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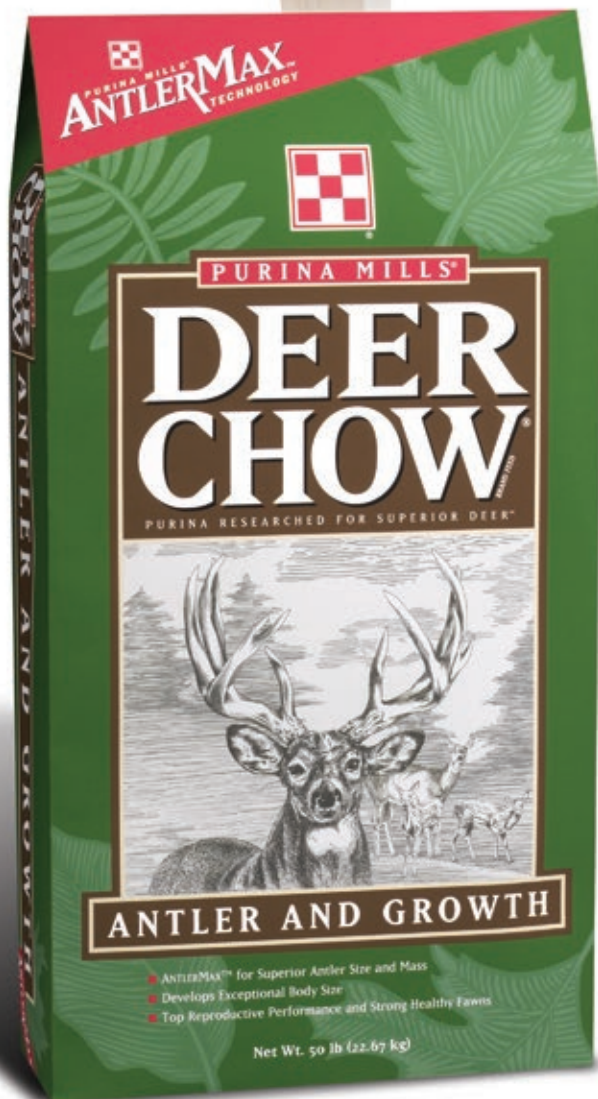
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Earl Says...

The subject of our annual Field Days has come up several times recently and I would like to address this to everyone so you can understand our situation.

Up until last year, *Wildlife Trends* has hosted Field Days for our subscribers every year since 2001 in several locations throughout Alabama, Georgia and South Carolina. We have always enjoyed these events as a way to thank our subscribers and provide not only a "hands on" experience for wildlife management but also a chance for you to meet some of the authors who write for us. We've had crowds as large as 150 to as small as 30 and with each event everybody learns something new. We've covered subjects on tree planting, hog control, food plot strategies, quail management, pond stocking, and the list is endless. But Mother Nature has always been the decider on how successful we can be.

The last Landowner Field Day we hosted was at a beautiful property in south Montgomery County in Alabama. The event was carefully planned and with over 140 folks signed up to attend we were excited to show off the property as well as introduce everyone to our speakers. But the tornadoes that took such a terrible toll on the good folks in Tuscaloosa and Birmingham the day before kept our numbers down to just a handful. We had an awesome day anyway with the tour and everyone who attended had a great time. But weather problems as well as finding sponsors for our Field Days has put us on a hold for now for future events.

Please know we are eager to continue more Field Days in the future but we're looking for the right venue with possible indoor facilities and sponsors to help with the costs of the events. If you would like to work with us on hosting and/or sponsoring an event, please contact me and I will be happy to discuss it with you. Thank you all for your patience and call me any time I can be of service.

Andy Whitaker
Publisher/Editor



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Cover photo by Scott Brown



Chiwapa Millet – Another Tool for the Waterfowl Manager

By Tim Teel &
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Management practices geared toward creating and improving waterfowl habitat to enhance hunting opportunities has become increasingly popular. Many landowners, both large and small, have realized the numerous opportunities that exist to attract ducks to their property, regardless of their geographic location in relation to the major flyways. That is, just because your property may not be nestled in the heart of the Mississippi flyway, it doesn't mean you can't experience some of the finest duck hunting the sport has to offer.

One strategy that has gained popularity is the construction of shallow-water impoundments along creeks, drains, and floodplains. This is easily accomplished by building a small dike along the low end of a creek or floodplain to collect runoff from rain events. A water control structure (e.g., flashboard riser, screw gate, etc.) is inserted into the dike and allows the water level to be manipulated as needed.

Another strategy that has become more prevalent in parts of the Southeast in recent years is the conversion of old catfish ponds into managed waterfowl impoundments. Because the catfish market has declined over the years, many farmers are looking for alternative sources to compensate for the lack of revenue. Thus, many are willing to lease their ponds to duck hunters. This can be an ideal situation for the duck manager because in most cases these ponds are already set up to facilitate management practices that can be used to draw in ducks.

While some assume that a large area is required to effectively manage for ducks, this is not always the case. In the right situation, a small impoundment can be extremely effective at attracting and holding ducks throughout duck season and provide sustainable hunting opportunities. In fact, I have seen small man-made impoundments (2-3 acres) in areas that most would consider to be marginal at best, provide duck hunting opportunities that would rival anywhere in the country.

One of the benefits of these shallow-water impoundments is that they can easily facilitate agricultural plantings or moist-soil vegetation management strategies used to attract ducks. Similar to planting food plots for deer and other wildlife, land managers are always searching for the “magic plant” that is cheap and easy to grow, requires no maintenance, and attracts ducks like no other. Unfortunately these do not exist. In order to meet the seasonal dietary needs of waterfowl, a diversity of food sources must be available. The most successful management programs address these requirements by tailoring their management practices to ensure a variety of food sources are available throughout the year.

Some of the more common agricultural plantings for ducks include corn, grain sorghum, millets (Japanese, golden, white proso, browntop, pearl, etc.), soybeans, buckwheat, rice, Egyptian

wheat, and chufa. Ducks readily use each of these and individually they serve a specific purpose in the overall management scheme. Some provide a higher energy food source while others provide more protein, some have longer deterioration rates when flooded, and others provide better cover. Thus, the best approach is to plant and manage several different crops in close proximity to meet nutritional demands of ducks, which will ultimately result in more successful and consistent hunting. One planting that we have been experimenting with over the past couple years is chiwapa millet.

Chiwapa Millet - Species Profile

Information pertaining to chiwapa millet and its use as a waterfowl planting is limited. Thus, much of what we report within this article is based on the demonstration plots and impoundments we planted during the summer of 2012.

Chiwapa is a variety of Japanese millet (*Echinochloa frumentacea*) and was developed in the mid- to late 1960s as alternative millet for the southern US. It produces an abundance of seed that is preferred by ducks. Chiwapa produces an impressive seed head, containing much more seed per plant than other millets. While we did not measure seed

production from individual plants, we estimate that the average seed head from the chiwapa was approximately five times larger than that of Japanese millet growing adjacent to it within the same impoundment.

Chiwapa can get relatively tall and will grow to heights of 3-8 feet, depending on soil fertility and growing conditions. Due to the heights that chiwapa can reach, strips planted along the edges or within the wetland provide great concealment cover for hunters as well. It also has a large root base and stem that remains standing longer than other millets when flooded. This is beneficial as it provides better cover throughout the winter.

While most millets (e.g., browntop, Japanese, pearl, white proso, etc.) mature relatively quick (60-80 days), chiwapa is much slower to mature and takes approximately 120 days. The long maturation period has several advantages that will be discussed later.

Lastly, chiwapa performs best in loam or clay soils and can tolerate shallow flooding after establishment, which helps suppress weed competition and results in a cleaner stand. Flooding (if possible) also helps during dry conditions to maintain development through-



On the left is the seed head of chiwapa millet, which is considerably larger and contains more seed than Japanese millet, which is shown on the right.



On the left is an impoundment that has been drained in preparation to plant chiwapa millet. The photo on the right shows the seed that was sown into the mudflat (look closely!) with a hand spreader.

out the summer. It also has moderate fertility requirements and can produce a respectable stand with little fertilization.

Soil Management

Like any other planting, special attention should be given to soil quality to ensure optimum conditions exist. This will promote a healthy stand that will be more productive, nutritious, and

attractive for ducks.

As with any other agriculture crop, soil testing should be conducted and lime and fertilizer recommendations should be followed to help maximize plant vigor and seed production.

Although chiwapa can tolerate a relatively low pH and low fertility, applying lime to neutralize the soil pH and the appropriate fertilizer blend (according

to a soil test) will promote optimum production. This can be especially important if you experience drought conditions or other stress factors that can negatively impact production.

Planting Methods

Chiwapa can be planted in a variety of ways. Similar to Japanese millet, one of the simplest planting techniques is to

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drain the water off the area to be planted and sow the seed onto the exposed mudflats at a rate of 15-20 lbs./acre. Because of muddy conditions, this is best accomplished with either a hand spreader or 4-wheeler spreader. However, it is important to sow the seed before a “crust layer” is formed when the mudflats begin to dry.

Chiwapa can also be broadcast on a prepared seed bed at a rate of 15-20 lbs./acre, however, be sure not to cover the seed more than ¼” deep. Culti-packing is the recommended strategy to ensure good seed-to-soil contact and avoid burying the seed too deep. Another strategy is to plant with a conventional seed drill or a no-till drill at a rate of 12-15 lbs./acre. If no-tilling, be sure to kill the existing vegetation with the appropriate herbicide prior to planting to eliminate competing vegetation. As always, if broadcasting the seed on a prepared seed bed or drilling, make sure there is good soil moisture or rain in the forecast to ensure optimal germination.

