

Your Side of the Fence

A bi-annual guide to help landowners gain in-depth information from experienced biologists in all corners of the state.



DOUG SCHOELINS

Cattails, a common emergent plant in Oklahoma ponds.

Managing Aquatic Vegetation in Ponds

By Chris Whisenhunt, Northeast Region Fisheries Biologist

A necessary component of any healthy fishing pond is vegetation. Vegetation supplies dissolved oxygen and nutrients necessary for fish survival. Larger plants provide cover for smaller fish and serve as habitat for insects and small aquatic organisms that fish need for food. But too much of a good thing can be detrimental to the overall health of a pond. Most vegetation will establish itself naturally, and optimum vegetation cover for most ponds should be around 20-25 percent, too much more than that requires action to be taken to get the vegetation under control. Transplanting ornamental or exotic plants designed for decorative “backyard” ponds should never be planted in a farm pond.

Identifying the type of weed problem you have is crucial to the type of method you will need to use for getting the problem under control. Aquatic vegetation falls into one of four categories: algae, floating weeds, emergent weeds (foli-

age appears above water), and submerged weeds (foliage is primarily below water surface).

Algae are probably the most common vegetation in a pond and come in three forms: planktonic (microscopic) algae, which are responsible for most of the necessary dissolved oxygen within the pond, filamentous algae (pond moss) and stoneworts. Floating weeds are either rooted or non-rooted plants whose foliage floats on the surface, such as water lily and duckweed. Emergent plants are rooted in the pond bottom but the foliage appears above the water surface and usually occur in the shallower portions of the water body (but can be up to 10 feet deep if the water is clear enough). Smartweed, cattails, and bulrushes are common emergent plants. Submerged plants grow mostly below the surface, usually only appearing above the surface during periods of low water. Pondweeds, coontail, and milfoil are common types of submerged weeds. A helpful website for aquatic plant identification is <http://aquaplant.tamu.edu/plant-identification/>.

So now that you have identified your particular type of weed problem, you need to decide on the appropriate control

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Managing Oklahoma's wildlife resources and habitat to provide scientific, educational, aesthetic, economic, and recreational benefits for present and future generations of hunters, anglers, and others who appreciate wildlife.

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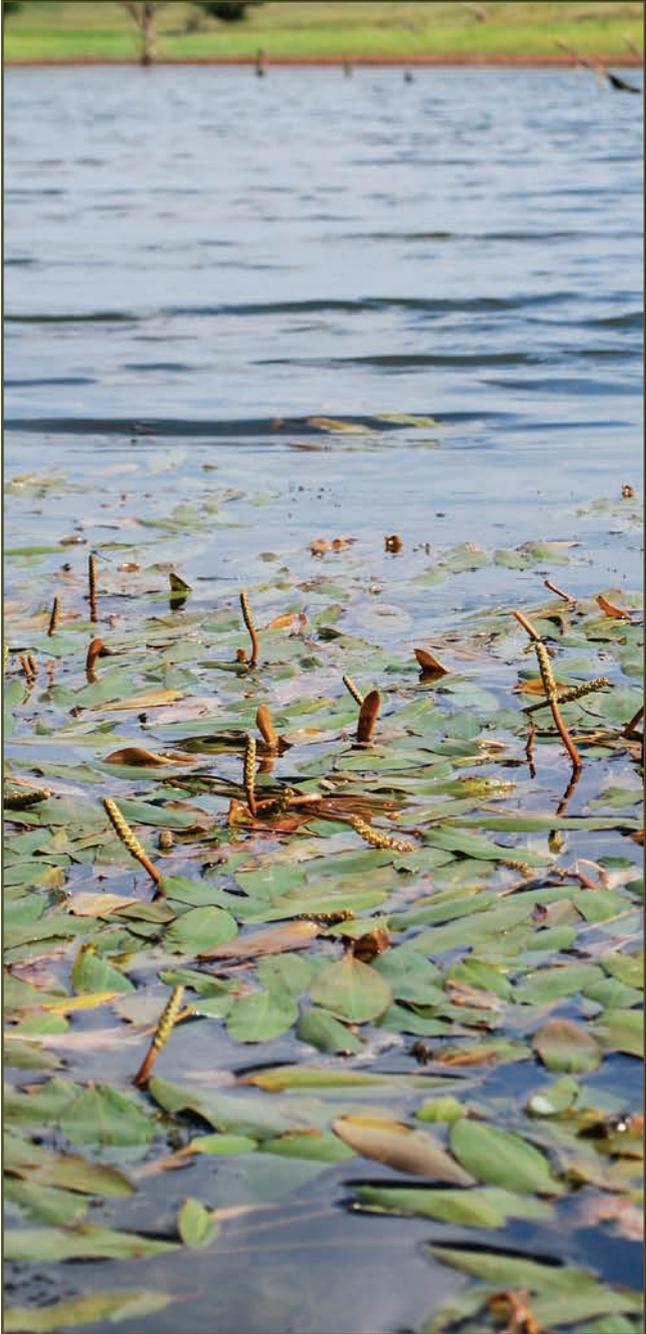
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DOUG SCHEBLING

