

PRACTICAL WILDLIFE MANAGEMENT INFORMATION



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Earl Says...

I can't tell all just you how much I enjoy my job. Every day I am blessed to talk to landowners from all over the country who are starving for wildlife management information. I get to visit beautiful plantations with rich histories and diverse habitats as well as smaller land tracts of land whose owners want to maximize the potential of every inch of their property. And best of all I regularly deal with my authors who not only make me look good through their informative articles, but teach me something new every time I talk to them.

Recently Allen Deese, (Manager of The Wildlife Group), and I visited Dave Edwards at his new job with Cabin Bluff in southeast Georgia. I was fascinated with the beauty of the property. But I could also see in my mind all the future projects Dave was describing to us. Adding onto the skeet range, planting new food plots and trees, widening woods roads, the list goes on and on. This just reminded me that we may never run out of article ideas for *Wildlife Trends*!

Thank you to our loyal subscribers for another growing and prosperous year. I hope you all have a wonderful holiday season and hopefully a successful hunting season as well. Remember to tell your friends about us in the coming year and please let me know if I can ever be of service to you.

Andy Whitaker
Publisher/Editor



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Cover photo by Michelle Isenberg

Avian Predators Every Quail Manager Should Know

By G. Ryan Shurette

G. Ryan Shurette is an Ecologist/Botanist with the USDA Forest Service.



The red-tailed hawk is a large and heavy buteo (wingspan of about 50 inches) but is still stealthy and agile enough to sometimes catch quail, although they prey mainly on rodents. Photo courtesy of USFWS National Digital Library.

Many of us who hunt or manage property for bobwhites have found the remains of a quail that was killed by a “raptor”, or bird of prey. The signs are usually easy enough to discern; a pile of plucked feathers, a devoured head, or a cleanly-picked breastbone. This scene brings to mind questions like “What species of hawk did this?” or maybe more importantly “How often does this happen?”. Over the past thirty years there has been a good deal of research looking at the predators of bobwhites. Raptors have consistently been found to contribute a significant number of deaths to the annual mortality of the average quail population. It has also been noted that many bird raptor species have been steadily increasing in numbers since the 1970’s and are now abundant. What is not consistently agreed upon, however, is the level of long-term impact these expanding birds of prey are having on local southeastern quail populations. Furthermore, this debate is sometimes distorted by the

fact that there are fewer legal removal options with birds of prey, as contrasted with mammalian predators.

Fortunately, there are some management options that can be used to mitigate avian depredation in quality quail areas where it may be one of the limiting factors. This article will address the identification and physiology of some important avian bobwhite predators, their population trends, and some strategies for minimizing their impacts on your quail.

Past Research on Avian Quail Predation

Avian predators have consistently been shown to play a major role in quail mortality, although most of the focus in management and research has been on mammalian predators (Carroll et. al., 2007). In fact, numerous radio-telemetry field studies with bobwhites (as well as other species of quail) have suggested higher adult mortality rates from predatory birds than from any other predator group. This is especially true during winter in the Southeast, when avian predation can account for over 65% of individual losses (ADCNR, 2005). Avian predation typically decreases somewhat but remains high during the bobwhite's breeding season. Stribling and Sisson (1998) observed somewhat lower avian predation rates at the Albany Area study site in southwest Georgia, where quail density and habitat quality was very high. Here they noted 40% quail mortality from raptors and an overall higher quail survival rate going into Spring. As with other cases, two peaks in avian predation were observed in the Albany Area study; one in April and one in December. These months are the northerly and southerly migration periods, respectively, for several hawk species. During these migrations high concentrations of raptors can occur over a given area. Other factors can also influence periods of high avian predation. Increased quail movement during spring covey break-up and risky behaviors like



Identification silhouettes of three common raptor groups; buteos (top), accipiters (middle), and falcons (bottom). Illustration courtesy of National Park Service.



The sharp-shinned hawk is a relatively small raptor and males are about the size of a blue jay. Photo courtesy of USFWS National Digital Library.



With a wingspan of 30 to 36 inches, the Cooper's hawk holds the title of king of the quailkillers. Photo courtesy of USFWS National Digital Library.

male courtship display better a raptor's chance at a quail. Stribling and Sisson (1998) and others also pointed out that after events such as large-scale prescribed burning and extended droughts, cover may be left temporarily sparse, leaving quail more vulnerable to flying predators. Perhaps most importantly to quail managers, habitat structure and quality have also been shown to influence bobwhite vulnerability to raptors, and this aspect will be discussed in greater detail towards the end of this article.

Which Raptor is That... And Does it Eat Bobwhites?

Over the course of natural history, probably every species of southeastern raptor has feasted on a quail dinner, although there are obviously some species that probably have done so more than others. To some folks a hawk is a hawk, and when they are plucking feathers from your dead quail, maybe that is a fair enough analysis. The tendency of a raptor to pursue or successfully kill a bobwhite actually depends largely on the physiology and physical characteristics of the predator. So let's see who's really dangerous.

Generally speaking (and depending on the time of year), there are about 20 species of raptors that are fairly common over large parts of the Southeast. There are some others that reside here but they were not included in this tally because they are considered scavengers, or are rare, accidental or extremely local. Our raptors fall into one of the following categories; eagles, kites, ospreys, buteos, accipiters, falcons, harriers, and owls. Eagles are the largest of our raptors. The bald eagle population, like most other raptor species, has rebounded dramatically over the past thirty years (believed to be due to legal protection and banning of organochloride pesticides), and this species is fairly common nowadays along major water bodies in the Southeast. Their diet consists mainly of fish and carrion, and the

bald eagle has not been shown to contribute any significant mortality to quail in any studies I've ever found. Although interestingly enough I have heard numerous reports from deer hunters who gave accounts of bald eagles preying on turkeys in greenfields in winter. The other species of eagle we see from time to time in the South is the golden eagle, but it is rare here (although I personally have documented this species on three occasions in central Alabama). It does not pose a significant threat to southern bobwhite quail. A lesser known group of raptors called kites inhabit the Southeast during the summer. The Mississippi and swallow-tailed kites have long, pointed wings and are fairly large raptors (with wingspans of 3 and 4 feet, respectively), but neither is a significant predator of quail. These two species of kites prey chiefly on insects which are caught in mid-air, and on small rodents and reptiles.

Moving on through the list, the osprey is a large white and chocolate-colored raptor. Like the bald eagle, it is fairly common around large water bodies and is an efficient predator of fish,

but not quail. So far, the raptors we've examined on our list have been pretty benign with regards to being quail-killers. The next few species we'll discuss aren't so innocent. By far, the raptors most folks associate with the word "hawk" are the buteos. Buteos are stout, broad-winged hawks with a fan-shaped tail (see Figure 1). They are built for high soaring and can spot prey items from literally thousands of feet in the air. The physiological explanation for a raptor's ability to see prey from so far away is discussed later in this article. The red-tailed hawk, red-shouldered hawk, and broad-winged hawk are our most common southern buteo species. The red-tailed hawk is a large and heavy buteo (wingspan of about 50 inches) but is still stealthy and agile enough to sometimes catch quail, although they prey mainly on rodents. Christmas Bird Count (CBC) data (from 1974–2004) showed a statistically significant increase of 3.3% per year in southeastern red-tailed hawks, although other local population trends have varied (Conservation Status Reports, Red-tailed Hawk, 2011). Red-shouldered

and broad-winged hawks are basically smaller versions of the red-tailed. Red-shouldered hawks (wingspan of about 40 inches) are very common year-round in the Southeast, whereas broad-winged hawks (wingspan of about 35 inches) arrive here in spring and head for South America come October. Like the red-tailed, both are sometimes predators of quail, although there is debate as to exactly what kind of overall impact these three species have on them. This is due, in part, to the fact that predator-prey relationships are dynamic and often very complex. For example, buteos like the three listed above do take quail and in some local situations may be limiting factors. But they also feed heavily on animals that influence quail fitness and survival. Much more often, buteos feed on snakes and small mammals like cotton rats. We know rat snakes are quail predators and until recently the cotton rat was also considered a significant nest predator. Recent research is suggesting however that cotton rats in fact are not important nest predators of quail and actually are most likely "buffering" the impacts of avian



Great-horned owls have even been documented to prey on other raptor species including red-tailed hawks and other owls. Photo courtesy of USFWS National Digital Library.

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predation on quail (Hannon 2011). So does that mean they are actually buffering the impacts or elevating hawk populations? As an added twist, it is also believed that these buteo species displace other raptors that are more dangerous to quail (Dailey, 2011). As you can see these multiple-species predator-prey interactions can become quite complicated. Considering all these factors the buteos would probably get a rating of “low to medium” on the quail predator scale in most areas of the South.

