PRACTICAL WILDLIFE MANAGEMENT INFORMATION

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Earl Says...

57 days. That's right, as of this writing it's been 57 days here in Central Alabama with NO RAIN! I'm used to a couple of weeks here or there without a shower but this is getting ridiculous.

About a month ago we planted our food plots with great anticipation of thick, beautiful carpets of leafy dinner tables for our deer. But with no real prospects for rain in the near future it looks like we've wasted a lot of time as well as money. I've hunted for many, many years and have never seen it this bad at this time of year. Looks like the food plot hunters are going to have work a little bit harder this year.

Droughts are not always a bad thing although I don't know of anyone who desires to have one. Scott Brown with Southern Sportsman Aquatics & Land Management said the lowering of your ponds will affect undesirable weeds in a pond. But if you have a small, shallow pond and lose a considerable amount of water you may need a survey next spring to determine the damage done.

I know it's going to rain again eventually so I'll pray harder and look for the new patterns the deer are making these days. And we do need to be thankful that we haven't had the major forest fires that some parts of our subscriber base have experienced.

Andy Whitaker
Publisher/Editor

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P.O. BOX 640596
PIKE ROAD, ALABAMA 36064
www.wildlifetrends.com
800-441-6826

PUBLISHER/EDITOR
Andy Whitaker

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

CONTRIBUTING AUTHORS
Dave Edwards
Dana Johnson
Brant C. Faircloth
Wes and Leslie Burger
Dr. Wes Wood
Theron Terhune
Marion Barnes
Ted DeVos
Bryan Burhans
Keith Gauldin
Rodney Dyer
Dr. Keith Causey
Ron Jolly
Dr. Stephen Ditchkoff
Tes Randle Jolly
Kevin Patterson
Ryan Basinger
G. Ryan Shurette
D. Clay Sisson
Kent Kammermeyer
Allen Deese
Scott Brown
Dr. Larry W. Varner
Jason R. Snavely
Steve Tillmann
Mark Thomas

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

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Cover photo by Tes Jolly

Feral Hog Invasion
The Rest of the Story!

By Ron and Tes Jolly
Photos by Tes Randle Jolly

Ron Jolly (ronjolly22952@mindspring.com) is an award winning outdoor writer and video producer living with his wife, Tes, on their farm near Tuskegee, Alabama. Tes (www.jollysoutdoorvisions.com) is herself an award winning writer and outdoor photographer. You've seen lots of her work in each issue of *Wildlife Trends Journal* including this issue's cover photo.

Rooting and wallowing by feral hogs can be devastating to native plant communities.

This article is the last installment in a series of stories dealing with the feral hog invasion across the United States. We have discussed the do's and don'ts when dealing with feral hogs. We have heard from experts on the front lines and their efforts. Landowners have shared their stories of how hogs have changed their management practices. At this point you may wonder what is left to discuss.

Fact is, there is plenty! Feral hogs may not top the discussion list at your property but odds are they will in the future. In 1987 there were an estimated 2 million hogs in 17 states. These hogs were primarily in the South and concentrated in Texas and Florida. Today there are an estimated 5 million hogs distributed across 39 states.

While sheer numbers of feral hogs roaming almost every state is alarming, the threat they pose can be frightening. Not only do these destructive creatures threaten habitat and native wildlife, they also pose a very real threat to domestic livestock and human beings.

Infectious Problems

By now you have no doubt heard the "pigs tore up my cornfield" story. That is the obvious focal point in most reports. Feral hogs cause over $1.5 billion damage to crops and property each year so that is the logical cause of most concern.

What you may not know is that feral hogs pose a real threat to the livestock industry in the United States. Feral hogs are capable of carrying up to 37 parasites and 30 diseases that are transmissible to livestock, people, pets or wildlife.

http://wildpiginfo.msstate.edu/diseases-wild-pigs-public-health.html

Diseases like pseudorabies, swine brucellosis, bovine tuberculosis, foot and mouth disease and hog cholera are diseases carried by feral hogs that are transmissible to domestic livestock.

Leptospirosis, brucellosis, E. coli, rabies, swine flu and toxoplasmosis, are zoonotic diseases and carried by feral hogs. They're transmissible to humans through bodily fluids and/or handling or ingesting infected tissues. These diseases can be transmitted indirectly through contaminated water sources and possibly through ticks.

Feral hogs can also carry parasites, some of which could pose problems to humans and other animals. External parasites carried by hogs include fleas, ticks, and hog lice. Internal parasites can include roundworms, kidneyworms, lungworms, stomachworms, whipworms, liver flukes and trichinosis. Trichinosis can be transferred to humans through consumption of undercooked pork.

Hunters, farmers and ranchers should be aware of these potential diseases and parasites and take precautions to avoid infection. Always wear gloves when handling feral hogs. Wild pork is excellent table fare and should always be cooked to a minimum temperature of 165 degrees. Ranchers should keep their livestock vaccinated against potential diseases carried by feral hogs especially if livestock runs the risk of contact with wild hogs.

Other Feral Hog Concerns

In some areas of the country, feral hogs have had a negative impact on water quality of streams, ponds and rivers. Hogs do not have sweat glands and must find water to keep cool during hot weather.

Hogs wallow along water edges and coat themselves with mud. This lowers their body temperature and helps with external parasites. This wallowing damages stream edges and increases sedimentation. Hogs defecate in and around water sources. This activity increases levels of bacteria and nutrients in the water. In many cases water reaches levels unsafe for human use or exposure.

http://feralhogs.tamu.edu/files/2011/08/Feral-Hogs-and-Water-Quality-in-Plum-Creek.pdf

In addition to damage done by hogs

Hogs are known to target reptiles and amphibians as a food source. Their rooting tendency destroys vital habitat, often devastating local populations.

Reptiles such as this Eastern box turtle's nests are vulnerable to hog rooting The eggs are targeted as a food source.

Feral hogs destroy agriculture and damage mature trees with their rooting and rubbing.

to water sources, they also damage habitat required by wildlife such as reptiles and amphibians. They also reduce and damage native vegetation. In a food habit study conducted by Jolley et al. (2010), one wild pig had 49 eastern spadefoot toads in its stomach. This suggests that feral hogs can and do actively hunt for prey. In the same study, it was estimated that 3,000 wild hogs consumed about 3.16 million reptiles and amphibians in a single year. These numbers show just how devastating wild hogs can be to the environment.

http://wild-wonderings.blogspot.com/2015/04/wild-pig-impacts-on-reptiles-and.html

Studies in Texas have proven hogs target nests of ground nesting birds. Game birds such as bobwhite quail and wild turkey are high on that list. In fact, it is suspected that hogs have played a role in the reduction of populations of both turkeys and quail in areas of high hog concentration.

http://feralhogs.tamu.edu/files/2011/08/Feral-Hogs-Impact-Ground-nesting-Birds.pdf

By now you should get the idea. Feral

Feral hogs compete with native wildlife, including wild turkeys, for food and space.

hogs do far more damage than just tearing up cornfields. They are omnivores that primarily eat vegetation but will eat anything they find or catch. Previously, in part two of the feral hog invasion, Steve Guy stated that if more was known about the horrific damage caused by feral hogs more would be done to control them, maybe even on the federal level.

The Feds Step In

In 2014 the United States Department of Agriculture, through its Animal and Plant Health Inspection Service (APHIS), launched a $20 million initiative to deal with the rapidly expanding feral swine population.

The agency works directly with states to control populations, test for diseases and research better ways to manage feral hogs and their damage. One key element to this national program is monitoring diseases that may affect domestic swine.

Work has begun in New Mexico where feral hogs have been eliminated from 5.3 million acres of land. The ultimate goal is to eliminate feral swine from two states every three to five years and stabilize feral hog damage in ten years.

Funding for APHIS includes:

-$9.5 million for state projects

-$1.4 for establishing procedures for disease monitoring, including the development of new surveillance and vaccination methods.

-$1.5 million for a National Wildlife Research Center to conduct research and economic analyses to improve control practices.

-$1.6 million for the centralization of control operations, and for making them safer and more cost effective.

The APHIS strategy is to provide resources and expertise at a national level while allowing flexibility to manage operational activities from a local or state perspective. The overall objective is to minimize feral hog damage. In states where feral hogs are emerging or populations are low, APHIS cooperates with local and state agencies to implement strategies to eliminate them. APHIS uses an integrated approach to feral swine damage management issues, incorporating the latest scientific research findings, improvements in field tactics, and communication and outreach tools to accomplish its goal.

APHIS has developed the following objectives with regard to feral swine damage management:

- Stabilize and eventually reduce the range and size of feral swine populations in the United States and territories in accordance with management objectives of states, territories and tribes.
- Further develop cooperative partnerships with other pertinent federal, state, territorial, tribal, and local agencies, and private organizations working to reduce impacts of feral

Studies show hogs target nests of ground-nesting birds and may be responsible for the decline of wild turkeys and bobwhite quail in some areas.

