the state of Alabama alone, beavers were estimated by USDA Wildlife Services to cause about $19 Million in lost timber value each year. The trees are cut (gnawed) down for food (cambium and inner bark) and for building materials. When a site along a stream, creek, or pond is selected as a preferred site, the beavers will look to create and expand suitable habitat by dam building and flooding, and they are often hard to eliminate. Although they play important roles in many ecosystems across the US (and even create habitat for some endangered species), they must be dealt with when they are costing the landowner big bucks. Most commonly, managers will tear out dams and implement a trapping program (typically using lethal body traps like #330 conibears). Conibears are set in runs, slides, dam overflows, trails, and lodge entrances. It might take killing quite a few before the dam reconstruction ceases. Landowners are generally allowed by law to trap nuisance beavers any time of the year on their own land but this can vary from state to state. Beavers can also be shot at night with the aid of a light but special permission from the local state wildlife agency is often needed, depending on the state. If a landowner is not interested in trapping beavers themselves, another option is to hire a trapper, or to contact the local USDA Wildlife Services office. Wildlife Services specializes in animal damage control and they can assist landowners (generally through cost share contracts) with advice and on-the-ground control of nuisance wildlife like beavers when they are causing damage to agricultural crops or timber resources.

Other mammalian pests (like possums, raccoons, and coyotes) can also be trapped, in some areas without restriction, and in some locations with the appropriate permits. Game cameras can provide valuable information about a problem animal, including its identity and habits. Sometimes just cleaning up trash and refuse, removing cat or dog food, and sealing grain or feed stores can make your property unproductive and boring for meso-mammal pests, and they will leave your area for a place that is easier to find a meal. When protecting domestic poultry and small livestock, it is almost always more effective to barricade and exclude predators, rather than to try to trap them all. Outside the farm in wild habitats this is obviously not possible, and trapping is usually the only option in reducing their populations. One of the most common predators of penned chickens is the **Virginia opossum**. They have a keen sense of smell and are strong enough to tear into wire pens and through screens. Unchecked, possums can take out an entire flock of chickens if given enough nights of freedom. Fortunately, however, individual problem possums are almost never trap-shy, and can be easily caught in live traps and any type of foothold trap, whether it is a long-spring or coil-spring, concealed or not. **Raccoons** seem to be a little wiser than possums, but they can generally still be caught readily in most situations. Sardines or canned tuna fish makes a quick and easy raccoon bait. **Coyotes**, on the other hand, can be a real challenge to catch. In my experience it is usually best to use a well-bedded and

concealed coil-spring foot-hold (#2 to #4) for coyotes and eliminate as much human scent as possible at the set. I think most of the time the canid still can detect the human scent if the set is fresh, but this becomes less of an issue if the set is close to an area where they are used to smelling humans. We won't go into a detailed trapping discussion here but using a good gland lure is another effective tool for coyotes and foxes when trapping them out across the property. For problem animals that are regularly showing up at chicken houses or backyards, the lure is probably not needed. If you are having trouble dealing with rogue coyotes, talk to your local coyote or fox trapper and they might part with a trick or two.

Armadillos are now abundant in many areas of the country (like the Southeast) that were, until recently, outside the species' natural range. Armadillos dig and seek shelter in burrows, where the females give birth to four identical quadruplets. They can also make a mess of lawns and their damage is easily identified as a linear series of rooting trails and divots, which are made as they search for grubs, worms, and other invertebrate prey. Fencing with a sturdy bottom that extends into the ground is effective for exclusion. A list of repellants are available and most claim to dissuade armadillos by overwhelming their acute sense of smell. Most of these repellants come in the form of granules containing one or more of the following ingredients: dried blood, putrefied eggs, garlic oil, castor oil, peppermint oil, and white pepper. Vinegar is another home remedy that some people claim is effective. Armadillos can also sometimes be live trapped using overripe fruits or earthworms, but often the simplest solution is to shoot them out of your yard at night with a .22 or similar caliber rifle, or shotgun. They are usually oblivious to humans more than about 20 or 30 yards away from them. But again, make sure that kind of firearm use is within the local laws and regulations.

While hunters and wildlife enthusiasts invest countless hours and spend big money to chase and watch **whitetails**, it can be very frustrating seeing the effects of their nighttime raids on your garden. Some gardeners use visual scare tactics, and some use the olfactory deterrents like dried blood or human hair (collected from barber shops), but these are usually not very effective for long periods of time. Deer damage permits can be requested for significant agricultural damage, but usually the most reliable remedy for small gardens and backyard ornamentals is exclusion using fencing. Deer can jump vertically over fences that are up to 8ft high. However, they cannot reach that height if the width of the fence is extended. Dr. Leonard Perry of the University of Vermont recommends using an angled fence (about 5 ft high) to increase the horizontal distance required to enter the enclosure. Flexible landscape fencing (plastic material) can be very effective in constructing deer-proof perimeters, as well as solid decked fences that the deer can't see through. According to Dr. Perry, even though they might smell food, if they cannot visually discern danger on the other side, they generally wont jump into the fence. Electric fences using one or more strands of wire can be effective as well, used alone or in conjunction with a smell deterrent. Some have had good luck "teaching" deer to avoid their electric fence and garden by wrapping tin foil wiped with peanut butter or other attractant around the electric wire in a couple locations, with the intent of delivering a strategic shock to the nose or tongue. Flagging along the electric fence can make it more effective, as well as protecting humans from accidental contact.

Bats in homes and buildings can be challenging to deal with, and they are responsible for a big percentage of wildlife exterminator's calls. Some bat species both hibernate during winter, and roost during summer, in caves. But some, like the big brown bat, will readily hibernate and roost in buildings. Bats are beneficial to humans in that they eat an amazing quantity of mosquitos and other insects, but large hibernating colonies (or summer roosting colonies) can cause problems. Only a small percentage of bats (typically less than 1%) carry rabies, but the buildup of guano inside an attic or under the eaves of a home is not ideal. The strong ammonia odor from the droppings is usually the first clue that bats might be roosting in a home or building. Since many bats are similar in appearance and some are federally listed as threatened or endangered, it is best to simply evict them via exclusion. Similar to the methods we have already described, you can use plastic sheeting or flexible screening to cover suspected entry and exit cracks and crevices, so that the bats can leave out in the evening, but cannot get back into the house the following morning. Once you are sure all bats have been evicted, you can permanently seal the entryways. Since bats can squeeze into very small spaces (1/2 inch is wide enough for them to slip through), this process might take more than one phase, before ensuring all alternate entries have been covered.