Probably the most capable and important group of raptors with regards to southeastern quail predation are the accipiters, or woodland hawks. Accipiters are typically bird-eaters, but are also efficient predators of small mammals. They have relatively short rounded wings and long narrow tails (see Figure 1) allowing them to quickly maneuver through trees and vegetation to overtake and capture birds in flight. The three species in North America are the northern goshawk, Cooper's hawk (sometimes called “blue darter”), and the sharp-shinned hawk. Goshawks are the largest of the three but are generally found in the western and northern parts of the country. Cooper's and sharp-shinned hawks are residents of the South, however, and are capable of wreaking havoc on adult and juvenile quail. The sharp-shinned hawk is a relatively small raptor and males are about the size of a blue jay. Male accipiters (and many other raptors) are significantly smaller than females and it is sometimes difficult to distinguish female sharp-shinned hawks from male Cooper's hawks, as their plumage is almost identical. Cooper's hawks' tails have rounded retrices (tail feathers) whereas those of sharp-shins are squared-off. Despite their small size, sharp-shinned hawks have been frequently reported to prey on quail (GDNR, 2011). The CBC data for sharp-shins indicates a significant increase of 2.1% per year in the Southeast (1974-2004), although other studies have shown slight declines across some parts of the US (Conservation Status Reports, Sharp-shinned Hawk, 2011). The conflicting trends may be attributed, in part, to a change in migration habits of this species. With a wingspan of 30 to 36 inches, the Cooper's hawk holds the title of king of the quail-killers. The Cooper's consistently shows up in the literature as a major contributor of annual bobwhite mortality, even during times when the species was not very common (Stoddard, 1931). Recently, however, southeastern Cooper's hawk populations have been increasing significantly. Data from the Breeding Bird Survey (BBS) suggest an increase of 8.4% per year in the Mississippi flyway from 1974 to 2004 and CBC data for that time period indicate an increase of 5.2% per year in the southeastern United States (Conservation

Status Reports, Cooper's Hawk, 2011). These trends support the need for managing habitats that favor bobwhites rather than raptors.

Moving on, the next group of raptors is the falcons, which in the eastern US includes the peregrine, merlin, and American kestrel. Falcons are the fastest animals on earth, with peregrines capable of reaching speeds upwards of 200 mph in a "stoop" or dive. Of these, the tiny kestrel is the most common but it is not a significant threat to an adult quail. The peregrine and merlin are not very common in the Southeast and feed mainly on high-flying birds, and therefore are not considered significant quail predators either. With falcons crossed off the list, we move on to the harrier. The northern harrier, our only harrier species, has long upward-swept wings and typically flies low over the ground, hunting open habitats preferred by the bobwhite. Males are light grey and white underneath and females are cinnamon and white underneath. Both sexes have a prominent white stripe at the base of the tail that can be seen in flight and a unique owl-like facial disk that increases their ability to hear faint noises. The northern harrier eats mainly rodents and frogs but does consistently take quail. In fact, in many areas it may outrank the Cooper's hawk as the top quail predator where there are locally abundant harrier populations. In an early documented account (1943) by the Texas Parks and Wildlife Department, northern harriers were responsible for a massive quail kill, following degradation of habitat (from drought and overgrazing) in the Rolling Plains area (Rollins, 2011). Northern harrier populations have been shown to be declining in the past 35 years (Conservation Status Report, Northern Harrier, 2011) in many areas, although they may be more stable in the East.

Lastly, owls are also quail predators. In the Southeast we have barn, short-eared, long-eared, great-horned, barred, eastern screech, and northern saw-whet



The eyes of raptors are typically oriented towards the front of the head to increase the binocular field of vision. This is an immature red shouldered hawk. Photo by Jason Smith.

owls, depending on the time of year. Of these probably the most important are great-horned, barred, and possibly short-eared due to their larger size and abundance in local areas. The remaining species are either uncommon or are too small to prey on quail. Not surprisingly, much of the depredation of quail by owls comes when they are at roost. Early studies by Errington and Hamerstrom in the 1930's have indicated that the great-horned is the more capable species when it comes to taking bobwhites, but were only a frequent predator during periods of high quail numbers. Great-horned and barred owls (and Cooper's hawk) have also been documented by Terhune et. al., 2008, to predate quail nests (incubating hens and eggs). Great horned owls have even been documented to prey on other raptor species including red-tailed hawks and other owls.

A Note on Raptor Physiology

Besides being fast and agile flyers, raptors have other weapons they use each day to survive. Strong, sharp talons for seizing prey and a hooked beak for tearing flesh are standard equip-

ment. Most raptors also have an excellent sense of hearing, especially harriers and owls. Many owls can hunt effectively in total darkness just by the sound of their prey, and can detect time difference between soundwaves in the left versus right ear of 30 millionths of a second (The Owl Pages, 2011). This allows them to accurately pin-point prey by sound alone, although they also have very effective night-vision.

The eyes of raptors are oriented towards the front of the head to increase the binocular field of vision. It is well-known that the visual acuteness of raptors (often estimated at about 20/2 vision) is far superior to that of humans. The physiological reason for this is due, in part, to the number of photoreceptors in the bird's retina. A hawk may have more than a million per square millimeter, as opposed to about 200,000 in the human eye. Among a bird's photoreceptors are neurons that can perceive colored light, called cones. The more cones an animal has, the sharper the image they will see. Humans have cones but not nearly as many as birds, especially raptors. Hawks also have other highly sophisti-

cated physiological features in the eye, including double cones, secondary eye muscles not found in other animals, and an indented fovea, which magnifies sharp images in the central part of the vision field (Avianweb, 2011, Kirschbaum, 2011). An extremely high density of nerve connections can transfer all this data to the brain at a very rapid pace, resulting in unfathomable reaction time. Quail have some of these visual capabilities too, but raptors couple these tools with effective tactical hunting techniques, and the ability to attack with surprise from the sky. Actually, when it comes down to it there is only one thing that keeps these creatures from eating every quail you have: cover.

Mitigating Avian Predation

Avian predation control research has focused mainly on issues relating to the various domestic culturing industries (animal farming). It is here in these “unnatural” settings that predatory birds can often inflict significant economic losses. More often than not though, these problems come from species other than raptors. For example, at a trout-rearing facility in Pennsylvania, several dozen great blue herons were documented to

be eating about \$300 worth of trout per day. In two other avian predation instances, annual losses of about \$500,000 were documented (APHIS 1997). These are extreme cases however, and the most common complaints against raptors stem from predation on domestic or game animals like chickens, racing pigeons, rabbits, etc. In these kinds of settings, a solution can usually be found through permitted removal of the raptor, scare tactics such as noise devices or scarecrows, or simply securing the domestic animals in a hawk or owl-proof enclosure. However, wild quail managers generally do not have these options. All raptors are protected by the Migratory Bird Treaty Act and other state and federal laws. USFWS and state wildlife agencies have issued shooting permits for problem raptors if “non-lethal methods of controlling damage have failed or are impractical and if it is determined that killing the offending birds will alleviate the problem”. However, this scenario is not consistent with wild game management programs and quail managers are advised to deal with raptor predation through manipulation of their habitat. Illegal shooting and trapping still occurs quite a bit in the real world, even on quail habitats where

it is far from being a limiting factor. But there is a legal, and better, way to deal with avian predation.

Only if your property is being burned and maintained properly for quail, has all the basic habitat requirements for quail, and is large enough to hold several coveys of quail, would you probably ever want to worry about predator management. If your property does meet these criteria, it is fairly simple (in theory) to weight the scale in favor of quail rather than hawks. The solution involves the manipulation of two things, the likelihood of raptors detecting your quail and, to a lesser extent, the likelihood of a quail successfully escaping if detected.

As we discussed earlier there are many kinds of raptors with different hunting strategies, but in general, reducing the proportion of high perches and vantage points (snags, hardwoods, or trees in general) and increasing the grassy herbaceous understory, is a step in the right direction (GDNR, Palmer et. al., 2000). Heavy thinning in pine stands also favors bobwhites. The more sunlight that reaches the ground the more forbs (sometimes food and/or cover), legumes (food), and bunch-grasses (cover) you will have on any given acre. Hardwoods seem to be preferred by many birds of prey for nesting and hunting, and the reduction of scattered individual hardwood trees is probably more important than reduction of individual pines, strictly from a quail management point of view. Of course, low thickets of trees and shrubs (plums, sumac, etc.) are quite useful to quail for escape cover and loafing areas. This escape cover would be ideally scattered amongst, and in close proximity to, some quality foraging habitat (food). Hedgerows and escape cover, however, should be maintained as such, and not allowed to develop into rows or islands of large hardwoods (GDNR, Palmer et. al., 2000). Also, make sure your quail don't have to spend significant amounts of time foraging without cover. Frequent prescribed burning is the best



Strong, sharp talons are standard equipment for raptors. Photo by Jason Smith.

way to accomplish this task. Tall native grass cover amongst legumes and other weeds, mixed with bare ground is what you should be shooting for (reference my previous *Wildlife Trends* article “Native Plant Community Establishment and Maintenance for Bobwhite Quail” for more information). This habitat situation is ephemeral, however, and must be periodically refreshed by fire. Burning in smaller scattered blocks may require more effort than larger contiguous blocks, but it’s important to maintain refugia with tall grassy cover throughout the year. Many plantations and managers are also now providing supplemental feed for quail in close proximity to, or within, cover vegetation. While expensive, there have been positive trends in survival and population growth with these practices. In addition to the obvious nutritional benefits, supplemental feeding has been shown to reduce the amount of time a covey is at risk from raptors, and therefore can decrease overall predation levels (GDNR, 2011; Stribling et. al., 1998).

