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FWF Extension Faculty and Staff Directory located on page 27
**Best Management Practices (BMPs) Near Streams**

Part 1 Types of Streams and Streamside Management Zones (SMZs)

Dr. Wayne Clatterbuck

Harvesting operations are a potential source of water pollution. Best Management Practices (BMPs) are designed to minimize soil erosion and transport of sediment from entering streams. The BMPs associated with stream types, streamside management zones (SMZs) and stream crossings are all necessary to maintain water quality in harvested areas. Part 1 of this article pertains to the SMZs and stream types where BMPs are applied. Part 2 applies to stream crossings.

Perennial Streams are those that flow all year or almost all year under normal weather conditions and provide a permanent habitat for aquatic plants and animals. Perennial streams usually appear as solid blue lines on maps.

Intermittent Streams are those that flow in response to seasonal variations in precipitation (40 to 90% of the time), provide a habitat for aquatic plants and animals during portions of the year, and have distinct channels even when dry. Intermittent streams sometimes appear as broken blue lines on maps. Flow is enough in these streams that mineral soil is exposed and a leaf or debris pack is not present in the bottom of the water channel.

Ephemeral Streams are often referred to as “wet weather” streams and are those that flow in response to rainfall events and disappear soon after rainfall ceases, flow less than 40% of the time, usually do not have distinct stream channels (but not always) even when dry, and include most recognizable drains. Ephemeral streams do not appear as blue lines on maps. Water flow is generally not strong enough in these areas to expose mineral soil such that the leaf pack remains in the drain area.

**Streamside Management Zones (SMZs)**

SMZs, sometimes referred to as buffer zones or filter strips, are areas immediately adjacent to streams and lakes that are designated as special management areas when forest practices are conducted. SMZs are established to protect stream channel and banks from disturbance by equipment, prevent eroded materials from entering watercourses, and maintain water temperature.

SMZs are areas of closely managed activity, not areas of exclusion.

**Where are SMZs needed?**

Generally, SMZs are necessary along perennial and intermittent streams where a distinct stream channel exists. Ephemeral streams usually do not require the establishment of a SMZ. Typically, aquatic organisms are present in perennial and intermittent streams, but not in ephemeral streams. SMZs should be placed adjacent to any drain (including ephemeral drains) where use of equipment or other anticipated site disturbance creates a potential for accelerated soil movement and deposition of sediment in a stream or lake.
What an SMZ does:

- Provides a relatively undisturbed buffer that serves to trap and filter suspended sediments, pesticides, fertilizer and other organic materials in overland flow from the disturbed/harvested areas before these particulates reach the stream or water body
- Allows the water to soak into the ground before reaching the stream, releasing suspended materials
- Protects streams and banks from erosion
- Provides canopy and shade for streams
- Leaves wooded corridors for wildlife habitat
- Maintains hydrologic functions of streams

Guidelines for SMZs

- Timber should not be skidded in streams or major drains. Sediment at the bottom of the stream may become suspended and dispersed in the water and cause soil to be transported downstream
- Avoid operating equipment (skidders, tracked vehicles, trucks, mechanical site prep equipment) in SMZs except at stream crossings. Whenever possible, timber should be cabled or winched out of SMZs to
  1. Prevent stream banks from sloughing off
  2. Prevent rutting, removal of cover, & soil compaction
  3. Prevent movement of soil into streams and lakes
- Timber may be cut in SMZs, but 50 to 75 percent of the vegetation canopy shading streams should be left to prevent increases in water temperature
- SMZs are productive areas for wildlife as well as timber. It may be desirable to leave mast trees, den trees etc. to serve landowner needs or desires
- Site preparation for natural regeneration, i.e., lopping non-merchantable midstory trees, is acceptable in SMZs provided trees are felled away from streams and the shade canopy is maintained.
- Never apply pesticides directly into the water except if the chemical is registered for application over water. SMZs should be established between perennial and intermittent streams and treatment areas to avoid airborne drift or accidental application of chemicals.

<table>
<thead>
<tr>
<th>Pesticide Application</th>
<th>Minimum SMZ Width</th>
</tr>
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<tbody>
<tr>
<td>Aerial</td>
<td>100 ft</td>
</tr>
<tr>
<td>Ground Vehicle</td>
<td>50 ft</td>
</tr>
<tr>
<td>Hand Spray</td>
<td>25 ft</td>
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<tr>
<td>Hand Dispersion/Injection</td>
<td>15 ft</td>
</tr>
</tbody>
</table>
• SMZ width should be based on the slope of the land between the stream and the disturbed area. Refer to BMP handbook for guidelines. SMZs can be wider depending on other considerations such as wildlife habitat or recreational use.

In summary, Streamside Management Zones should be applied to harvests near perennial and intermittent streams to protect water quality and aquatic organisms by preventing sediment from adjacent areas from entering the stream and maintaining water temperature for these organisms (thermal pollution). Ephemeral streams do not require SMZs unless the soils in the drains are saturated with water and can be damaged through rutting and soil compaction by the harvesting equipment.

*Part 2 “Best Management Practices (BMPs) Near Streams: Stream Crossings” will be included in the next newsletter.*
Plant the Right Species in the Right Place, Species-Site Relationships

Dr. Wayne Clatterbuck

Most species occur on sites that are favorable to their growth and development. Some species are fairly adaptable in that they can inhabit a range of sites (examples are white oak, pines, and red maple), while others are very specific in their site requirements (examples black walnut, cherry and red oaks). Although species may occur on a wide variety of sites, they may only make their best growth or production on a narrow range of specific site conditions.