When to Plant

As discussed previously, one of the primary characteristics that separates chiwapa millet from other millets is the long maturation period (approximately 120 days). Thus, it needs about four months of growing season to mature before a hard frost. The recommended planting dates are May 1-June 30, and can vary to some degree depending on the geographic location of the property.

The ability to plant early has several benefits. One of the primary benefits is that soil moisture is typically better during early summer and rainfall is more abundant, which will help the stand get off to a good start. Having a long maturation period also prevents the seed from maturing too early and falling to the ground where it can germinate again, reducing the amount of food that would be available for ducks during hunting season. This is one of the issues with using Japanese millet and why it is recommended to plant it during mid- to



As soon as our chiwapa millet germinated, so did cocklebur, which is an unwanted weed. It was effectively controlled with one application of 2,4-D.

late summer to compensate for the shorter maturation period.

Weed Control

Again, one of the benefits of chiwapa millet is that it tolerates shallow flooding after establishment. This is a great strategy for suppressing weed competition. However, if flooding is not an option, any broadleaf-selective herbicide (2,4-D, Banvel) can be used to control broadleaf weeds (e.g., cocklebur, coffee-weed, etc.). Remember, herbicides should be applied when weeds are 3-6” in height for best results.

Pest Management

Another factor we dealt with last year in our chiwapa fields was armyworms.

Thus, if you are in an area that has experienced problems with armyworms in the past, it will be important to regularly inspect your plantings for armyworms and/or associated damage. Armyworms can be difficult to detect during the day as they conceal themselves under debris on the soil surface and along the underside of vegetation. They are most visible and active during the cooler parts of the day. One of the best strategies to detect their presence is to examine the plant leaves and sheaths for damage.

If armyworms are detected, they should be sprayed immediately with the appropriate pesticide to minimize further damage. They are aggressive feeders and can destroy entire stands in a



The damage created by armyworms looked like someone had taken a weed eater to the millet. Shown on the right is a close up of the armyworms, which can be detrimental if not treated quickly.

matter of days. The pesticide we had good results with last year was Intrepid. With this particular product, the armyworms consume the active ingredient as

they feed upon the vegetation, which disrupts their digestive system and causes death. It is also a good idea to spray a buffer around the infested area

(such as around the dikes) to prevent armyworms from spreading into adjacent impoundments or other areas.

Management Strategies

Planting entire impoundments or flooded fields in chiwapa millet is not recommended (or any other single species planting for that matter). As discussed previously, it gets very tall and forms a dense stand, making it problematic for ducks to land in it to feed until late winter when it begins to lodge over. Pure stands of chiwapa millet tend to create roosting areas for ducks, which may be desired if managing on a large scale with multiple impoundments.

A good strategy is to plant chiwapa along the edges and deeper portions of the impoundment, leaving the interior portions of the wetland relatively open by planting lower growing species (Japanese millet, white proso millet, buckwheat, etc.) or promoting naturally occurring moist soil plants (panicgrasses, sedges, smartweed, wild millet).

This will provide open water that is more accessible for feeding and loafing in close proximity to quality cover. If managing relatively large impoundments (>5 acres), strips of chiwapa can be planted (approximately 40-60 feet wide) throughout the impoundment to further increase diversity and structure.



Shown here, the edges of the impoundment were planted with chiwapa millet, while the interior was managed in lower growing vegetation to increase diversity and encourage ducks to land in specific locations for hunting.

Conclusion

Based on our experience with chiwapa millet last year, we were very impressed with the role it played in the overall success of our management program. In conjunction with other management practices, chiwapa will certainly be incorporated into future management regimes and will provide additional options to help accomplish specific objectives.

It is important to consider that when developing a sound management strategy to enhance your property for ducks, one of the key factors is to promote habitat diversity within the areas being managed. Like anything else, chiwapa millet alone will not satisfy all the nutritional requirements for ducks. It is merely a small piece of the puzzle. The most successful management programs offer a wide array of food and cover types to satisfy seasonal changes in habitat requirements.



One of the authors with a nice stringer of bluewinged teal taken last September during the early season. The maturing chiwapa millet (background) provided excellent concealment cover for the hunters.



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Providing Homes for Cavity Nesters

By Anna Huckabee Smith, CWBO

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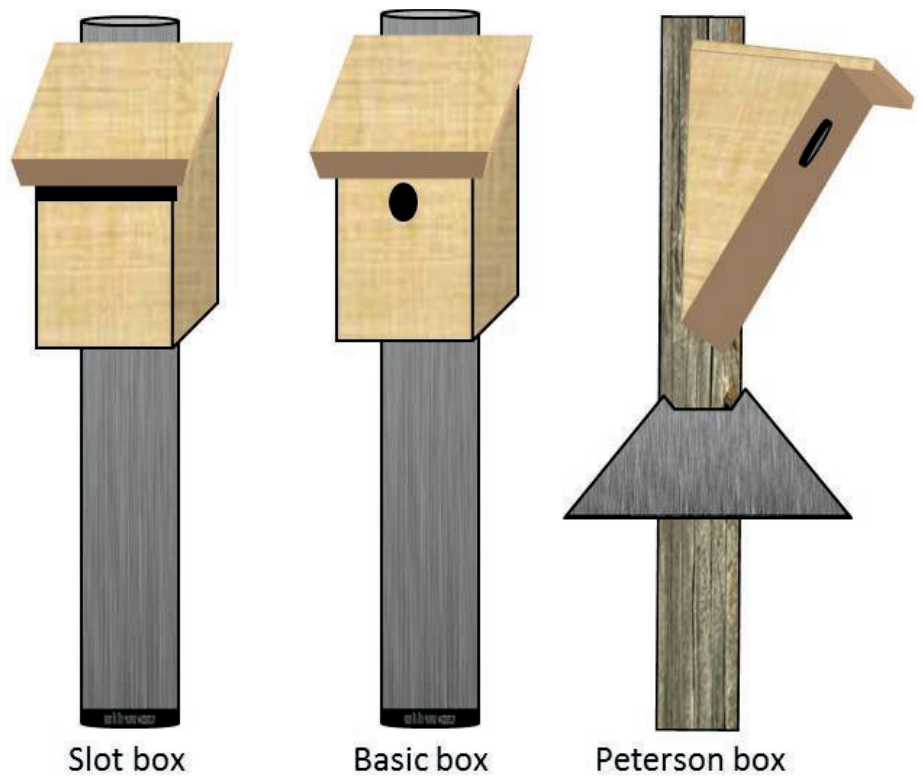


The Prothonotary Warbler is the only wood warbler in the East that nests in cavities. Credit: USFWS

Take a good look around your property. How many nest cavities can you find? Are they different sizes, shapes, heights off the ground, and in various habitat types? When we really take the time to study our natural woodlands and planted pine stands, we often find that snags have been removed for aesthetic purposes or are lost in storm events. Many species often compete for limited nest sites and subsequently, their numbers are declining. The removal of snags from the landscape has been known to reduce some avian populations by as much as 50%. On average, there should be three quality snags per acre that are within 500 feet of openings and water sources; two snags per acre is acceptable for forest interiors. Knowing that there are 85 species of birds in North America alone that require cavities of some sort for nesting, not to mention those mammals that need them as well, it is wise to preserve naturally occurring hollows and install artificial houses where appropriate.

There are over 24 species of birds that will readily accept bird houses. The more common ones in our area include bluebirds, tree swallows, titmice, chickadees, wrens, great-crested flycatchers, prothonotary warblers, purple martins, some species of woodpeckers and owls, American kestrels, and wood ducks. Raccoons and squirrels will also utilize man-made structures. Most of these species are considered Secondary cavity nesters because they rely on pre-existing holes. Making homes for cavity nesters increases the chances of enhancing species diversity across the landscape, and it can provide both viewing opportunities as well as a means to increase the population for hunting purposes (in the

These three common nest box shapes can be adapted to suit a wide variety of songbird species. Credit: Anna Smith



NEST BOX DIMENSIONS AND GUIDELINES

SPECIES	Floor of Box (in.)	Box Height (in.)	Entrance Diameter	Placement Height (ft.)	Additional Requirements
Eastern Bluebird and Tree Swallow	5 x 5	6-12	1 ½ round or 1 ½ x 2 vertical oval	4-6 (up to 15 for swallows)	This is for a standard box. The Peterson box design is another option.
Tufted Titmouse, Carolina Chickadee, and Carolina Wren	4 x 4	8-12	1 ¼ round	4-15	Wrens are not picky and will inhabit a wide variety of houses.
Great-crested Flycatcher	6 x 6	8-12	1 ¾ round	5-15	Place in a tree.
Prothonotary Warbler	5 x 5	6	1 ½ round	4-8	Place over water.
Purple Martin	6 x 6	6	2 ¼ round	10-20	These are often difficult to build and so may be purchased online if desired from www.purplemartin.org .
Northern Flicker and Red-bellied Woodpecker	7 x 7	16-18	2 ½ round	8-20	Shavings (2") in box.
Eastern Screech Owl and American Kestrel	8 x 8	12-15	3 round or oval	10-30	Add 2" shavings to screech owl box.
Barn Owl	10 x 8	15-18	6 round or oval	12-18	Place within field with low vegetation.
Wood Duck	10 x 18	10-24	3 x 4 horizontal oval	6-20	Shavings (4") in box; place over water or within 100 feet of it.
Gray and Fox Squirrel	6 x 6	20	3 round	10-30	Add layer of dry leaves or shavings to box.
Raccoon	11 x 11	24	5 x 6 horizontal oval	10-30	Add 3-4" shavings in box.