Depending on the location and condition of habitat around a yard or farm, **venomous snakes** might become an issue for landowners. Healthy, diverse wildlife

Healthy, diverse wildlife habitats tend to attract snakes of many species. Farm ponds are very popular for aesthetic and recreational fishing reasons, but almost all of these will from time-to-time harbor cottonmouths in the warmer months, due to the fish and amphibian prey base they also host. Photo: USFWS

habitats tend to attract snakes of many species. Farm ponds are very popular for aesthetic and recreational fishing reasons, but almost all of these will from time-to-time harbor cottonmouths in the warmer months, due to the fish and amphibian prey base they also host. Although an actual bite to humans is uncommon, their presence does and should make one wary for them, and "kill on sight" is the typical means of dealing with them for most folks. Cottonmouths and other venomous snakes are not protected by law in most states if they are threatening your safety or are present in your home or yard. In reviewing the laws and regulations for each state regarding protections for snakes, however, I found a surprising amount of variation. There are obviously a few federally protected species (including but not limited to the Eastern indigo snake, Black pine snake, and Eastern Massasauga rattlesnake) that are protected regardless of the state, but otherwise some states have laws protecting all snakes, non-venomous snakes only, and others have no laws protecting any snake. As far as non-lethal methods, snakes can be captured directly and moved, and they can sometimes be deterred by removing hiding places (wood piles, rock piles or walls, etc.) and maintaining a clean and low-cut grass lawn in frequently used areas. Some landowners keep guinea fowl for serpent control. Snake repellant products are also available. Most of these commercial repellants contain naphthalene, the same ingredient found in moth balls. Vinegar, sulfur, and ammonia are also reported to be somewhat effective at dissuading and repelling snakes around a home or garden.

A wide variety of avian wildlife can

also cause problems around the home and farm. **Birds** are a diverse class of animals, and therefore they can generate issues in a plethora of ways. Blue herons for example can endlessly pluck fish one by one from a managed fishing pond, while red-headed woodpeckers might be drilling holes in the wooden siding of your farmhouse. Canada geese are now overly abundant in many areas in the country and their profusion can lead to a buildup of feces and potentially unsafe conditions in concentrated locations. Large flocks of winter roosting blackbirds can pose the same threat in many areas. Just like some of the other wildlife we've mentioned, many birds are protected by federal (Migratory Bird Treaty Act, etc.) and state laws, which means killing them outright might not be the best option. Others (like European starlings, English sparrows, Rock doves (pigeons), crows, and some blackbird species) are generally not protected in most states and can be shot at any time. Scare tactics using visual deterrents that blow in the wind (like flagging, pie plates, clothing and string) and sound devices (like horns, sirens, and gun blasts) can work to some degree depending on the species, but for larger more significant issues, animal damage permits can sometimes be obtained from USDA Wildlife Services. These permits often allow the killing, trapping, or otherwise extermination of problem birds or other wildlife. Examples of such damage permits are typically issued for birds causing commercial losses (like birds of prey taking poultry, or roosting bird colonies causing damages or impacts to businesses) but on occasion these are also issued to individual landowners for nuisance birds. Contact your local Wildlife Services office for more details. I have found that the old-time method using effigies (hanging dead individuals of the same species) can have a significant effect on some birds, and yes it actually does keep crows out of cornfields or gardens for a period of time. This tactic is sometimes used (under permit by Wildlife Services) with large groups of turkey vultures and black vultures roosting and causing a mess on radio and cell towers. A vulture is generally mounted by a taxidermist (which lasts much longer than a dead individual) to mimic an unlucky victim that has died from a broken or entangled wing or foot. This evidently gives a bad vibe to others and they will avoid the tower and the possible dangers there.

There are many tactics that may be employed when waging war on nuisance animals. But sometimes the best thing to do about unruly wildlife is to do nothing at all. Some landowners and wildlife managers are not bothered in the least by Yellow-bellied sapsuckers ringing their apple and plum trees with sap well rows. They get out their binoculars and enjoy them. Nor do they stress when the squirrels blitz their pecan tree in late summer, taking more than their fair share of the bounty. They just smile and buy more pecans at the store if there are none left to make pies. Again, we have the choice of elimination or toleration, and sometimes the least stressful approach is actually the latter. If action is required however, remember to consider the biology and natural habits of the target animal when formulating a plan.

Is Moving Fish Worth It?

By Scott Brown

Scott Brown is a Biologist and regular contributor to Wildlife Trends Journal with over 35 years experience in research and managing natural resources throughout the Southeast. Scott founded Southern Sportsman Aquatics & Land Management in 2007 and now has clients from Texas to Florida and into the Carolinas. Contact him at tazmanlabs1@gmail.com or (336) 941-9056.

With an oxygenated hauling tank and shocker boat in the foreground, this landowner wanted his quality bass moved from this lake to another on his property while they drained and repaired the leak as to not lose his prize largemouth bass and other large species he didn't want to perish during the lake dewatering.

On occasion, we receive requests from clients to move fish from one waterbody to another for various reasons. Usually, it is to move forage or quality sport fish from an unused, deteriorating or soon to be filled in lake to a regularly used waterbody that is being managed on the same property. Another reason is some landowners have small ponds designated as forage ponds where they stock a forage species without bass or other predators present and feed, hoping they naturally reproduce to later move some to a bass or crappie lake and increase forage and bass or crappie growth rates.

Before moving any fish, check your state fish and wildlife regulations on moving the species you want to move. Some states prohibit the movement of non-native forage species and some prohibit the movement of sport fish or may require a permit. States are becoming more protective of local genetics particularly in largemouth bass and creating laws to reduce the movement that may infringe on a local gene pool. This is becoming more prevalent with the largemouth bass after decades of stocking Florida bass in other states and now it is out competing local strains of black bass. Make sure you can easily identify your target species. Moving a tank full of green sunfish, warmouth or gizzard shad while you think they are bluegill, longear sunfish or threadfin shad is a big mistake, but it happens regularly. These recommendations are only

for the moving of fish within your own property lines when legal, not from other properties or local public waters.