Sites are characterized based on the physical setting (landform and topography), soils (texture, structure, drainage and depth) and moisture profiles. Generally, the most limiting factor affecting tree growth is moisture. Sites on lower slopes, stream valleys, and floodplains (generally concave surfaces) have better moisture profiles than the convex surfaces of upper slopes and ridges. Trees on these moisture favorable sites grow much faster, attaining larger sizes more quickly. Too much water (floodplains and alluvial areas, e.g., flooded) can be detrimental to tree survival and growth as too little water.

Two examples are presented to illustrate the importance of matching the species to the site. Black walnut is a species that brings one of the highest prices for lumber. Thus, many people would like to plant black walnut to increase their financial returns. However, black walnut will only grow well on a very specific site: one where soils are relatively rich and deep, moist, and well-drained. Often black walnut is planted on marginal sites where it is not well-adapted and other species outgrow it. Thus, the investment in planting black walnut – site preparation, seedlings, planting and maintenance cost far exceeds the expected revenue once walnut reaches maturity, if it reaches maturity.

The second example is with natural stands of yellow-poplar. Its habitat is usually on lower slopes and stream valleys where moisture is plentiful. Yellow-poplar will not tolerate poorly-drained soils where flooding and soil puddling are prevalent. During periods of higher than normal rainfall, yellow-poplar is successful in colonizing dryer sites. However, during periods of drought, these same yellow-poplar that survived on the dryer sites during periods of high moisture, are now declining because of the lack of moisture. Trees are stressed, diameter growth decreases sharply, and crowns become sparse. The decline of these trees makes them more susceptible to diseases such as hypoxylon canker. Yellow-poplars are not adapted to these dryer sites during adverse conditions, while trees on the more favorable, moister sites are not stressed.

Although most pines are planted for production purposes as monocultures, most hardwood/deciduous stands naturally occur as mixed species stands. A variety of species with common site characteristics are recommended for hardwood plantings for species diversity and to lessen potential pest problems that are usually specific to one species.

Most all trees grow best on deep, moist, well-drained soils. However, most of these better sites are usually in some other, perhaps more valuable land use, than forests. Matching the correct species to the site conditions is critical for the long-term health of forests. Species that prefer dryer sites usually are not adapted to wetter sites and vice versa, trees that prosper on wetter sites do not do well on dryer sites. Rarely are riparian species like sycamore or bald-cypress that commonly occur near streams able to adapt to lower moisture areas such as ridges. Matching the species growth characteristics with the site conditions will ensure more successful plantings and fewer planting failures.
Private landowners and contractors regularly use herbicides to accomplish forestry and wildlife management objectives, including site preparation, food plot maintenance, seedling and sapling release, thinning, cull tree removal (or creation), and control of invasive species. The result of herbicide applications is normally satisfactory, provided the manufacturers’ directions are properly followed. However, sometimes the results are disappointing even with experienced applicators. There are a number of explanations why herbicides sometimes fail to perform as intended, and they are summarized here:

**Precipitation**
Probably the most common reason for herbicide failure is when the herbicide is washed away shortly after application due to a rainfall event. Liquid herbicides have a “rain-fast” period where precipitation could move the herbicide off-target before it can be taken up by the weeds. These rain-fast periods are found on the herbicide label and the length of time varies by herbicide. Some herbicides need only an hour of time after application before a rain event occurs to be effective. Other herbicides require several hours. If rain happens inside the rain-fast period, retreating may be needed. In contrast, herbicides applied in droughty conditions also can fail because of inadequate uptake (either foliar, root, or both).

**Volutility and Air Temperature**
Rapid conversion from a liquid or dry herbicide to a gas can cause some herbicides to move off-target and damage non-target vegetation. This is herbicide volatility. Applying under cooler temperatures (daily highs less than 80°F) can help mitigate volatility. In contrast, many herbicides will perform better with warmer (but not hot) air temperatures. During cool or even cloudy weather, plants may not be actively growing and herbicides may not translocate readily and favorable results will be slow, if at all. Refer to the herbicide label for air temperature recommendations.

**Improper Application**
Failure to calibrate equipment properly, poor site preparation, improper mixing, faulty spray equipment, too much variation in ground speed, excessive wind, etc. all contribute to inconsistency or disappointment.

**Not Following Label Directions**
Reading and following label directions are not an option, but an obligation, when applying herbicides. Following herbicide label directions to the letter will insure the most likely chance for success. Remember: the label is the law.

**Failure to Add Surfactant**
Surfactant is a liquid sometimes added to herbicides to improve coverage by reducing the surface tension and thereby improving results. Many herbicide labels recommend the use of surfactant, yet this step is often overlooked.

**Solubility**
Herbicides designed to work as a solution are easier to mix and will more readily stay in solution. Herbicides formulated as suspensions can settle out if not agitated for a period of time, causing very poor performance. This is especially the case if the solution has set due to stoppage of work (end of the day or halting due to the weather).
Soil Texture
Soil texture is not a common cause of herbicide failure, but it can influence effectiveness of soil-applied herbicides. Herbicides act more slowly on finely textured soils (clay) than on coarse soils (sand). Often it is necessary to slightly increase application rate on finely textured soils and soils with high organic matter, and slightly lower the application rate on coarse soils. The rate adjustments (by soil type) will be on the herbicide label.

Sap Flow
When applying herbicides to the girdles or frills of certain trees (e.g. maple) in early spring, sap flow can be so aggressive that herbicides are immediately “pushed” back out by the sap, never to reach the roots.

pH of the Water
Herbicides mixed in hard water (high pH) will be less effective than with acidic water. The reason for this is that cations associated with hard water (e.g. calcium and magnesium) can tie up herbicides to the point they will not work effectively. Most water sources are acidic enough that this is not a problem, however that is not always the case. Adding ammonium sulfate to the spray mixture can help offset hard water issues if they exist. The directions to add ammonium sulfate to the spray mixture will be stated on the herbicide label. Of less concern but worth noting is the soil pH. Check the herbicide label to confirm whether the soil pH is an issue.