Hog rooting and grazing can be devastating to food sources planted for native wildlife.

Wild pork, when properly handled and cooked, is excellent table fare.

swine to agriculture, natural resources, property, animal health, and human health.

- Expand feral swine management programs nationwide to protect agriculture, natural resources, property, animal health, and human health.
- Monitor feral swine for pathogens that affect domestic swine, other livestock, and human health.
- Develop predictive models for population expansion and economic impacts of feral swine, along with risk analyses to agriculture, animal health, and human health.
- Develop outreach materials and activities to educate the public about feral swine damage and related activities to prevent or reduce damage.
- Coordinate with Canada and Mexico to establish a collaborative plan to address the feral swine threat along common borders, including monitoring research and operational responses as appropriate.

Mineral rocks can be elevated on a post to keep them out of feral hogs' reach.

Contacts at APHIS are:

Carol Bannerman, (301) 851-4093

Carol.A.Bannerman@aphis.usda.gov

Lyndsay Cole, (970) 494-7410

Lyndsay.M.Cole@aphis.usda.gov

For those of you who think this is a bunch of government mumbo-jumbo there is at least hope. The USDA's Natural Resources Conservation Service (NRCS) will be offering financial assistance to eligible Alabama landowners in all 67 counties through 2017's funding under the Environmental Quality Incentive Program (EQIP). Alabama landowners interested in Alabama's Wild Pig Damage Management Program should apply by December, 2016 through their local Alabama NRCS office.

Contact: **Jeff Thurmond, Certified Wildlife Biologist**

USDA Natural Resources Conservation Service

P.O. Box 311

Auburn, AL 36830

334-887-4510

Alabama landowners are eligible to receive $736 ($883 for limited resource farmers) for camera monitoring per individual trap site.

- One trap per 200 acres owned. Example: Landowner may receive $3,680 (5 x $736) if he owns 1,000 acres and builds/captures pigs in all 5 traps.
- Purpose is to encourage cooperatives between at least three landowners.

Mineral sites established for native wildlife are often fouled and destroyed by feral hogs.

- Must perform damage assessment of the property before and after.
- Must purchase two trail cameras or one wireless camera per trap site.
- Must set trap and feeder to meet NRCS specifications.
- Must fill out camera data sheets.
- Must run at least one trapping cycle to receive financial assistance.

Realistic Advice

While some help with the feral hog problem is encouraging, some think it is not enough, nor a step in the right direction. Rod Pinkston, owner of Jager Pro Hog Control Systems offers this insight.

"The USDA financial assistance to landowners under the Environmental Quality Assistance Program (EQUIP) is for camera monitoring of feral swine. This program will not control feral swine populations because it does not measure results using capture success percentages. The NRCS definition of success is damage management, not population control."

"For example, a three-panel trap enclosure using a 32-inch wide drop gate controlled by a trip wire which only captures 10 out of 25 pigs (40% capture success) is considered successful damage management by NRCS because the remaining 15 do less damage. That is temporary because of the high reproductive rates of feral hogs."

"This landowner will be awarded the same financial assistance as someone using a 35-foot diameter corral trap controlled by a wireless camera which captures all 25 pigs. There is no incentive for the landowner to be efficient at feral swine control to receive financial assistance," said Pinkston.

In Pinkston's opinion, this program won't be effective without the correct performance standards in place. The optimum management program results from capturing the entire sounder at one time to avoid escapes, which effectively eliminates any future reproduction or damage from that specific sounder.

Pinkston offers this advice: "Our long-term advice is to form county Wild Pig Working Groups. The first

Feral hogs root, defecate and wallow in and around water sources. This habit can encourage the spread of diseases to native wildlife and domestic animals. In areas of high feral hog densities some water sources may be rendered unfit for human, domestic animal or native wildlife use.

challenge is to effectively communicate a single Integrated Wild Pig Control (IWPC), plan to multiple landowners with connected acreage. This endeavor requires a group of producers and landowners who are motivated to achieve the same mission on multiple properties at the same time to produce a mutual benefit. The stakeholders involved must effectively adopt the IWPC tasks and performance standards needed to overcome the high reproduction rate and intelligence of wild pigs."

According to Pinkston, to be successful a group must task itself with four specific functions:

1. Law enforcement—identify local criminals to eliminate illegal transportation/release of wild pigs.

2. Communication—promote local law enforcement, whole sounder control measures and ecologic, economic and health concerns to the public.

3. Economic—coordinate a cost-share finding proposal to efficiently utilize a multi-partner or multi-agency county budget to implement whole sounder control.

4. Integrated Wild Pig Control—develop and implement an efficient IWPC plan to demonstrate measurable and quantifiable whole-sounder results.

Back in the Real World

At this point I find my head spinning from all the political, scientific and economic facts, logic and opinions on how to best manage a problem that began so innocently on our small farm ten years ago. It was just a single sow with pigs!

I wish I had all the answers but I don't. I can tell you that over the past decade, since that first sow and pigs appeared on our farm, we have tried everything to control the ever-increasing numbers of hogs invading our land. I can also tell you that to this point we have not succeeded. We have had to alter how we manage and plant for wildlife. We have seen body weights of our mature bucks decrease and fewer turkey poults hatched.

I can also tell you there is hope. For the first time in years we feel somewhat in control of our destiny. We have partnered with neighbors and adopted strategies that we feel are finally making a difference. Have we won? Not yet!

To win this war it will take more cooperation from more neighbors who want to rid our area of feral hogs. That will mean more traps and more landowners committed to total sounder removal.

In late June of this year my wife Tes and I made the commitment to win the war. We purchased and installed a Jager Pro M.I.N.E. Trapping System. Since that time, we have trapped 47 hogs in a single trap. That, combined with what neighbors have trapped is encouraging but the job is not done.

The task is daunting. It is time consuming and expensive. In the past we tried small corrals and poor man gates. We had some success but ten years later we have more hogs than ever before. At least now, with the new equipment and strategies, we feel we are in control. We know that if a sounder invades our property, odds are they will leave very differently than they came. This is a war! Take no prisoners!

Habitat Improvement on a Budget

By Daryl Bell

Daryl Bell is a freelance outdoor writer from Mobile, AL and President of the newly formed Five Rivers Delta QDMA Branch. Contact him at darylbell7041@gmail.com.

Natural area that was disked and fertilized.

The closing of deer season is always a very sad day in my household. However, the closing of whitetail season brings on the start of my habitat management projects which is almost as exciting as deer hunting itself. For any serious deer hunter, deer season starts as soon as it ends. It's the time of the year to evaluate your deer herd, plant food plots, improve habitat, and try to make next deer season even more successful than the previous one. But let's face it, not everyone has the money to pour into extensive habitat projects. In this article we will cover a few ways you can improve your hunting land without breaking the bank.

Natural Food Plots

When you hear the term 'food plot' you probably think of planting something like soybeans, oats, turnips, rye, or some other type of seed that you have to buy at the store. However, planting a food plot the correct way can get expensive. But, for the cost

of a little tractor fuel and a bag of fertilizer, you can create a natural food plot that will serve a number of purposes.

When you are getting ready to create a natural food plot, you don't necessarily have to go through all the trouble of laying it out like you would a hunting food plot, unless of course you plan on converting it to a hunting plot in the fall. Most of my natural food plots are along the sides of roads, or in some cases, an entire logging road itself.

The process of creating a natural food plot is really quite simple. Pick a few areas on your property that aren't otherwise benefiting the local wildlife, like a barren logging road. Trim back some tree limbs to allow sunlight to the ground, disk the area, and fertilize it with a Nitrogen Urea (46-0-0).

Natural area that was disked and fertilized with urea

Logging road that was disked and fertilized with urea, awesome bedding and fawning cover

Disking the soil will uncover a fresh seed bank and within a few weeks you should have tons of fresh, natural growth. This growth will be a great food source and will be great fawning cover when fawns begin to drop. For properties that lack in bedding cover, this is also a great way to create bedding.

Eliminating Competition on Beneficial Plants

This practice is as easy as it sounds and can really make a positive impact on your local habitat. Studies show that fruit baring trees, where the competition has been removed, are 30-40% larger by the 4th year than trees where the competition was not removed. When you have a fruit tree, or any other beneficial plant that has to compete with other plants for sunlight, nutrients, or water, it simply can't reach its full potential.

Eliminating competition can be as easy as terminating the plants under the drip line of the tree. This will allow the crown to better develop which will result in a larger crop. For instance, if you are trying to kill a sweetgum under a white oak, the best method is to make a downward hack into the base of the sweetgum with a hatchet, then apply Arsenal to the fresh cut. This method is most commonly known as the 'hack and squirt' method.