Before moving any fish, determine what the benefit to the receiving waterbody is and what the effects to the donor site's fish population will be. Many times, we see a deteriorating pond full of golden shiners, small bream, mosquitofish or occasionally threadfin shad that either has a water quality issue or vegetation issue preventing the largemouth bass from reaching their full potential or possibly no predators present at all. Another instance is some quality largemouth bass are discovered in a waterbody rarely fished or not easily accessible to angling. If the donor pond is not being used or managed for quality fisheries, it may be a situation of moving fish will benefit another waterbody. Does the new waterbody have forage for the species being relocated? Does the new waterbody have the required habitat for the new species being relocated? Too often we see landowners moving fish within their lakes unsuccessfully, because the receiving site does not have the species requirements (food and/or habitat) to be successful. Also know whether the species you are moving is hardy or fragile. Generally, the larger individuals are hardier, with largemouth bass and bream being fairly hardy, while black crappie and threadfin shad most frail during collection and transport. Channel catfish are the hardiest of all fish that may be targeted to move.

Consider when moving predator species such as largemouth bass or crappie that there are is enough forage for the new members of the fish population and ones already present to survive and/or flourish. Know this information even prior to ordering fish from a hatchery, they may not ask prior to stocking. Unfortunately, some hatcheries may not discuss your possible mistake and stock as you wish, knowing the action will not be successful. Landowners and their property managers do not look at the forage available for the species being moved, they only see a shortage or void of that species and not look deeper into the aquatic ecosystem to make sure they have plenty of food and or habitat for the movement of fish to be successful. Just introducing a species or adding more of a species does not mean in a few years that species will be present or present in the numbers and sizes desired. This is never seen more frequently than with threadfin shad. They need a planktonic algae bloom (green water) to survive. The planktonic algae is what they eat their entire lives, so if moving from a green lake to a crystal-clear lake, they will not survive. They will provide a short period of good forage for the largemouth bass and crappie, but will disappear whether consumed or not over time.

Once the decision is made to move a species, figuring out how to collect them is the next step. Minnow traps, seining, trawling or electrofishing are all good methods to collect fish. Most landowners do not

It is very rare to add largemouth bass to an existing lake, but not uncommon for a landowner to build a lake and want it stocked with sub adult largemouth bass once the forage base has been established to handle the new predators.

Sometimes the common minnow trap is overlooked as a sampling tool or fish collecting device. Although it collects small individuals, baited it works well collecting small bream, mosquitofish and golden shiners.

Stocking larger bream to prevent predation and establishing a brood source may be required, because the predators have reduced numbers and there are no large forage individuals present to naturally reproduce.

own an electrofishing boat or trawl, but those methods can be done by a qualified lake management company. To remove large bass, electrofishing works best. Threadfin shad are mostly in open water and can be collected with a trawl or in some unique situations with an electrofisher. Bream and golden shiners can be collected with electrofishing, minnow traps and seines. The work should be done in spring, fall or winter in the Deep South when water and air temperatures are cooler and fish will be less stressed during the process. I have successfully moved threadfin shad in Florida in mid-summer using ice to cool them down during transport, but it is not recommended, mortality for you will be high and can be easily avoided other times of the year. Electrofishing can be done in any water depth the boat can float, around any habitat for most species. In some instances, it does not work well for open/deep water species. Baited minnow traps can also be successful in most situations except in deep water, but the fish you are targeting are small and will be near the shoreline close to or in vegetation or around brush piles. Baited minnow traps prove successful for small bream, golden shiners and mosquitofish. A seine requires a clean, hard sandy or gravel bottom, usually near, but not in, vegetative or woody snag habitat. A seine can be used to collect bream, shiners, and small bass. A trawl is drug behind a boat in open fairly deep water that can be used for crappie, silversides (glass minnows) or threadfin shad.

Handling, transporting and stocking the fish requires some care to assure you finish with a high survival rate. Depending on collection method, the captured desired species needs to go into an aerated tank or temporary bucket with salt added to the water. Freshwater fish under stress begin moving water through their body by osmosis causing them to flush out body salts, which is why salt needs to be added to every new container the fish is stored in. All water needs to come from the waterbody they are being removed from, this will reduce stress while being moved from one container to the next and during transport. Once fish are removed from its container (bucket, shock boat tank or hauling tank) it needs to be replaced with fresh water for the next batch. When fish are crowded, they regurgitate, defecate and put out toxins that deteriorate the water quality in the tanks, which is why we start with fresh water every time. When electrofishing, several fish are dipped and placed into the salted aerated tank of water on the boat, then they are moved into a hauling tank in a truck bed or on a trailer on shore. An air pump is sufficient while fish are in the boat tank, but it is recommended to use bottled oxygen in the large hauling tank on shore. Once the onshore hauling tank is full of fish, they can be transported. When collecting small fish with seines or minnow traps they can be quickly removed from the trap and

placed into buckets with saltwater temporarily until taken to the onshore salted aerated hauling box. Research recommends hauling no more than fingerling (1-3 inches) largemouth bass or intermediate (1-4 inches) bluegill, redear sunfish, golden shiners or threadfin shad than about 0.3 lbs./gal. of water. Sub adult bass/adult bream (5 – 12 inches) can be hauled at a rate of 1.5 lbs./gal. of water. Adult largemouth bass can be transported 2 - 3 lbs./gal. of water. While trying to fill the hauling tank with fish, keep an eye on them. If between collections is taking too long, haul them and stock into the new site while others continue trying to collect more fish. Take water temperature in the hauling tank and donor lake when you start and monitor as time goes. If the temperature rises more than a couple degrees above the lake water temperature, transport, temper and stock them them.

Once the hauling tank is full of fish they are quickly transported to the new waterbody. Once there, take a temperature from the tank and the new stocking lake. Unless the waterbodies are connected, we recommend tempering them a little while, even if the water temperatures are identical. There may be a difference in pH or other water chemistry parameters that neutralizing will increase success. If there is a big temperature difference, temper them until the temperature in the tank matches the lake water. **Tempering** is putting water from the lake the fish are to be stocked into the hauling tank. Let it flow out the top or open the valve on bottom just enough to let water out at the same rate water is flowing in. A net may be required to drape over the valve opening inside the tank to prevent fish from coming out. This may only take 5 or 10 minutes (may take longer), but

When transporting fish, have a good aeration system. In smaller tanks a good air pump is sufficient, but in larger tanks, bottled oxygen works best, both with a stone diffuser or some kind of small bubble making end(s).

helps reduce stocking shock and improves survival rates. It is well worth your time to temper the fish to assure your efforts are not wasted and survival is high. This technique should also be conducted

Know your fish species forage requirements. This lake looks like a good candidate to receive some threadfin shad.