Improper Species Identification
Herbicides are labeled to control specific species of plants. Users should confirm identification of the weed(s) to be controlled and match that with those listed for control on the herbicide label.

Thick Bark
Liquid herbicides that are applied (and to be absorbed) directly into the bark of woody plants may not work if the bark is too thick. Examples are older woody shrubs and trees. Oil carriers are often recommended to aid in bark penetration, and if recommended, should be used. Again, the herbicide label will indicate this.

Landowners who are inexperienced with herbicide application should first seek professional assistance, starting with the local County Extension Office or state forestry and wildlife agencies. Restricted use herbicides require a pesticide applicator's license. However, the vast majority of herbicides used in forestry and wildlife management applications are not restricted use.
You may have seen headlines over the past few years about ‘Mass Timber’; the potential for making ‘Skyscrapers Out of Wood’ using cross laminated timber, aka ‘Plywood on Steroids.’ The new possibilities for using wood in structural applications where only steel and concrete have been allowed is indeed an exciting development. It also has people wondering if new types of wood – namely the hardwoods that dominate in Tennessee – can be included in this new application.

Large wooden structures have long been a reality, thanks to composite wood materials such as “glulam”. Glued-laminated (glulam) beams are made by gluing dimension lumber (think ‘2x4s’) parallel to one another to create very large-dimension beams that can be almost any size and shape. Glulam are commonly used to create churches, sporting venues and other structures with large open interiors.

Cross laminated timber (CLT) is a relatively new technology that also uses dimension lumber as the raw material. However, instead of making beams, CLT is used to make large panels, by gluing dimension lumber in perpendicular layers – like plywood made from 2x4s. This technology offers the potential to build tall buildings out of wood by using CLT panels for the floors and walls. CLT was developed in Europe but is moving around the world. Building code approval for CLT, CLT manufacturing capability and CLT buildings are starting to happen in the USA. Building with wood used to be restricted to buildings of only a few floors but 10- and 20-story buildings made with CLT are already a reality.

Most houses in the USA are currently framed in wood – dimension lumber cut from softwoods such as pine. It would be possible to frame houses out of hardwoods such as yellow-poplar but there are two main reasons why this doesn't happen:

1) Softwood (e.g. pine) lumber is inexpensive. Softwood lumber mills are large and efficient operations that use a lower-cost, more uniform raw materials (pine logs) to produce a large volume of a limited range of commodity items; 2x4, 2x6, 2x8 etc. Hardwood logs are relatively expensive and hardwood lumber mills produce a wide range of products in an effort to maximize the value recovered. The end result is that softwood lumber is about 1/3 the cost of hardwood.

2) According to the building code, wood used in buildings (i.e. structural applications) must be structurally graded. This process requires specially-trained personnel and/or equipment, and third-party verification. Because hardwood lumber is not generally used for structural applications, these grading systems are not in place in hardwood mills.

Technically, CLT could be made with yellow-poplar or other hardwoods such as those that dominate the forests in Tennessee. However, CLT is an expensive material compared to the concrete-and-steel technology it seeks to replace. Making CLT with hardwood would make it an even more expensive option.

Hardwoods are already widely used in buildings – in ‘non-structural’ applications such as furniture, cabinets and flooring. These uses take advantage of the special beauty and capability of hardwoods and will likely remain the best options for Tennessee hardwoods in the future – whether the building is a single-story house framed in pine or a wooden skyscraper.
Don’t Pay Too Much Tax on Timber Sale Income!
Mr. Larry Tankersley

Income from timber sales is considered the “disposition of a capital asset” and most tax preparers understand how to report capital gains. There are no specific tax people who specialize in timber taxes as it is not that common but a good tax preparer does understand that depending on the facts and circumstances of the ownership and sale, the income can qualify as a long-term capital gain. Ask your tax preparer if they understand capital gains and will file your return reflecting that. Schedule D is typically used and if the sale qualifies as a long-term capital gain be sure to calculate your tax bill accordingly. This may require use of the “Qualified Dividends and Capital Gains Worksheet” to separate your ordinary income from capital gains. Long-term capital gains are taxed at lower rates than your ordinary income. For most of us, the maximum tax on a long-term capital gain is 15% but folks in lower ordinary brackets may not be liable for any tax or maybe just 10%. Of course folks in the highest ordinary tax brackets may owe 20% on long-term capital gains.

Your timber income is considered “long-term” if you have owned it for more than one year prior to the sale or if you inherited it. Timber that is given to you as a gift can also be considered a long-term asset if you and the giver combined have owned it for more than a year. An example of this might be someone who owned the timber for eight months, gave it to you and you held it the remaining four months.

It is important to note selling logs is not the same as selling timber. Timber is still attached to the stump when the “contract” is finalized. Selling a load of logs is considered ordinary income; be sure to have an agreement for the timber sale before the trees are converted to logs.

For more information on Timber taxation see the fact sheet prepared by Dr. Linda Wang, a tax specialist with the U. S. Forest Service, Tax Tips for Forest Landowners for the 2018 Tax Year at https://www.fs.fed.us/spf/coop/library/taxtips2018.pdf

Of course you are always welcome to give me a call at 865-974-7977.
Managing Native Grass Forages
Dr. Patrick Keyser

Image by A. Vander Yacht
Figure 1 – Schematic diagram of a 3-patch system for patch-burn grazing. One patch is burned each spring, and cattle, which have access to all three patches, selectively graze patches burned most recently. The current year’s burn is grazed most heavily, the previous year’s with intermediate pressure, and the oldest (two years earlier) the least.