Again, as stated above, all raptors are protected by federal and state laws and it is ILLEGAL to shoot, trap or kill them. Hopefully by becoming more familiar with the various southeastern raptor species, their hunting strategies, and the management strategies used in mitigating avian predation, you can minimize the little brown feather piles across your property.

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Removal of hardwoods favors quail by reducing potential hunting perches and nest sites for raptors. Photo by Ryan Shurette.

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Waterfowl Habitat— Banana Water Lily

By Jim Hills

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Duck's eye view of Banana Water Lily

Banana Water Lily, *Nymphaea mexicana* or *Castalia mexicana* as it used to be called, is an underappreciated and under utilized waterfowl food that is gaining acceptance as a real winner. Long known to be a great diver duck food source, it has been shown in our demonstration impoundment at Ingleside Plantation in Georgetown, South Carolina, to be a superior waterfowl food source for dabblers as well. We have approximately 15 acres of Banana Water Lily in a 19 acre impoundment that consistently held approximately 600 waterfowl from late October, 2010 through mid-March, 2011, with the peak of approximately 3000 birds in mid-November, just prior to duck season. A short video of the Ingleside impoundment last fall can be viewed on YouTube at the link: <http://www.youtube.com/watch?v=hjVSbYIXsWo>

The surprising thing we discovered in 2010, was that when we lowered the water level from our normal 21-35 inches of water to 12-18 inches of water, the number of

different species of waterfowl increased dramatically. We went from primarily Ring Necks, Coots and Green Wing Teal, to adding Blue Wing Teal, Shovellers, Gadwall, Widgeon, Pintails, Mallards and a large number of Wood Ducks. We held this diversity of birds throughout the season and added about 40 Canvasbacks in February, a first for us. This has led us to recommend that Banana Water Lily be managed at a lower water level in the winter if maximum waterfowl usage is desired. This water level change allowed us to carry approximately 50% more waterfowl on average than we have experienced before at the higher water level. Time will tell if this will hold up in the future. It has prompted us to convert an additional 100 acres to Banana Water Lily with another 62 acres to follow this coming year. Cost is a big reason we are converting, as input costs continue to rise in our sport. Anything that can lower the cost of our duck hunting gets our attention. Although there is a cost associated with acquiring and planting the Banana Water Lily, the costs dimin-

ish dramatically after the first year. We will not have to plow it, fertilize it, spray it with herbicides, or fence out the deer, so the labor cost to manage it will be dramatically lowered after the initial installation cost. Banana Water Lily is not as dependent on good weather as dry land crops, thus it is more dependable. **The advantages for Banana Water Lily are: (1) permanently flooded (2) natural regeneration (3) lower input costs over time (4) superior food source.** I have had this plant in my impoundment for almost 20 years and believe it is a way to have quality hunting at a much lower cost.

Banana Water Lily flowers emerge from the water on day one and open at around 11 a.m. to be pollinated and close around 4 p.m. The flower stays above water for a second day, opening and closing as the previous day, then submerges to form a fig-like fruit underwater that produces as many as 60 seeds, each the size of Milo. Every flower you see stays visible for only two days so it is easy to see why this plant, that begins to flower in early May and continues into the fall,

is such a prolific food source. Every day the numbers of blooms, in the thousands, are submerging after pollination to produce fruit and new blooms are emerging to get pollinated. The numbers of blooms seem to never diminish until later in the fall as the plants begin to form the starchy banana-like tubers that hibernate below the root system until a duck eats it or it sprouts next spring. The Banana Water Lily reproduces in three ways: from seeds, from rhizomes that sprout from another plant and from the banana hibernacula that awaken in the spring to form a new plant. Waterfowl will consume the fruit, seeds, banana tubers and small plants. They will even uproot entire large plants that will float to the surface to then be picked apart by the feeding waterfowl.

Propagation

Establishment is commenced in February, March and April by planting the live plants in shallow water 12 to 18 inches deep. We have planted all the way through the summer with diminishing success as the season begins to



Banana Water Lily growing in a Georgetown, SC impoundment.



shorten. The best success is a late winter-early spring planting with plants at 5 foot intervals for coverage in one year or 10 foot intervals to get decent coverage in two years. If you have a well established plant population in an existing pond and you wish to change to Banana Water Lily, you may need to prepare your pond the previous fall with herbicide work to eliminate the potential competition the following spring. There may be management options with water control or salinity that will help on competition. We can help with advice on how best to accomplish this.

We recently assisted Nat Ruth, manager of Mt. Pleasant Plantation, in establishing Banana Water Lily in an upland impoundment that had been previously drained, planted and re-flooded annually. We have been pleased at the success of this project and how well the

plants adjusted to this application.

Banana water lily has a long and storied history dating from the late 1800's and early 1900's when wealthy business titans learned of its merits at attracting and holding waterfowl, especially the prized Canvasback. Edward McIllhenny had Banana Water Lily at Avery Island, Louisiana, home of Tabasco Sauce. Isaac Emerson, inventor of Bromo-Seltzer, had Banana Water Lily at Arcadia Plantation in Georgetown, SC, and Senator Gayer Dominick, of Dominick and Dominick on Wall Street, had Banana Water Lily at his hunting retreat on Bull's Island just south of McClellanville, S.C. Dominick sold Bull's Island in 1936 to the Fish and Wildlife Service to become part of the Cape Romain Wildlife Refuge. In 1937 the CCC Corps set up camp on Bull's Island and built the Jack's Creek

Pond, a 750 acre impoundment on the northern end of Bull's Island. When Jack's Creek Pond was completed, the Fish and Wildlife Service planted Banana Water Lily in this impoundment to complement the 400 acres of other impoundments that Dominick had planted in Banana Water Lily. John Cely, retired SCDNR biologist, reported in 1979 that 37% of the estimated Canvasbacks wintering in 1977 in South Carolina were eating Banana Water Lily.

W.L. McAtee, USDA Biologist, author, and waterfowl food expert, wrote about Banana Water Lily in USDA Bulletin 465 in 1917.

The following is an excerpt from the above mentioned USDA Bulletin:

BANANA WATER LILY VALUE AS DUCK FOOD:

The writer has investigated the value

of the Banana Water Lily (*Castalia mexicana*) as a food for wild ducks in only one locality-Lake Surprise, Tex. The proofs of its importance are so great, however, that they should be brought to the attention of American sportsmen. At Lake Surprise the Banana Water Lily alone made up nearly half of the entire food of the 10 vegetarian species of ducks occurring there at the time. This showing is much more significant from the fact that sago pondweed (*Potamogeton pectinatus*) also was abundant in the lake. The latter plant (see p. 17), in the writer's opinion, is the best all-round duck food in North America, yet at Lake Surprise it furnished somewhat less than 29 per cent of the food of the ducks, in comparison with more than 48 per cent supplied by *Castalia mexicana*.

Thirty-seven Canvasbacks collected at Lake Surprise had eaten various parts of this plant to the extent of 71.6 per cent of their diet. This is a second illustration of the unusual phenomenon of the Canvasback's being attracted to shallow water by a highly prized food. Six Ringneck Ducks, or Blackjacks, made more than 91 per cent of their food of this plant, and two southern Black Ducks (*Anas fulvifilla*) 98 per cent. The following ducks also were feeding on the plant: Mallard, Pintail, Lesser Scaup, Redhead, and Shoveller. The parts eaten are the rootstocks, stolons, tubers, and seeds. Mr. Charles W. Ward has furnished rootstocks of

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The starchy banana tuber.

Castalia mexicana from Avery Island, La., with the information that this plant and wild celery (*Vallisneria spiralis*) furnish the bulk of the food of Canvasbacks in that locality.

DESCRIPTION OF PLANT:

The Banana Water Lily is the only native species of the group of true Water Lilies (as discussed above) that has yellow flowers. But the leaves and flowers of this species may either float on the surface of the water or stand a few inches above it. The leaves are green above with brown mottling and vary from greenish to purplish red below with small black markings. The edges of the cleft of the leaf are either somewhat separated or overlapping (fig. 32). The plant springs from an upright rootstock (fig. 33) which bears some resemblance to an unopened pine cone. The rootstocks vary in size up to 2 inches thick and 12 inches long. The

smaller ones (at least up to 12 inches long by three-fourths of an inch thick) are swallowed by ducks.

Tender white stolons or runners extend in various directions from the rootstock. These runners are from a quarter to half an inch in diameter. During the active growing season they give rise to new plants, but in autumn they form peculiar hibernating bodies. These consist of the short modified tip of the stolon, which bears several (1 to 7) upwardly directed buds on one side and a cluster (2 to 17) of thick tuber-like roots on the other. The appearance of these (fig. 34) is strongly suggestive of a miniature "hand" of bananas, and for this reason the name Banana Water Lily has been proposed for this plant, which has no distinctive vernacular appellation. The name has the additional merit of suggesting the yellow color of the tubers and of the flowers.