This lake went almost dry before the quality largemouth bass and small and large bream were relocated by seining. The reason small bream were also moved was forage for the newly relocated largemouth bass.

This lake was dry a week after this photo. Several quality largemouth bass, bluegill, redear and black crappie were collected and relocated to another of the landowner's many lakes on his property. Instead of allowing 22 acres of good fish to die, they were spread out in other waterbodies where plenty of forage was present.

when the hatchery brings you fish, but is not always conducted. You are paying for the fish, request it. There seems to be more harm to fish being moved from cooler water to warmer than the opposite, but tempering is important. Once the water temperatures are the same, the fish can be placed in their new waterbody using long handle dip nets, buckets or opening the valve and shooting them into the lake.

If stocking forage fish, stock amongst vegetation or woody structure to give them a chance to survive beyond a few minutes. I was tempering shiners once into a quality largemouth bass infested lake, and small bass were trying to grab shiners through the clear plastic bag while still in the bags during tempering and even darting into the bag when I was letting them out. Although there was high instant mortality that day, we overstocked with a number high enough to assure future generations of shiners for bass forage would exists.

We rarely partake in the relocating of fish from one waterbody to another, but in some instances, it makes sense and does not hurt anything in the environment. More and more clients are designating a small pond on site as a shiner or bream pond. They kill it out with Rotenone, add an automatic fish feeder or two and restock it with only shiners or bream, and annually or bi-annually remove a bunch and stock into their trophy bass lake to supplement forage, maximize bass growth and reduce hatchery truck visits in a waterbody that probably could not grow largemouth bass that fast without that help. If you are considering building a pond just for forage production purposes, consider how you will get the fish out yourself using minnow traps or seines, or calling a professional to trawl or electrofish them out when you want.

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Fired Up for Bobwhite

By Dr. Theron M. Terhune

Dr. Theron Terhune is a Wildlife Biologist and Research Scientist at a privately-owned property near Wilmington, NC and a Research Fellow at the Spatial Informatics Group – Natural Assets Laboratory (SIG-NAL). He received a B.S. and M.S. degree from Auburn University in Wildlife Science and a Ph.D. in Forestry and Natural Resources at the University of Georgia. Theron has studied gamebirds and fire-affiliated species for more than 20 years during which he has published 65 scientific articles in peer-reviewed journals and 34 popular magazine articles.

Recently I have been blessed to spend time camping at various campgrounds while self-isolating and steering clear of COVID-19. It was common at these campgrounds to observe people staring aimlessly into a blazing campfire. There is something about fire that is simply intriguing and captivating. When you gaze at the leaping flames of a campfire, you are observing not just an object, but a process – a chemical reaction. In a similar vein, prescribed fire is not just an event but an ecological process. Herbert L. Stoddard opined the Northern Bobwhite Quail – the Firebird. Yet, paradoxically, fire is a destructive force by nature – it must destroy in order to feed itself. So, why is the Prince of Gamebirds the Firebird?

For quail, the wrongly used fire is capable of damage, but the real destruction begins when fire is excluded from an area. Fire has historically been integral to forests and ecosystem health – we have yet to find a replacement functionally and ecologically for fire. In fact, fires first covered prodigious areas before the days of roads and other anthropogenic influences, but more recently it is estimated that only 5-10% of the landscape that once burned regularly, in the late 1800's, is burned today (Pyne 1997). Fire is one of nature's most essential agents of manicuring the landscape and habitat for wildlife. In many ways, however, humans have disrupted the natural environmental link with fire. This has resulted in a maldistribution of fire on the landscape resulting in an increased risk of wildfire and decreased application of controlled burning.

Nevertheless, fire remains the most economical, effective tool for anyone hankering to promote wild quail. Carefully controlled fire (or prescribed burning) used at the proper frequency, season and spatial extent (or scale), and under proper weather conditions, for the purpose of regulating cover and increasing food supply for wildlife is a necessary tool for much of the southeastern woodlands. It is an essential feature in any sound bobwhite quail program. But the use of fire can be and often is underutilized with relatively scant positive results, or it can be overdone with adverse effects on habitat and bird populations.

Research has shown that quail profit from fire such that its proper application will foster a balance of habitats needed for meeting annual, seasonal and daily requirements. Bobwhites are comparatively weak scratchers and so need considerable

amounts of bare ground to provide direct access to food. The absence of fire, however, can quickly lead to increased mid- and over-story canopy cover reducing the quality of ground cover for bobwhites and other fire-adapted species. Furthermore, improper frequency of fire may yield dense wire grass, broomsedge, or accumulation of debris and pine needles which may become a detriment to feeding and an impediment to mobility for young chicks. In addition, bobwhites also require roosting, nesting and feeding cover that is structurally open, at ground level and up to a foot above, with protective cover from winged enemies above. In general, managing toward the ***Rule of Thirds*** will help to ensure adequate distribution of these habitats and vegetation structure optimal for quail. The ***Rule of Thirds*** involves maintaining an approximate balance of native (bunch-type) grasses, legumes/forbs, and shrub-scrub in upland sites being managed for quail. This balance can be achieved through the proper application of prescribed fire but may vary slightly from property to property depending on locale, general plant community, soil type, and annual precipitation. Applying fire at the appropriate frequency, season, and spatial extent will facilitate accomplishing this balance.

Frequency

Burning with the right frequency is of great importance to maintain the proper balance of habitats and bare ground required by bobwhites. In particular, fire frequencies <3 years are necessary to sustain high-quality habitat in most southeastern upland pine ecosystems. This frequency may vary with respect to richness of vegetation as influenced by growing season or timing and fertility of soils as well as which kinds of vegetation are being targeted at a given point in time. For example, where bunch grass is limited, annual fire can help to increase the amount of grass, but where mast (e.g., dwarf chinquepins, runner oaks) and fruits (e.g., dwarf varieties of huckleberry, blueberry, etc.) are desired from ground shrubs, annual fires should be avoided. This is because such shrubs do not bear well the year of the burn, despite the occasional pruning back by fire being highly beneficial to overall production. On the other hand, many native perennial legumes, which are of special benefit to quail, provide the advantage of increased native seed availability to birds when burning is more frequent. However, areas that are burned too frequently can have

Frequent fire is important to maintaining quality vegetation conditions in the Southeast, especially on wiregrass sites. (a) This picture shows how wiregrass will lay down and create a carpeted understory at the ground level reducing cover quality (protection from predators) and reducing mobility for bobwhite. In some sites, quality will begin to wane dramatically 18 months post-fire. However, recently burned wiregrass (b) provides good cover by standing erect and high as well as opening up at ground level.

an overall reduction in biodiversity. Extra challenges can be found in depauperate soils like sand-heavy sites. Thus, fire application requires a delicate balance and a flexible, adaptive approach tailored by a keen eye to identify and manage for vegetation limitations.

