



Forestry, Wildlife & Fisheries Update Newsletter

Department of Forestry, Wildlife and Fisheries
George Hopper, Department Head

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Website: <http://fwf.ag.utk.edu>

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Notes From the Web

Samuel W. Jackson, Web Coordinator, Extension Forestry

Spring is here and the wildlife around us has begun to move during a primary mating and nesting season. This is the time of year when nuisance animals can become a problem around the home. As always, there are some websites that can provide you with information to help control these pesky critters.

The Internet Center for Wildlife Damage Management (<http://wildlifedamage.unl.edu/>) provides information for homeowners, landowners, and professionals for the purpose of controlling and monitoring animal problems. For damage identification, the site boasts a list of the common problem animals with pictures and background information. It also provides prevention and control techniques for problems once they are identified.

The site also maintains a listing of damage control businesses in your area. This "keyword" index helps you find a professional wildlife damage control specialist who can help you with major problems. Remember, some animals are dangerous and should only be handled by professionals.

For more information contact: *Sam Jackson at (865) 974-2946*
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Calendar of Events

- April 20** TSU Agroforestry Workshop,
Cheatham County (*see article*)
- May 7** Firewise Workshop - Living on the
Edge in TN, Knoxville (*see article*)
- May 10** Smoky Mtn. District 4-H Forestry
Contest, Knox. Experiment Station
- May 11** Cumberland District 4-H Forestry
Contest, TBA
- May 12** Central District 4-H Forestry
Contest, TBA
- May 13** Western District 4-H Forestry
Contest, TBA
- May 25-26** Stream Restoration Workshop
Oak Ridge
- June 7-11** State 4-H Wildlife Conference
Greeneville
- June 17** State 4-H Forestry and Wildlife
Judging

Faculty

- Wayne Clatterbuck** *Forest Silviculture*
Craig Harper *Wildlife Management*
Thomas Hill *Fisheries Management*
George Hopper *Natural Resources*
Samuel Jackson *Forest Management*
David Mercker *Forest Management*
Larry Tankersley *Forest Management*

Management Calendar for March

Wildlife

Finish burning woods (hardwoods and pines) and fields to enhance conditions for wildlife

- make sure firebreaks are in place
- **much** more beneficial for wildlife than bushhogging!

If you won't burn fields, now is the time to bushhog – just before spring green-up

- for best results for wildlife, disc the area after bushhogging to facilitate litter decomposition, improve travel for small wildlife and stimulate the seedbank

Spray tall fescue, orchardgrass, and other perennial cool-season grasses

- spray a glyphosate herbicide @ 2quarts per acre (with surfactant) when grass is 8 – 10 inches tall and actively growing
- after grass is killed, burn the field, then disc to stimulate the seedbank

Disc strips around field edges to encourage early successional growth

- disc strips 2 tractor-widths wide (12 – 15 feet)
- can be used as firebreaks

Plant firebreaks and other disced strips not left for natural vegetation

- iron-clay cowpeas, re-seeding soybeans, milo, and various millets provide forage and seed for a variety of wildlife species

Plant warm-season food plots

- see Planting Chart for Wildlife Food Plots in Tennessee, SP 550-A, for planting recommendations

Plant NWSG and associated forbs

- kill existing sod before planting, then burn
- use pre-emergence herbicides
- plant before late May, - plant seed **no deeper** than ¼ inch
- Be patient!

Conduct drumming counts for grouse

Leave young wildlife alone -let nature takes it's course, you'll do more harm than good by trying to save "orphans"

Erect boxes for wood ducks and bluebirds

- 1 box per 100 yards of shoreline is adequate for wood ducks
- clean out old wood duck boxes and put in fresh wood shavings (about 4 – 6 inches)
- bluebird boxes should be no closer than 80 yards apart
- up to 9 or more bluebirds may roost in a single box during the winter

Build brushpiles - put large stems on bottom, small stems on top

Fertilize and lime perennial forage plots as recommended from a soil test

Establish salt/mineral licks for white-tailed deer

- best if offered in a metal-lined trough that can be cleaned occasionally with bleach/water solution