DISTRIBUTION:

The Banana Water Lily has been known chiefly as a native of Florida, and the plants of that State have long gone under the name *Castalia flava*. Plants identified from a few localities in Mexico and from Brownsville, Tex., have been called *Castalia mexicana*. Dr. H. S. Conard, who has monographed the genus, unites these species, as he is fully justified in doing, on the basis of their possession in common of characters unique among Water Lilies. The new records of the plant from Galveston, Tex., and Avery Island, La., go far toward bridging the previous apparent gap in distribution of the plant and toward corroborating Dr. Conard's views. The accompanying map (fig. 35) shows the probable natural range of the species along the Gulf coast and in Mexico.

Publication No. 4, Carnegie Institution, 1905

PROPAGATION:

Although the Banana Water Lily is native to only a small portion of the United States, it can be successfully grown over practically the whole country. The plant has long been familiar in cultivation and is sold by most dealers in ornamental aquatics. The Water Lily expert of one of the largest firms in the United States reports that *Castalia mexicana* is perfectly hardy as far north as New York City when covered with a foot of water, and he believes that if covered with 2 feet of water it would be hardy at Boston.

The Banana Water Lily needs an abundance of sunlight, water from 1 to 3 feet deep, and a mud bottom. It is not injured by a trace of salt, as is shown by its growing in lakes very near the coast. The rootstocks may be planted by weighting them with stones and dropping where desired. Having great vitality, they may be shipped with only moderate precautions to prevent them from drying, and may be transplanted at almost any time of the year. When established it will spread to places where the water is even five feet deep.

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Undesirable Fish Species in Ponds

By Matt Euten

Matt Euten works as a fisheries biologist for Southeastern Pond Management in Birmingham, AL. He earned his Masters degree in fisheries science from Auburn University where he studied the recruitment and growth of largemouth, smallmouth and spotted bass. Contact him at meuten@sepond.com.



Spotted bass like this are great fun, but their presence in ponds can be detrimental to a trophy largemouth bass management program.

In today's society, we all want more! More money, more land, more, more, more. You'll never hear anyone complain about getting too many French fries with their value meal. More is always better, right? Well not for every situation and definitely not when you are referring to adding more diversity in terms of species composition in your pond. Yes, I know, variety is the spice of life and that statement can work for some ponds. However, there are many fish species that just don't belong anywhere near a pond intended to grow trophy largemouth bass. In this article I will examine the "why's" and "how's" of undesirable fish species and also look at how a few of these species can specifically impact your lake.

Basic pond management principles were designed to encompass managing the relationship between two main fish species; largemouth bass and bluegill. The idea behind the first "managed" ponds was to create a body of water that would constant-

ly produce a source of food for those individuals living in the surrounding area. These ponds were stocked with largemouth bass, which served as the predator species and bluegill, which were the bass's food source. Many different combinations of various fish species were stocked together, however, the largemouth bass/bluegill combination proved to be the best option for food production and entertainment.

Over the years, the entertainment factor became extremely popular and manipulation of the relationship between largemouth bass and bluegill was explored. This led the way to quality and trophy largemouth bass management where the ultimate management goal was to grow the biggest individuals in the shortest time frame. To create quality or trophy largemouth fisheries, one rule applies: simpler is always easier! In other words, managing a live, ever-changing fishery is best accomplished by eliminating as many impactful variables as possible. Environmental variables such as rainfall and temperature obviously cannot be manipulated, however, total species composition can be and preventing the introduction of undesirable prey and predator species is imperative to a management program. Undesirable means "not desired" or "not pleasant", which makes it the perfect term for describing many of the species I have seen make their way into ponds or lakes throughout the Southeast. Undesirable fish species can be either predator or prey and their impact can have devastating effects on a management program geared towards creating quality largemouth bass and bluegill fishing.

I am sure the first question that comes to mind is, "Why is it such a problem to have a variety of fish species, rather than just largemouth bass and bluegill in ponds?" The answer can be quite contradicting. First, it is not necessarily a bad thing to have multiple fish species in your pond; you just have to make sure you only stock certain

combinations of different species. For instance, redear sunfish or shellcracker are consistently stocked in largemouth bass/bluegill ponds to add diversity when fishing for pan fish. Redear sunfish utilize a slightly different niche in ponds, therefore the coexistence between the bluegill and redear sunfish is not detrimental to a management program. On the other hand, an additional predator species, such as crappie, will impact your largemouth bass population because competition occurs for available food. Largemouth bass are opportunistic feeders and the more you feed them the bigger they can get. However, when an additional species is eating from the same "trough" as the largemouth bass, the competition can impact growth rates in your bass population.

The same can be true when stocking various forage options for bass. To grow big bass, you have to feed them. A robust bluegill population can provide

enough food in ponds to sustain a healthy bass population. However, if you are in the business of growing truly behemoth largemouth bass, alternative food sources are a must. This is where the contradictions come into play. Ideally, loading a pond with every type of forage fish available would make the most sense to grow big bass. However, this can be counterproductive. If competition for available nutrients exists among your forage fish species, then these species cannot reach their potential and factors such as growth and reproduction are affected. A decline in reproduction among your forage fish essentially takes food from the bass and all the while you think you have done great things for your pond. So what's the answer? Well, the key is to stock forage species that don't compete heavily and provide supplemental food sources.

To answer the previous question, the presence of multiple fish species in



Crappie compete with your largemouth bass for available food, which will ultimately reduce growth rates for both species.



Initiating intense supplemental feeding programs can provide additional food to the bluegill populations when competing forage species are present.

ponds becomes problematic when available resources become limited due to competition. Now that we know why they are bad, the next step is to discuss how these undesirables make their way into ponds. From getting introduced from a local fisherman's livewell thinking he's doing you a favor, to being pumped in from a local creek during a drought, there are many ways that undesirables get into ponds.

The first and most obvious way many undesirable fish species can get into a pond is when a "buddy" brings Saturday's catch from the reservoir to stock in your pond. This may sound absurd, but so many times I have shocked spotted bass out of ponds that were miles from any creek or river that had an established spotted bass population. I am sure you are thinking, "Surely a few big spotted bass won't hurt." Just remember, it only takes one male and one female to establish a population and bass are some of the hardest fish to correctly identify the sex.

Another way undesirables are introduced is when they are purposely stocked. There are people in this industry that are solely concerned with the mighty

dollar and they will sell whatever to turn a profit. I have seen this particularly with ponds that were supposed to have been stocked with "hybrid bluegill", but over time these ponds had only green sunfish and bass. More on green sunfish later. I have also heard of instances where undesirable species got into ponds after the pond owner responded to a sale ad in the local paper stating something like, "bluegill for sale." The pond owner buys these fish thinking he was getting only bluegill, but the fish producer stocks what's left in a holding pond after the growing season was over. The producer was trying to sell fish he couldn't get rid of during the prime stocking season and therefore the pond owner gets whatever species is left in the holding ponds. This could be anything from small bass, crappie, gizzard shad, or carp. This stocking almost always results with the introduction of undesirables!

Probably one of the least recognized ways undesirable fish species are introduced in ponds is when the pond owner pumps water from a nearby creek or river to increase the water level in his pond. There is nothing more unsightly than a pond during major drought con-

ditions. If you have an accessible water source, why not install a pump and intake screen and fill your pond, right? Not exactly. Intake screens work to keep the bigger fish out, but it will not prevent their larvae from passing through to the pond. Because most all fish species are larvae at some point in their lifecycle, pond owners can introduce an undesirable species when pumping from creeks when the larvae are present. During these larval stages, the "baby fish" swim in large groups for protection so when they get pumped into the pond, a pond owner could get thousands of unwanted species!

Enough about the how's and why's of these undesirables, let's get species specific. I guess the first and most popular of the undesirable species is crappie. I can't tell you how many calls I get about pond owners wanting to stock crappie in their ponds. Crappie are considered by most fishermen as the tastiest fish swimming in freshwater. I can understand the draw to having the ability to catch them from your back porch, but the recommendations are always the same, keep the crappie out because they just don't work in ponds. The problem



Although great for growing trophy-sized largemouth bass, many forage species such as threadfin shad and golden shiners can compete with bluegill for available resources.

with crappie in largemouth bass/ bluegill ponds is they compete with bass for available food and their reproduction is very unpredictable. These two factors are a recipe for disaster and my advice is to keep them out of your pond.

Probably a close second to crappie is the introduction of spotted bass. Spotted bass fight hard, are very aggressive and grow to fairly large

sizes. However, in a pond setting with largemouth bass, they can be quite detrimental to a management program. Spotted bass and largemouth bass share similar diets, but the competition between them doesn't have the same impact in reservoirs as it does in ponds. Reservoirs are larger bodies of water that can support a variety of forage options for these two species and there-

fore their coexistence is manageable. However, even in ponds with robust forage populations, the competition for available resources is too great and growth rates of both species are usually unacceptable. My advice to pond owners, no matter how tempting it may be, is to leave the spotted bass in the reservoirs. If for some reason they do make it in your pond, spotted bass harvest

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Green sunfish have larger mouths and are very aggressive, which make them a nuisance to many pond owners wanting to grow big bluegill.

must become a high priority!

There are various other predators, such as catfish, gar, bowfin, and pickerel that are considered as undesirable species. Just remember, if it takes food from your largemouth bass, it is probably not the best for your pond. Once they have been introduced you have two options, kill off the pond and start over or work diligently to harvest all competing predators present.