Just recently I stumbled across a honeysuckle thicket that was being shaded out by the local vegetation. Honeysuckle is a very sought after plant for whitetails and this particular stand was having trouble surviving, much less producing quality forage. I broke out my machete and within thirty minutes the honeysuckle was in full sunlight and all surrounding competition had been removed. It only took three weeks for this particular stand to bloom out and double its previous vegetation. This is an excellent example of promoting your local deer forage without having to go out and spend money on food plot seed or new fruit trees.

A few beneficial plants for wildlife across the country to keep an eye out for are; Honeysuckle, wild strawberry, green briar, Beauty Berries, poison ivy, ragweed, wild rose, trumpet creeper, wild lettuce, Virginia creeper, Pokeweed, fireweed, pond weed, and sow thistle.

Improving Your Understory

Having an understory with plenty of browse is key to any QDM program. Deer are browsers; they do not stand in one spot and eat their fill before moving on. That's why it is so important to have quality forage on all parts of your property. Often times, you will see people put all of their time and effort into food plots and then assume that will be enough forage for a whitetail herd. An average 100 pound doe eats about 9 pounds of food per day. Think about how big a 9 pound salad would be; that's a lot of lettuce!

One way you can assure your deer have enough browse is by promoting the understory of your property. The understory is any plant life growing below the canopy of surrounding trees. The best way you can promote your understory is by cutting down or killing trees to allow sunlight to the forest floor. However, you do not want to just go in blindly and start cutting down trees. Be sure to

Honeysuckle stand that I eliminated the competition from and it's doing quite well now

correctly identify trees before terminating them in order to keep from killing beneficial trees and plants.

There are a few ways to go about killing invasive trees in your understory. The first way is to simply go in with a chain saw and cut the trees down as low to the ground as possible. However, over time, the stumps will re sprout and you will be back to square one. The best way to control these plants is with the hack and squirt method that I mentioned previously in the article. Depending on your budget, you could go with a product like Arsenal. However, this can get costly on big habitat projects. I've found that a concentrated Glyphosate will do a great job on most plant species and is substantially less expensive. Personally, I use a 41% Glyphosate, such as Gly-Star, and put it directly into my spray bottle, DO NOT ADD WATER. Be sure

Sawtooth acorns that I recently planted.

to wear gloves and approved PPE when handling chemicals.

A few trees with low wildlife value are: sweet gums, maples, elms, ashes, yellow popular, sourwood, and sycamores. Concentrate on eliminating trees with little to no wildlife value and you are well on your way to having a successful habitat management program.

Transplanting Saplings

This may possibly be the most over looked method of habitat management. However, transplanting saplings does not yield immediate results. It may take 7-10 years for a sapling to begin producing fruit or acorns, depending on the plants age when transplanted. This may be turn off for someone that leases hunting property, as there is always a chance you could lose the lease at any time and your work goes down the drain. However, for property owners, this is a great way to ensure the future of your deer habitat.

I see oak, black gum, and persimmon saplings every time I walk through the woods. However, most of these saplings will never produce quality food due to all of the surrounding competition. I eventually decided I would start carrying a bucket and shovel on walks through the woods. When I find a sapling that looks promising, I dig it up and put it in the bucket. I then transplant it to one of my already prepped tree plots.

When you dig up a sapling, it is important to remove the entire root ball to ensure survival. You also want to be sure not to re plant it too close to existing trees, as you

Buck using the water hole that I filled.

don't want competition to become an issue. You always want to leave at least 30ft. between hard mast trees and 20ft. between soft mass trees. For the first few years you will want to keep an enclosure around the sapling to keep wildlife from damaging it. Tree tubes are a must for keeping wildlife off of the saplings and promoting upward growth.

Another practice that I thoroughly enjoy is growing trees from seed, such as sprouting oaks from acorns. This is more time consuming than simply transplanting already established saplings but it allows you to grow the exact plant you are looking for. The best way I have found to sprout acorns is to put them in a pot full of dirt, planted about ¼ of an inch deep. Be sure to keep them watered every day to assure they do not dry out. Once sprouted, be sure to keep them protected from the frigid winter temperatures the first year.

Keep in mind, just because you lease land, don't let this keep you from planting new trees. Your property owner will appreciate that you are working to improve the habitat of his land. If you take care of your property owner, your property owner will take care of you.

Water

As I write this article, the South is experiencing one of the worst droughts that I can remember in a very long time. On my particular property, the deer have all but left in the search of a sufficient water source. This is the perfect opportunity to create the 'limited resource' on your land.

Recently, I happened to be at my property rolling seed beds on my food plots ahead of a predicted rain. While I was working on the land I noticed one of my proven water holes was dry as a bone. This particular water hole seemed to always hold water and the deer knew it. At this point in time it had no water and zero deer activity. This gave me the idea to drain the water from my plot roller into the water hole in order to give the deer at least some temporary relief from the wicked drought. Once I filled the water hole, I placed a trail camera over it to monitor the deer activity. Upon checking the camera, it was very clear the deer needed the water. Within one night, the deer found the water.

Unfortunately, within three days the water hole was dry again and the deer activity ceased. This gave me the idea to bring up a small, plastic swimming pool and burry it up to the rim on the edge of one of my food plots. Once buried, I go up every week or two and fill the pool up with water. Since it's plastic, ground leakage really isn't a concern, but the water does tend to evaporate pretty quickly. So I like to check on it pretty regularly in order to help the deer through this tough time.

In some areas, water may not be the limited resource, but in others it could really bring in the deer. Ultimately, finding the limited resource is key to holding and hunting deer on your property.

Prescribed Fire

This very well may be the number one habitat project that one could utilize on their property. Prescribed fire

can be used for a number of reasons; creating bedding cover, promoting native vegetation, and even re generating a seed bank. Depending on what you are trying to accomplish from the fire will determine what time of the year you should burn.

Dormant Season Fires

In the fall, going into the winter, deciduous plants and trees will lose their leaves. Once they lose their leaves, they have no way of producing their own food through photosynthesis. To prepare for this, deciduous plants will begin moving energy and sugars into their root system so that they can survive the winter.

Due to having this stored energy in the root system, it is almost impossible to kill off invasive species with dormant season fires. So, the goal from dormant season fires should be to burn off the duff and decaying leaf tissue on the forest floor, uncovering the native seed bank. This seed bank will sprout in the spring, resulting in a multitude of young growth for the wildlife to benefit.

The benefit of utilizing this type of burn is native trees have so much energy in their root system, you won't have to worry about damaging your beneficial trees. Thus, you can get away with burning with a hotter fire than you would during a growing season fire. For example, during the cold winter months, deer will normally bed on south facing slopes in order to get out of the biting north winds that are common during the winter. Therefore, I like to create my bedding areas on these south facing slopes.

The goal behind a bedding area fire is to promote new native grasses, as well as browse for the deer herd. You would think that a dormant season fire would be best for this situation. However, I have one other issue that has to be addressed. The bedding area that most of my deer use is an old grown up clear cut. Like other re generated clear cuts, there is a lot of wild Yaupon and sweet gum growing throughout it. These are both invasive species and have no potential wildlife value, so they need to be controlled. Like I mentioned previously, dormant season fires are not best for controlling invasive species such as these. This brings me to growing season fires.

Growing Season Fires

Growing season fires are ideal when trying to control invasive plant species like the ones I previously mentioned. Due to the plant still having leaves and actively growing, a fire during this time will interrupt the photosynthesis process and ultimately kill the plant. And due to having to kill invasive woody plants, you will have to burn the fire a little hotter than you would a dormant season fire. This means you have to bring into account the chance of possibly damaging your beneficial trees if you are not careful.

Before you light any prescribed fire, whether it be a dormant or growing season fire, creating fire breaks is very important in order to help contain the fire. To keep from damaging beneficial trees, such as oaks, consider creating a fire break around these trees. This can

be done by raking the leaf matter away from the base of the tree, or even clearing the area around the tree with a leaf blower.

Prescribed fires can be the best tool a land manager has when trying to manage quality deer habitat. However, they can be very dangerous and pose a great risk when not done correctly. If you are not experienced in prescribed fires, please consult your local biologist or find someone experienced to lead the project. Do not go out and start a fire without having the proper safety gear or experience needed to keep the fire from getting out of control.

Conclusion

Habitat improvement on your property can be as in depth or as simple as you would like it to be. However, it doesn't have to break the bank. The practices I highlighted above vary from little to no cost and can really take your whitetail habitat to the next level. The three most important features a property must have in order to hold whitetails are food, water, and sufficient cover. These practices cover the bases on all of these fronts and ensure the future of your deer herd and hunting. Feel free to reach out to me for any further tips on improving the habitat on your specific property. Happy hunting!