Short fire-return intervals are typically required in the southeastern portions of the bobwhite range given high annual rainfall and long growing seasons to keep habitat in check. In the research that I have been a part of over the years it has been evident that bobwhites preferentially shift use of habitat toward more recently burned areas almost immediately following a burn (see Figure 1). The majority of bird locations throughout the year and

especially during the breeding season are found in areas burned less than 18 months with approximately 63% of all brood locations occurring in burned areas less than 2 months since fire (see Figure 1). Thus, for bobwhite, a 2-year fire return interval on most sites in the Southeast is recommended, and in some native, wire grass communities, short fire rotation burn regime may prove even more advantageous. In certain edaphic and climatic conditions along the East Coast, a 3-year fire rotation can provide excellent cover for bobwhite, especially in northern periphery sites.

Season

Although fire frequency is the most important factor, seasonality of fire is also influential to some essential native food plants, but weather rather than calendar should govern the timeframe of the burning season. Variation in the timing of fire will tend to favor certain plant communities that may be desirable for bobwhite, and this may vary from site to site depending on site-specific conditions (such as soil type, temperature and precipitation), management objectives and vegetation goals.

Burning reduces the amount of cover on a property for a short period of time which can result in increased movements of birds to nearby unburned cover. This combined movement and concentration of birds in less area may result in below average survival for the year. In addition, quail woods burned too early (such as December/January) may expose bobwhites to excessive predation prior to breeding season, depending on the timing of hawk migrations. However, burning too late (June/July) may result in destroyed nests. Once again, the proper timing of fire requires a delicate balance.

A common question centered around fire timing and bobwhite, is how late is too late to burn? It has been my experience that according to radiotracking collared bobwhite, burning as late as mid-May will result in less than 10% of all incubated nests for a given season being destroyed (see Figure 2). Of course, fire size/scale plays into this; burning

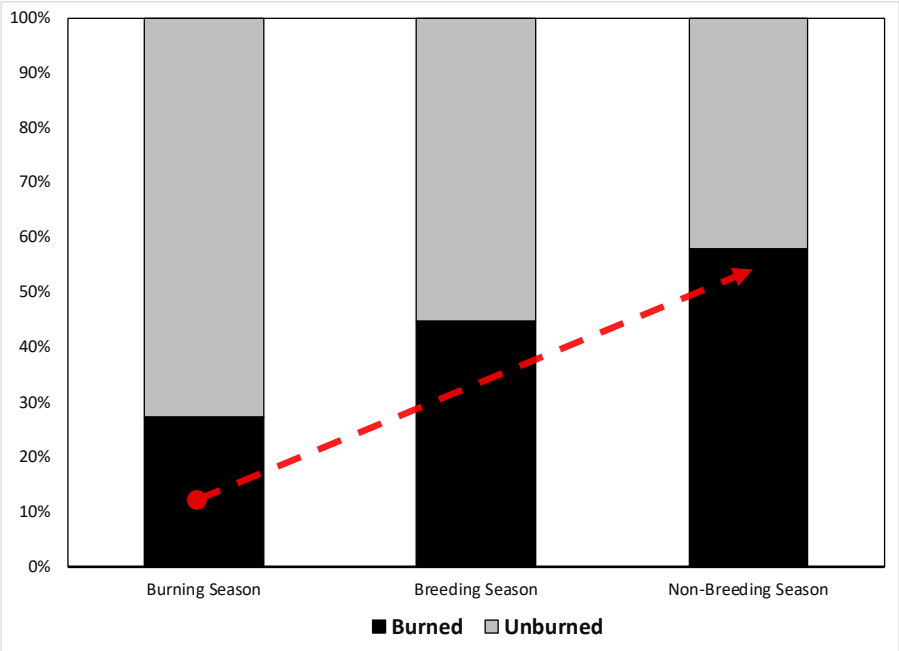

Figure 1. Percentage of burned and unburned upland piney woods used by northern bobwhite during the typical burning season (February – May), breeding season (April – September), and non-breeding season (October – March). The red arrow shows the increasing trend in use of recently burned uplands as time since burn increases on a 2-year fire rotation in the Southeast.

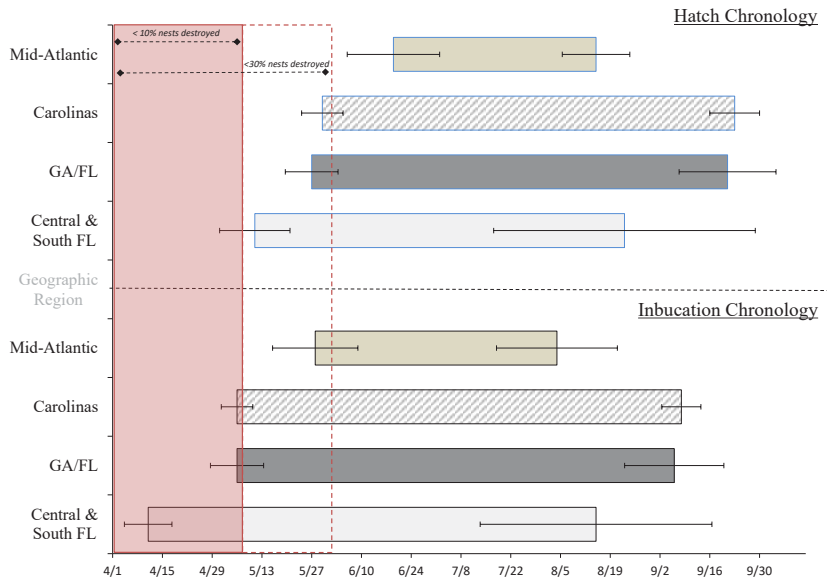

Figure 2. Average incubation and hatch chronology delineated by region along the East Coast. Burning through mid-May will result in less than 10% of nests being destroyed by fire and burning up to 1 June still results in less than 30% of nests being destroyed by fire in most of Florida, Georgia, and the Carolinas. Even fewer nests are vulnerable in the Mid-Atlantic region during this time, but a higher proportion of nests are at risk of being destroyed by fire in central and south Florida. The take home message here, however, is to get the burning done if you have to creep burn in May or even early June because when the proper application of fire size and timing is applied (a) a relatively small number of nests are lost to fire and (b) bobwhite will renest.

into June can result in as much as an additional 10-15% of nests being destroyed which, if adult survival is low, can have objectionable impacts on brood and chick production. However, when properly distributing burns through time and space coupled with maintaining a small burn size, burning well into June will not in most cases be detrimental to bobwhite populations. Bobwhites are prolific nesters and if their nest is destroyed or depredated, they will renest!