Patch-burn Grazing

Over the past 20 years or so, a very old notion has come back into the picture for managing native rangelands in the Great Plains. The approach uses prescribed fire to manage grazing pressure within pastures. Cattle preferentially graze areas that have been burned more recently over those burned a year or more ago – or not burned at all. Because of this selection, cattle grazing patterns can be manipulated by burning different “patches” within a pasture over the course of a three-year period. This approach is referred to as patch-burn grazing. Range scientists believe that this cycle of burning and grazing and their interaction mimics what has taken place in North American grasslands for eons – except originally with buffalo and not cattle.
Patches burned in the current spring have higher nutritive value and palatability than other parts of the pasture. Consequently, cattle will spend the majority of their time in this patch. The third of the pasture that was burned one year earlier receives a fair amount of use, but much less than the current spring’s burn patch. And the patch burned two spring’s previously, receives very little use. This built-in “rotation” among the patches within the pasture allows each third to receive increasing amounts of rest the greater the interval since burning. Despite very heavy use in the year of the burn, in years two and three, the stand has ample time to recover and become quite vigorous.

There are a number of advantages to patch-burn grazing. First, management can be easier compared to rotational grazing. A single water source can be used, no cross-fencing is needed, and there is no need for moving cattle throughout the season. Another advantage is that patch-burn grazing creates a higher degree of plant, insect, and wildlife diversity within the pasture. This is because each patch is at a different stage of succession following the grazing and fire – and while the pattern may shift within the pasture, it is always present. Interestingly, animal performance with patch-burn grazing is similar to that with more traditional management, such as rotational grazing. For producers, patch-burn grazing is a viable option, one that involves the trade-off of implementing an annual burn vs. greater management during the summer for rotational grazing – but with no lost production.

Over the past two summers, a UTIA study being conducted in collaboration with the University of Kentucky has evaluated the use of patch-burn grazing on the much smaller pastures we have here in the Mid-South. Studies conducted on the Great Plains have been on much larger pastures – 320-640 acres, or more. So far, our preliminary results suggest that this approach can work on native grass pastures as small as 20 acres. Cattle still show preference in where they graze and animal performance does not appear to differ from rotational grazing.

Patch-burn grazing may not be the tool for you, but even here in the Mid-South, it certainly is an option for managing native grasses. For wildlife enthusiasts, it may be a way to enhance habitat while still producing beef.
University of Tennessee Students Traveled to Professional Landscape Industry’s Largest Skills Competition and Recruiting Event
Dr. Sharon Jean-Philippe

From March 20-22, 2019, University of Tennessee, Department of Forestry, Wildlife & Fisheries, Urban Forestry students joined more than 1,500 peers, eager-to-hire employers, faculty and volunteers from across the U.S. to demonstrate their talents at the 43rd annual National Collegiate Landscape Competition, presented by the National Association of Landscape Professionals. Hosted at Colorado State University in Fort Collins, Colorado, the three-day event, coined the ‘Olympics of the Landscape Industry’, provided University of Tennessee students access to the country’s largest landscape skills competition, educational workshops, presentations from the industry’s top professionals and a career fair.

This event is key in helping to fill the labor shortage within the industry by cultivating the talents of the future professional landscape industry leaders. The competition provided top students enrolled in interior and exterior horticulture, urban forestry and landscape management programs at two- and four-year colleges and universities the opportunity to connect with professionals from the field during the career fair and networking events. Students highlighted their professional skillset by participating in competitions ranging from arboriculture techniques (tree climbing) and 3D landscape design to skid steer loader operation and small engine repair.
This year’s competition brought together over 800 students from approximately 60 schools, including the University of Tennessee, who competed to take home top honors in 29 team and individual competitions. This was the first time in years The University of Tennessee – Knoxville, attended the NALP NCLC and was represented by a group of three students (Korey Kinsler, John Sise and Raven Powell) all juniors majoring in forestry with a concentration in urban forestry.

In addition to exhibiting skills in a variety of competitive events, University of Tennessee students were given the opportunity to network with landscape industry leaders throughout the event. At the career fair, over 100 industry employers were on site to tap into the best talent across landscape disciplines, including construction, greenhouse/production, design, business development and management.

“The National Collegiate Landscape Competition has a rich history spanning over four decades, but never before has it been as critical as it is today,” said Missy Henriksen, vice president of public affairs, National Association of Landscape Professionals. “Each year, our industry must fill 300,000 jobs. This event is an incredible opportunity for the next generation of landscape professionals to showcase their skills and discover their passion, while walking away with new connections and in many cases, lucrative job offers.”

To learn more about the National Collegiate Landscape Competition, visit [www.landscapecompetition.org](http://www.landscapecompetition.org).

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Wildlife Notes

April
- White-tailed deer antlers begin new growth
- Black bears emerge from dens
- Bobcat kittens are born
- Peak ruffed grouse drumming and wild turkey gobbling
- Peak nesting for wild turkeys and ruffed grouse in late April
- Northern bobwhite begin nesting
- Wood ducks and Canada geese are nesting; early clutches hatch by end of April
- Bluebirds are nesting; early clutches hatch by end of April
- Neotropical songbirds arrive and males establish territories in mid- to late April
- Hummingbirds return

May
- Most groundhogs, beavers, raccoons, and chipmunks are born in May
- Wood duck broods begin to appear
- Peak of dove nesting season
- Northern bobwhite nesting peaks May – July
- Wild turkey hens are incubating eggs; turkey pouls begin to appear
- Grassland birds are nesting; do not mow fields now!
- Neotropical migrant songbirds have arrived and are nesting
- Fowler’s toads, northern cricket frogs, and gray treefrogs begin calling

June
- Black raspberries and mulberries ripen in early June
- Wild plums ripen through June
- Most white-tailed deer fawns are born in June. Do not pick them up, thinking they have been abandoned
- Peak hatch for wild turkeys (early June) and bobwhite (mid- to late June). DO NOT MOW old-fields!
- Ducks and geese molt in June and July and are flightless for a couple weeks
- Initial nests of most songbirds have hatched in June and nestlings are fledging
- Box turtle peak nest initiation in June, often in fields and other open areas where relatively warm and dry; turtles hatch and leave nest about 2 months later
- Bullfrog breeding peaks in June and July
**Habitat Management**