The Bluegill

By Scott Brown

Scott Brown is a biologist and regular contributor to *Wildlife Trends Journal* with over 30 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. Scott can be reached at scott@southernsportsmanaquatic-sandland.com or (336) 941-9056.

This quality bluegill was caught on a winter afternoon using a beetle spin. Several more just like it were caught, placed in a cooler and fried for dinner that evening. Notice the lack of breeding colors during winter.

The bluegill (*Lepomis macrochirus*) is one of the most common pond fish in the country and are native to the eastern half of the United Sates. However, they have been stocked and relocated to waterbodies throughout the country. Whether your goal is trophy largemouth bass or quality bream/perch/panfish fishing, bluegill are probably present and part of the strategy. Bluegill are in the Sunfish Family (*Centrarchidae*) along with the redear sunfish, warmouth, redbreast sunfish, spotted sunfish, green sunfish, pumpkin seed, crappie and even largemouth bass.

Bluegill are identified by their deep body shape, small mouth, solid dark ear flap, vertical black bars and spot at the bottom rear base of the dorsal fin. All colors are accentuated during the spawn and breeding males may have a copper patch across the bridge of the head, hence the nick-name copper head. There is also a sub species in Florida named the coppernose bluegill (*L. macrochirus purpurescens)* which has

Here is a bluegill alongside a redear sunfish. Both are starting to display spawning colors. Usually the redear spawn before the bluegill, unless it has been unseasonably cold and then quickly warms up, and even then redear usually nest first.

become quite popular in pond management as a superior subspecies for quality bluegill amongst lake managers and landowners. Small bluegill can be differentiated from redear sunfish by gently opening the gill flap – long hair-like gill rakers are on a bluegill and short stubby gill rakers are on a redear sunfish. Adult bluegills will typically reach 6 – 10 inches long and weigh up to one pound. According to the IGFA (International Game Fish Association) the world record bluegill was caught in 1950 from Ketona Lake in Alabama, over 15 inches long that weighed 4 lbs. 12 oz. Bluegills live 4 -6 years and have been documented up to 11 years old in the wild.

The bluegill inhabits both large and small rivers, creeks, streams, lakes and ponds, including man-made waterbodies. They do best where there is abundant cover such as vegetation and/or woody snags to feed and hide from predators. They do not do well in con-

Typical bluegill spawning beds along the shore of a pond with an excellent algae bloom.

tinuously turbid (muddy) water or continuously high flow situations. Temporary turbidity or high flow due to flooding is not detrimental to them. Their requirements are almost identical to the largemouth bass, which is why they are rarely not found together, whether naturally or due to human introduction.

Bluegill are often in schools remaining in deeper water during the day and moving into the shallows to feed late afternoon. During sunny weather, they can be observed using overhanging trees, vegetation and docks for shade and to hide from predators in the shadows. Larger, older bluegills will be more independent except during the spawning season. Bluegill feed on both the surface and the bottom, depending on the time of day and food sources available. Their diet consists of zooplankton (microscopic animals) after hatching and gradually seeking larger foods, from small crustaceans to insects on the surface or their larvae on the bottom, to small fish and crayfish. Their main food source, when available are insects and their larvae. They do consume pelletized fish feed which increases their growth rates and can increase the waterbody's carrying capacity for the species. A well run supplemental feeding program is the best tool to increase bluegill sizes and numbers. Feed fingerling or grow-out size pellet feed so small bluegill mouths can eat feed at will. A common mistake, especially when starting out, is the feed is too large for small bluegill to consume. If feeding catfish and bluegill, mixing feed or buying feed already mixed with various sized pellets work best. Stocking fathead minnows or mosquitofish will also provide large bluegill with a food source. This technique works well in small ponds where bass are not present.

Nesting

Bluegills begin preparing nesting sites in spring when water temperatures approach 70° F. They will continue to nest through the summer until water temperatures drop below 70° F. This is why they are desired as a largemouth bass forage, because they are such prolific spawners and continually provide various size forage for young to trophy size largemouth bass. In the Deep South they may spawn from late March into October. They will spawn on almost any type of bottom, but prefer gravel. Bluegill spawn in one to six feet deep water, depending on the clarity and water chemistry quality on bottom. If you feel your waterbody is not producing the numbers of bluegill it should, have water chemistry parameters tested near the bottom during late spring/summer. They may spawn on a highly organic substrate (muck bottom), but if

Dissolved Oxygen (DO) is low, hatching success or fry survival will be low. Nests are round depressions, one-to-two feet in diameter, two-to-six inches deep and are usually located close together made by the males. Females lay between 2,000 and 60,000 eggs, may lay eggs in multiple nests and multiple females may deposit eggs in the same nest. Eggs hatch one-to-two days after being deposited. Post hatching, males continue to guard the fry for several days. To improve bluegill spawning habitat, dropping #57 limestone gravel along the shoreline in proper depths is a great tactic. We have seen bluegill spawning activity on these sites within a few days post installation.

Your waterbody objectives will dictate how you stock and manage your bluegill. As a largemouth bass forage, stocking bluegill prior to bass reaching 6 – 18 months old will allow your bluegill to grow and possibly reproduce a bit, allowing your original stockings to grow-out beyond what the newly stocked bass can prey on is advised. For new waterbodies, stocking in fall, feeding over winter and then stocking bass the following spring is recommended. Allowing the bluegill to remain a full 18 months before bass are stocked will increase the forage base for small bass and have medium size forage waiting for bass once they get large enough to consume. Stocking rates range from 250-1,000 per acre depending on the size fish stocked and your objectives. If stocking a new waterbody without any predators present, fish can be one-to-two inches, which makes them cheaper. However, it will take longer for them to mature or become harvestable size. If largemouth bass are present, but none over 12-14 inches, stocking 3 – 4 inch bluegill is advised, and if some quality bass (over 20 inches) are present, stocking bluegill no less than six inches is advised. The larger the fish, the more expensive. However, the larger the fish with predators present the higher the survival rate. The initial stocking can be any size fish your budget allows, or mix the sizes so some will reach harvestable size sooner. They will reproduce, and growth rates will be determined by how much natural and supplemental feed is available to them.

Depending on your waterbody objectives, the bluegill population structure will differ. If you have no predators it will remain natural, and may become overpopulated with stunted mid-size individuals if not enough are being har-

This gravel was being placed around a pond that lacked quality spawning substrate for bluegill. Within days of it being put out, bluegill were observed spawning on it.

Here is a bluegill searching and feeding on supplemental feed pellets as they sink.

A typical male bluegill in April, showing its spawning colors and markings.

These mosquitofish make great forage for large bluegill, which this pond was void of until the hatchery truck arrived with several hundred six-inch bluegill. With feeders running, these bluegill will be of harvestable size shortly.

vested and/or the food supply is not sufficient. If there is a stunted largemouth bass population, you will see many large bluegill, but few smaller ones. If you have a trophy bass fishery, you will see very few large bluegill, and more in the smaller size range. These profiles can change over time as the predator population size structure changes, or with under or over harvesting of bluegill by angling. It is typical as a lake transitions from an all-around fishing lake to a trophy bass lake, large bream catch success declines while quality bass catch increases. The larger your bass, the larger and more bluegill they can consume. If you have bass present, but want a quality bluegill fishery, not harvesting bass is recommended. Let them become stunted so there are fewer that consume larger bluegill. If a trophy bass fishery is desired, removing bass from the target size slot is required. Many lakes that are neglected with bass and bluegill present revert back to quality bluegill and stunted bass status. With proper stocking and harvest, any of these scenarios can be converted to another that you desire.

There is nothing more enjoyable than catching large bluegill on ultralight tackle or fly rod. Small flies, similar to common area insect species, small beetle spins, small hook with split shot on bottom or suspended by float with

worm or even a small piece of hotdog. For kids or novice anglers, a piece of softened fish feed on a small hook suspended or on bottom works well where supplemental fish feed is used. But the go to bait for bluegill are crickets. On the surface, suspended, or on bottom, all produce harvestable fish throughout the year. In spring and fall bluegill may bite any time. In summer, just after daylight and just before dark is best. During winter, fish midday when waters at the surface get warmed by the sun. Small and light is the key when choosing line, bait, hook or lure. In waterbodies with high fishing pressure they can become educated, and periodically changing angling techniques may be required.

Harvest numbers and size to harvest depends on the size and numbers of bluegill your waterbody can grow and support. In a highly productive lake, allowing bluegill to reach 9 or 10 inches before harvesting is advised. In colder climates or less productive areas, harvesting 7-8-inch bluegill may be necessary to reap benefits from your efforts. As you progress in the management of your lake(s), you will learn what the bluegill growth potential and carrying capacity is and adjust harvest guidelines accordingly.