Adapted from USFWS Nest Box Dimensions table as well as data from Cornell University, the Missouri Department of Conservation, & the USGS.



Purple martins are colonial nesters. Credit: Wiki/Flickr

case of squirrels, raccoons, and wood ducks). Many bird species eat insect pests such as mosquitoes, cutworms, grasshoppers, and bark beetles; others consume rodents that threaten quail and other ground-nesting species.

First, evaluate what already exists on the property in terms of snags, hollow branches, burned stumps, woodpecker holes, rock crevices, and other natural cavities. Some species of trees make better cavity producers than others depending on how quickly they rot. Black oak is sometimes cited as a good tree as older specimens often develop decays in the heartwood that progress rapidly. Where they are located will also determine what animal may use

them. Some species want to be on the forest edge overlooking a field while others prefer to be over water. When constructing nest boxes, there are certain dimensions and features that tend to attract certain species. However, there is often overlap making some standardized box designs more multi-functional than others. [See table that lists nest box dimensions by species.] Some animals you don't want to necessarily attract—wasps, bees, snakes, flying squirrels, English sparrows, and European starlings. Sparrows and starlings are known to kill the young and sometimes the adults of other bird species in order to take over a nest site.

There are many box styles: standard,

Peterson, PVC, diamond-shaped “wren house”, gourd, condo, and slit. However, successful bird house designs tend to share the same basic features. For example, wood is the building material of choice because it is breathable yet insulates. Red cedar or cypress in a $\frac{3}{4}$ inch thickness is advisable as these wood types are rot-resistant. The inside of the box should be rough cut or wire mesh should at least be attached below the entrance hole to facilitate the exit of fledglings. In addition, the inside should not be made of treated lumber or coated in stains or other preservatives. External box colors should include shades of tan or gray as these are more natural, reflect heat, and camouflage well. The exceptions are purple martin apartment houses or gourds which should be white. Hardware used in construction should include galvanized or brass shank nails, hinges, and screws which resist rusting and board warping. The box should be able to be opened from the side or top to facilitate cleaning and to discourage the premature fledging of nestlings when the box is checked. The roof should slide into a groove on the backboard to keep out rainwater while the floor should be recessed and given drainage holes to prevent moisture accumulation. Ventilation holes should be drilled along the sides of the box about an inch under the roof overhang. The entrance hole should match the requirements of the species it is meant to attract and be positioned two to four inches below the roof, depending on the size of the house. A covering made of sheet metal or thicker wood should be fitted over the hole to enhance its durability against gnawing squirrels. Never place a perch by the entrance hole; native birds don't need them and it only invites English sparrows and nest predators. Every nest box should be made for only a single occupant, since birds are territorial, unless it is for the colonial nesting purple martin.

Placement of the box is also very

important. New boxes should be put out by February in the South and by mid-March in points farther north. They should be placed facing away from winds and hot afternoon sun. It is ok to place boxes on a tree, but a metal pole is often more desirable because a predator guard can be attached below the box to discourage climbing predators like raccoons, cats, and snakes. A guard consists of either a stationary, conical metal collar or a stovepipe-shaped baffle that shifts as a predator tries to climb it. Wire mesh cages called Noel predator guards can be used around entrance holes to keep out the grasping feet of owls as well as raccoon and cat paws. Do not place pole boxes near overhanging limbs from which predators can drop down onto the box. Other places to avoid include near bird feeders where predators often lurk. The height of poles is important for two reasons: (1) different species nest at different heights, mainly five feet off the ground or higher; and (2) the pole needs to be high enough so that cats

cannot leap up onto the box.

Houses should be inspected once a week during the nesting season to determine occupancy and resolve issues such as wasp infestations. Never use insect sprays inside nest chambers. Insecticides that claim to be safe for birds and rid vacated boxes of fly larvae, lice, and mites include 1% rotenone powder or pyrethrin spray, but use with caution. Besides, once the bird hosts leave, so will the parasites. One of the best defenses against wasps is a layer of bar soap spread on the inside box top. This makes it hard for the wasp nests to adhere to the wax-coated roof.

When inspecting an occupied box, tap lightly on the outside of the box before opening so that the female has a chance to flush. Do not check boxes in the morning as this is when egg laying occurs. Also, do not check boxes during inclement weather or when young are close to fledging (after 12 days old). If non-native, invasive English sparrow or European starling eggs are detected, they can be removed and destroyed as

they are not protected under federal law. The best way to avoid these nest box usurpers is to not place boxes in sparrow or starling habitat.

Some researchers suggest removing old nests after the young fledge in order to promote reuse of the box. However, others suggest that the material be left as it sometimes attracts other birds to a potential "successful" nest site. Some species simply build new nests on top of old ones. In addition, some fledglings return to the nest box for several nights to roost (e.g. barn owls). Clean out old nests just before the breeding season because, in the winter, the old nesting material is utilized by roosting birds. Bluebirds have been known to pack into a single box on cold nights in order to keep warm. Old nest material should be discarded some distance away so as not to alert predators to the location of the box.

The most common species people tend to want to attract are bluebirds. These colorful birds of open country prefer old fields, parks, orchards, golf courses, cemeteries, and large forest

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Bluebird nests near fields are composed of grasses while birds located near pine forests typically make their nests completely out of pine needles. Credit: Anna Smith



Tufted titmice (pictured) use a variety of plant materials in the construction of their nests. Both titmice and chickadees are known to cover their eggs with nesting material while away from the nest. Credit: Anna Smith

openings. This is because of their foraging style which consists of sitting and watching for insect prey and then flying down into sparse or low vegetation to retrieve it. Bluebirds set up two to three acre territories. Bluebirds are double or triple-brooded in southern latitudes and don't mind reusing nest boxes that haven't been cleaned out. Their nests consist entirely of dry grasses or can be all pine needles, depending on the available material. To attract this species, place the appropriate size bird box 100 feet from the treeline facing an opening with individual boxes 100 yards apart. Some people place a series of boxes across appropriate habitat at intervals of every 300 feet (out of site of each other in order to shorten the distance). These are referred to as "bluebird trails" and often attract many breeding pairs. A different idea is to pair two boxes back-to-back on the same post, not to attract two sets of bluebirds, but instead have one for bluebirds and one for tree swallows. Territoriality in these species only extends to members of the same species, thereby making it possible for them to nest within a very short distance of each other. This also reduces competition for available cavities. (The opposite is true in the case of house wrens that will destroy the eggs of other species nesting within their territories.) If tree swallows are the focal species, place boxes 75 yards apart on posts or on the side of dead trees. These aerial foragers, like their purple martin kin, prefer to be near large water bodies like lakes, ponds, and rivers.

Titmice and chickadees share the same habitat, prey base, and are often seen flocking together in the non-breeding season with downy and hairy woodpeckers as well as brown-headed nuthatches. These species are birds of open woodlands and nest at the edges of mature mixed pine-hardwood stands. One box per acre is customary for titmice. Dead leaves and dry grasses constitute a majority of their nest material

while chickadees often incorporate moss and animal hair as well. Chickadees also have a habit of covering their eggs while away from the nest. They also are known to excavate cavities in dead wood.

Wrens, especially Carolina wrens, are almost comical in their choices for nest sites—boots left on the front porch, hanging baskets, clothespin bags hanging on the clothesline, and other odd sites. More natural locales include upturned tree roots, vine tangles, snags, and stump holes. They can use a nest box or a ledge, but if constructing a box, a slot-shaped opening is best. Wrens maintain territories year-round in a variety of habitats, especially bottom-land forests with thick underbrush and a well-developed leaf layer where they forage. The female chooses a nest location and both sexes build it out of skeletonized leaves, pine needles, grasses, rootlets, and an occasional snakeskin.

Although most cavity nesting songbirds are content to use crevices at a person's eye-level, the great-crowned flycatcher prefers to be elevated to the canopy, at least ten feet off the ground in a tree within a sparsely wooded landscape. This often includes orchards or along the edge of a stream or field. This migratory species arrives in our mixed deciduous-coniferous woodlands in the spring from its winter habitat in Central America. Nests appear “trashy” and are constructed of dried leaves, grasses, and straw as well as a snakeskin or two that typically hangs out the entrance hole. The nest is often built up to the level of the entrance hole.

The only cavity-nesting, eastern wood warbler is the prothonotary. This migratory species arrives in the Gulf states from Central and South America in late March or early April where it seeks out flooded bottomland hardwood forests, marshes, and swamps. Prothonotary warblers feed by creeping along trees and gleaning aquatic insect larvae from floating wood. They are capable of excavating an existing cavity and then constructing a nest of moss, lichen, twigs, bark strips, and leaves. Nest boxes designed



Barn owls often choose existing structures as nest boxes like the inside of this deer stand. Credit: Anna Smith



Encourage barn owls to nest on your property for rodent control. Credit: NPS

specifically for this species should be placed five feet or more over water. Thankfully, the fledglings can swim!

Another species attracted to water is the purple martin. These colonial nesters are very popular with landowners along the coast or inland near large water bodies like lakes. Touted as mosquito-killers, these aerial foragers' main prey-base is actually dragonflies, but they will eat those pesky Japanese beetles. (If

you are looking for mosquito control, put up a bat house!) Male scouts arrive from South America in the spring to find potential colony sites. They display some site fidelity with 40% returning to the general area of the previous year's colony. This species has become entirely dependent on manmade structures in the eastern part of its range. In the past, it utilized cliffs and hollow trees. Its western counterparts rarely use artificial nest



American kestrels are birds of prey that will nest in man-made nest cavities. Credit: Steve Hillebrand, USFWS

cavities (except gourds on some occasions). Purple martins are single-brooded and build their nests out of mud, fine grasses, and green leaves.