As we have discussed earlier, competing predator fish are not the only fish species that can be undesirable. Many of the prey species that bass consume can be considered “undesirable” because of the impact they play on the management program. Species like green sunfish, golden shiners, threadfin shad, gizzard shad and many carp species can compete with bluegill and cause problems.

I know what you’re thinking, “Hey, he just said threadfin shad and golden shiners are bad and can be considered undesirable?” Let me explain. Both golden shiners and threadfin shad are perfect for growing trophy-sized largemouth bass. Both also reproduce in ponds and grow to a maximum size that most adult largemouth bass can con-

sume. However, they can be considered “undesirable” when the pond owner’s management goals are to grow big bluegill as well as quality-sized bass. Threadfin shad and golden shiners compete with bluegill for available resources in ponds. The presence of either of these species can impact a management program intended to grow larger bluegill. To grow big bass with threadfin shad and golden shiners, and have quality sized bluegill, a pond owner must minimize the competition among the forage species. Establishing a supplemental feeding program to increase available food for the bluegill population can help reduce this competition and grow bigger bluegill.

Green sunfish is another “undesirable” forage species that can be detrimental to a management program. Often times they become prevalent a few years after the introduction of the “hybrid bluegill” into ponds. To create a “hybrid bluegill,” fish producers cross a green sunfish with either a redear sunfish or bluegill. The first generation cross of these two species is not a true “hybrid” because they can spawn and their offspring will spawn as well. The back cross among the hybrid bluegill’s

offspring produces mostly green sunfish. Over time, the pond becomes inundated with a high abundance of green sunfish and competition occurs for available food between the green sunfish, smaller bass and bluegill. Green sunfish have larger mouths than bluegill which allows them the ability to consume smaller fish and compete slightly with small bass. They will also train to automatic feeders and take food from the bluegill population. Their competitive nature coupled with lower reproductive rates and success make the green sunfish an undesirable species for pond owners wanting a quality largemouth bass/bluegill fishery.

There are many other undesirable forage species that can impact a pond management program. Similar to the predator undesirables, if the introduced species is negatively impacting your largemouth bass and/or bluegill populations, then the management program will suffer. Obviously the introduction of an undesirable can sometimes be unavoidable or accidental. When this occurs it is best to work closely with your fisheries biologist to ensure all means necessary are implemented to reduce their impact on your management program.



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How to Control Privet Hedge

By Michelle Isenberg

Michelle has worked in the herbicide business since 1995. She was a BASF representative in both the forestry and wildlife markets for over 13 years in Alabama. In 2008, she entered into a partnership with Herbicides Plus and Custom Air. She works with private landowners, consultants and timber companies. Custom Air sprays throughout the entire Southeastern U.S. and works as well in the mid-west for farmers. She may be contacted either by email or phone. Michelle Isenberg-Associate Wildlife Biologist 256.749.3261 or michelle.isenberg@customair.us



A large privet hedge infestation.

Privet hedge is a semi-evergreen shrub commonly found in many different types of habitats and forests. Landowners, foresters and wildlife biologists agree that privet hedge is one of their top 10 invasive, troublesome species on properties they own or manage. Privet has fast become a problematic species for landowners.

Background

There are three varieties of privet hedge: Chinese, Japanese, and European. All three are considered an invasive species.

Chinese Privet-*Ligustrum sinense*

Japanese Privet-*Ligustrum japonicum*

European Privet-*Ligustrum vulgare*

All three species were introduced into the U.S. between 1800 and 1850. They were

primarily used for landscaping due to their accelerated growth ability. Being introduced as a landscape material, they have easily found their way to fence rows, field borders and eventually moved to hardwood bottom areas. Privet can be found in virtually any pine or hardwood area. The distribution of privet is not limited to the southeastern U.S. There are only 10 states where privet is not found: Alaska, Arizona, Idaho, Kansas, Minnesota, Nevada, North Dakota, South Dakota, Washington, and Wyoming.

The three types are similar in their ability to invade bottom-land areas, forests, and field edges. They are shade tolerant, which makes them very difficult to control due to the fact that they will grow in both sunny and shady environments. Privet forms a very dense thicket with multiple stems. As well, it invades quickly through multiple root sprouts and massive seed production. Wildlife, such as birds, further helps the distribution of seed. Although there are multiple species of privet, the control methods are virtually the same. However, the location of where the privet is found ultimately determines the method of control.

Identification

Privet is a fast growing shrub that can reach heights of over 30 to 40 feet tall. In the spring privet will have a white flower cluster which helps to easily identify the plant. The cuticle of the leaf is waxy, oval and opposite on the branches. Because there are many plants with distinguishable characteristics, if you have a field guide handy this will help or you can take up-close pictures for later use. You can also visit your local USDA office and receive assistance from an Extension Specialist for help in identification. As well, your local forestry commission can help you to identify. If you happen to have a forester or biologist who manages your property you can receive their expertise. If you do not know the answer, there are several avenues to receive assistance in identification.

Positive Benefits

As with every plant or tree found in nature, generally there are some positive benefits. Some of the benefits of privet on your property may be for wildlife or as a landscape screen. Deer, as well as birds, at times may browse privet. If you see a defined browse line on your privet, this is an indication of a stressed deer herd and over population. Another great example of why you may want privet is simply as a blocker to your neighbors or as a border to keep out unwanted guests. I have a client who has a high fence, and the privet is a great screen on one side of the property to keep unwanted eyes from looking in. But with all things good, the downside is the potential for the privet to continue to take over. Have a good plan in mind for when this takes place.

Negative Benefits

Privet hedge is very invasive to any type of property. Both in pine stands and hardwood stands, privet can become established and slowly over time, evolve into a problem species. It can be very hard to control and eradicate. Although eradication of privet is difficult, set goals to control problem areas through-

out your property in a patch-work fashion. This gives you a multi-tier and multi-step solution to the problem.

Privet Control Using Herbicides

There are different examples of where privet grows and becomes established. In order to utilize herbicides on privet hedge, the landowner needs to understand fundamentally how herbicides work. This can be broken down into three categories. Some herbicides are foliar active, meaning when you spray the leaf it is absorbed through the leaf only. The second type of herbicide is soil active. This is when the plant absorbs the herbicide through root uptake only. The third type of herbicide is basically a combination of both foliar and soil active. This will help to decide which herbicide to use and the method of application. It is always best to be knowledgeable of how plants uptake herbicides so you don't have collateral damage to desirable species on your property.

To demonstrate why it is very important to distinguish between foliar and soil activity, the diagram of the oak tree helps to explain this difference. If you spray inside the drip-line of a hardwood tree with a soil active product, you can have collateral damage to the tree. The



Young privet berries in the fall, lime green.



The leaf structure. Opposite and oval. Note the waxy leaf shining in the sunlight.

drip-line of the tree is the length of the longest branches. Roots of hardwood trees can extend 2.5X's the length of the longest branch. Please be aware when you are spraying inside the drip-line of desirable trees.

Privet Hedge in Pine Trees

There are different types of pine trees in the Southeastern U.S. The three main pine trees for the purposes of this article are Loblolly, Longleaf and Slash. These three types also have different tolerance levels to herbicides. So we must further break down how to control privet hedge within the different types of pines.

Loblolly Pine

Within a loblolly pine stand, we can generally easily control privet hedge either by means of over-the-top of the pine or underneath the pine. Over-the-top applications to control privet hedge can begin the first year the pine seedling is planted until the pine tree is at final harvest. The herbicides that can be used in a loblolly pine stand are both foliar and soil active and give superior control for privet hedge.

The treatments that can be used can be applied by back-pack sprayer, four-wheeler, tractor sprayer or helicopter. The landowner has multiple options to choose

from based on the size and location of the infestation. Here is the prescription for privet hedge in loblolly pines:

Timing: June-February

Rate: **Foliar** and **Soil** Active 1% Arsenal AC® (imazapyr) + 1-2oz. Escort® (metsulfuron methyl) + 0.25% non-ionic surfactant @10-20 gallons of water per acre.

This is a base-line recommendation. The preferable time of year to spray privet is in the fall and winter.