This bluegill is too large to swallow for this largemouth bass. This is typical of a stunted largemouth bass population where forage of the proper size is not available, which results in the sunken belly and snake-like appearance. This lake was full of large bluegill and no quality bass.

Frying bluegill is the only way to prepare for table fare in my humble opinion. Scale, gut, remove head, coat with cornmeal and fry in a cast iron skillet with oil, or deep fry filets from large bluegill. If you have never cooked it this way it is the only way. It makes a great meal at camp or with kids who want the full outdoor experience of cleaning, cooking and eating their own catch with fries, slaw and hush puppies.

What's Out There? Wildlife Survey and Inventory Techniques for Land Managers

By G. Ryan Shurette

G. Ryan Shurette is a Certified Wildlife Biologist and Owner/Guide of DragSmoker Fishing Guide Service. Contact him at 256-404-5814.

Cameras are now commonly used in estimating deer density, sex ratios, and recruitment. Recruitment for example (essentially calculated from fawns per doe) is a valuable piece of information, especially when trying to determine the appropriate level of antlerless deer harvest in areas with high coyote populations.

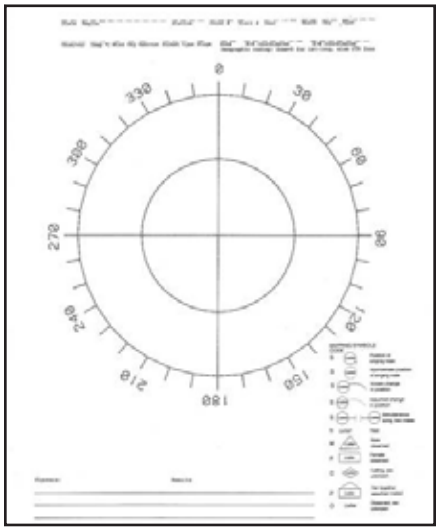
Many years ago I remember hearing a story about a lady who loved the outdoors. She especially loved birds and she would watch them from her front porch every day. She would constantly put out seed and fill her bird bath in an attempt to attract them so that she could enjoy them in her yard. The lady did indeed attract some birds with her seed and the little pool of water but they were always the same old common species; a bright red cardinal here, a curious tufted titmouse there, and an occasional northern mockingbird at the bath. Frustrated and curious why there were no "interesting" species in the area, she called up an old friend who happened to be an amateur ornithologist. After they had finished a glass of iced tea on the porch and she had explained the lack of diversity in the area to him, she asked why this was the case and pondered what she could do or where she could go to experience the warblers, tanagers, flycatchers, and vireos that filled the pages of

her field guides. Her friend smiled and explained to her that she need only to venture a little ways from the porch to find them. In fact, in the seven minutes it took them to finish their tea, he had heard and distinguished no less than twenty five individual species in the woods and old-field just beyond her yard. The lady was both astonished and delighted but at the same time she was a little bit embarrassed. The lady learned a lesson that I will try to relate in this article. The point is different groups, and sometimes individual species, of wild animals are best detected using a variety of different methods, depending on their biology, behaviors, and life cycles. Most passerine birds (the target group in the story above) for example, are most efficiently discerned using sound (songs and calls), rather than a single type of food bait. This article will provide an overview of the various survey methods and techniques for a variety of both game and non-game terrestrial wildlife species.

Before we get into discussing the wide array of modern survey methods, it is probably worth clarifying a few terms related to the subject. I often hear land managers and wildlife biologists discussing **surveying, sampling, inventory,** and **monitoring**; and sometimes they may even use these terms interchangeably. However, in a scientific context each of these four terms, while they are similar, actually implies something completely different. To **survey** means to examine or search for something (whether or not you may actually find it). As a noun, a survey is this search or examination itself. A **sample** implies you'll be examining or testing by taking a part or piece of something (which means you have to find or have something in the first place). An **inventory** implies you will be finding and listing all the target critters in an area. In other words, an inventory is like a census. And finally, the term **monitoring** implies a surveillance of a target over a period of time. Monitoring typically means you'll not only be finding something, but repeatedly looking at it in an attempt to determine trends.

As we established earlier, there are plenty of methodologies out there to survey for wildlife species in a particular area. To determine what method is most appropriate, managers often consult books, scientific literature, or someone with knowledge about the target group. And depending on the type of wildlife a land manager is interested in surveying, the purpose and nature of the survey, and the level of accuracy needed, the manager may elect to conduct the survey himself or hire a consulting biologist. Some species are easy to detect, some seemingly impossible (although we know they are probably there). This variability has to do with a wide assortment of factors like home range, size of the animal, behavior, and the kind of habitat in which it lives. More often than not, a survey will be designed to provide more than just presence/absence data. Density, relative abundance, diversity (implying a survey for multiple species), habitat use, seasonality, and population trends (implying monitoring) are all factors that are commonly of interest when conducting wildlife surveys. An internet (or field guide) search of the species' range is a good place to start. Knowing whether you are within the known range of a species will narrow down the list of potential species on a particular tract. Reasons for conducting wildlife surveys vary as much as methodologies, and can range from pure research in regards to

Quail covey counts are established at optimal listening points across a property and observers record coveys calling just after daylight (usually in October-November). Most calls occur a half hour or so before sunrise and last only a few minutes. Each observer can be expected to detect quail over about a 200-acre area, or about 550 yards in any direction.



Breeding bird point counts involve recording all birds seen or heard (the vast majority will be detected only by song or call) during a set period of time (typically 10 minutes). While facing north or another known direction, bird species codes are recorded on a data sheet like the one above, in the direction and at the estimated distance of the call. Image from USDA FS General Technical Report SO-120.

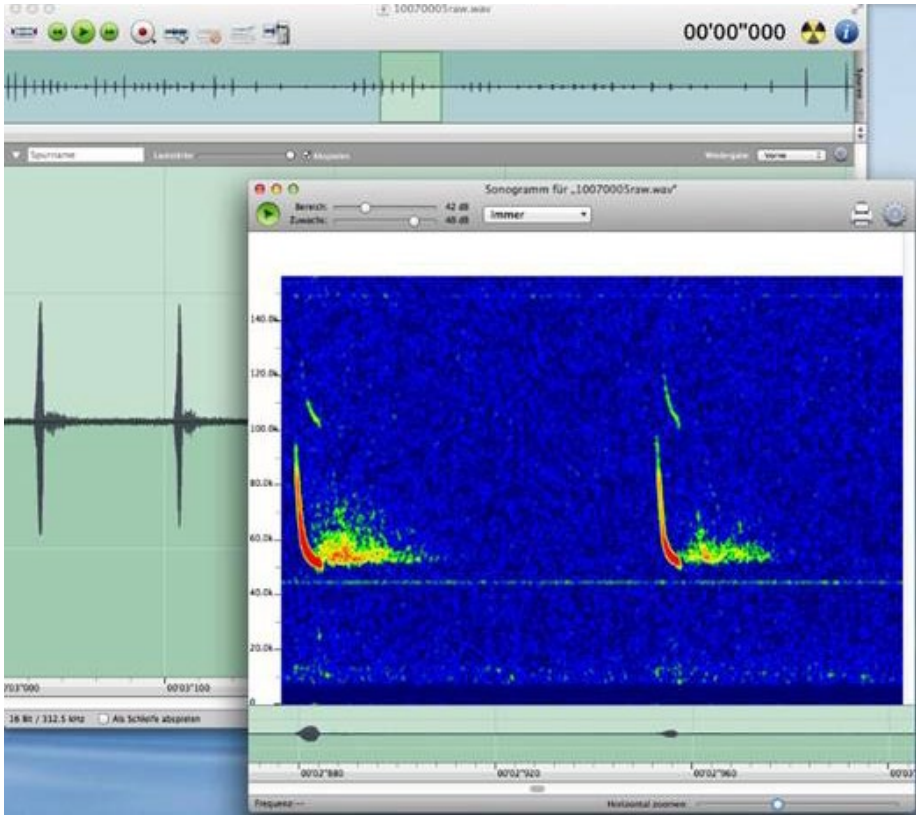
Number of Coveys Detected	Call Rate Factor
1	0.53
2	0.85
3 to 4	0.87
5 or more	0.94

Quail covey counts are typically adjusted by the factors shown in this table that compensate for the number of coveys calling and coveys that may not call. In other words, if several coveys are calling they tend to make other coveys "speak up", thus making them more likely to be detected. For example, if two coveys are heard during a count the adjusted number of estimated coveys within the 200 acre sample area is 2.4 coveys (2/.85 = 2.4). Table adapted from University of Missouri Extension, 2010.

population monitoring and ecosystem health (typically universities and/or government agencies), to hunting and private land management purposes (typically private land managers or consultants). The following are some of the most common techniques.