Fisheries

Stocking Fish Fingerlings

- Fish hauling containers should be cleaned and never used for toxic chemicals
- Plastic bags make good container liners
- Fill the haul container halfway with well-aerated water
- Put fish in and tie a burlap bag across the top of the container - prevents fish from sloshing out
- A small battery powered aerator is used when distant traveling is involved. Get fish to the pond quickly
- Fish should be gradually "tempered". Empty 1/3 of hauling water and add back an equal amount of pond water
- Wait 30 minutes, do this again. Follow this procedure until water temperatures in container and pond are similar
- Fish will adjust slowly to the change, thus temperature shock and death will be avoided

TWRA Constructs Website for Information on Conservation Programs

Craig A. Harper, Associate Professor, Wildlife Management

TWRA's website now contains an overview of conservation programs promoted by various agencies' to improve wildlife habitat, while providing technical and cost-share assistance to eligible landowners. The *Conservation Programs* page can be accessed at <http://www.state.tn.us/twra/wildlife/conprowild.html> or by accessing the TWRA home webpage at www.tnwildlife.org and clicking on *Wildlife Habitat Management Information*, then scrolling down to the link on *Conservation Programs*. In the near future, the webpage will contain, by county, the names and addresses of who to contact within various state and federal agencies for technical assistance.

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TSU Cooperative Extension Program Hosts Agroforestry Workshop

Joshua Idassi, Associate Professor, TSU Extension Forestry

The Tennessee State University (TSU) Cooperative Extension Program will open the gates to its research and demonstration farm in Cheatham County on April 20th as part of its monthly Third Tuesday series. The main objective of this workshop is to provide Tennessee landowners and land management professionals with knowledge on the benefits of adding value to small farms and woodlands using selected high quality hardwood species."The topics for the meeting will cover the production of shiitake mushrooms, grafting of new varieties of pecans, the progress report on established demonstration plots for hybrid black walnuts in Tennessee and weed control requirements for small woodland owners," said Joshua Idassi, TSU Extension Associate Professor of Forestry. Pesticide training and points for recertification will also be offered. The workshop is part of a series of educational workshops provided by the TSU Cooperative Extension Program called "Third Tuesday Field Days and Workshops." Each month the Third Tuesday program offers information on different topics which target small farm operators, extension educators, backyard gardeners, the green industry and the general public. According to Idassi, the planting of high quality oak seedlings and a selected variety of hybrid walnuts by small woodland owners in Tennessee has led to a renewed interest in designing demonstration plots for research and outreach. The event is free and open to the public. The farm is located at 3101 River Road, 10 miles north of Nashville off I-40. Take the Charlotte Avenue exit NW and turn right on River Road. Look for the TSU Demonstration Farm sign. Pre-registration is required by April 19th.

For information and directions to the TSU campus call Finis Stribling, TSU Farm Superintendent, at (615) 963-1844 or e-mail fstribling@tnstate.edu.

For registration and directions, please contact Bridgette Bush at (615) 963-1842 or e-mail bbush@tnstate.edu.

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Firewise Workshop, *Living on The Edge in Tennessee*
Larry Tankersley, Extension Specialist, Forest Management

A Firewise Workshop entitled *Living on the Edge in Tennessee* is scheduled for May 7, 2004 at the University of Tennessee Conference Center in Knoxville (*directions attached*).

This workshop is being sponsored by the Clinch Powell Resource Conservation and Development Council and the Tennessee Division of Forestry to achieve fire safe planning and development in the wildland-urban interface, the fringe area of our communities where homes are frequently damaged or destroyed by wildland fire.

The Tennessee RC and D Councils have contracted with Interactive Training Media , Inc. to conduct a series of 10 workshops across Tennessee this year. Funding for these workshops are being provided from a Economic and Community Development Grant from USDA Forest Service.

Jim Gilpin, Interactive Training Media CEO states, “as homeowners continue to build homes in rural and wildland areas, disastrous wildfires are occurring more and more frequently. We will likely continue to experience damaging wildfires in this wildland-urban interface area until people begin to work together to solve basic community planning issues at the local level.” (*Please see attached special invitation from Jim Gilpin to Community Leaders. You may print this letter to give to members of your community who you would like to invite to the workshop*).

The *Living on the Edge in Tennessee* workshop is a one-day event that brings together citizens and community leaders involved in planning, developing, building, sustaining and protecting communities in the wildland-urban interface. The workshop is an enjoyable learning experience utilizing small groups and an interactive approach with cutting-edge technology to analyze wildfire hazards in real-world situations. Participants will be presented with several scenarios that interface communities experience and tasked with modifying residential developments with firewise attributes for better wildfire protection. Participants will also receive free copies of the CD-ROM *Living on the Edge in Tennessee* and workshop materials.