Native forbs and legumes such as beggarweeds, lespedezas, bush clovers, and many others sprout vigorously and seed prolifically even if pruned back by fire as late as May. These critical insect-producing plants are abundant among burned piney woods in high site-index soils but less productive in low site-index soils. Even though recently burned areas are pervadingly important for bobwhite, leaving adequate amounts of unburned (30-50%) cover is necessary for quality nesting and roosting grounds, especially early in the breeding season and depending on precipitation following fire. As time since fire increases, the occurrence of nests in recently burned areas will also increase. Despite brood use being concentrated largely in the recently burned areas, broods regularly use unburned areas (<30 months post fire) to roost depending on proximity to quality brood-rearing cover. In lower quality (e.g., sandy soils) brood habitat often needs to be supplemented through the establishment and maintenance of annual weed fields, such that broods select for these fields in most years, especially during low-rainfall conditions.

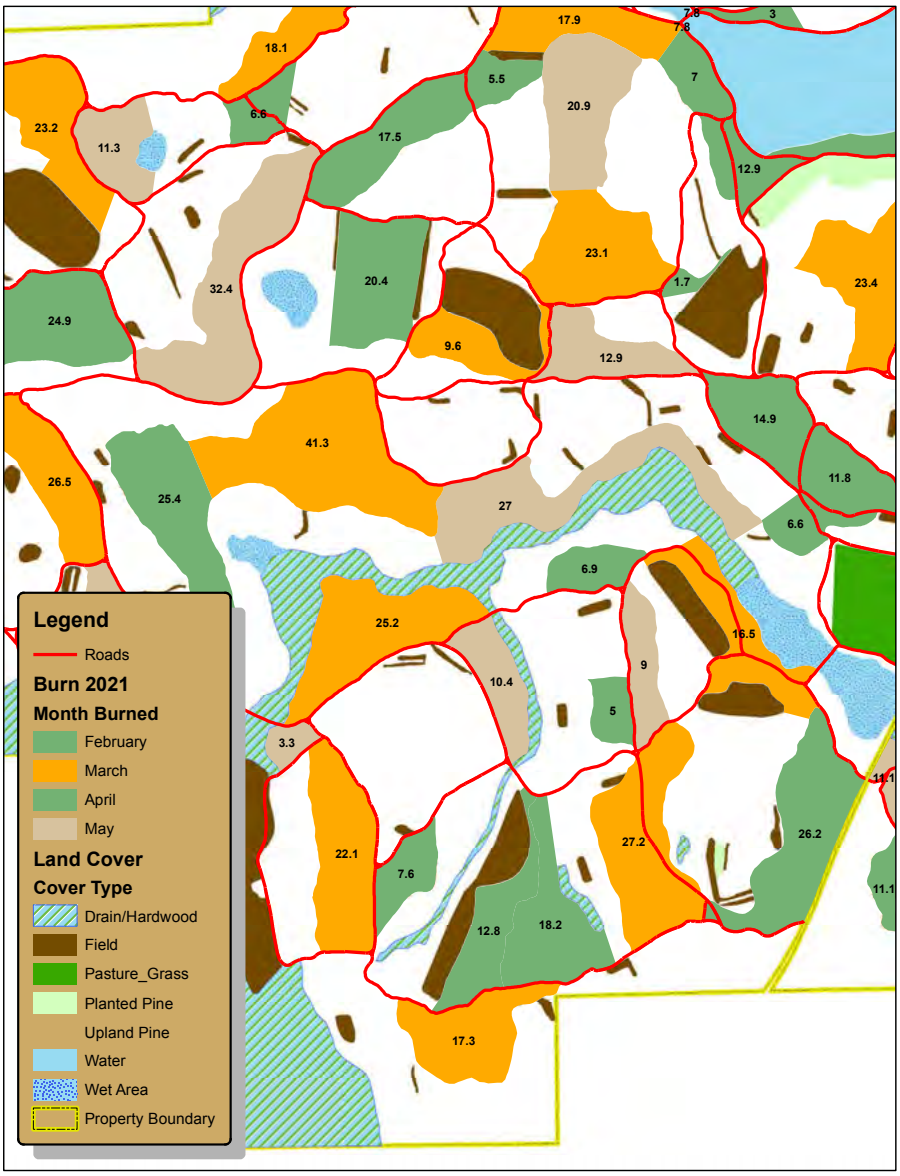

Figure 3. Burn plan for a private property located in Georgia demonstrating (a) staggered burn timing distributed among February, March, April, and May, (b) small fire size (<100 acres and an average at ~32 acres), and (c) a good mixture of burned (~48%) and unburned (white; 52%) upland piney woods.

Adult survival, reproductive success, and brood habitat-use may all be influenced by the season at which fire is applied. Generally, it is common to conduct burning after the hunting season and as late in the season as is possible without injury to the nesting of bobwhites. However, mixing burn season timing every few or alternate years can be a good thing in terms of plant biodiversity, insect availability and accessibility to foraging chicks.

Spatial Extent

Fire extent (the size of individual fires), in addition to frequency and season, is an important but often overlooked factor necessary to defining natural or managed fire regimes. On private lands, burn extents are often relatively small (<200 acres) compared to public lands where fuel reduction and wildfire prevention are often the primary goal of fire programs rather than quail management. To meet burn acreage goals, fire managers may need to depend on large burn extents (>1000-acre blocks) on public lands or even larger tracts of private lands. A combination of low fire return intervals (>2 years) and large burn extents is likely a

contributing factor for the decline of bobwhites in the southeastern United States. Further, when habitats are recovered using large extent fires bobwhite may not respond as expected.