Longleaf and Slash Pine

Longleaf and Slash are much more sensitive to herbicides than Loblolly. Therefore, you are limited to a very specific window of treatment for privet hedge. Otherwise, there could be extensive damage to your longleaf or slash pine. Preferably, if your site has privet prior to planting seedlings, target controlling the privet at the time of site prep through your herbicide application. The following is the recommendation for controlling privet in longleaf and slash pine:

Timing: Mid-August-February

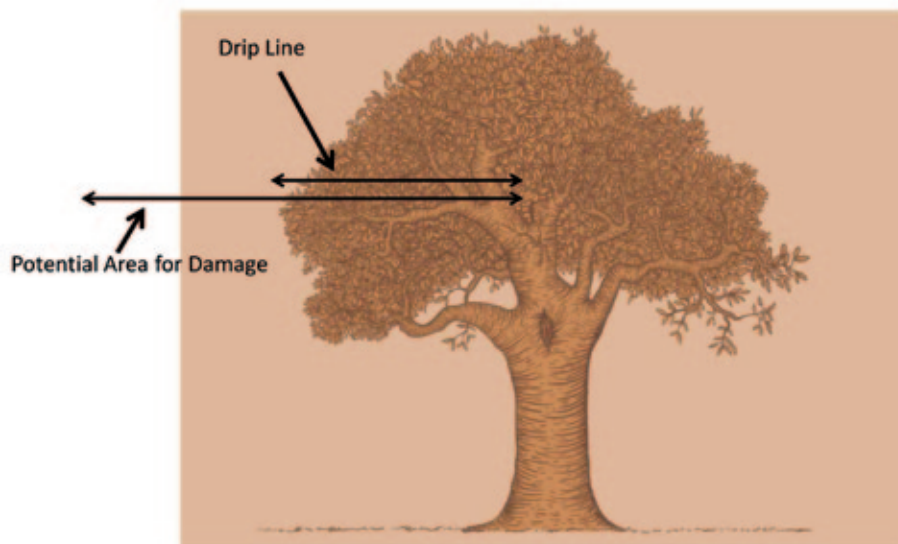
Rate: Over the top of Longleaf and Slash: Age 2-5 ONLY

Foliar and **Soil** Active 1% Arsenal AC® (imazapyr). No other additives in the spray tank. No surfactant and no Escort products. This is why the privet must be targeted prior to planting.

Under Longleaf and Slash: **Foliar** and **Soil** Active 1% Arsenal AC® (imazapyr) + 1-2oz. Escort® (metsulfuron methyl) + 0.25% non-ionic surfactant @10-20 gallons of water per acre.

If the privet hedge was not controlled prior to planting, a release treatment over the top at a reduced rate will knock back the privet but not necessarily control the privet. Once the longleaf and slash are planted, no treatment for privet can take place until the end of the second growing season of the seedlings. At that time the window then narrows until the end of the fifth growing season. To re-cap, you can only treat for privet hedge in young longleaf and slash from year 2 through year 5.

Example of the Drip Line of a Hardwood Tree



After the longleaf and slash have reached a height where ground equipment such as a back pack, four-wheeler or tractor can safely move through the plantation, the privet can be treated underneath the foliage of the pines. Again, there are limited amounts of herbicides and rates that can be used. Longleaf and Slash have the capability of root uptake of the herbicide, and there can be potential damage to the planted pines.

Privet Hedge in Hardwoods, Fields, Edges and Borders

A vast amount of privet is found in hardwood bottoms and in mixed pine/hardwood areas. When privet is found in field edges and borders, the same precautions need to be taken. If there are hardwoods present that have wildlife or timber value, my recommendation is to use a foliar treatment. Conversely, if collateral damage is not important, use the soil active recommendation. The recommendations for controlling privet with directed spray underneath hardwoods is as follows:

Timing: August to December, with a mild winter, September to February

2/3 of the leaves need to be attached and green

Rate: Foliar only application:

4% Accord® XRT

II(glyphoste)@10-20 Gallons of water

per acre or 4% Garlon® 4 Ultra (triclopyr)+ 2%oil/silicone blend @10-20 Gallons of water per acre. Spray the leaves and the stems.

Basal treatment: For large stems where the foliage cannot be adequately sprayed: Pathfinder® II (triclopyr), treat the whole stem, all the way around, from the ground level up to 16” above the ground. Pathfinder II is a RTU-ready to use product, no mixing is required.

New Technology and Application Method for Controlling Privet

The newest application method for controlling privet is taking control to a

whole new level! Dow AgroScience, with the technology of Accord, has brought this option to landowners who have a problem where none of the aforementioned techniques apply. Understanding how invasive privet hedge is to the landscape, the Georgia Forestry Commission (GFC) embarked on a new way of controlling privet. Previously thought impossible and too risky, the GFC along with Dow took on this project. The goal, to control privet located under mature hardwood stands by aerial application (over-the-top) of the hardwoods.

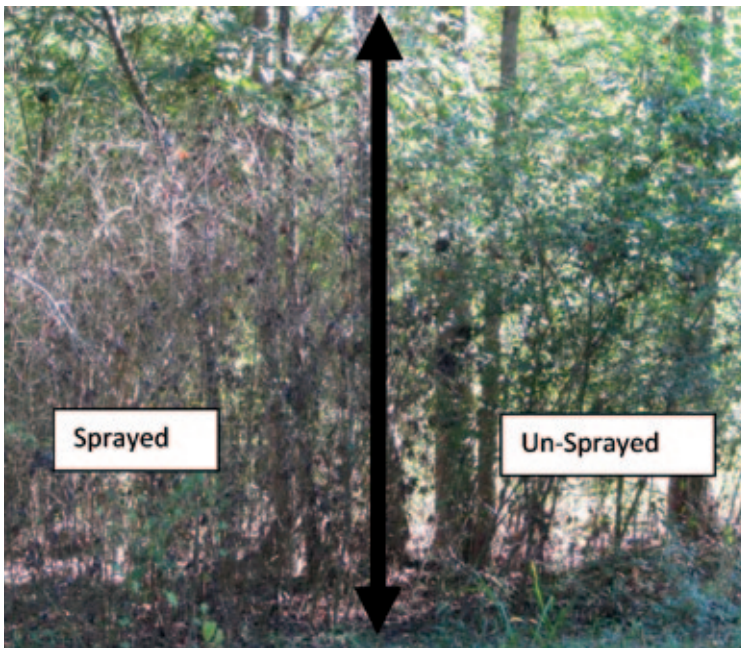
In general privet can invade an understory of hardwoods where it is next to impossible to get a four-wheeler or trac-



Sprayed privet hedge under loblolly pine.



Sprayed privet hedge under desirable hardwoods along a woods road.



Sprayed vs. unsprayed under hardwood trees.

tor sprayer. In these situations, a back pack sprayer is incapable of putting out the volume necessary to put a dent in the privet. Therefore, utilizing a helicopter to spray over the top of dormant hardwood in the winter became a solution to a long standing problem. The key to this treatment is for the dominant, mature hardwood in the infested areas to be dormant. Persimmon was the only species at the time of the study which showed symptoms of herbicide damage. Even though this is considered a new technique to control privet, again, there can be collateral damage of desirable hardwood trees. The treatment that GFC found to work is as follows:

Timing: December to early February

Rate: **Foliar** only application:

3-6% Accord® XRT II (glyphosate) + ½% Entry II Surfactant@15 Gallons of Water per acre, aerially applied by helicopter.

Privet Hedge Control via Mechanical Equipment

In both large and small infestations, you may want to consider mechanical removal. If this option is taken, remember the root structure will re-sprout and the problem will remain. Unless you have a method to completely remove the vast root system, you will want to take steps to remove the new growth in following years. Ways to mechanically remove privet include but are not limited to: mulching, rake or straight blade, bush-hog, and hand-pruning. Not only will the roots re-sprout, the seed-bank which is there will be disturbed and will eventually sprout.

Summary and Conclusion

In the ongoing battle of controlling privet hedge, a very important fact is to be considered. Multiple treatments over a period of 1-3 years may be necessary depending on the level of infestation. Depending on your surrounding species of plants and trees, this will dictate which herbicides to use. As always with herbicides, if you are uncomfortable using them, find someone to help you, or hire the work to be performed. There are a vast number of individuals in every state who can help you fight your infestation. Seek information first, and then implement a plan second. Always, always, always read your labels! They contain very important information for you, the landowner. Remember to have perseverance and patience, only then will you win the war on privet hedge!

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Growing Apple Trees on Your Property

By Allen Deese

Allen Deese is the Nursery Manager for The Wildlife Group in Tuskegee, Alabama. Contact him at 800-221-9703 or Allen@wildlifegroup.com.



Proof that deer love apples!

Part of the pleasure in growing apple trees on your property derives from luring big boys like the one in the adjacent photo into your fruit tree orchard. Another benefit is getting to grab a couple of tasty apples on the way to your stand. Combining different selections of apples in your orchards will insure that you have the best of both worlds.

Why would you combine early, mid & late season varieties in the same orchards? Early, mid and late drop apples all bloom at different times. By mixing these different selections together this insures you of having apples that overlap in bloom time, which is very important for the set of fruit. Combining different selections also increases the productiveness of the orchard by having fruit drop from early July thru December. This approach is a must for wildlife enthusiasts who are planting to increase the productiveness of their natural habitat. Also keep in mind that

date. If the roots look extremely dry, soak for up to one day before planting.

Planting

Begin by digging a hole twice the diameter of the root system and about one foot deep. Insert the root system into the hole and spread the roots, making sure that the grafted union is about 2–3” above ground level. The grafted union is where the scion meets the rootstock. (See attached diagram).

Apply water as you fill the hole with soil to remove all air pockets. Do not allow the grafted union to sink next to or below ground level.

Install trunk protection to help protect the trees from field mice and rabbits girdling the bark around the base of the tree. This will also deter deer from rubbing the trunks. It may be necessary in high deer density areas to fence each tree.

Mulch a 3-4 ft. circle around each tree 2-3 inches deep to help retain moisture and suppress weeds (weed competition is one of the most limiting factors for all newly planted trees).