To attract this species, use a multi-chambered condo-style house that is placed 10 to 20 feet off the ground. The birds need an unobstructed flying space of 40 feet around their house and prefer to be 30 to 120 feet from human residences. Telescoping poles can be used for aluminum houses while heavier structures require a sturdier pole. Houses should have porches, railings, and porch dividers to keep young in and neighbors out. Martins need supplemental roof perches as well as nearby wires. An alternate housing arrangement is the use of gourds hung by wire and strung between two poles. In this instance, no additional perches are nec-

essary. The swaying gourds also deter English sparrows from using them.

Woodpeckers are harder to attract to man-made nest boxes because many can excavate their own. The two species most likely to use a nest box are the Northern flicker and the red-bellied woodpecker. These species inhabit park-like settings of mixed pine-hardwoods and nest in snags along forest edges or clearings. To entice these species to utilize a box, place it 10 to 30 feet off the ground and add two inches of wood shavings to the bottom so they can “excavate” it. No other nesting material is added.

Another bird group that doesn’t do much nest preparation either is the owls. The great-horned owl will use old crow or hawk nests, while barred owls, screech owls and barn owls are content to lay their eggs on the hard floor of a

tree cavity, nest box, hayloft...or a deer stand. The only “added material” is the leftover remains of their prey and regurgitated pellets. American kestrels and barn owls often use the same habitats and nest locations. Some are even known to lay eggs in each other’s nests! Barn owls and kestrels prefer open woodlands and meadows where they can find their prey. Barn owls consume mice and voles while kestrels eat insects, small birds, reptiles, and mice. A box placed in a lone tree in a field or on a tree or pole out from the treeline is advised. The height should be about 15 feet off the ground. Screech owls prefer a two inch layer of wood shavings in their boxes which should be placed under a tree limb on the trunk of a tree facing an opening. Owls begin pairing while it is still winter. They have asynchronous hatching of nestlings so that some are already two weeks old before the last egg hatches.

Wood ducks are birds of the water, and as such, prefer a nest cavity or box over or near it (30 to 100 feet away) and 3 to 60 feet off the ground. Boxes should have an oval-shaped entrance hole to accommodate the body shape of the hen. Boxes should be placed out of site of each other to prevent “egg dumping.” Habitats suitable to wood ducks include forested wetlands, beaver ponds, marshes, and river systems. They eat vegetative matter as well as aquatic insects. The ducklings are precocial and leave the nest within hours of hatching, following their mother to the water. Hens have one brood per year but have extreme sight fidelity, returning in subsequent years to prime habitat.

Although the majority of nest boxes constructed for use by wildlife are for bird species, gray squirrels, fox squirrels, and raccoons will also utilize man-made den sites. It is especially nice to make a few extra bird boxes for flying squirrels to use so they don’t usurp songbird boxes as often (and eat the occupants to get them). Gray squirrels and fox squirrels can benefit from having two to six den trees per acre as these

ANATOMY OF A CAROLINA CHICKADEE NEST



fur and fine
plant material

moss

Credit: Anna Smith



Flying squirrel nests can be recognized by the shredded bark and plant material used to completely cover the occupant(s). Credit: online blog

are safer than leaf nests during adverse weather events. In addition, young survival is often two times higher in dens than leaf nests. Squirrels use dens all year long, especially in winter so new nest boxes need to be in place by fall. Boxes should be constructed out of the same material and in the same manner as bird boxes with one notable exception: the entrance hole should be on a side close to the trunk and a limb to make access easier. A layer of dry leaves or wood shavings on the inside will make the box more enticing. Place the box 10 to 30 feet off the ground in a tree along the edge of a large forest and not deep within. Fox squirrels, in particular, are animals of more open environments. A nest box constructed of durable wood like cedar or cypress may last 10 years and host over 20 families of squirrels. Boxes should be cleaned out and checked for repairs every three years.

Raccoons typically nest near water in mature hardwood forests with large, hollow trees. In fact, some researchers suspect that their populations are often limited by suitable den sites, not food. Young are born in the spring and summer in den trees but then are moved to a ground den when they are able to walk/climb. Ten weeks later, their den days are over and they follow their mother until fall or winter. Raccoons

require a large box with an oval entrance hole. Boxes, like den trees, are used most during daylight hours but also during the cold winter months.

Making homes for raccoons, squirrels, and bird species can be a fun hunt club project with ultimate benefits for the wildlife that will inhabit them. Remember to leave them up year-round to provide both nesting/denning sites and a refuge during the winter (even for mice). You may be surprised at the myriad of animals you can attract.

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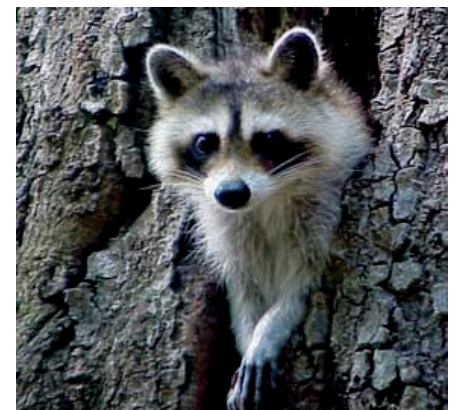
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Fox and gray squirrel nest boxes need side-opening entrance holes for ease of access. Credit: Anna Smith



Natural cavities in living and dead trees should be protected for use as den/nest sites or winter refugia. Credit: NPS

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Panfish: Biology, Management and How to Catch Them

By Scott Brown

Scott Brown has 30 years experience in researching and managing natural resources throughout the Southeast. Scott founded Southern Sportsman Aquatics & Land Management in 2007 and now has clients from Texas to Florida. Scott can be reached at scott@southernsportsmanaquatic-sandland.com or (214) 383-3223.



Here is a nice redear sunfish.

There are many species of panfish/sunfish/bream that can be found in lakes, ponds and streams. I grew up in the Midwest and we referred to them as panfish. Depending on the part of the country you are in, these names can include or exclude certain species like crappie. When I started my professional career in Florida, I adjusted to calling panfish - bream. Within that grouping, there are many common names for each individual species used by locals in various regions. A few names I've heard over the years are Copper Head – bluegill (*Lepomis macrochirus*); Shellcracker – redear sunfish (*Lepomis microlophus*); Red Belly – redbreast sunfish (*Lepomis auritus*); Stump Knocker – spotted sunfish (*Lepomis punctatus*); Scummer – green sunfish (*Lepomis cyanellus*), Goggle Eye – rock bass (*Ambloplites rupestris*) or warmouth (*Lepomis gulosus*) (depending on the region of the country you are in) and Slab or Speck – crappie (*Pomoxis* spp.). Add in some genetically

enhanced species' names and it can get confusing. Also throw in some natural cross breeding such as a bluegill/redear or green sunfish/bluegill cross and these fish can get difficult to identify when in hand. Whatever you call them; these are usually the first fish most of us catch as children.

When managing a fishery, knowing the needs and life history of the species you are dealing with is absolutely necessary for that species and dependent species to reach their full potential. Some panfish are more desirable in ponds than others. Some Lake Managers may recommend the genetically enhanced species and some may not. The two most commonly stocked panfish are the bluegill and redear sunfish.

The **bluegill** (identified by dark vertical bands, black spot at the base of the dorsal fin and small mouth) is by far the most widely distributed and popular panfish in the country. It is also the most common fish stocked into private ponds. They provide forage for largemouth bass, can be perused as sport with ultra-light tackle and fly-rod, and are harvested for table fare. They can reach 11 inches long and over one pound. The World Record bluegill was caught in Alabama and weighed 4 lbs.

12 oz. Bluegill are chosen to stock for their quick growth and long annual spawning period which gives them a high reproductive potential. Bluegills begin spawning when water temperatures reach about 72 degrees and will continue to spawn all summer until water temperatures drop below 72 degrees in the fall. Bluegill beds are round shallow depressions in water ranging from 2-6 feet deep. They prefer to bed on hard substrate, but have been documented spawning on almost any bottom type, while bed sites may include as many as 50 beds in a small area. Many experienced bluegill fishermen can smell a bream bed and target the large ones during the peak spawn. Bluegill predominately feed on insects and their larvae. The best bait for bluegill is crickets, but worms, grasshoppers, small beetle spin, artificial flies and even small pieces of hotdog work. Use a #8 hook with a small split shot. Depending on the water temperature the use of a bobber may or may not be beneficial. Do not use any weight when using crickets while fishing a bream bed, it looks much more natural and they will eat it up. Bluegills can be found around structure or vegetation. They readily come to fish food, which

accelerates their growth and increases the pond's carrying capacity for bluegill. Feeding small size pellets benefit both small and large bluegill. When stocking bluegill, rates can vary from 500 - 1000 per acre, and even higher, depending on the management objective. Hatcheries now offer the Coppernose bluegill (not a hybrid) which is a subspecies of the common bluegill found in the extreme south that is more aggressive in feeding, grows faster and is easier to catch than a common bluegill.