Sound-Based Survey Methods

As we established earlier, many species are most efficiently detected using sounds. Bird point counts conducted in the breeding seasons (May or June) are probably the most common example of non-game avian survey. This method focuses on both resident and migrant songbirds. While most landowners do not consider these counts, they can actually provide very good information about the health and functionality of the habitats on a particular tract of land. This is because birds are effective habitat indicators and are quite predictable in their association with vegetation structure and composition. As habitats change or management occurs, changes in breeding bird assemblages would be expected. Consistently picking up species like Bachman's sparrow, prairie warbler, and field sparrow lets you know you are providing the early successional habitats that are needed by other species like bobwhites. Some landowners just want to know what species of wild birds use their property. Breeding bird point counts involve recording all birds seen or heard (the vast majority will be detected only by song or call) during a set period of time (typically 10 minutes) in the morning along with weather conditions and a few other pieces of environmental information. While facing north or another known direction, bird species codes (there are published four-letter codes for each individual species) are recorded on a data sheet in the direction and at the estimated distance of the call. This method allows the observer to keep track of what birds are calling during the count and prevents duplicate recording. Counts are generally taken from a set point once or twice a year so that trends can be observed over time. These surveys are essentially free to conduct and basically require only the knowledge of bird calls and songs. These skills can take a while to master however and may fall outside the ability of the average landowner. There are many consulting biologists who can provide these services. Like most of the following survey methods, data collection is important. We won't go into



Bats were until recently most often surveyed only by capture (mist or harp netting) or direct observation (within or emerging from hibernacula), but now full spectrum recording technologies are available. Special software can then be used to interpret the sound files and automatically distinguish individual species. Software image from BatScope analysis program.

deep detail here but at the very least using a spreadsheet or some similar way of logging and analyzing data is essential in keeping the records generated from any surveys. This information may later be used to inform management decisions.

Game bird surveys vary, but for the most part, like song birds, they can also be detected effectively using sound. Formal wild turkey gobble counts are conducted during the springtime in a similar fashion as breeding songbirds, or so they tell me. Personally, the only gobble counts I ever do are with my shotgun on my shoulder. That's why I did my graduate research on non-game bird communities; they can be done after turkey season! When it comes to using sound-based surveys for quail however, the techniques are usually a little different. While you can and will certainly detect bobwhite cocks whistling during spring point counts (in appropriate habitats), their populations are more typically assessed during the fall using quail covey counts. These covey counts can be performed by the average landowner and they basically involve a similar principle as the counts described above. However, these surveys rely on a different type of call; the covey "break-up call" as opposed to territorial singing. If you have never heard this distinctive call in the wild, it can readily be found online with an internet search. With covey counts, set points are established at optimal listening points across a property and observers record coveys calling just after daylight, on a cool calm fall morning (usually in October-November). Most calls occur a half hour or so before sunrise and last only a few minutes. This type of survey is different from breeding bird points in that it is a "one point per morning" deal. With breeding counts you can move from one point to the next as the morning progresses and obtain data for several 10 minute counts, whereas the break-up call is only performed once in the early morning. This usually means several folks must participate on the same morning to cover large areas (the preferred method) unless fewer observers can commit to multiple mornings. Each observer can be expected to detect quail over about a 200-acre area, or about 550 yards in any direction (Univ. of Missouri Extension, 2010). On a relatively small tract, plan enough listening stations to essentially cover all the usable property. Each observer records the number and location of the covey heard on a data sheet. The number of coveys heard is adjusted by a factor that compensates for coveys which may not have vocalized that morning (see Table 1). In other words, if several coveys are calling they tend to make other coveys "speak up", thus making them more likely to be detected. Some managers also use an adjustment formula that considers change in barometric pressure, cloud cover, and wind speed to further refine the estimate. These covey estimates are then typically used to generate an estimate of quail density. To calculate density the following formula is used: number of coveys estimated multiplied by 12 (average covey size) divided by the number of acres surveyed. This will provide a raw estimate for acres per quail (or one quail per X acres). Since bobwhites have relatively small home ranges, these counts can also be used to spatially map essentially all the coveys across a property. If quail management work is planned for a property, most managers will want to take baseline surveys and subsequent counts on an annual basis to determine the population response.

There are a number of other species that are often detected via their calls or sounds. Frogs for example are another group that "sing" in the late winter and spring to establish territories and attract mates. This often makes them easy to detect and identify to species, even in a dark and cold swamp. While songbirds and frogs sing on their own accord, species like owls and wolves are often surveyed for by reproducing their calls and then listening for their respective replies. Owl hooting and wolf howling surveys (where the observer does a series of hoots or howls) are typically conducted along a road to cover a lot of ground, since these are after all very mobile creatures. Modern technologies have changed the way some audio-based surveys are conducted, and sensitive audio recorders can now be used to capture the vocalizations of certain animals, especially if the calls are soft, infrequent, or difficult for the human ear to distinguish. Bats, for example, were until recently most often surveyed only by capture (mist or harp netting) or direct observation (within or emerging from hibernacula), but now full spectrum recording technologies are available. Sensitive audio recorders take advantage of the echolocation calls and other vocalizations active bats make. These listening devices can be used over time at a fixed point or can be integrated with GPS to run driving routes or transects. These instruments can detect flying bats at over 50 yards away. Special software can then be used to interpret the sounds and even distinguish individual species. Sometimes these types of recorders are even left to collect data for days or even weeks. The audio data can then be downloaded and analyzed in the comfort of a lab or office. Generally, these recorders are used for research projects and endangered species monitoring, rather than in typical private land management.

Capture Surveys

Live capture remains a standard and a popular way to determine what wildlife species live in an area. Live capture includes such methods as mist-netting, live trapping (cage traps), and pitfalls. Bats and birds are often mist-netted, especially when banding or collecting tissue samples. Mist nets are typically made out of fine black nylon or polyester material so that they cannot be easily seen or detected. These nets are

raised in strategic areas and are checked constantly to minimize the amount of time target animals are in the net and therefore reduce stress and risk of injury. The observer removes the captured individuals, takes measurements, fits a band, collects any other data needed, and then releases the animal unharmed.

Live cage trapping is typically the preferred method for small (non-flying) mammal surveys. The **Sherman trap** is the most popular small mammal trap system and they fold up so that a large number of them can be easily transported into the field. These little live traps are used to detect and survey native shrews, mice, voles, cotton and wood rats, chipmunks, and squirrels. They are usually baited with a mixture of rolled oats, mixed bird seed, and peanut butter. A typical array of Sherman traps consists of six transects laid out to form a hexagonal pattern 400 meters across, with traps placed every 20 meters (total of 80 traps). Traps are checked and rebaited if needed twice daily (morning and again before dark) for at least three consecutive days (72 hours). This is a fairly intensive survey but this protocol will provide estimates for species richness and relative abundance for the small mammal communities in an area. Most small mammal surveys are conducted for research purposes. Pitfall traps are basically what the name implies, a bucket or jar that is level with the ground which serves as a pit that small animals fall into. Some small mammals (especially shrews and gophers) are effectively detected by using pitfalls.

A long-standing method of estimating the population size of a species that is often used in conjunction with live trapping is the **Mark and Recapture system** (sometimes also called the Peterson Method). It is a fairly effective way of assessing abundance when there are either too many individuals in a population to count or when the species is cryptic or difficult to see. Using this method, a subset of a population is trapped, marked in some way (for example with a band, paint, tag, etc.), and then released back into the population. After a certain window of time has passed the population is trapped again and the number of marked individuals in the second trapping sample is divided by the proportion of marked individuals to give an estimate of population size. The following scenario can be used as an example. 100 aquatic snails are picked from a large slab of bedrock (trapped), dried with a towel, and marked with a painted dot on their shells. They are then released back into the stream (at the same site), allowed to mix back into the population, and in one week are trapped again. A total of 90 individuals are captured in the second sample and, of those, only 10 are marked. The following formula provides the estimated population size (P): $P = A \times B / M$, where A represents the number of individuals marked initially, B is total number of individuals captured in the second sample, and M is the number of marked individuals in the second sample. Considering our numbers (100 x 90 / 10), the population estimate is 900 snails. This process can

Live cage trapping is typically the preferred method for small (non-flying) mammal survey. The Sherman trap is the most popular small mammal trap and they fold up so that a large number of them can be easily transported into the field. These little live traps are used to detect and survey native shrews, mice, voles, cotton and wood rats, chipmunks, and squirrels. Image in Public Domain.

be repeated and implemented over multiple sites and then averaged to increase the accuracy of the estimate.

If the mark is unique to a specific individual (an exclusive identifier like a numbered band), this method can also be used to gather additional information about growth rate, longevity, habitat use, migratory patterns, and a great many other biological and ecological data, when the individual is recaptured over longer periods of time. As an example, a female pine snake is caught, measured, weighed, pit-tagged, and released at one year of age. She happens to be captured again at the same site one year later as an adult snake and is found to be gravid (with eggs) and significantly larger than the expected normal for a 2-year-old. These data suggest that habitat for this species in the vicinity of the trap location is of high quality and the population is reproductive and appears to be healthy.