Finish burning woods and old-fields by early April to enhance conditions for wildlife
- Secure burning permit and develop burning plan with Tennessee Division of Forestry
- Make sure firebreaks are in place
- Get help from experienced personnel if you don’t have experience burning
- Burning fields is much more beneficial for wildlife than mowing!
- Refer to [https://www.srs.fs.usda.gov/pubs/su/su_srs054.pdf](https://www.srs.fs.usda.gov/pubs/su/su_srs054.pdf) for additional information on the use of prescribed fire
- Refer to [https://extension.tennessee.edu/publications/Documents/PB1855.pdf](https://extension.tennessee.edu/publications/Documents/PB1855.pdf) for additional information on using fire to manage old-fields and other early successional communities

Disk fields before spring green-up to encourage fresh forb growth and improve structure at ground level for many species, such as young bobwhite and wild turkey
- Disking is an excellent way to set-back succession, especially if you can’t burn, but even if you can burn, disking typically stimulates more annual forbs that provide excellent forage, seed, and cover for many wildlife species
- Disk sections of the field in block design or strips, rotating such that each block is disked every 3 – 4 years
- Blocks of 2 – 5 acres generally are better than relatively narrow strips—makes it more difficult for predators to find nests
- If you disk strips, they should be at least 50 feet wide

If you can’t burn fields, mow by early April – just before spring green-up
- If you have any interest in wildlife, do not mow during the growing season or you will disrupt nesting and rearing young (broods, nestlings, fawns) and reduce fall recruitment of wildlife that require early successional cover in summer
- For best results for wildlife, disk the area after mowing to facilitate litter decomposition, improve travel for small wildlife and stimulate the seedbank

Plant firebreaks in late April – May for additional forage, seed, bugging opportunities
- Iron-clay cowpeas, re-seeding soybeans, grain sorghum, Egyptian wheat, and various millets provide forage and seed for a variety of wildlife species
- Refer to [https://extension.tennessee.edu/publications/Documents/PB1769.pdf](https://extension.tennessee.edu/publications/Documents/PB1769.pdf) for complete information on planting and managing food plots

Spray tall fescue, orchardgrass, and other perennial cool-season grasses in early to mid-April
- Eradicating these undesirable grasses will enable the seedbank to germinate and provide better forage and cover for wildlife that use fields
- Spraying in spring is not as effective at killing these grasses as spraying in fall, but approximately 70% reduction in grass coverage can be expected following spring sprayings
Habitat Management (continued)

- Spray a glyphosate herbicide @ 2 quarts per acre (with surfactant) when grass is 8 – 10 inches tall and actively growing in early to mid-April (just prior to warm-season plants germinating or sprouting)
- After grass is killed, burn the field (if needed), then disk to stimulate the seedbank
- When disking in spring, a preemergence application of imazapic (6 – 10 ounces of Plateau) may be necessary after disking to control johnsongrass, crabgrass, and other undesirable plants germinating in late spring
- Refer to https://secure.touchnet.com/C21610_ustores/web/classic/product_detail.jsp?PRODUCTID=1165 for additional information on eradicating perennial cool-season grasses and other undesirable species

Finish fertilizing trees/shrubs in April for increased soft mast production
- This is for trees out in the open, not those in woods
- Fertilizing oaks in woods is a waste of time and money; to increase mast potential for trees in the woods, forest stand improvement (FSI) practices are needed

Finish erecting boxes for bluebirds by early April
- Bluebird boxes should be no closer than 80 yards apart

Spray weeds in perennial cool-season food plots as needed before weeds get too large
- Most weeds are best killed when sprayed before they reach 3 inches tall
- Refer to https://secure.touchnet.com/C21610_ustores/web/classic/product_detail.jsp?PRODUCTID=764 for complete information on planting and managing food plots
- Always read and follow directions on the herbicide label

Collect soil test samples from plots to be planted this fall and lime in spring as needed
- Applications of lime require about 6 months before full effect on pH is realized

Plant warm-season food plots late April – May
- Refer to https://secure.touchnet.com/C21610_ustores/web/classic/product_detail.jsp?PRODUCTID=764 for complete information on planting and managing food plots

Conduct drumming counts for ruffed grouse in mid-April

Spot-spray undesirable plants in old-fields and other early successional communities in May/June
- This is a great method to improve the composition and structure of early successional areas and does not destroy cover for nesting or rearing young
- Drive across field with tractor and sprayer as you would when mowing; spot-spray undesirable species on either side of tractor with a spray gun as you drive slowly across field; don’t roll your eyes—this technique works!
- Composition of field will change over time, developing into an early successional area with desirable plant species
- Roundup and other glyphosate products work well
- PastureGard works particularly well for controlling sericea lespedeza
Spray native warm-season grasses that were planted and have become too dense mid-May/early June
• Planted native warm-season grasses, especially big and little bluestem, indiangrass, and switchgrass, commonly become dense and rank, provide poor structure at ground level, and inhibit the seedbank from germinating
• Spray with glyphosate herbicide at 2 qts/ac to reduce grass density; burn if possible after grass cover has died to consume thatch, improve structure at ground level and release the seedbank to increase forb coverage
• Refer to https://ag.tennessee.edu/fwf/craigharper/Documents/FNR-548ADACompliantUT1.pdf for complete information

Burn unharvested wheat fields that have been left standing for doves in late June/early July

Plant Japanese millet in June and early July around beaver sloughs and other areas that will be flooded in fall for ducks

Construct/repair dikes and water-control structures in June/July for flooding fields/woodlands for waterfowl this fall/winter

Leave young wildlife alone
• Let nature takes its course; you’ll do more harm than good by trying to save “orphans”
• Young birds “fall” out of the nest as they learn to fly
• Fawns remain bedded in seclusion throughout the day for the first few weeks of life

Snakes are beginning to appear with warmer days in April and May
• Clean-up around the house (mow, remove piles of wood, brush, and trash) to repel rodents that attract snakes
• There is no reliable “repellent” for snakes; only “snake oil”!