Once the scale of management surpasses the behavioral adaptations and physiological ability of a species to respond to change, their populations could be negatively impacted. This is likely the case with bobwhite where research indicates that survival rates decline as fire scale increases. As bobwhite populations are highly sensitive to survival rates of adults, larger extent fires result in a temporal loss of habitat and possibly even direct mortality. Therefore, in areas where recovery of bobwhite is a priority, reducing burn extent should be considered. The negative impact of large burn scales may be manifested in a way that many are not familiar. Specifically large-scale burns can impact small mammal (such as cotton rats) communities that provide an alternative prey resource for avian and mammalian predators of bobwhite. Put another way, when small mammals are abundant, bobwhite survival can increase because predators key in on those species most abundant (small mammals in this case) taking the pressure off quail.

Covey breakup (generally during March & April) already provides a time of heightened vulnerability to predation given increased movements in search for mates and decreased vigilance outside of coveys. Raptor migration timing may also impact bobwhite mortality this time of year which may be exacerbated in native groundcover sites because very clean burns often result in little-to-no cover following fire compared to some structure (e.g., scrub habitat) left standing in old-field habitats. As such, the intersection of fire timing and fire scale is also very important to get right, minimizing mortality during the burning season and carry as many breeders into the breeding season as possible. As cover begins to respond following fire and raptor numbers remain low, bobwhite survival typically improves for the remainder of the breeding season. Delaying prescribed burning until after the raptor migration may help to improve survival but may not always be feasible. In addition, burning at a small scale (<100-acre patches; see Figure 3) and leaving burned and unburned areas patchily distributed among upland sites can improve bobwhite survival during this critical time period.

Good habitat management is the best defense against predation, and timely application of fire may also help to improve quail survival. As such, a properly executed fire management plan is crucial to growing and maintaining good bobwhite numbers. I prefer staggering burns throughout the burning season rather than burning too much too early to too much too late (see Figure 3). Planning to burn at small scales (<100 acres and average size of 40-60 acres) proportionality throughout February, March, April, and May will distribute burns across the property and through time while providing varying vegetation conditions and insect accessibility for disparate hatch timings throughout the season.

Take Home Message

Fire is an essential agent that has shaped plant and animal life around the globe, but in many ecosystems today, the role of fire is severely out of balance. This is perhaps the single-most important landscape attribute that has impacted – for the worse – bobwhite abundance throughout its range. In contrast to range-wide declines, areas maintaining the proper balance of fire are prime examples of where consistent application of fire on the landscape and intentional management can maintain good quail numbers year in and year out. Therefore, if we are to cast back ecological darkness and prevent the bobwhite from following the path of the passenger-pigeon or the dodo bird, we must actively keep fire on the landscape.

The bobwhite quail is called the "firebird" for good reason: *You can apply fire and not have wild quail, but you cannot sustain wild quail without proper application of fire in the Southeast.* The proper application of fire involves first establishing the proper **frequency** to shift or maintain vegetative conditions conducive to fire-affiliated species like bobwhite. As such, it is recommended to burn at any season to maintain high fire frequency – better to burn a little early or a little late than to let the cover go unburned for an extra year in the Southeast. Second, the application of proper **fire timing** will adaptively alter plant composition and structure toward the Rule of Thirds as needed from year to year, fine-tuning bobwhite habitat. Lastly, applying fire at the proper **scale** will help to optimize bobwhite survival through time. Thus, keeping the burn scale small while maintaining a good mixture of burned and unburned areas will mitigate mortality and increase reproductive efforts for bobwhites.

I doubt many folks stare aimlessly into a campfire thinking about quail being the firebird, but the fire still serves its purpose on the campground. In a similar vein, bobwhite may not always read the management handbook but, in the Southeast, they will respond favorably to the proper application of fire. Let's go burn some piney woods!

Wildlife Trends Journal Management Calendar

Dave Edwards

Don't let COVID stop you from continuing to learn. Many webinar opportunities are available this summer.

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.

Keep learning – Attend or watch wildlife and land management seminars

Although the past year has been challenging to attend seminars due to COVID, I'm noticing more in-person events being offered as social distance restrictions are being lifted. As a result of COVID, there are many more podcasts, online events, etc. Take advantage of these educational opportunities to further your knowledge and learn how to best manage your land and enhance hunting success. Generally speaking, educational events peak in summer because everyone is hunting during fall and winter. One of the best ways to find out about these events is to search the internet, contact your local extension office, state wildlife agency, wildlife federation, or a national organization geared towards your interest (e.g., National Turkey Federation, Ducks Unlimited, National Deer Association (NDA), etc.). For those interested, NDA offers monthly "Beer and Deer" webinars throughout the year. As a land and wildlife manager, you should be constantly learning new ways to improve wildlife and habitat, experimenting with various wildlife and land management practices on your property, and sharing your results. If you attend some of these events, don't be surprised if you see me there. Even as a veteran wildlife and land manager I continue to seek better ways to do things, and to learn better ways to manage wildlife to achieve desired results.

Take care of new fruit trees or other tree plantings

Many landowners, wildlife managers, and hunters incorporate fruit trees into their wildlife management program to provide additional food sources and aesthetics to

Adding wildflowers to your management strategy adds both wildlife and aesthetic value to your property.

their property. Many have taken great care in deciding where to plant these trees, dug the appropriate sized hole, loosened the surrounding dirt, added time released fertilizer and moisturmizer packets, firmly packed soil around the root ball, and added a tree tube to protect the tree and enhance growth – then walked away to later find the tree died. Due to the transplanting process itself, which causes a good bit of stress on a tree, some trees simply do not make it. However, in many cases the tree died from a combination of being stressed from transplanting and not being taken care of (TLC – tender loving care). Simply planting the tree is not enough in many cases. After planting a tree in late winter, tree survival is much higher if you ensure weed competition is eliminated (normally done via application of herbicide) in the immediate area of the tree. Weeds compete with the trees for nutrients and water. Speaking of which, it is important to monitor rainfall and water trees when needed during their first year after being transplanted. Most trees have been propagated and grown in a nursery where they grew in ideal conditions – adequate nutrients, water, and sun. Some trees do not fare well with the struggles of the "real world" where irrigation is not providing daily water. Thus, taking a little extra care of them during their first year will help them adapt and develop a root system that can better handle periodic droughts. Another helpful tip is to place 3-4" of mulch around the base of the trees. Mulching will reduce weed problems due to the unfavorable germination conditions under the mulch (no sunlight) and will also conserve soil moisture. I mention this in the June/July calendar because this seems to be when the highest mortality occurs, which makes sense due to the very hot and dry conditions during this time.