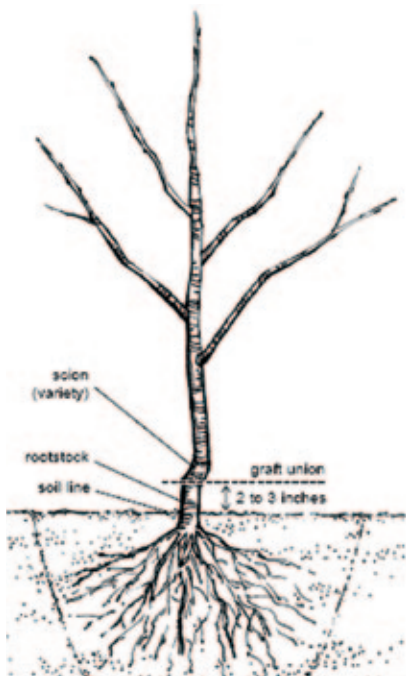
For container plants, remove from pot and break up root ball with your hands or a shovel. This allows the root system to spread out into the freshly dug hole. Then simply follow the steps 1 thru 4.

Pruning

Pruning begins the day you plant. (When purchasing bare root plants they should be pruned at the nursery before shipping). Neglect to prune results in poor growth and delayed fruiting. The best time to prune is late winter (end of Feb.). Early summer thinning is sometimes required to thin inside branches or water sprouts.

1st year- Pruning a young tree controls its shape by developing a strong, well balanced framework of scaffolding branches. Remove unwanted branches early to avoid the necessity of large cuts in later years. Remove inside crossing limbs that will block sunlight and air circulation. Heading the central leader brings the top and the roots back into balance and causes buds just below the cut to grow and form a new group of scaffolding branches. Remember to always make your cuts directly above an outward facing bud.

2nd year- Again, top the main leader to encourage another group of scaffolding branches. Remove all inside and crossing limbs. The use of limb spreaders is encouraged to get the desired spread of limbs (45 degree angle with main trunk). This will insure sufficient sunlight reaches the interior portion of



Rootstock photo courtesy of extension.umaine.edu

Crabapples are a great source for fruit production and they do an excellent job pollinating apples. One other note on pollination is to remember that the transfer of pollen is aided by bees. I recommend planting clover in and around all orchards because of the attractiveness of the flowers to bees. Clover has many benefits other than attracting bees but that's for another article.

Plant & Care Information

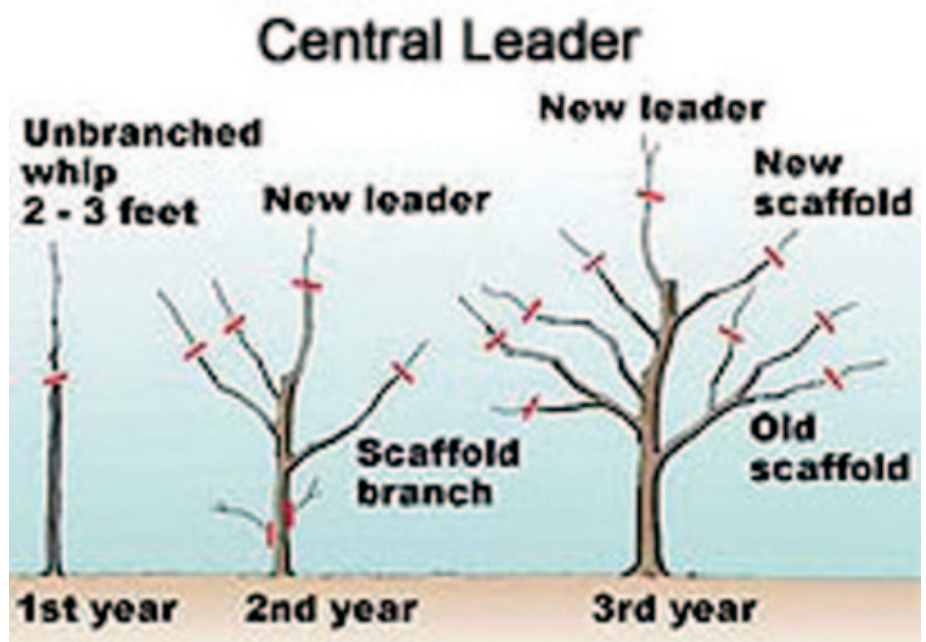
Choose a nice sunny area with full, all day sun. Morning sun is most important. This allows the foliage to dry off quickly and reduces the incidence of disease.

Apples require an optimum pH of 6.0- 6.5 with rich well drained soil. Apples and most crabapples cannot handle wet feet.

Remember to space your trees at 25 - 30 ft. This allows for plenty of all around sun and good air circulation.

The best time to plant in the South is fall and winter. In the North, early spring.

Upon receiving your bare root trees it's very important to keep the roots moist. Before planting, soak the roots in water for at least 30 minutes to rehy-



Pruning photo courtesy of www.weekendgardner.net



Yates apple

the tree. Remember to always keep the central leader as the highest point on the tree and keep the ends of the scaffolding and primary limbs below the central leader.

Correct pruning and thinning is very important in shaping your young trees for vigorous production in later years. Yes, later years! It is very important to allow the tree to grow and mature before allowing it to fruit. Most fruit trees are capable of producing at very early ages, especially trees that have been grafted to semi dwarf rootstocks such as MM106. Although this is preferred by you it is not the best thing for the tree. Allow the tree to put on at least two years of solid growth before fully fruiting. This may involve as stated above some minor summer pruning and removing young fruit so that the tree will use all of its energy on new limb and root development.

Fertilization

GET YOUR SOIL TESTED!

Optimum pH for Apples and Crabapples 6.0-6.5. If your soil is very deficient I believe the best choice would be to bring your pH up to 7.0 before planting. This will allow for a longer period of optimum soils. After three or four years you would then need



Gibson Gold

to top dress the area again with the recommended amount of lime.

From my own experience I have found that excess fertilization on Fruit and Nut trees causes extreme vegetative growth, reduced fruit set, reduced quality of fruit and increased instances of disease such as fire blight, crown rot and powdery mildew. On the other hand, I've also found that a deficiency of nitrogen also causes poor growth habits and low fruit production.

Balance is the key. So what I recommend is an 8-12-12 or similar fertilizer in a slow release formula (nine month slow release preferred). Apply one even cup of fertilizer in February the first year of planting. If you see any yellowing of the leaves or poor performance, add one additional cup in May. Follow the same application the second year. In the following years, add one pound of fertilizer per inch of trunk diameter. Do not exceed three pounds even on older trees. If you are having problems with early fruit drop then omit or cut fertilizer rates to half the recommended rate.



Arkansas Black Apple

On a final note, remember that all apples require a period of dormancy to bloom and set fruit. This period is referred to as "Chill Hours". "Chill Hours" are the amount of time fruit trees need below 45 degrees to properly flower and set fruit. I personally know

of several varieties that do well in our southern climates. Some of my favorites are Arkansas Black, Yates, Gibson Gold, Anna and Horse Apple. I would also recommend mixing Crabapples in your orchards for a greater variety and excellent pollination.

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Wildlife Trends Journal Management Calendar

By Dave Edwards

December 2011/January 2012

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



Late winter and early spring are generally a good time to assess the progress of management strategies and develop a plan for improvements for the upcoming year

Assess progress and create a plan for improvements in 2012

With the 2011-12 hunting season coming to an end, it's time to revisit the wildlife management program on your property to assess whether or not your management strategies are working and helping you achieve desired goals. Doing so may reveal limiting factors that may be pre-

venting you from reaching your management goals or maximizing your efforts. Addressing limiting factors and implementing improvements where needed will help you succeed in reaching goals. Unfortunately many landowners and hunting clubs keep doing the same thing and expect different results. Depending on the wildlife species you are managing for, late

winter or early spring is generally a great time to assess habitat needs, review current management strategies and how wildlife or habitat has responded to these strategies, and devise a plan for addressing needs. While a general property assessment is easily done by a landowner, I recommend getting the assistance of a professional experienced wildlife biologist to help identify less obvious and often times overlooked strengths and weaknesses of your property or wildlife management

program. At the risk of sounding arrogant, I can't tell you how many times I have been helping a client where I made what I thought was an obvious recommendation that they had never thought about or recognized as a limiting factor. My point is that it is always good to get another set of eyes when assessing your property, particularly from someone that does not see the property often and/or someone that is an experienced wildlife/land manager. With the property wildlife management goals in mind, and from this assessment, you and/or your wildlife consultant can develop a list of several to many management activities that will address limiting factors identified. Depending on the property, this can be a relatively short list or a very long list of activities that need to be addressed. Many of you have heard me say this before, but consistent good hunting doesn't happen by accident. It takes planning, hard work, patience and an understanding that Mother Nature is dynamic and things are constantly changing requiring adjustments in management strategies to reach desired results.

Ensure doe harvest goals are met

Due to abundant mast crops throughout much of the southeast last fall, most deer herds experienced good fawn production and survival this year. This means that increased harvest will be needed on most properties to maintain control of deer population growth. A very simple law of nature taught in our college Wildlife Population Dynamics course is that $\text{Population Growth} = \text{Births} - \text{Deaths}$. Thus, with an increase in "births" (more fawns), managers will need to increase harvest rates unless growth is desired.