Black vultures may be problematic as calves are born
• Try scare tactics using firearms and pyrotechnics as soon as vultures appear during calving season—persistence is necessary
• It is against the law to shoot a vulture without a permit. Contact USDA-Wildlife Services (866-487-3297) for severe problems and information on obtaining a permit

Do not allow pet cats outside; report all feral cats to the animal shelter for immediate removal
• Putting a bell around a cat’s neck does not keep it from killing birds and young rabbits and squirrels

Check for openings in the attic as nesting season approaches
• This helps keep bats and squirrels from getting into places where they are not welcome.

Close all entrances to crawl spaces and other areas where skunks are not wanted
• Most skunks are born in May
• Females are choosing sites to give birth in April
Wildlife Damage/Population Management

Set traps correctly to catch moles!
- Make sure runway (tunnel) is active before setting traps
- Excavate 6-inch by 6-inch square exposing runway and determine exact depth of runway
- Replace dirt firmly, but not compacted
- Set trap at exact depth so mole will be caught

Vole activity may be more apparent as there is increased activity planting gardens, flowers, and shrubs. Pine voles, in particular, eat bark from roots, bulbs, tubers, and seeds in and around flower gardens and shrubbery
- Flowers may be protected by placing ¼-inch mesh galvanized hardware cloth under and around flower beds
- Zinc phosphide-impregnated baits are effective when placed in the runway or in burrow openings
- Snap-traps baited with peanut butter and bird seed also are effective; place baited snap-traps under some type of cover, such as an open-ended box approximately 3 – 4 inches in diameter, to prevent catching birds and other non-target species

Put up chicken-wire fence at least 6 inches belowground and 2 feet aboveground around vegetable gardens to repel rabbits

Put up a 2- or 3-strand electric fence (one strand 6 inches above ground and the other 6 inches higher) to keep groundhogs and raccoons out of vegetable gardens

Erect a single-strand electric fence (2 ½ feet above ground) with aluminum tabs attached every 3 – 5 feet to repel deer from vegetable gardens
- Smear peanut butter on the aluminum tabs
- Deer are attracted to peanut butter; when they touch the aluminum tabs with their mouths, they learn to stay away

Plant “alternative” forages for wildlife on the outside of fencing around a garden to satiate the appetite of deer, groundhogs, and rabbits, further helping to keep them out of the garden

Snapping turtles and others are more visible as they move about selecting sites to lay eggs

Nuisance crawdads in the yard may be remedied by pouring boiling water down the spout of the mound

Refer to https://extension.tennessee.edu/publications/Documents/PB1868.pdf for additional wildlife damage management information.
Chronic Wasting Disease Update March 2019
Dr. Daniel Grove

Background
In the late 1960’s mule deer in a Colorado research facility and later elk and mule deer in Wyoming were the first to be identified exhibiting signs of what is now called CWD. The animals would become thin, stop eating and eventually waste away over a prolonged period. Ultimately, the disease was recognized in wild animals in Northern Colorado and Southern Wyoming. In the 1980’s the disease agent was identified as a prion. Since that time, the disease has slowly progressed across western states and has been detected in 26 states, 3 Canadian provinces, Norway, Finland and South Korea.

Definition
Chronic Wasting Disease (CWD) is the Transmissible Spongiform Encephalopathy (TSE) of cervids.

Causative Agent
CWD is caused by a prion. A prion is essentially a misfolded protein that exhibits infectious properties.

Species Affected
CWD is known to infect members of the Cervidae family. The disease has been found in wild white-tailed deer, mule deer, elk, moose and caribou populations. Captive populations of white-tailed deer, mule deer, black-tailed deer and elk have also been documented with the disease. Additionally muntjac have been experimentally infected. CWD is NOT known to infect cattle, sheep, goats or horses. Pigs have been infected in experimental studies.

Distribution:
Prion body distribution
The prion is found in highest concentrations in the neurologic system (brain, spinal cord) and lymphatic system (lymph nodes and gastrointestinal associated lymphatic tissue). It has been detected in the liver, spleen, kidney, muscle, heart and antler velvet. Additionally prions have been found in bodily excretions and fluids such as saliva, urine, feces and blood.

Damage caused by prions
The most significant damage caused by prions replicating in an animal is to the brain. Over time, the abnormally shaped prions build up in the brain and lead to irreparable brain cell death. The most common clinical signs associated with the disease are a result of the slow death of the brain. A vacuolization (hole formation) occurs when the cells die and leads to the classic “sponge like” appearance to the brain on microscopic examination.

Image 1
Photomicrograph. CWD infected brain. Photo Courtesy of Dr. Kevin Keel UC Davis. The clear areas are the vacuolization that occurs as a result of CWD (arrow). The red staining is highlighting the buildup of prion protein.

Transmission
The most likely route of infection is via ingestion of prions that have been deposited in the environment. Other behaviors such as mutual grooming amongst social groups or interactions during rutting behavior may facilitate transmission. In utero transmission (mother to offspring during gestation) has been experimentally documented in muntjac deer. Transmission may also occur during parturition (at birth) or shortly thereafter during the initial maternal interactions with the fawn.

Disease Progression
CWD is a slowly progressive disease. It is 100% fatal. Once infected animals will succumb to the disease. On average, post-infection, it takes 10-18 months before clinical signs appear.