This workshop is a unique opportunity for homeowners, homeowner associations, fire departments, community leaders, land and forest owners to become more educated about the dangers of wildfires in the wildland urban interface.

Registration will open at 7:00 a.m. and the workshop will conclude at approximately 3:00 p.m. Breakfast food, lunch, and refreshments will be provided. (*See attached agenda*).

To register for the workshop, go to www.itm-info.com/lote/workshops/html or call ITM toll free at 1-866-INFO-ITM. If you prefer you can also contact Robin Bible, Staff Forester, Wildlife Management, Tennessee Department of Agriculture at (615) 837-5537 or e-mail at Robin.Bible@state.tn.us. **You must register no later than April 30, 2004.** There is no charge to participate in this workshop.

If you have immediate questions, please contact Robert Taze, Ph.D. at (866) 463-6486 or e-mail at robert@itm-info.com.

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Qualifications of a Forester

Wayne K. Clatterbuck, Associate Professor, Forest Management and Silviculture

Quite a bit of rhetoric has appeared in the Tennessee media lately about foresters with the inference that all most foresters want to do is cut trees. In reflection, I am not aware of many foresters who got into the profession just to cut trees. A forestry degree is not needed to cut trees. Most people are in the forestry profession for their love of trees and the forest environment. Trees are the most renewable and sustainable resource on earth and forest management involves the integration of many forest attributes: flora, fauna, water, and soils. Forest science is quite challenging, considering all the different values of the forest. Foresters were the first ecosystem managers and the forests that we value today are a direct result of the conservation (wise use) principles employed by foresters for more than 50 years.

Forestry curriculums probably have wider breadth than most professional curriculums. Besides the core university courses such as English, botany, ecology, calculus, chemistry, social sciences, humanities, computers, statistics, economics, ethics, history and communications, the forestry professional core classes at the University of Tennessee include forest ecology, forest pathology and entomology, dendrology, silviculture, measurements and sampling, forest inventory, forest fire, wildlife management, habitat evaluation, soils, forest recreation, human dimensions, forest economics, ecosystem prescription, surveying or geographic information systems, forest management, forest policy, and wood properties. A few course electives include tree physiology, watershed management and forest growth & development. A capstone course during the senior year on planning and management of forestry, wildlife and fisheries resources evaluates whether students are proficient in integrating these subjects to meet landowner property objectives. The forestry curriculum is much more than just managing trees, integrating all aspects of forest resources and ecology into ecosystem management.

The Department of Forestry, Wildlife & Fisheries at the University of Tennessee is the only forestry curriculum in Tennessee accredited by the national professional forestry organization: the Society of American Foresters. A vigorous review by the Society is conducted every 6 to 8 years to maintain accreditation. Curriculum, students, graduates and faculty are evaluated to make sure that forestry graduates have the knowledge and ability to perform to high standards of professional foresters.

Perhaps foresters have been taken for granted by society. More wood is being grown today than at any time in last 100 years. There has not been a shortage of wood for consumers. Forest users enjoy the many values of the forest that multiple-use management has brought forth. Forest operations in Tennessee are responsible for less than 1 percent of the non-point pollution of streams and rivers. Wildlife populations are increasing statewide. Fifty-five percent of the land in Tennessee (14.5 million acres) is in forests. Public forest land composes about 1.5 million acres. Forests are not scarce and wood is the most environmentally friendly building material.

Seek out a professional forester the next time you have questions about the forest. A forester can offer you different management options to meet your ownership objectives. Each option will have both advantages and disadvantages from biological, economic and social standpoints. Then you can choose the one management scenario that best meets your expectations.