The **redear sunfish** (identified by the red edge of the ear flap) is usually stocked in conjunction with bluegill. A common stocking ratio is 75% bluegill/25% redear. The main forage is snails and small clams, hence the name "Shellcracker." These fish rarely feed near the surface. They can reach over 12 inches and not uncommon weights well over two pounds. The World Record is 5 lbs 8 oz. that was caught in Arizona. Redear generally spawn before bluegill in water temperatures around 68-70 degrees, and may spawn at or near the same time as largemouth bass. Redear beds look similar to bluegill, but closer together, so much that the bed rims may be touching. Redear generally



Three bluegills taken from the same waterbody, yet look different. The one on the right has some redear sunfish in its genetic makeup.



Although this warmouth is not the biggest I have seen, some anglers would consider it a prize catch on light tackle or fly rod.

only spawn once or twice per year. The best baits for redear are worms, grubs and beetle spin fished deep. We only recommend stocking redear sunfish if there is a food source. Walk or ride around your pond and look for snail and clam shells in the shallows. If the

pond does not have a good supply of snails and/or small clams, they will not do well. Redear sunfish will generally not consume floating fish feed, but have been documented to intake sinking feed once it has settled on the bottom.

The **redbreast sunfish** (identified by

a long “ear” and redish/orange chest and belly) doesn’t grow as fast as the redear or multiply as often as the bluegill. Redbreast can reach lengths of 10 inches and weigh 0.5-0.75 lbs. The World Record was caught in Florida weighing 2 lbs. 1 oz. Redbreast feed on insects and their larvae, grass shrimp, snails, and small fish. They traditionally like gently flowing clearer water with gravel or sandy bottom, but on occasion do appear in ponds. They create beds similar to bluegill, but prefer spawning in water temperatures around 68 degrees. They will consume fish feed. If targeting redbreast, similar angling tactics for the bluegill are recommended.

The **warmouth** (identified by its large mouth and 3-4 dark bars coming from the eye back and stopping at the edge of the gill plate) has a ravenous appetite and competes with small bass for food. These fish prefer organic (muck or muddy) bottoms with little or no flow. They feed similar to a bass by waiting in vegetation, around woody snags and rocks to ambush their prey. Warmouth



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can get to 12 inches and weigh up to two pounds, but typically reach eight inches and 0.5-0.75 lbs. The World Record was caught in Florida and weighed 2 lbs. 7 oz. They like to spawn at about 71 degree water temperature and will spawn all summer. Their nests look like other panfish, but are usually next to some cover such as vegetation or stumps, as opposed to being in the open. Small minnows and beetle spins are the best baits, but also worms, grubs and tiny rattle traps work. In a traditional management strategy this species is unwelcome, as they do compete with small bass for food. However, we know land owners who like to catch and eat them, so if desiring to encourage their success in an old waterbody with an abundance of vegetation and/or stumps and woody snags, stocking fathead minnows annually or every other year will accomplish this.

The **crappie** (identified by its deep, silvery, slab-sided body with big mouth) feeds heavily on small fish. These fish can live in various substrate types, but the black crappie is slightly less tolerant of turbidity and siltation. They can be found in open water and around submerged woody snags. They move into shallow water to spawn when water temperatures are between 55 and 65 degrees, depending where in the country you are. They can quickly over populate small impoundments. Crappie can get 14 inches and two pounds with the World Record black at 5 lbs. 0 oz. caught in Missouri,

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This is an impressive redbreast sunfish, although rare in private lakes and ponds, they do appear in waterbodies from nearby waters via flooding or angler transplant.



This longear sunfish was photographed with one of the panfish's favorite food – grass shrimp.

and white at 5 lbs. 3 oz. caught in Mississippi. Crappie populations are dependent on open water forage such as small threadfin shad and silversides (glass minnows). Minnows and beetle spins are the best bait, either trolling open water or fished around sunken tree trunks and brush piles. This species is frequently debated whether it is a good species to stock in small ponds. We have seen successful crappie fisheries in ponds as small as five acres, but don't recommend stocking them in lakes less than 20 acres. If you have them, enjoy them, but to keep numbers

down harvest many throughout the entire size range present. They are cyclic, where their numbers rise and fall over a 6 – 10 year period, which has been documented in both large and small impoundments. This means some years the fishery may be phenomenal and others poor.

The **green sunfish** (identified by its large mouth and turquoise spots) at one time had a limited range in the United States, but is now found almost everywhere in the country. It can be found in a wide variety of waterbody types and is very adaptive. Green sunfish feed on

insects and their larvae, small fish and crayfish. Due to its ability to quickly over populate, out compete more desirable panfish, desire and success rate to hybridize with other sunfishes and its small size when with other species, it is not welcome in ponds. Unfortunately, through intentional and unintentional stockings, this species can and is causing issues in both public and private waterbodies. Green sunfish rarely exceed 10 inches in most areas, but the World Record is 2 lbs. 2 oz. caught in Missouri. When angling for green sunfish, use similar baits as when targeting the warmouth.

The final type of sunfish that is available for pond stocking is a various cross of males and females of different species to create a hybrid, which I refer to as "genetically enhanced". There are several out there and all claim to be better than the next. Growth rates of these original individuals after stocking are very impressive if on a properly run supplemental feeding program. But because of the hybridization, as future generations arrive, those individuals get smaller and smaller until starting the population over may be required. Before stocking these, check your state's regulations, as some states have created laws prohibiting the stocking of hybrid fish to protect the pure genetic strain of species already present.

The two fish attractors that you can add to your waterbody that will help your panfish population are brush piles and gravel beds. Everyone is familiar with fish attractors using oak tree tops, cedar type (Christmas trees) trees or synthetic materials arranged in a tree-like form to create brush piles. Besides providing an area for these species to hide from predators, they create areas for the larger individuals of these species to congregate and catch. Installing areas of gravel in 3-6 feet deep water provides spawning habitat for some panfish species and largemouth bass. These areas can be created in a new lake, or the gravel can be spread from a boat in older

lakes that may not have an abundance of quality spawning habitat. We use #57 limestone gravel to create these sites and have seen bluegill spawning on them within two days of installation.

Reference *Wildlife Trends Journal* July/August Volume 12, Issue 4 for various structure types and instructions on how to build them yourself.

Not all panfish consume floating fish feed. If you mix floating and sinking together you will benefit more species than if using only one or the other. If the feeder brand you use cannot broadcast multiple sized feed, fill half the feeders with sinking and half with floating feed around the lake. Set the automatic fish feeders to go off twice per day (mid morning and mid afternoon) when water temperatures are 55-70° F. Feed four times per day; twice in the AM and the same in the PM when water temperatures are between 70° and 85° F. During hot weather (water temperatures between 85 and 90 degrees) feed at daylight and dusk, when fish are most active. In extremely hot weather (water temperatures above 90° F) stop feeding if fish are not consuming the feed. During cold weather (water temperature below 55° F) do not feed, or feed sinking feed once per day during the afternoon (warmest part of the day) in 4-8 feet deep water. Feed dispensed on the bottom of the deepest part of the lake in the winter or summer may not get consumed if there is insufficient DO present. If all feed dispensed is not consumed within 15 minutes, reduce time dispensed to reduce waste. If all feed is consumed in less than five minutes, increase feed dispensed per feeding. We recommend one feeder per five acres. Most feeding attracts fish, so feeding times throughout the day need to remain the same for long periods of time so the fish will be nearby when the feed is dispensed to ensure most is consumed and waste is reduced. Feeder locations can be points to sight evaluate panfish/ bream, catfish and shiner populations while fish are at the surface consuming

floating feed. If you have a newly stocked pond, use high protein Fingerling or Grow-Out sized pellets. Various fish feeds are sold at feed stores but use a 32% protein or higher feed. Be sure the feed is fresh, and not moldy. Certain feed molds can be toxic to fish.

If you want a high quality bream fishery and you are just starting your lake, consider not stocking predators such as largemouth bass and catfish. Without predators you can foster more individuals to the quality size with good habitat and a feeding program. If this is done, harvesting large numbers annually is required to prevent over population and stunted growth. Large catfish, whether blue, channel or flathead (the

worst of the three), the bigger they get the more and larger forage they will consume. Even if they are eating feed they will still consume panfish. If you want a quality bream fishery and you already have the lake full of fish, stop harvesting largemouth bass and even remove the bigger ones that might consume big panfish. As the bass population becomes stunted and few or no bass remain to consume five inch or bigger panfish, more big panfish will start appearing in your catch. I have observed this in small public lakes where all bass over 16 inches were harvested and the bluegill and redear sunfish almost 11 inches were abundant for several years.



The "Slab" white crappie, thought by many freshwater anglers as the best tasting freshwater fish.



Not thought of as a typical predator in a lake, this 22 lbs. blue catfish can eat a lot of panfish throughout the year.

White-Nose Syndrome: Could a New Fungus Mean Extinction for Some North American Bats?