Allow wildflowers to mature and go to seed before mowing. Managing wildflower areas is a great addition to your property management strategies, particularly if one of your goals is improving habitat for turkeys and quail. They not only add aesthetics which adds to your outdoor experience, but the flowers attract an abundance of bugs and insects that are eaten by turkeys and other birds. If you have planted or are managing wildflowers on your property, avoid mowing

Duck Pond - Slow drawdowns result in increased species diversity within moist soil impoundments.

these areas until seedpods have matured. Allowing the wildflowers to produce seed before mowing will ensure adequate reseeding for a good crop the following year. If you are not currently managing wildflowers on your property, but want to do so, do your homework to determine the best wildflower blend for your particular soil and climate, begin preparing seed beds well before planting time (fall) to create a smooth firm seed bed, and plan to plant them this fall. Due to the small seed size of many wildflowers, a smooth seed bed is critical to success. Rough seed beds often result in seeds getting covered too deep and will result in low germination rates even if broadcasted by hand. Once established, and with periodic management such as mowing, wildflower areas can persist for many years.

Complete draining duck ponds and prepare for planting.

Those managing moist soil areas/ duck ponds (i.e., native vegetation vs. planting agricultural crops), 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 start plowing and preparing the soil for planting. Leaving the pond flooded until this time will provide weed control and will reduce tractor time later. Drying time will vary depending on your soils. It is better to drain early than to wait and not be able to work the ground because it is too wet and chance running out of growing season. My personal favorite crop for duck ponds is rice. Rice, however, requires more time and effort to manage and takes about 120 days to produce seed (depends on variety used) so you need to plant early. For best

results, obtain soil samples and apply required lime and fertilizer before planting. Japanese millet is also a favorite of ducks and is easily grown by duck pond managers. In fact, Japanese millet can be top dressed or broadcasted onto mud flats of a wetland or beaver pond. Japanese millet is a strong re-seeder, meaning that it will produce seed that will germinate the following year.

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 that it is not "soil active", meaning that it gets transported to the soil and will kill entire trees or shrubs (unless of course this is your goal). I often use Garlon (triclopere) or RoundUp (glyphsate) to "limb" roads. These herbicides only kill 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. 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. Again, it is very important to read and under-

Preventative maintenance helps keep clay throwers operational.

stand 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.

Service sporting clays, skeet, and trap machines

Whether you have a full 12 station sporting clays course, a 5-stand shooting range or just a trap machine on the camp porch, regular maintenance of this equipment is needed to keep everything working. Let's face it, maintenance of trap machines is not fun or gratifying. As such, performing this maintenance seems to be low on the priority list for most owners until it's time to shoot. It is quite frustrating inviting friends or family out to shoot and a machine(s) malfunctions or simply doesn't work. Through experience in managing several sporting clays courses and 5-stand shooting ranges, I've learned that regular maintenance significantly reduces "down time" and helps machines last longer. If your machines are actively used throughout the year, it's a good idea to check and service them each month to ensure proper operation. Each machine should be cleaned, lubricated, tested, adjusted, and if necessary, replace any worn parts. Two of the most common problems encountered are battery and controller wire issues. Batteries are similar to a boat in that you "use it or lose it". The longer they sit idle the more problems you can expect to experience. If you don't have solar trickle chargers for your trap machine batteries consider adding these. Solar chargers are relatively inexpensive and keep batteries charged and active through trickle charging. They also eliminate the need to remove and transport batteries to a power source for charging. My life changed when I discovered wireless remote controllers for trap machines. I have no idea why squirrels and other rodents are so attracted to controller wires, but they regularly find and chew them which shorts the connection. Installing wireless remotes eliminates the need for a wire to run through the woods from the machine to the shooting station – and removes potential problems. Wireless remotes also allow you to easily move trap machines for different shots/angles without having to deal with a long wire to controllers at the shooting station. Like any equipment, preventative maintenance on trap machines will result in fewer problems and longer machine life.

Conduct summer quail call counts

Call counts conducted in May and June provide an estimate of the number of males available for breeding and an evaluation of winter survival. This information allows you to monitor the quail population's response to habitat management efforts and quail production. In much of the bobwhite's range, May and June are peak months that males will be actively calling as part of the breeding season. To obtain an index of male birds, set up several "listening points" on your property that can be used each year. Preferably space these locations far enough apart that you could not hear the same quail from different listening points. Call counts should be conducted at or shortly after daylight. To standardize the call count, arrive at the first station at sunrise, wait one minute to allow vehicle disturbance to settle, then listen for five minutes and record the number of quail heard whistling. Count and record the number of different individuals you hear. Continue until all stations have been monitored. For each survey, start the survey at a different listing point. You will need to conduct the call counts at least 5 different days for the most accurate estimates. The more counts you conduct, the more accurate your esti-

mates will be (statistically speaking). We often conduct 10 call counts (10 different mornings) each May -June. After completing the call counts, calculate the average number of calling males heard per station. This is your "index" and the number in which you will compare against future call count data to assess increases or decreases. The key to accurate year-to-year counts is to be consistent about everything you can control: same people listening, same locations, same kind of weather (clear, windless days) same week of the year, and the same time of day.

Widen roadsides to create roadside management areas

Creating roadside management areas can add wildlife and aesthetic value to your property. Roadside management areas are simply widened roadsides that allow various management to be applied that result in enhanced wildlife value. To create a roadside management area, simply clear the understory and undesirable trees along a roadside, then apply periodic management such as mowing, disking or burning to maintain control of encroaching trees species and maintain a relatively low understory (avoid keeping a "manicured" look by mowing roadways often – this does not offer as much wildlife value). How wide you make the area is site specific, but 10-20 yards wide is generally wide enough to accomplish the goal. Be sure to leave desirable mature trees within the managed area. These trees will provide shade to conserve moisture in the summer and will add aesthetics along the road. There are many ways to widen roadsides, but the practice of choice will be determined by the existing conditions (habitat type, age of trees, etc.). In some cases, roadsides can be widened by simply mowing. However, if the existing roadside is thick or forested, heavier equipment will be required. I often incorporate widening roadsides into timber harvest plans. That is, when an area is being thinned or cut, I simply include removal of trees within the desired roadside area. Regardless of how intensely you manage these areas, they will create more "edge" habitat which is preferred and used by most game animals. If you desire to intensively manage roadsides you can seasonally disk or burn them to promote desirable weeds, and/or install wildlife plantings such as clovers, sorghum, or wildflowers. Wildflowers provide esthetics as well as bugging areas for turkeys. Managing roadsides not only increases the aesthetics of the property and adds wildlife value, but will increase wildlife viewing opportunities throughout the property.

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