For more information contact: *Wayne Clatterbuck at (865) 974-7346*
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50 Years of Tennessee Forest Statistics

Wayne K. Clatterbuck, Associate Professor, Forest Management and Silviculture

Year	Commercial Forest Acreage	Sawtimber Volume (million bd ft)	Net Annual Growth (million cu ft)	Annual Removal (million cu ft)	Annual Growth to Removal Ratio	Number of Sawmills
1948	12,353,800	16,240	285.5	252.3	1.1: 1	2,789
1961	13,432,400	20,082	322.1	207.7	1.5: 1	1,135
1971	12,819,800	26,340	509.1	216.4	2.3: 1	546
1980	12,879,000	38,897	511.4	213.7	2.4: 1	718
1989	13,265,200	53,614	637.4	219.4	2.9: 1	579
1999	13,965,000	72,796	748.6	383.6	2.0: 1	519

Source: USDA Forest Service, Tennessee Dept. of Agriculture, Forestry Division

These statewide statistics for Tennessee are from permanent forest inventory plots that are located on a 3 by 3 mile grid statewide and measured every 10 or so years by the USDA Forest Service Continuous Forest Inventory Survey in cooperation with the TDA Forestry Division.

Commercial forest acreage (does not include forest land set aside by statute -- National Parks and Wilderness Areas) has increased by more than 1.6 million acres since 1948. Most of this increase is from abandoned agricultural land that has reverted to forests. The amount of sawtimber in Tennessee continues to increase indicating a maturing and aging forest. Net annual growth (growth minus mortality) continues to increase substantially with more pro-active forest management and better forest protection primarily through fire control. Forest removals were almost constant from 1948 to 1989, but showed an increase in the 1999 measurement. Even with increased harvest/removals in 1999, the annual growth to removal ratio is 2 to 1 indicating that forest growth is twice that of removals. The number of sawmills in Tennessee has decreased with lower efficiency and older technology mills going out of business.

These statistics indicate that the amount of land, volume, and growth of Tennessee's forests continues to increase. The amount of timber removal has only increased in the last 10 years. Removals should be monitored to see if removals will remain steady, decrease or continue to increase in relation to forest growth.

For more information contact: *Wayne Clatterbuck at (865) 974-7346*
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Conservation Easements and Tax Breaks

Larry Tankersley, Extension Specialist, Forest Management

There's a good bit of talk in Estate planning circles about "Conservation Easements and Tax Breaks". What many people are talking about is a 'qualified conservation donation'. According to the IRS if you donate a **qualified interest** to a **qualified donee** exclusively for **conservation purposes** you may deduct the value of that interest as a charitable contribution on Schedule A–*Itemize Deduction*.

It is important to note that "Tax Breaks" are not assured with a Conservation Easement. The IRS requires that the easement have several characteristics in order to qualify for the deduction. The most restrictive characteristics as pointed out by Stephen Small, are that the easement must be **"in perpetuity"** and must be for **conservation purposes yielding significant public benefits**. From the code: "conservation purpose" means–

- (i) the preservation of land areas for outdoor recreation by, or the education of, the general public,
(This is the only purpose which would require public access. Many folks believe that a Conservation Easement requires them to open their land. This is not true.)
- (ii) the protection of a relatively natural habitat of fish, wildlife, or plants, or similar ecosystem,
- (iii) the preservation of open space (including farmland and forest land) where such preservation is 1) for the scenic enjoyment of the general public, or 2) pursuant to a clearly delineated Federal, State, or local governmental conservation policy, and **will yield a significant public benefit**, or
- (iv) the preservation of an historically important land area or a certified historic structure.

A Certified historic structure is any building, structure, or land area which is either listed in the National Register, or is located in a registered historic district and is certified by the Secretary of the Interior as being of historic significance to the district.

Most important is the definition of "significant public benefit". Context is very important. The area under consideration must meet at least one of the specified criteria to qualify as a charitable deduction. Acreage is not a criteria necessarily, a Letter ruling in Rhode Island allowed 0.75 acre for a "scenic" ocean view. Note that open space can be for scenic enjoyment "or" pursuant to a government program.

A good way to determine whether a particular piece of ground would qualify is to contact one of many groups in Tennessee that are **"Qualified"** to accept these easements. Each of these groups have their own interests and responsibilities. The interests of these groups generally meet the definitions for "significant public benefit".

For more information on "Conservation Easements" contact Tennessee Parks and Greenways Foundation at (615) 386-3171. Ask them about their guidebook on voluntary protection of land in Tennessee. Of course you can contact us here in Knoxville, for additional information as well.

For more information contact: *Larry Tankersley at 865-974-7346*
ltanker1@utk.edu

Criteria for Hardwood Veneer Trees (Part 4 in a series of 7 articles)

David Mercker, Extension Assistant II, Forest Management

Criteria for qualifying as a fine veneer tree is condensed into one precondition . . . quality. Quality is related to the amount and extent of **grade defects** found in the lower trunk of the tree. Typically veneer logs are only produced on the butt log (first log cut) from the lower tree trunk. Grade defects are abnormalities which lower butt log quality by reducing its utility. Grade defects cannot be removed by adjustments in scaling; they are permanent. Two types of grade defects are recognized: exterior and interior.