Ideally, strive to harvest does early in the season and/or before the rut. Doing so will save food resources for remaining deer and immediately improve the sex ratio for the upcoming breeding season which will conserve energy for your deer herd. An unbalanced sex ratio will result in an extended breeding seasons where bucks can lose up to 30% of their body weight from excessive breeding



Maintaining a desirable deer density in balance with the existing habitat is essential in managing a quality deer herd

activities. Consequently, these bucks enter spring green up trying to recover. The highly nutritious spring food then goes towards body maintenance versus body/antler growth for the following year. The extended breeding season associated with an unbalanced sex ratio also results in poorer hunting due to the lack of breeding competition. That is, there are so many does that bucks do not need to compete (fight, chase during the day, etc). In this case, hunters generally do not see much breeding activity such as chasing, rubs or scrapes. We often refer to this as a diluted rut.

By the time you get this issue of *Wildlife Trends* it will be late in the hunting season. If you have not met your doe harvest goals, get to work. If needed, recruit the help of friends. Holding a "doe harvest weekend" is a great way to get participation from club members or friends. Make a big deal out of it by having a cook out at the camp with "awards" for those that harvest the largest doe, oldest doe, or most aggregate weight. These events can sometimes be the most memorable hunts of the year.

Manage duck hunting pressure

Most properties have at least one swamp, beaver pond, lake, wetland, or managed waterfowl area that offers duck hunting. If you enjoy duck hunting but only have one or two small "duck holes" on your property, enhancing these areas (water management, plantings, etc) and managing the hunting pressure will ensure you have exciting hunts each time you go. Like most wildlife, ducks react to hunting pressure. As hunting pressure increases, the number of ducks using the area decreases. Managing the pressure simply means that you don't hunt the pond every chance you get and allow the area time to rest between hunts. A good rule of thumb is to not hunt a small pond (or any small area where ducks use) more than once per week. It is also a good idea to not hunt the area in the morning and afternoon of the same day. If food sources remain and you allow the pond to rest longer than a week, you will be pleasantly surprised at the number of ducks that will be using the pond, especially if there is hunting pressure on surrounding areas.



Don't wait until the last minute to flag upcoming projects. Flagging early allows time to think things through and reduces the chances of having to make a hasty decision later.

Assess and flag or mark wildlife clearcut areas, new food plots or plot expansions, new roads, and roadsides that will be widened.

Because temperatures are cool (or cold) and the leaves are off trees where you can generally see better in the woods, winter is a great time to assess and mark areas where trees will be harvested or dozier work will be needed. Having the leaves off is certainly a big help because you can see what you are doing and visualize areas that you are flagging. Projects that may need to be marked or flagged include small bedding areas that will be created with chainsaws (you can run the chainsaw during the winter too, while it is cooler), new food plot areas or expansions on existing plots, areas along roadsides that need attention next spring, etc. Besides flagging areas that will require heavy equipment and drier conditions, winter is also a good time to flag areas

that will be planted in wildlife friendly orchards, supplemental hardwoods, areas to plant hedgerows for quail through fields, etc. Marking these areas in winter will not only be more pleasant for you and allow you to see what you are doing, but will also ensure you are ready to tackle these projects when conditions are right. Also, flagging in winter gives you time to think more about the areas you have flagged before the project is implemented. The last thing you want is to be flagging just ahead of a logging crew and having to make hasty decisions on where you want a new food plot to be created.

Prepare dormant season prescribed burn plans and initiate burns as weather permits.

Fire is a management strategy that is relatively cheap to implement and the results are very obvious for wildlife. If you have pines on your property, fire is

an essential tool to improve wildlife habitat and should be on your annual task list. However, burn plans need to be well thought out and completed well ahead of time. With the exception of longleaf pine/coastal plain areas, most understory burning in the Southeast is conducted during the winter dormant season. Acceptable relative humidity, temperature, fuel moisture, and steady, persistent winds often occur during this period. Cool season burns are generally conducted between December and spring green up. In the Deep South, try to conduct burns before March 15 to avoid destroying turkey nests. Cool season or winter burning is not only a good way to reduce fuel loads and control undesirable hardwoods in a pine stand (which reduces the chances of a wildfire that can be detrimental), but is also a great way to stimulate new understory plant growth which will result in quality food sources for wild-

life. Fire rotations (interval of time between burning the same area again) vary depending on your goals and habitat types but are generally every 2-5 years to promote quality wildlife habitat. It is also a good idea to strategically plan your burns so that you always leave some areas unburned. How much area to burn will depend on your specific property and habitats. However, do not feel that you have to burn large areas (50-100 acres or more) to make a difference and create quality wildlife habitat. Relatively small burn areas in the 5-10 acre range are easily done in a couple hours and will make a difference. Always check local burning laws and consult with an experienced burn manager before lighting a woodland fire. The U.S. Forest Service or your state forestry commission are great sources for obtaining more information regarding burning in your area. Check with the US Forest Service for informa-

tion regarding prescribed burning as well as examples of a burn plan. It is also a good idea to coordinate your burns with a professional land manager who has experience burning.

Prepare deer stands for the off-season.

Once deer season ends, it is a good idea to “summer-ize” them. That is, to ensure they are in good working order next season there are a few things to do. Ladder and lock on stands should be loosened or removed from the tree to allow the tree to grow during summer and prevent it from absorbing the attached chain or strap of the stand. This not only protects the stand from potential damage, but is good for the tree. If the stand is not going to be removed from the woods, remove any cushions or seat straps and burlap/camo covers that may be on a stand. This will prolong their life and prevent the

weather or critters from ruining them before the next season. Cushions and covers should be removed from tripods or other stands as well. Although they should already be secured, double check the tie downs and anchors of a tripod. There are two kinds of tripods – those that have blown over and those that will. Making sure they are securely anchored will reduce the chances of a tripod getting blown over. Shooting houses should be cleaned out and sealed up as much as possible. Sealing them (meaning closing the door and windows) will reduce damage by squirrels, owls, etc. It will also reduce wasps as well (notice I said reduce). Cleaning shooting houses out in late winter is much nicer than trying to do it in August! Obviously, all climbing tree stands and pop-up blinds should be removed from the woods and stored over the summer. When “summerizing” ladders and lock on stands, it is VERY



Dormant season prescribed fire is a great tool that can result in abundant food and cover for wildlife

important to revisit these stands just before hunting season starts again the next year to reattach the chains/straps and tighten everything up. One trick we use to identify stands that are ready is to tie a piece of flagging onto the stand once it has been tightened and checked. Use the same color flagging for each season. For example, this year we are using blue flagging. Next year we will use orange flagging. So if a hunter gets to a stand this season and does not see the blue flagging, he will know that the stand may have been overlooked and/or has not been checked and secured.

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

Besides actually planting the trees, site preparation is important to reduce competing weeds to enhance tree seedling survival during the first growing season. Depending on the situation, 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. Areas commonly planted in fruit trees include road intersections, roadside management areas, 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.

Build wood duck boxes

Wood ducks are cavity nesters, meaning they construct their nests in hollow trees near water. Since nesting trees can be limited, providing artificial nest boxes can attract more wood ducks to your property and help increase local populations. Because it is sometimes hard to find time to do “side projects”, building wood duck boxes while hanging out at camp during hunting season is a great time to do this. Because “green” cypress wood is very wet/heavy, building the boxes ahead of time allows the wood/boxes time to dry before installing them making the task much easier. Building, erecting, and annually maintaining wood duck boxes can be a relatively easy way for the entire family to be involved in wildlife management that is both fun and rewarding. See the *Wildlife Trends* website for blueprints of a one-board design for building a wood duck box.

Wood ducks will begin searching for a suitable nest site as early as February. Therefore, install new boxes during winter so they can be used during the upcoming spring nesting season. Existing wood duck boxes should be cleaned out each year before nesting begins to remove old nesting material, squirrel

nests, and egg shells and filled with 4-6 inches of fresh wood shavings or chips (preferably cypress or cedar) which are available from many pet stores, chip mills, lumber mills, cabinet shops, etc.

Build deer feeders

Similar to building wood duck boxes, building deer feeders is a great project to tackle during “down time” while spending the weekend at your camp during hunting season. As a side note – I generally do not recommend implementing a supplemental feeding program until more important things are addressed in your deer management program. Supplemental feeding is just as the name implies...it supplements other management activities such as ensuring a desirable deer density is being maintained and habitat is being managed in a way to provide adequate natural food and cover. Without addressing these things first, supplemental feeding is often a waste of time and money. However, if you are addressing these needs, late winter is a great time to build feeders in preparation to putting them out in the spring. One of my favorite designs is a trough style wooden box feeder with a tin roof covering the feeding tray which has a hardware cloth bottom. This design and instructions on how to build it was featured in *Wildlife Trends* a few years ago and is available on the website as well.



Weekends around the camp during hunting season is a great time to build deer feeders for the upcoming year.



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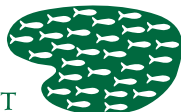
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