By Ryan Shurette

G. Ryan Shurette is a Certified Wildlife Biologist.



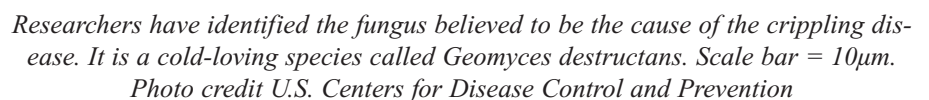
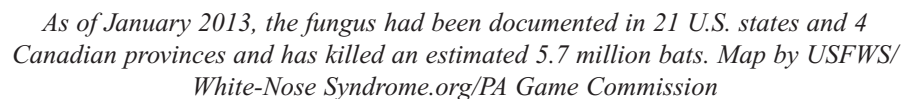
A hibernating little brown myotis with symptoms of White-Nose Syndrome. The little brown myotis was the most common eastern bat until the onset of the disease and now biologists have asked the FWS to place it on the endangered species list. Photo credit USFWS

In February of 2006, in Schoharie County, New York, a caver noticed some hibernating bats with a whitish substance around their mouths and snouts. There were also a few dead bats lying about the cave floor. He photographed the bats and went on his way. Little did he realize that this was the tip of an ugly ecological iceberg that would soon have scientists scrambling to try to find a solution for what is now being called “an unprecedented wildlife disaster” by many biologists. In January of 2007, after hundreds more dead and dying bats were found in a handful of caves near the area, biologists with the New York Department of Environmental Conservation documented the mysterious “White Nose Syndrome” (WNS). The disease is so named because of a whitish fungus commonly seen on the infected bats’ muzzles. In 2008 it was noted in several other New York caves, as well as in Vermont, Massachusetts, and Connecticut. As of January 2013, the fungus had been documented in 21 U.S. states

What Causes WNS?

wood leaf litter on the forest floor. We don't know yet if the fungus will spread into these types of habitats, but many of our species do use large cold caves where we know the fungus is able to grow. All the details are not yet clear about how this fungus affects North American bats, but one serious thing it does is to wake the bats more frequently from their torpor during hibernation.

As we all know most North American bats are active in the warmer months of the year and feed generally around dusk, at night, and a little after dawn. They are insect specialists and they





Biologists meet outside a WNS-infected mine shaft in Vermont. Photo credit USFWS.

echo-locate to find their prey, and then eat it on the wing. Contrary to the myth, they can also see, although the keenness of their eyesight depends on the species. During the daytime they will roost (sleep) in various places (including caves, trees, snags, attics, etc.), which is also often dependent on the species. Roosting sleep is very different from torpor. In colder months when food is scarce, bats (like a few other animals) employ the strategy of extended torpor, or hibernation. Typically during hibernation, an animal's body cools to a temperature near that of the ambient air and metabolism essentially shuts down so that energy (fat) reserves may be slowly rationed until warmer weather. During hibernation (which may last for 5 or 6 months), the animal is literally barely alive. Every few weeks, bats will naturally arouse and then go back into torpor. However, should the bat be repeatedly un-naturally aroused from torpor (whether it's by a curious spelunker or through the irritation from the *Geomyces destructans* fungus), the event can be costly. Even one or two un-

planned arousals (and the flying around that may result from them) could deplete enough energy to emaciate the individual, and the bat may starve to death or freeze. This seems to be exactly what is happening in all the infected hibernacula. Although the fungus is often prevalent around the mouth and ears, researchers have found that it also damages the wings of the bats. It erodes the outer skin and damages connective tissues resulting in water loss and other metabolic problems. The hyphae (filaments) of the fungus can also penetrate into the bats' sebaceous glands and cause ulcers. Observed mortality rates have been 95-100% in the infected hibernacula so far (Hirsh, 2012).

Other Fungal Diseases

There are lots of other cave fungi that are native to the Eastern U.S., even other species in the *Geomyces* genus. But only the one currently seems to cause major problems in our native bats. The idea of exotic fungi significantly affecting native populations is not exactly new. Fungal diseases (most

often from non-native sources) are to blame for a number of massive die-offs and extinctions in both plants and animals. For example, just over a hundred years ago it is estimated that in many parts of the eastern U.S., one out of every four hardwoods was an American chestnut (*Castanea dentata*). This tree was known for its sweet plentiful chestnuts that fed man and beast, and for its massive straight trunks that provided timber for barns and homes in the Appalachians for over 300 years. Then a fungal blight (*Cryphonectria parasitica*) was accidentally introduced with the importation of exotic Japanese chestnut trees. Within 40 years, the chestnut blight had wiped out an unfathomable number (>95%) of mature American chestnuts. Today a few scattered infected sprouts are all that remain of the once-dominant species. Another lesser known example is chytridiomycosis, which is affecting amphibian populations all over the world (McKie, 2012). This disease is caused by the fungus *Batrachochytrium dendrobatidis*, which attacks the skin of frogs and other amphibians. And since these animals breathe through their skin, this obviously causes serious problems. Since 1993, it has been decimating populations in western North America, South and Central America, Australia, and many other countries, and to date more than 30% of the world's amphibian species have been affected. In the case of chytridiomycosis, it appears the responsible fungus may have actually mutated into a more virulent pathogen. Several other fungal diseases have been noted recently in sea corals, turtles, and various species of bees, including honeybees (McKie, 2012). A drastic increase in global travel and trade in the last half-century is undoubtedly fueling this trend.

Which Bats are in Trouble?

The majority of North America's 47 bat species hibernate in caves and mines. As I mentioned, cave-dwelling

bats often cluster tightly together in large numbers within winter hibernacula and roost caves, and are therefore in imminent danger from WNS. The fungus grows in temperatures ranging from 39 to 59 degrees Fahrenheit, and cannot persist in temperatures above about 75 degrees. To what extent other (non-subterranean) habitats will become infested with *G. destructans* is unknown. Little brown myotis (*Myotis lucifugus*) has been one of the most affected species thus far. The Little brown was one of the most common eastern bats until the onset of the disease and now biologists have asked the FWS to place it on the endangered species list, as an emergency measure. Besides little browns, the other species that have been affected to date are Big brown (*Eptesicus fuscus*), Eastern small-footed (*Myotis leibii*), Northern long-eared (*Myotis septentrionalis*), Indiana (*Myotis sodalis*), Gray (*Myotis grisescens*) and Tri-colored (*Perimyotis subflavus*) bats. Prior to WNS, all of their populations were increasing or stable, but now their future is uncertain. The Indiana and Gray bats were already federally endangered and now these two species are poised for rapid population declines unless a solution is found. Indiana bats, along with some of the other aforementioned species, huddle tightly together during hibernation (See Figure 5) and if one infected bat finds its way into the group, the fungus spreads to the others over the course of the winter. Furthermore, large cold hibernacula (suitable habitat for the bats and unfortunately the *G. destructans* fungus as well) are often limited on the landscape and as a result large numbers are often found concentrated into few locations. For example, almost all of the known Gray bat population hibernates in only nine eastern caves, and more than half of them winter in a single cave in northern Alabama. It is easy to see why this species is believed to be so vulnerable to the fungus.

Some recent evidence suggests Big brown, Eastern small-footed, and

Northern long-eared are holding on better than some of the other species.

There have been a few recent observations of Little browns adopting more solitary habits, and scientists hope that there will soon be more signs of immunity or behavioral defenses in the species most at risk. But even if the current trend is broken and there is observed resistance to the disease in the next few years, it's unlikely that populations will recover to pre-WNS levels in our lifetimes. This is because most bats have very low reproductive rates. Unlike most small animals such as rodents, bats are long-lived and many often raise

only one pup per year. So population increases are naturally very slow to occur, even in a healthy bat populace.

Implications of the Losses

Although the *Geomyces* fungus is not apparently a direct threat to humans or other animals, major declines in North American bat populations could have some serious implications to our normal way of life. Obviously, one of the greatest benefits we reap from our native bats is their voracious consumption of insects. But we're not just talking about picking off a few aggravating mosquitoes. Bat declines may have sig-



A cluster of endangered Indiana bats, hibernating on the ceiling of a large cold cave. Photo credit USFWS.



The disease has now made its way down into areas occupied by the endangered Gray bat, shown here. Photo by R. Shurette.



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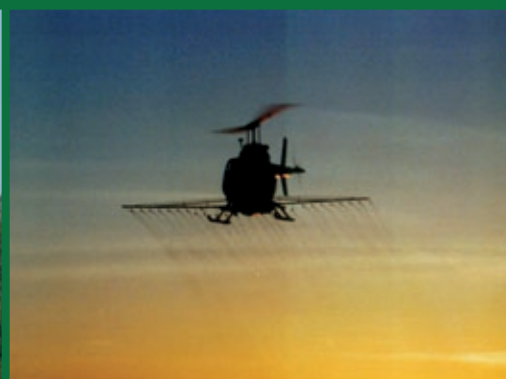
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nificant implications in our national agricultural systems. Research has shown that a single Little brown myotis can eat 4 to 8 grams of insects each night during the summer months (Anthony and Kunz, 1977). A million of them would consume between 660 and 1320 metric tons per year (Boyles et. al., 2011). Mexican free-tailed bats (*Tadarida brasiliensis*) in Texas have been estimated to consume over 9,000 metric tons of insects per year (Lee and McCracken, 2005).

Considering the reduction of pesticide applications and other associated costs of insect damage, the value of bats to the U.S. agricultural industry has been estimated at roughly \$22.9 billion annually (Boyles et. al., 2011). Ecologically, it will be interesting to see whether any corresponding increasing population trends emerge in the coming years in other nocturnal insectivorous animals, like nightjars (whip-poor-wills, chuck-wills-widows, etc.), or other bat species not affected by the disease, since there will most likely be more insect resources for those species.

Besides providing insect control, bats serve other significant ecological roles as well. In the desert Southwest for example, several plant species (including many cacti and agave) depend on bats for pollination. The WNS fungus is spreading westward now and it will be a waiting game to see just how far it moves. In the tropics, bat pollination (also known as chiropterophily)



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is important in producing many of the foods we consume. Fruits and spice plant products like mangos, bananas, cocoa, durian, guava, breadfruit, almonds, cashews, cloves, vanilla, carob, balsa, and figs rely largely on chiropterophily. Fortunately however, tropical systems seem to be too warm for the *Geomyces* fungus. Since this type of wide-scale decline in cave-dwelling bats is so new, we don't yet know exactly what kind of ecological implications the declines will have on the plant, fungal, and wildlife species that they interact with, especially those that are associated with caves. Other (non-subterranean) kinds of wildlife may be affected to some extent (perhaps as in barred and other owl species that are known to sometimes prey on bats, for example). For the majority of our upland wildlife species, however, no significant impacts are expected from the drop in bat numbers.