Exterior grade defects include abnormalities on the bark surface which can be seen. They indicate interior degrade, and include: bumps, bulges, butt swell, knots, lesions and sweep (or curve). Holes (both large and very small, including bird beak) are also exterior grade defects, as are seams caused by lightning, frost or drought. Perhaps the most difficult exterior grade defect to detect is adventitious buds. These are dormant or recessed buds that exist along the trunk from which small sprouts (called epicormic branches) will periodically flush. If logs with adventitious buds are processed into veneer slices, reduced quality will be evident on the wood surface.

Interior grade defects are abnormalities which are typically not apparent on the exterior bark surface, but which become visible on the surface of the log end when the tree is felled and “bucked” into logs. The most common interior grade defect is discoloration such as staining or streaking of the wood. Interior defects also include: double pith (two-hearts resulting from two trees growing together when they were young), loose heart (separating of the annual growth rings), and grease spots, soak or pin worms (all results of poor site quality or mismanagement of the forest).

Internal natural wood characteristics such as texture and color are also factors. Premium veneer logs must have a well-centered heart and an even grain texture, meaning that the annual growth rings are relatively evenly spaced, not fluctuating between rapid and slow growth. The wood color should be consistent, without mineral or fungal streaks. Although, lesser markets for off-colored wood occasionally exists.

Interior grade defects are very difficult to detect - proficiency comes only after years of experience. Seasoned foresters, veneer buyers and loggers are regularly surprised at how poorly logs look once harvested, when the tree’s exterior signals appeared safe prior to the harvest. Judgment on interior wood quality must be made based on **characteristics of the forest**. Forest clues can signal poor internal wood quality. Previous mismanagement such as heavy woodlot pasturing or ground fires are examples. A poor site is another. Poor sites typically have shallow topsoil, are prone to drought, are very poorly drained, or are found on south and west slopes. Further, forest stands which are overly-mature are also high risk for interior grade defects. Overly-mature forests have trees with many broken tops, stem holes or swollen-bases. Sometimes irregular bark pattern will signal caution, indicating a site limitation or that tree growth has been altered by some external stimuli.

A set of specifications relative to **log length and diameter** must also be met. Most markets for quality face veneer logs require a minimum of 8 feet in length (10 to 12 feet for top price) and prefer at least a 16 inch diameter inside the bark (dib) at the small end of the log. This is a general guide. Each veneer mill has its own unique specifications.

Given all these criteria, it’s a wonder that any hardwood trees qualify as veneer. And indeed most don’t. Normally only 1-2% of the board foot volume in a hardwood timber sale is veneer. Yet that same volume could account for as much as 20% of the total sale value.

For more information contact:

David Mercker, Extension Assistant, Forest Management
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Quail Unlimited Offers Incentive Payments for Native Grass Buffers in Middle TN

Craig A. Harper, Associate Professor, Wildlife Management

The Tennessee Quail Unlimited State Council (TN QU) will offer a one-time \$50 per acre incentive payment to landowners who establish native warm-season grasses on certain USDA program buffer practices in 10 middle Tennessee counties including: Coffee, Franklin, Giles, Lincoln, Maury, Marshall, Montgomery, Stewart, Robertson, and Sumner. Practices eligible for the extra \$50 per acre incentive (above the existing USDA payments and incentives) include Conservation Reserve Program (CRP) native grass CP21 Filter Strips and CP22 Riparian Forest Buffer native grass Zone 3 acres, and PL319 Small Watershed native grass field borders, native grass filter strips, or riparian forest buffer Zone 3 native grass acres.

TN QU funds available for the \$50 incentives are limited. To be eligible, landowners must first apply at the Farm Services Agency office in the eligible counties. Once accepted by USDA and a contract signed, TN QU incentive funds will be obligated on a first-come, first-served basis until funds are exhausted. Participants must then establish the native grass practices by June 30, 2005 and will receive the TN QU incentive after inspection by NRCS.