Direct Observation Surveys

Direct observation, visual encounter, or other sight-based surveys can be employed for many wildlife species. One fairly common example of this kind of methodology is the spotlight count. Spotlighting can be fairly effective for both ungulates (hoofed animals) and rabbits. Spotlight counts can be used to estimate density and abundance by directly observing individuals during the night when they are most likely to be detected. Furthermore, many of these nocturnal species exhibit "eye shine" which make them easier to see. Typically, a spotlight survey is conducted along a pre-determined road route from a slow-moving vehicle (with a driver and two observers; with one shining and looking left and one shining and looking right). Animals are recorded on datasheets. Dense vegetation makes detection less likely, therefore sight distances (how far the observers can see into the woods) are also recorded at regular intervals along the route. Sight distance is averaged and multiplied by the length of the spotlight route. This area calculation allows an estimate of density (acres per deer) to be estimated. In other words, if the average sight distance is 250 feet on each side of the road (500 feet total) and the route is a mile long (5,280 feet), this suggests a survey area of 2,640,000 ft^2. Divide by 43,560 to convert to acres and we come up with about 61 acres. If a total of two deer were seen during the survey, the estimated density would be approximately one deer per 30 acres. Obviously, you wouldn't want to base density on a single one-mile sample but this is the general concept. This estimate becomes more accurate with multiple sample runs. Although it is illegal to spotlight in many areas, wildlife managers and biologists can often request and obtain a permit for conducting controlled spotlight surveys for research and management needs.

In daytime, simple walking transect counts are sometimes used to count wildlife using the same general principle as the spotlight count. Number of individuals observed are divided by area observed (which is calculated in a similar way by multiplying transect length by the average sight distance) to give an estimate of density. Walking transects typically cover much less ground and aerial counting (from a plane or helicopter) is sometimes used to determine population and herd size in some larger species (like bison, elk, feral pigs, etc., especially in wide open terrain. These counts are more common in western states, in prairie, desert and grassland dominated habitats.

Many common visual survey and monitoring techniques nowadays use modern camera technologies. **Game and trail cameras** have become much more advanced (and much more affordable) over the past several years. Cameras significantly reduce the amount of time an observer has to spend in the field and they can be employed in multiples. And they are very effective in detecting some groups of wildlife on a property. Not all wildlife species can "set off" the camera and so they are more commonly used to survey large birds and mammals. Cameras are associated by most folks in the way they are used by hunters to scout for deer. It is true that individual deer can be patterned and their schedules can be studied by employing a few cameras at food plots, or along trails. But these cameras can be used in so many other ways, ranging from intensive research projects to active management applications. For example, automatic cameras have been used successfully in studies to examine nest predators of bobwhite quail, turkeys, and other ground nesting birds. They are also invaluable when it comes to whole-sounder feral swine trapping. Pre-baiting and using cameras to ensure that all the individual pigs of a sounder are comfortably feeding and entering a trap is critical when your goal is to capture the entire maternity group (which has proven to be the most efficient method of eradication and control). Cameras are now commonly used in estimating deer density, sex ratios, and recruitment. Location and placement of cameras is just one factor to consider and may best be determined by the kind of information the manager is interested in, as well as life cycle of the animal. The same is true for timing of a camera survey. Recruitment for example (essentially calculated from fawns per doe) is a valuable piece of information, especially when trying to determine the appropriate level of antlerless deer harvest in areas with high coyote populations. Fawn recruitment can be estimated using cameras, but a survey in July versus September versus November will produce different results. In July, (in some parts of the South) fawns may not have been dropped yet. In September, they may have dropped but still not be with their mothers. November will likely capture a "truer" picture of fawns per doe. If surveying in fall however, during a high mast crop year, a camera along a high use trail may actually prove to be

more productive than one located at a food plot. Identification skills are important to develop when using cameras (in order to determine does from older fawns, etc.) since you may only be looking at single photograph images. Setting the camera to video or for multiple shots (along with enabling the time and date) will help ensure an accurate representation of family group is captured. With careful and skillful identification, mark and recapture methods can actually also be conducted using non-invasive camera surveys to determine abundance. With deer, this level of individual identification is obviously easiest to make in antlered bucks (which often have distinguishing characters in their antlers).

Cameras are also commonly used to "capture" the presence of rare and secretive wildlife species. In recent years they have been used to examine the abundance and range of eastern golden eagles, spotted skunks, black bears, and mountain fox squirrels, to name a few. Strategic settings and locations (often associated with specific baiting techniques) are generally used when pursuing cryptic wildlife with cameras.

Another non-invasive concept similar to the camera survey is called the **track plate survey**. Track plates are a low-cost way to test for the presence of some mammals (especially carnivores), and as the name implies, they are based on the identification of footprints left on a plate or sheet after the target animal walks over a chalked mat or paper. Carbon black is also sometimes used instead of chalk. A potent scent lure is typically used in the center of, or behind, the track plate. American martens and black-footed ferrets, fishers, lynx, wolverines, bobcats, otters, voles, lemmings, and squirrel and rabbit species can all be effectively detected using track plates. Mud track plots are essentially free to set up and use basically the same idea; a plot of mud that is wiped smooth and "clean". Mud plots (typically one meter square) can be used without bait and therefore can provide a more accurate picture of habitat use and natural movement, and can be used for other mammal and wildlife groups. Since there is no bait or lure, they are usually checked after longer periods of time (a week or longer).

Wildlife survey and monitoring methodology has evolved greatly over the past few decades. New technologies are leading to more effective and cost effective ways to survey. Some species that were thought to be extirpated are actually being re-discovered in some areas thanks to cutting edge research and inventory techniques. For example, eDNA assays (conducted by sifting through the genetic material filtered from a river or lake) can now be used to detect species-specific DNA in water samples. Cryptic animals like hellbenders, turtles, and some rare fish species are being studied in this way, and these eDNA techniques are fast becoming the new wave of aquatic survey and research. Whether using advanced concepts such as these or just taking a good old fashioned walk through the woods, there are countless approaches to help a land manager determine what's out there.

Wildlife Trends Journal Management Calendar

By Dave Edwards

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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 General Manager for Cabin Bluff Lodge and President of Tall Tines Wildlife & Hunting Consultants, Inc. Contact him at Dave.Edwards@CabinBluff.com or 912-464-9328.

Check every doe harvested for fetuses. Reproductive data provides valuable information about the health of your deer herd.

If possible, collect fetal data from harvested whitetail does

If your breeding season or rut occurs before or around Thanksgiving, and your hunting season extends into late December of January, you should be able to find and measure fetuses in does harvest later in the season. Similar to human fetuses, the age of the deer fetuses is determined by their length. Commercially produced fetus scales are essentially rulers that can be used to measure and ultimately determine age of the fetuses. White-tailed deer fetal scales can be obtained from the Quality Deer Management Association. Once you know the age of the fetus and the date of the harvest, you can determine the day of conception. When an adequate sample size of fetus ages are collected, this information can provide much insight to your deer herd's reproductive performance as well as the length and peak of the rut in your deer herd. This not only helps you determine when to put in for vacation next year (during the rut), but the length of the breeding season will shed light on the adult sex ratio of the herd. A tighter sex ratio will result in a shorter more intense rut due to increased competition for mates, while an unbalanced sex ratio will likely be represented by a long, weak rut due to less competition and the length of time it takes bucks to "service" the abundant doe population.

This information, along with hunter observation data, is a great and free way to assess the status and success of your deer management program.

Perform preventative maintenance and calibrate sprayers in preparation for burning and early summer uses

Although you probably won't use them for a couple months, late winter is a good time to over haul sprayers. By over haul I mean check all hoses, tubes, connections, filters, nozzles, etc. This is also a good time to calibrate sprayers so that everything is ready when early summer weeds become a problem in food plots. We commonly use the pistol nozzle of our sprayers to assist in prescribed burns. Be sure to check all parts and test the pistol nozzle, hoses, etc if you plan use it this winter during burning activities. Working on sprayers is a great midday activity while hanging out at the camp during a weekend of hunting.