What Can Be Done?

Scientists are working quickly in an attempt to stop or at least slow WNS. They are looking at the development of a vaccine, but have not found a way to effectively utilize it at a large scale. Other creative measures of saving some bats include the construction of an artificial cave, near an existing Gray bat cave in Tennessee (Kingsbury, 2013). The structure was built in the fall of 2012 through funding support by The Nature Conservancy, and it is basically a large underground concrete room with some monitoring equipment. And although fungal sterilization treatments are not an option in wild caves, the artificial cave can be sterilized during the summer and can therefore theoretically be a refuge for up to 200,000 bats (if they decide to use it). Electronic calling devices will be employed to try to lure bats into the cave in the coming winters.

At the moment, the spread seems to be an overwhelming phenomenon and the survival of several species probably will ultimately depend on natural resistance

to the disease. However, in the meantime there are a few things landowners may be able to do to help slow the spread or assist in the research. First, if you happen to observe dead or dying bats or abnormal winter behavior (including bats flying around in the daytime), it is important to report these observations to either your state wildlife agency or to the U. S. Fish and Wildlife Service. The following email address was established for reporting bats with WNS symptoms: WhiteNoseBats@fws.gov. When reporting suspicious individuals, it is important to know the species of bat and therefore a close-up photograph, if possible, would be helpful. Do not handle any bats as there are a small percentage of them that do contract and carry rabies, and almost all bats will bite when threatened. It is especially important to report any bats, whether dead or alive, having wing bands or radio tracking devices (typically identified by a small antenna). These individuals may hold important information regarding survival, migration, or other trends that may be associated with the disease. In addition to reporting unusual bat behavior, the FWS has called for a voluntary moratorium on caving in eastern states so that spread of the fungus can be minimized.

Summary

White Nose Syndrome is now effectively wiping out populations of several native North American cave-dwelling bat species. At the time this article was written, the exotic fungus had been confirmed in 21 states and Canada and had affected seven bat species. In only five years, this fungal disease has decimated the once-common Little brown myotis across most of its range. With no clear large-scale solutions at hand, scientists and bat conservationists are frantically trying to find a breakthrough to avoid extinctions, and are watchful for signs of natural resistance to the disease. The described bat population declines will undoubtedly have significant ecological and economic conse-

quences, especially when considering the resulting reduction in pest insect control. Previous fungal disease events in other plant and animal species do not offer much in the way of optimism and only time will tell when, or if, the current trends will begin to taper for this "unprecedented wildlife disaster".

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Wildlife Trends Journal Management Calendar

By Dave Edwards

June/July 2013

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.

Newly built duck boxes can be very heavy. Building duck boxes in the summer allows time for the wood to dry making them much lighter and easier to install later.



Build wood duck nest boxes now – deploy them this winter.

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. 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's both fun and rewarding. One of the best designs I have used is built from a single 10'x12" cypress board. With a couple of hinges, a small piece of hardware cloth and some screws, it is easy to turn a single board into an effective duck management tool. See instructions for building a duck nesting box on page 36. 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. The reason for building duck boxes in the summer is to allow them time to dry. "Green" wood (freshly cut or purchased) is wet and very heavy making them more difficult to erect. Build them now then deploy them in the winter. 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, cabinet shops, lumber mills, etc. Avoid using sawdust as it absorbs moisture which results in a wet mess and rotting of the duck box.

Plant chufa for turkeys.

Chufa can be planted in May or June in the Southeast, but most plantings occur in June when summer rains start. Monitor chufa plots for competing grasses and weeds and apply herbicide accordingly to control. Adding chufa to your planting program can be quite rewarding if you like to see or hunt turkeys. Turkeys primarily utilize chufa in the fall, winter and spring once the tubers have developed. If your turkeys have never seen chufas, you may need to lightly disk a strip through the patch in late winter to expose tubers. Once turkeys find them, you will not be able to keep them out. A word of caution – raccoons and hogs like chufas as well and can pose problems in some areas. Chufa patches can often be regenerated the following spring by lightly disking the areas. There has to be adequate chufa seed remaining to regenerate an adequate stand (there's often more left than you may think). To regenerate the stand, lightly disk the plots once in April, again in May, and once more in June. The key is to continue disking each month regardless of how nice your plot is growing with chufas – it's going to kill you, but do it. Be sure to rotate your chufa patches every 2-3 years to avoid nematode problems.

Take advantage of dry duck ponds – maintenance, repairs, and build hunting blinds

Unless you are keeping water on a duck pond to act as a weed screen until it will be drained later this summer for planting, now is a great time to make needed repairs to water control structures, hunting blinds, and levees. While the pond is relatively dry, I often lubricate and check water control valves to ensure



Building, installing, and managing artificial wood duck nesting boxes can significantly enhance wood duck use and reproduction on your property.

they work properly. This is also a good time to remove muck that builds up in front of drain pipes or along pond edges. In some cases, re-leveling with a tractor may be needed. This is also a great time to inspect duck blinds and perform routine maintenance or repairs as needed, or build new ones. From a habitat management standpoint, this is also a good time to inspect the pond for undesirable vegetation such as sesbania, willows along the dam or levee, etc.. A chainsaw, machete, and/or herbicide applications are the tools of choice for removing these trees.

Evaluate and repair existing roads & build new ones.

Unless all of your roads are paved, road maintenance is an annual activity for most landowners. June and July are often the driest months in the Southeast (other than those of you lucky enough to get sea breezes and regular afternoon thunderstorms). Thus, this is a good time to work on or build new roads. Although you probably have a good idea of areas that need repair, the best time to identify road problems is during the wet season which is usually during late hunting season. Make notes during the winter then repair them when the property dries up in the summer. As you know, having all weather access to

your property is important from a management perspective so that you can get tractors and equipment into areas of your property, but will also make life easier and more comfortable for you during hunting season. While working on roads, consider increasing the road-sides where possible to enhance wildlife habitat (see calendar item below). These areas can be planted or simply



While duck ponds are drained, check and maintain water control structures to ensure they work properly. This may include replacing valves, lubricating moving parts, and removing muck.



Widening roadsides can significantly increase early successional habitat and wildlife value on a property.

maintained as native grass/weedy areas that wildlife will use for food and cover. Wide roads also dry out quicker due to additional sunlight and wind.

Widen roadsides to create roadside management areas

Summer is a great time to create roadside management areas throughout your property. Creating roadside management areas can add wildlife and aesthetic value to your property. Regardless of how intensely you manage these areas, they will create more “edge” habitat which is

preferred and used by most game animals. To create a roadside management, area simply clear the understory and undesirable trees along a roadside, lime/fertilize as needed, and *periodically* mow to maintain control of encroaching tree species and maintain a relatively low understory (avoid keeping a “manicured” look by mowing roadways often – this does not offer as much wildlife value). How wide you make the area is site specific, but is generally 10-20 yards wide. Be sure to leave a few desirable mature trees within the managed area. These trees will provide shade to conserve moisture in the summer and will add aesthetics along the road. If you desire to intensely manage your roadsides you can seasonally disk or burn them to promote desirable weeds, and/or install wildlife plantings such as clovers, sorghum, or wildflowers. Wildflowers provide both aesthetics as well as bugging areas for turkeys. Managing roadsides will not only increase the aesthetics of the proper-

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ty and add wildlife value, but will increase wildlife viewing opportunities.

Take care of new fruit tree or other tree plantings

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

Identify and control invasive exotic plant species.

Exotic species are very competitive with native plants and can take over your property and compromise habitat quality. The best time to control or eradicate exotic plants is often during the growing season. Strategies to control these plants vary depending on the species at hand. However, herbicide (and fire in some cases) will likely be the tool of choice. It is much easier to control




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While many managers focus on the crops they are planting, maintaining areas of bare soil within a planted field will enhance its attraction for dove.

exotic species if you catch them in the early stages of colonization. Once they have a foothold, eradicating can be extremely challenging. Some of the

common invasive exotics in the Southeast include Cogongrass, Chinese tallow tree, Kudzu, Chinese Privet, Chinese Lespedezas, and many others. A

great field guide to keep on hand is “*Nonnative Invasive Plants of the Southern Forest*” by James H. Miller. You can get this publication from the USDA Forest Service – Southern Research Station at Auburn University or visit <http://www.bugwood.org/weeds/foretextotics.html>. This guide has information regarding identifying invasive exotics as well as methods of controlling them. Another resource is the Florida Pest Plant Council - www.fleppc.org.

It is also wise to consult with a professional herbicide applicator before deciding which herbicide and method to use. Besides the complex world of herbicides themselves, mixing and applying them can be complicated as well.

Start preparing and planting dove fields.

Dove field preparations should begin by June or July. Planting dates will depend on the soil moisture, crops you are planting, and the time required to produce seed. Common dove field crops include a variety of millets (e.g.,



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dove proso, browntop, Japanese, pearl) sunflowers, grain sorghum, corn, and wheat. For best results obtain soil samples and apply required lime and fertilizer before planting. Be sure to allow enough time for your crop to produce seed before dove season arrives.