Currently, the USDA is in a continuous sign-up for CRP buffer practices, which allows landowners to enroll land automatically into the CRP program without a competitive bid process, if certain land eligibility criteria are met. Filter strips are grass strips established on the edge of cropped areas adjacent to streams and rivers. Riparian Forest Buffer Zone 3 acres are native grass borders adjacent to a streamside tree zone. While enrolled in CRP, landowners also receive USDA annual payments per acre and cost-share payments for establishing these buffer practices. In addition, USDA currently has Signing Incentive Payments (SIP) for these CRP practices of \$100 per acre for 10-year contracts, and \$150 per acre for 15-year contracts. **Therefore, landowners taking advantage of the TN QU incentive would receive combined incentive payments of \$150 or \$200 per acre enrolled.**

Native warm-season grasses eligible for the TN QU incentive payment include big and little bluestem, indiangrass, switchgrass, and sideoats grama with some legumes included. These grasses and forbs offer excellent habitat to a variety of wildlife, especially ground-nesting birds such as bobwhites, wild turkeys, and several species songbirds. "Native grass acres in CRP are helping bobwhites and rabbits make a comeback in some west Tennessee areas. We're hoping to get enough acres on the ground in these selected middle Tennessee counties so we can make a difference here, too" stated Chris Wolkonowski, NRCS Private Lands Wildlife Biologist. "Quail Unlimited is committed to helping the Tennessee Wildlife Resources Agency, USDA, and other agencies improve habitat for quail across the state, and feel our incentive payments are one way to help landowners put habitat on the ground," noted Jim Pierce, TN QU State Council Chairman.

Since the TN QU incentive funding is limited, landowners are encouraged to apply soon through their local USDA Service Center in the 10 counties. Participants applying to the USDA offices for these practices will be eligible for the TN QU incentive payment.

The incentives are a joint effort of Quail Unlimited, USDA, the Tennessee Wildlife Resources Agency, and a grant obtained from the National Fish and Wildlife Foundation.

For more information, contact Chris Wolkonowski, USDA-NRCS Biologist (615-893-9295 EXT 112), or Mark Gudlin, Tennessee Wildlife Resources Agency (615-781-6614).

Quail Unlimited Offers Incentive Payments and Free Seed for CRP Practices in West TN

Craig A. Harper, Associate Professor, Wildlife Management

The Tennessee Quail Unlimited State Council (TN QU) is offering an incentive and free seed to landowners who implement certain management practices on their current Conservation Reserve Program (CRP) native grass acres. Landowners in 12 west Tennessee counties (Benton, Chester, Crockett, Decatur, Fayette, Gibson, Haywood, Hardeman, Hardin, Henderson, Madison, and McNairy) are eligible to receive a one-time \$10 per acre incentive payment on certain CRP contracts. These practices include strip discing, strip herbiciding, prescribed burning, and legume interseeding. All are cost shared by USDA.

The incentives are a joint effort of QU, the Tennessee Wildlife Resources Agency, USDA-NRCS, the Chickasaw Shiloh RC&D Council, and a grant obtained from the National Fish and Wildlife Foundation. In addition to the incentive payment, participating CRP landowners will be eligible to receive enough free legume seed from QU to plant up to 5 acres under the legume interseeding practice. Other west Tennessee counties also may have a limited supply of legume seed. Check with your USDA Service Center for details. Interested CRP landowners must first apply at the Natural Resources Conservation Service office in the eligible counties. The QU incentive funds will be awarded on a first-come, first-served basis until funds are exhausted. Participation will require a contract modification to existing CRP contracts.

“Mid-contract management practices like strip discing will help CRP landowners improve their grassland for wildlife and landowners can receive cost-share from USDA,” stated Mike Hansbrough, NRCS Private Lands Wildlife Biologist. Jim Pierce, TN QU State Council Chairman added, “The west Tennessee Quail Unlimited chapters been very active in helping educate landowners on the CRP, native grasses, and wildlife. They also have helped obtain discounts on native grass seed and distributed free food plot seeds to numerous landowners. We feel the \$10 per acre incentive for these management practices, coupled with the existing 50% practice cost share from USDA, will substantially reduce costs to interested CRP landowners and greatly improve wildlife benefits”.

Because the TN QU incentive funding and seed are limited, landowners should apply immediately through their local USDA Service Center in the selected counties.