Strip disk areas to promote natural, desirable habitat for wildlife

Strip disking is simply one of the easiest, cheapest, and most effective management practices to implement to create high quality food and cover for wildlife. Strip disking is as simple as it sounds. To strip disk, you merely drop the disk far enough into the soil to lightly break the surface of the ground. Lightly disking the ground will provide enough disturbance to stimulate the natural seed bank of wildlife friendly weeds the following spring and summer. Heavy disking like you were preparing a clean seedbed for planting a food plot is not needed. One pass is generally enough to stir the ground up and expose bare soils that will promote germination of desirable weeds. While not necessary, I often mow areas I plan to strip disk ahead of time. This makes disking more effective if vegetation is relatively thick or tall. It also knocks back/reduces competition of the undesirable or overgrown plants I am trying to replace. Strip disking at different times of the year will result in different plant communities. While disking can be conducted anytime of year, it is normally done in spring or fall. Fall/winter disking generally results in a broadleaf plant response, while spring/summer disking will result in more native grasses. Altering the season in which you strip disk will add diversity to your property. Strip disking can be done in thinned pine plantations, relatively open mature pine stands, along the edges of food plots, or in open fields. Basically anywhere sunlight can reach the ground will work. To optimize the benefit of strip disking, avoid disking straight lines. A serpentine pattern that winds through the habitat will provide the most edge and diversity.

Winter is a great time to check and make repairs as needed to sprayers, tanks, hoses, nozzles, and spray booms.

Strategically adding trees to your property adds habitat diversity, wildlife value, aesthetics, and can be a very gratifying project – especially once the trees mature and you see the value they are providing

Even in the South, late winter can be a nutritionally stressful period for deer. Providing supplemental feed during this time can boost energy and nutrition

Tree planting activities - start planning, ordering supplies, and planting.

Strategically adding trees to your property adds habitat diversity, wildlife value, aesthetics, and can be a very gratifying project – especially once the trees mature and you see the value they provide. However, planting trees is more than just randomly plopping trees in the ground. For the best success and results plantings should be well thought out with the future in mind. Besides the obvious "where" to plant trees, you need to consider which species are suitable and do well in your soils/climate, how large they get, and future maintenance needs. Once trees are planted, they will require a bit of care to ensure good survival and growth during their first growing season. Site preparation is important to reduce competing weeds to enhance tree seedling survival during the first growing season. Depending on the situ-

ation, an initial mowing may be needed to provide a clean working area and reduce weed competition. There are many species and varieties of soft (e.g., fruit trees) and hard mast (e.g., oaks) trees available that will benefit wildlife on your property. I generally like to plant a diversity of trees that will provide various food sources throughout the year. Supplemental tree plantings not only provide additional food resources for wildlife on your property but can provide exceptional enhancements to the aesthetics. Common areas to add supplemental tree plantings include road intersections, roadside management areas, old field habitats, and in or along the edge of fields or food plots. The key is to plant them in areas that will receive sunlight. Some trees require cross-pollination to produce fruit so, if needed, be sure to plant them in small groups. I recommend contacting your tree supplier/nursery, such as the folks at The Wildlife Group, well ahead of planting time. They can help you determine which trees will grow and produce best on your property, help you develop a planting plan based on your goals, and ensure the trees and other supplies are ready when you are.

Provide supplemental feed for deer

Even in the south, late winter can be a nutritionally stressful period for deer. They have endured the rigors of breeding season and natural food sources can be limited. Providing supplemental feed during this time can boost energy and nutrition. This recommendation/activity is directed towards landowners or managers that have done a good job managing their natural habitat, food plots, and deer herd conditions. That is, before thinking about starting a supplemental feeding program for deer on your property, you need to take care of the "important" things first. In other words, you cannot hang shutters if you do not have a house – and you will not grow big bucks and a healthy herd with supplemental feed alone. It is a supplement to other management strategies and activities. However, when done in combination with other core management practices, supplemental feeding can be valuable for deer. Be sure to check your local game laws before providing feed on your property. Many states do not allow the use of feed during hunting season. Ideally, providing supplemental feed throughout the year is best, but supplemental feed will be most used and most valuable for deer in late winter and summer. These are periods when natural food availability is at its lowest. So if you have a limited budget and cannot or do not want to feed throughout the year, provide it during the periods deer need it most.

Conduct maintenance to equipment

As a land manager, quality/working equipment is essential to success. While the list of equipment used to manage hunting/recreational properties is wide ranging, most managers have, use, and need the basics such as farm tractors, tractor implements (such as harrows, mowers, grain drills, spreaders, sprayers, etc), UTVs, chainsaws, and other mechanical "hand tools". To remain in good working order, this equipment will require proper maintenance. Without maintenance, these tools will begin to wear down until they eventually break. This can result in costly repairs and added downtime in which nothing can be done until the machinery or equipment is fixed. Nothing is more frustrating that planning a food plot planting project, getting everything ready, finally getting the right weather and soil moisture, then having a tractor or implement breakdown. There are two forms of maintenance. The first being *repair* maintenance, which is conducted once the equipment has started to malfunction or has completely broken down. *Preventative* maintenance is a program designed to prevent equipment from failure – resulting in less *repair* maintenance. Preventative maintenance varies depending on the equipment but generally consists of checking/replacing fluids, seals, filters, hoses, blades, batteries and/or electrical parts, screws/bolts, etc. In a nutshell, it is giving equipment some love before neglect results in breakdowns. Winter is a great time to conducting preventative maintenance on equipment. Doing so can be a relatively easy project between hunts. Of course, there's absolutely no way to avoid breakdowns and damage in the long term. No matter how much care you give your equipment, it will ultimately breakdown. However, preventative maintenance certainly slows down functional decline but also helps keep equipment in reasonably good shape in the event that you decide to trade it in or sell for new. On larger more complicated equipment like farm tractors, skid steer machines, back hoes, etc, keep in mind that maintenance must be done properly to be effective. If you decide to do it yourself and it's not done correctly, you are not only wasting time, but may damage the equipment. For this equipment, consider an annual "checkup" by a professional. Although hiring a professional mechanic to perform preventative maintenance and checkups will be an expense, think about all the time and money that you'll save by fixing it once instead of over and over. Part of your preventative maintenance program may include hiring a mechanic each winter to visit your "equipment shed" to perform checkups. One of my philosophies is that if you take care of your equipment, it will take care of you.

Trap and remove nest predators

If managing for wild turkeys is a goal on the property you hunt, don't overlook the value of removing nest predators such as raccoons and opossums. Having said this, attempting to control predators should not be a priority if you are not actively managing the land to promote quality turkey habitat. Creating and maintaining quality habitat should be the highest strategy on our list for managing turkeys. By the way, wild tur-

keys are a species that responds quickly to good habitat management such as thinning timber, burning, understory control, roadside management, etc. However, research has clearly demonstrated that nest predators, particularly raccoons, can significantly impact nesting success rates and thus turkey population growth. Not only will they eat the eggs, but they may even kill the hen turkey. Winter is a great time to trap and remove nest predators. This is also when hunters spend the most time at a property. Trapping offers a great midday management activity during a weekend at the camp. The key in being successful and efficient is to pick good trap locations. Water sources, feeders, and food plots can be good places to start. There are many effective traps available. The most common are live traps (cage traps) and steel traps (leg hold traps). If you use leg hold traps, I recommend "soft-catch" or offset jaw traps. These traps do not damage the foot of the trapped animal in the event that you catch a dog or other non-target critter. If you have never trapped before, you will learn a lot by trial and error. I recommend doing a little homework by surfing the web and YouTube to learn effective techniques. One more thing to know is that nest predators are prolific and have relatively high reproductive rates. This means that populations can rebound quickly. To be effective in controlling nest predators and helping turkeys, you must significantly reduce nest predator populations and continue to aggressively remove them each year.

Scout now for next duck season

Doing a little homework this season, even if it means missing a hunt or two, will help you have better duck hunts next year. By this I mean take time to watch and glass wetlands, moist soil impoundments, beaver ponds, lakes, and flooded fields to find new areas to hunt. While food sources and water can change from year to year, in most cases ducks will be attracted to the same areas each year. Simply stage yourself somewhere that you can see the area you are scouting without spooking ducks. In most cases, a high vantage point that offers a landscape view is best as it often allows you to see where ducks are coming from as they approach and which direction they go when they leave. Good vantage points are often hills, highways, bridges, barns, and sometimes deer stands. The point is to get as high as you can so that you can see the sky where ducks are flying. I can't tell you how many times I have set up and scouted like this and found an even better spot by being able to see flocks from a landscape level verse getting into the actual area (tight) where I thought ducks would be. In some cases, you may not see ducks go down but notice that lots of flocks headed in a certain direction. Relocating closer to the area you saw ducks headed on the next scouting mission will often reveal a new honey hole. As you begin to pin point areas ducks are using, close in tighter and start learning exactly where ducks want to be and how they approach when coming in. If it is still duck season, this is when I like to hunt the spot a couple times. Doing so will help you identify exactly where to build a blind this summer. So by next season, you will be sipping coffee after putting out your spread of decoys while waiting on daylight and ducks to start flying.

Late winter is one of the best periods to remove turkey nest predators such as raccoons.

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