Clinical signs
Most of the clinical signs seen with CWD are the result of damage to the neurologic system (brain, spinal cord). Often animals will first appear as thin with poor hair coats. As the disease progresses ataxia (stumbling), incoordination, and hyper salivation (drooling) can be seen. Unfortunately the signs of CWD are not specific to just CWD. Confirmation of CWD infection can only be done by testing the animal.
CWD Surveillance
In general wildlife agencies utilize two methods of surveillance. Targeted surveillance is conducted year round on sick acting, neurologic and roadkill animals. Hunter harvested surveillance is conducted during hunting season.

Testing
Typically retropharyngeal lymph nodes (behind the pharynx) or brainstem are collected and tested.

Image 2
Retropharyngeal Lymph Node. Blue Arrow= Lymph Node. Yellow Arrow=Pharynx (voice box)

Image 3
Retropharyngeal Lymph Node. Blue Arrow= Lymph Node. Yellow Arrow=Pharynx (voice box)
Treatment
There is no known treatment for CWD or any other prion disease.

Prevention
There currently is no effective vaccine.

Resistance
About 5% of deer will have an apparent “resistance” to developing clinical disease. These deer still get infected, develop disease and die. The “resistance” basically means there is a prolonged period between infection and developing clinical disease. These animals are able to continue to shed prions into the environment but will do so for longer before succumbing to the disease. This prolonged shedding leads to a greater level of environmental contamination.

Immunity
There is no known level of immunity to CWD. Resistance does NOT equate to immunity.

Prions in the environment: Prions are nearly indestructible. They are not destroyed by sunlight, heat, freezing or desiccation. The only known methods to destroy prions is through alkaline digestion or incineration at 1000C (1838F). Once shed into the environment will remain infectious for over 15 years.

Zoonotic Potential
The jury is still out as to whether CWD can cause disease in humans. To date there has been no conclusive link between human disease and consumption of CWD infected animals. With that said, state wildlife agencies defer to public health officials for recommendations. If hunters are hunting in a known CWD endemic area it is recommended that they have their deer tested for CWD. If the animal tests positive for CWD, do not consume meat from that animal. For additional information regarding CDC recommendations please visit CDC.gov.

CWD in Tennessee
In the fall of 2018, TWRA began an enhanced CWD surveillance program. The goal of this program was to test an appropriate number of deer statewide that would, through statistical modelling, give the confidence of whether CWD is in Tennessee. All 95 counties underwent a risk assessment of the likelihood of disease introduction and a point value was assigned to each county. Higher risk counties had higher point values assigned to them. Then the goal was to test deer in each county until the point goal was reached. Older bucks the highest points compared to yearling bucks and the lowest point value assigned to does who tend to not venture far from where they are born. TWRA also initiated a program to obtain samples directly from taxidermists and deer processors throughout the various deer seasons and also conducted check stations during the opening weekends of deer muzzleloader and gun seasons. In addition, year round targeted surveillance was continued with emphasis on sick, dying or road killed deer.
In December 2018, the first round of results from the fall CWD sampling efforts started coming in from the testing lab at Colorado State University. On December 14, the Agency was notified of 10 CWD suspect animals sampled in November during the opening weekend of deer gun season. These samples were taken from deer harvested in Fayette and Hardeman counties.

TWRA immediately started to prepare to shift from surveillance to monitoring while awaiting final Immunohistochemistry (IHC) confirmation of the 10 samples. Once confirmed positive, TWRA’s CWD Response Plan was enacted. The Tennessee Wildlife Commission passed an Emergency Rule 1660-01-34, which established the CWD Management Zone (CMZ) that included Fayette, Hardeman and McNairy Counties and Proclamation 18-15, which established a new hunting season in the CMZ with mandatory check stations during the weekends. The additional hunting season allowed for more hunting opportunities for hunters and helped TWRA collect more samples to establish a better frequency and distribution of the disease.

With the aid of hunters, processors and taxidermists in the CMZ, TWRA was able to collect over 2900 samples.

Table 1
CWD Samples by County Fall 2018-January 31, 2019

<table>
<thead>
<tr>
<th>County of Harvest</th>
<th>Not Detected</th>
<th>Positive</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fayette</td>
<td>902</td>
<td>107</td>
<td>1009</td>
</tr>
<tr>
<td>Hardeman</td>
<td>1051</td>
<td>77</td>
<td>1128</td>
</tr>
<tr>
<td>Madison</td>
<td>127</td>
<td>1</td>
<td>128</td>
</tr>
<tr>
<td>McNairy</td>
<td>465</td>
<td>0</td>
<td>465</td>
</tr>
<tr>
<td>Hardin</td>
<td>116</td>
<td>0</td>
<td>116</td>
</tr>
<tr>
<td>Shelby</td>
<td>102</td>
<td>0</td>
<td>102</td>
</tr>
<tr>
<td>Tipton</td>
<td>77</td>
<td>0</td>
<td>77</td>
</tr>
<tr>
<td>Chester</td>
<td>48</td>
<td>0</td>
<td>48</td>
</tr>
<tr>
<td>Haywood</td>
<td>42</td>
<td>0</td>
<td>42</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2930</strong></td>
<td><strong>185</strong></td>
<td><strong>3115</strong></td>
</tr>
</tbody>
</table>

Table 2
CWD Prevalence by age class in positive counties.