For more information, contact Mike Hansbrough, USDA-NRCS Biologist (731-668-0700 EXT. 112), or Chris Moyers, Chickasaw Shiloh RC&D Council, (731-668-0700 EXT. 103).

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Yellow Grubs in Fish

Thomas K. Hill, Professor, Fisheries Management

Yellow grub infestation of fish seems to be more and more a problem when compared to just a few years ago. I do not believe people have suddenly become more observant. Rather, the population of great blue herons has grown dramatically in recent years and their visits to farm ponds and lakes for their diet of fish has certainly increased opportunities for spread of yellow grubs.

Calls with questions related to yellow grubs have already been coming to the University this spring. You may have gotten calls in the counties, too. If not, you likely will before summer is over. Following is an article with information to help you educate your clients about yellow grubs so that they can better understand the complex life cycle of the grubs and gain some insight about the problem.

You had a successful fishing trip to your favorite pond or lake and came home with an ice-chest full of largemouth bass and bluegill. As you clean them, you notice some tiny, yellow worms either just under the skin or in the flesh of the fish. They are infested with yellow grubs.

Yellow grubs often invade the muscle, the edible part of the fish. Their size and color make them easily visible, particularly if fish are skinned rather than scaled during the cleaning process. They are not harmful to people eating the cooked fish, but parasitized fish flesh is not very appealing as food either.

The complex life cycle of yellow grubs makes prevention or even control very difficult. It not only involves a fish as second intermediate host, but a snail as first intermediate host and an aquatic bird. Here's how the life cycle goes.

Starting with a mature microscopic-size egg, it hatches in the water into a stage known as a miracidium. The miracidium is a free-swimming organism and dies within a few hours unless it comes in contact with a ram's horn snail. The miracidium enters the snail's body through the skin and forms a sporocyst.

The sporocyst produces several stages in the snail known as rediae. In turn, rediae produce many daughter cells that are called cercariae. The cercariae leave the snail, are free in the water and come in contact with any one of several kinds of fish. They burrow through the skin and form cysts.

Once in the fish flesh, the cercariae develop into grubs in about 20 weeks. They are then called metacercariae.

When the infected fish is eaten by a fish-eating bird such as a great blue heron, it passes down into the stomach, where the cyst walls are digested by enzymes. The freed grubs migrate upward to the upper esophagus, the trachea and the mouth cavity of the bird. The grubs attach themselves to these areas and within a few days become sexually mature, egg-laying adults. They live in the mouth for about two weeks.

As the bird thrusts its beak into the water to feed and drink, eggs laid by the adult grubs are released into the water. When the eggs hatch, miracidia are once again free-swimming in the water and the cycle is completed.

Prevention and control amount to only token efforts. There are, however, a few things that may reduce occurrence of yellow grubs in fish.

Avoid introducing both snails and already infected fish from other ponds and lakes into a pond. Snails feed on aquatic vegetation, so pond management practices to reduce their food

supply is very important. Water that is at least 18 inches deep at the pond edge discourages both aquatic weed growth and birds that feed in shallow water. Chinese grass carp stocked at 15 per surface acre can help control aquatic weeds.

Copper sulfate, when used to control algae, reduces the snail population. It should not be used in ponds where total alkalinity of the water is lower than 30 ppm or fish can be killed.

Great blue heron control is not a good option because they are migratory and federally protected. Permits to kill them may possibly be obtained where fish losses are substantial.

Redear sunfish (shell crackers) eat snails. Most recently stocked ponds have redear, but older ponds may not. Stocking 20 pairs of adult redear per acre in a largemouth bass-bluegill pond can help reduce the snail population. They will spawn and redear offspring will become a part of the fish population.

Draining and drying ponds are likely the most effective controls. This management strategy results in lost production time, but in many instances those practices may be what it takes to have grub-free fish. There are other kinds of grubs with similar life cycles, but yellow grubs seem to be more prevalent in Tennessee at this time. Catfish farmers are dealing with one that is being carried by white pelicans.

For more information contact: *Thomas K. Hill at (865) 974-7346*
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The Agricultural Extension Service offers its programs to all eligible persons regardless of race, color, national origin, sex, age, disability, religion or veteran status and is an Equal Opportunity Employer.
COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
The University of Tennessee Institute of Agriculture, U.S. Department of Agriculture,
and county governments cooperating in furtherance of Acts of May 8 and June 30, 1914.
Agricultural Extension Service
Charles L. Norman, Dean