While the seed of planted grains offer attractive food sources for dove, maintaining a clean disked strip or two through the field offers dusting areas for dove. These are strips that you do not plant, rather, simply keep plowed through the summer and into dove season. Dove find these bare dirt areas attractive which will keep them in and around your field until grain seed is mature. It also offers landing areas and access to seed once it matures as well. Another trick that I have used many times with great success is to include/spread pea gravel (very small gravel) along roads that are within the dove field area. Dove eat the smallest particles of gravel to assist in digestion (used in their gizzard to break down seeds and other food parts). This is the reason dove are often seen “feeding” along roadsides.

Conduct summer quail call counts.

Call counts conducted in June provide an estimate of the number of males available for breeding and an evaluation of winter survival. This information allows you to monitor the quail population’s response to habitat management efforts and quail production. To obtain an index of male birds, set up several “listening points” on your property that can be used each year. Listen for whistling males for the first 1-2 hours after sunrise. In June, nesting by females is at its peak in many regions, so males will be actively calling. To standardize the call count, arrive at the first station at sunrise, wait one minute to allow vehicle disturbance to settle, then listen for five minutes and record the number of male quail heard. Count the number of different individuals you hear. Continue until all stations have been

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

Conduct warm season or summer prescribed burns.

Warm season burns are an exceptional tool for managing quail habitat. Warm season burns are generally conducted from June through August. However, extreme caution should be used when conducting summer burns. Due to higher ambient air temperatures and low relative humidity, summer fires can get very hot and difficult to control. If the area you plan to burn has a heavy fuel load (understory shrubs, grasses, and thatch) or has not been burned in over three years, I recommend initially conducting a cool season burn (December – March) to reduce fuel loads before attempting a summer burn. Fire rotations (interval of time between burning the same area again) for summer burns vary depending on your goals and habitat types but are generally every 1-2 years to promote quality wildlife habitat. Regular warm season burns will often promote native warm season grasses that are desirable for quality quail habitat. It is also a good idea to strategically plan your burns so that you always leave some areas unburned. This will help to maintain diverse habitat types which will enhance the wildlife value of the area.

Always check local burning laws and consult with an experienced burn manager before lighting a woodland fire. The U.S. Forest Service or your state forestry commission are great sources for obtaining more information regarding burning in your area.

Plan now for late summer trail cameras - Create mineral licks

While the nutritional benefits of providing mineral licks for deer have not been well studied, they are cheap to create, deer use them, and they do not appear to have any negative nutritional effects. In fact, most deer biologists think there are nutritional benefits of providing minerals for deer. You can create a mineral lick using commercial blends of dry minerals and/or placing mineral blocks in desired locations around your property. While I am not promoting commercial salt rocks, such Bio-rock or Trophy Rock, I have had great success getting deer to use these throughout summer and into early fall. Using a mineral lick or salt rock is also a good way to reduce bear or hog problems commonly experienced when using corn. Deer tend to use mineral licks the heaviest from summer through early fall. The key, however, is to establish the mineral licks early in the summer to allow deer time to find them and begin using them. My experience with mineral licks has been that the longer they have been established, the better they are. Rains dissolve the minerals and saturate the stump or area they are placed. Evidently “leftover” minerals or salt that attracts them lingers and deer often come back to the same site the following year. Having said this, corn is still the “go to” attractant if you are conducting a true camera census on a property, but mineral licks offer a cheaper way to get deer in front of cameras for “casual” photographing. Get them established now so that deer are using them during later summer/early fall when you want to photograph them.

Wood Duck Nest Boxes



Wood ducks, or as some people call them “woodies” or “summer ducks” are one of the most commonly observed ducks across the Southeast. Due to their preferred habitat (wooded swamps, sloughs, shallow lakes, beaver ponds, and marshes) as well as their tendency to be “resident” ducks (30-75% do not migrate), wood ducks are commonly observed, managed for, and hunted across the Southeast. In addition to reduced bag limits and increased

habitat management efforts, one of the reasons wood ducks have become so abundant is the development and construction of 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. Building, erecting, and annually maintaining wood duck boxes can be a

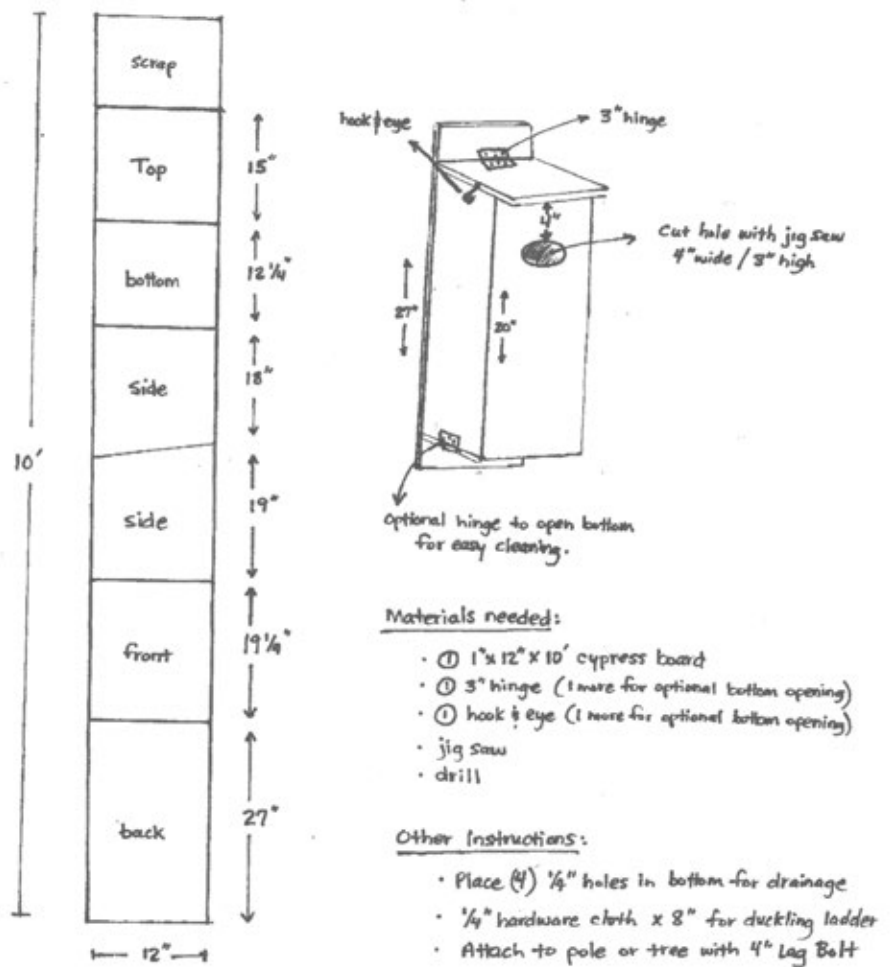
relatively easy way for the entire family to be involved in wildlife management that is both fun and rewarding. See instructions for building a duck nesting box. Wood ducks will begin searching for a suitable nest site as early as February. Therefore, install new boxes during winter so they can be used during the upcoming spring nesting season. 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, etc. Finally, without protection, wood duck eggs can easily be preyed upon by raccoons, snakes, and other predators. Installing a predator guard below each wood duck box will reduce predation. Although there are several different styles and materials used, a roll of aluminum roof flashing works well and can easily be cut to fit around the tree/post and attached.

Wood duck box Management Tips:

- Allowing recently built boxes (made with “green” wood) to air dry for a few months makes installing them much easier because they are much lighter. Also, be sure to pre-drill holes, and start the lag bolts used to hang the box before going up the ladder.
- Use caution when checking duck boxes. Many other animals will use these boxes including squirrels, raccoons, owls, snakes, wasps, and spiders. Slightly crack the top to peek in before disturbing its residents.
- Do not use sawdust for nesting material as it absorbs water and will result in poor nesting material, a wet mess, and will increase wood rotting. Use chips or shavings.
- Clean boxes EVERY year to increase nesting success and ensure wood ducks have a clean nesting environment. A small hand-held gardening hoe works well to scrape old debris from the box.
- Ideal brood rearing habitat has mid-story vegetation (often button bush) that provides aerial protection for ducklings. Look for areas like this to install boxes.

Wood Duck Box Construction



Instructions:

**** see blue print for measurements, materials/supplies, and tools needed.**

1. Measure and cut the 1x12x10" rough cut cypress board to produce the six pieces.
2. Attach the back (1) to the sides (3) using screws fastened from the back of the box.
3. Attach the top (5) using a 3" hinge and hook & eye.
4. Draw the entry hole on the front (2) using a pencil (4" x 3" oval). Drill a pilot hole and cut out the entry hole using a jig saw. Be sure to file or sand off the rough edges.
5. Use a staple gun to attach a 3-inch wide x 8" tall strip of 1/4-inch mesh hardware cloth to the inside of the front panel (2) under the entrance to function as a ladder for the hen and newly hatched ducklings. The cut edges of this cloth should be folded back before insertion to avoid injury to the ducklings.
6. Attach the front (2) using six screws.
7. Drill five 1/2" drainage holes in the floor (4). Attach the floor using a 3" hinge and hook & eye. This will allow for easy cleaning after nesting season.
8. The box is now ready to install. Use the 4" lag bolts to attach the box to a tree or pole. To reduce predation, select trees that are isolated and not near other trees where predators could easily climb the adjacent tree to access the nest box tree. Don't forget to put a 4-6 inches of wood shavings (not sawdust) in the box for nesting material.
9. Use metal shears to cut a piece of aluminum flashing long enough to wrap all the way around the tree or pole as a predator guard. Securely attach it to the tree or pole.



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