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Not Detected</th>
<th>Positive</th>
<th>Total</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Female</td>
<td>806</td>
<td>62</td>
<td>868</td>
<td>7.14%</td>
</tr>
<tr>
<td>Adult Male</td>
<td>485</td>
<td>86</td>
<td>571</td>
<td>15.06%</td>
</tr>
<tr>
<td>Yearling Female</td>
<td>208</td>
<td>17</td>
<td>225</td>
<td>7.56%</td>
</tr>
<tr>
<td>Yearling Male</td>
<td>181</td>
<td>10</td>
<td>191</td>
<td>5.24%</td>
</tr>
<tr>
<td>Fawn Female</td>
<td>107</td>
<td>2</td>
<td>109</td>
<td>1.83%</td>
</tr>
<tr>
<td>Fawn Male</td>
<td>89</td>
<td>1</td>
<td>90</td>
<td>1.11%</td>
</tr>
<tr>
<td>No Age Female</td>
<td>53</td>
<td>2</td>
<td>55</td>
<td>3.64%</td>
</tr>
<tr>
<td>No Age Male</td>
<td>22</td>
<td>5</td>
<td>27</td>
<td>18.52%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1951</strong></td>
<td><strong>185</strong></td>
<td><strong>2136</strong></td>
<td><strong>8.66%</strong></td>
</tr>
</tbody>
</table>
There is not one easy solution to the riddle of CWD management. Various management techniques have been attempted over the years in other states with highly variable results. Management will rely on hunters continued support and participation. Surveillance, monitoring and management efforts need to be coordinated with hunters, landowners, agricultural counterparts and other affected stakeholders. Impacts of both the disease and the eventual implemented management system will not be readily apparent for years and possibly decades. Successful management will require long term efforts, and assistance from all stakeholders focused on limiting the spread of the disease to new areas and attempting to prevent an increase in the prevalence of the disease in the affected areas.

No exact management options have been determined or undertaken to date. It is difficult to say exactly what the future holds. If we look to the lessons learned by other states and what is happening to populations when the disease continues to spread, it could be grim. There have been population declines of up to 40 percent in some mule deer populations in the west. There are predictive models that indicate mule deer may be wiped out from some western habitats within the next 50 years. There has also be an apparent shift in the age structure of populations that have had the disease for longer periods of time. Older animals are no longer found. Often does only live long enough to make it through one fawning season and may die before the fawn is able to survive on its own.
The quality of the habitat plays a role in a population's overall health and ability to thrive once the disease is introduced. In areas with a high-carrying capacity, the population may remain stable or increase in size despite the presence of the disease. However, eventually the disease, if left unchecked, will reach a prevalence level that can no longer sustain growth or even viability of the population. Environmental contamination with prions increases as prevalence increases even further perpetuating the disease.

At present time TWRA is still developing a long term plan for CWD management in TN. The plan will include regulations, management and research. Updates will be provided on the website CWDinTN.org and concerned hunters and public can sign up for emails through this website.
Most grades of hardwood lumber are experiencing steady demand and reasonable pricing. Overall, from winter 2017 to winter 2019, HAT reports that the price for average grade lumber across six common hardwood species is up 17 percent (although late 2018 was more challenging). Log and lumber prices during the spring often is a reflection of the weather. A wet winter, spring, or both, strongly influences logging access and log availability – log supplies can turn abruptly.

This winter’s weather was not typical. Excessive rain left soil conditions very wet. Logging activity and thus sawmill production has been slow. This has led to a pause in downward pricing for red and white oak lumber, a decline that began last summer. What follows is a snapshot of eight species of hardwoods commonly harvested and processed in Tennessee.

Red Oak – Demand for red oak can be labeled as unconvincing. Exports caused significant increase over the past few years, but more recently, with 70 percent going to one nation (China), price has softened. Through late summer until fall, prices declined about 25 percent and have since stabilized.

White Oak – White oak lumber has enjoyed a long run-up in price that began late 2015. Orders are plentiful. Exports drive this species as does the domestic demand for barrel staves to accommodate the barrel industry. Presently the list price for white oak lumber is a striking 1/3 over that of red oak.

Tulip Tree – Pricing and demand is strongly dependent upon grade. Demand for top quality (good grade) lumber used for millwork and molding, is steady. As with most species, poor logging conditions have hampered lumber production. Price reflects this, and is up 6 percent in the past two months.

Black Cherry – In general, Tennessee forests do not produce the quantity nor quality of cherry logs as do the northeastern states, a factor of sites and weather. Too, cherry trees do not tolerate extended drought, a condition that regularly visits the state. Mills rarely see a great volume of logs. This species is challenging to sell at present. Supply across the eastern US exceeds demand and cherry lumber price has fallen 30 percent since last summer.

Sugar Maple – As with black cherry, sugar maple generally is not a highly processed species in Tennessee. Maple lumber is mostly used for cabinets and flooring, competing with oak. Maple logs stain easily during warm weather, especially if not placed under a sprinkler system, forcing many mills to curtail purchases during spring and summer. Log purchases may be clipped soon. Markets are satisfactory, but not vigorous.

Black Walnut – Because of a lack of substitutability for walnut lumber, prices remain higher than any other species tracked by HAT. Lumber price rocketed up 54 percent over a two-year period. That ended last summer and has since moderated by 15 percent.

Ash – Ash lumber price regularly tracks oak lumber price. Ash lumber color and grade mimic oak. So when oak prices rise, consumers switch to ash. More recently something very unusual has occurred. Ash lumber price now exceeds red oak lumber by 11 percent. Demand is steady in the US, Vietnam, Pakistan, and the Middle East. The emerald ash borer does not appear to have negatively impacted this species, at least at present.
Hickory – Of all species tracked by HAT, hickory has the lowest value. Demand for finished products such as flooring and cabinets is uninspiring, but for drumsticks is solid. However, such industry has limited log needs, and only seeks the highest quality logs. Hickory lumber price declined 10 percent since last summer.

Summarized with permission of the Hardwood Market Report, Memphis, TN.

Recent FWF Extension Publications

Why Herbicides Sometimes Fail: An Overview for Forestry and Wildlife Practices
https://extension.tennessee.edu/publications/Documents/W802.pdf
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