Longleaf pondweed, a common submerged plant in Oklahoma ponds.

method. With any problem, prevention is the best control. One of the most common causes of overabundant vegetation is fertilization of the pond, or nutrient loading, usually from surface run-off from surrounding fields that have been sprayed with fertilizer or by fecal matter from nearby livestock or waterfowl utilizing the pond. Creating buffer zones around the pond where no fertilizers are sprayed and fencing off the pond from livestock will help with preventing large algae and vegetation blooms. Also, making sure the pond banks are sloped properly, usually 3:1 to about four feet deep, will help prevent rooted plants from establishing. Another way of preventing major weed problems is by drawing down the pond during the winter months to kill the vegetation by allowing it to freeze and dry out. However, vegetation problems may not be com-

pletely avoidable, and one or more type treatment is necessary: mechanical control, biological control, or chemical control.

Mechanical control of vegetation involves the use of rakes, seines or some type of mechanical cutters to physically remove the problem vegetation from the pond. This is best done in early spring before the vegetation reaches a point too difficult to control.

Biological control is the use of another living organism — usually triploid grass carp — to control the vegetation problem. You must first have a good idea of the type of vegetation affecting the pond, as grass carp are selective in their diet and may consume good vegetation before having any effect on the problem vegetation. Grass Carp can help in controlling bladderwort, pondweeds, naiads, stoneworts, muskgrasses, watercress, elodea, and water stargrass, but will have very little to no control over filamentous algae, cattails, smartweeds, white water lily, rushes, and other species of plants. Also, they may only provide partial control of coontail, duckweed, water milfoil, long-leaf pondweed, and large-leaf pondweed. Recommended stocking rates for triploid grass carp (8-12 inches) are 8-10 per vegetated acre. If a three-acre pond is 60 percent covered in vegetation, then 14-18 fish are needed and it may take 3-4 years before control can be adequately measured. Once the fish are stocked, it is very difficult to remove them, so stocking fewer fish and exercising patience is recommended.

Chemical control is often the only option for some vegetation problems when mechanical control is too difficult and when grass carp may not control the problem. There are several brands of herbicides on the market safe for applying to ponds that, if used correctly, will not harm the fish or livestock that may drink the water from the pond. Copper and copper complexes (copper sulfate) are best for control of all algae types.

For submerged plants, endothall (Aquathol® or Hydrothol®) are best. For emergent plants, 2,4-D or glyphosate (Rodeo®) should be used. For floating plants, fluridone (Sonar®) or diquat (Reward®) are best. Proper plant identification, careful measurements, and proper application (time of year, time of day, wind conditions, etc.) are crucial for success in vegetation control. The applicator is responsible for the effects of the herbicide and its residues on livestock, crops, and even to neighboring properties, so it's important to always read and understand the labels of any chemical you use.

You can find more information on aquatic vegetation, fisheries management for ponds, and other useful topics on the Wildlife Department's website at wildlifedepartment.com and on the Oklahoma State University Cooperative Extension Service website at <http://osufacts.okstate.edu>. ■

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Smartweed, a common emergent plant in Oklahoma ponds.

DOUG SCHEILING

From Egg to Adult: Frogs and Toads Across Oklahoma

By Curtis Tackett, Aquatic Nuisance Species Biologist

RUSSELL GRAVES



Bullfrogs are one of Oklahoma's most commonly recognized frogs. Often observed on ponds and creek banks, bullfrogs are popular among hunters and anglers as well, because of their sizable and meaty hind legs.

We all know that Oklahoma is home to a diverse array of habitats and is arguably one of the most diverse states in the country. With that abundance of diverse habitats comes a diversity of frogs and toads that can be found from the clear streams in the eastern half of the state to the great plains of the Panhandle region. From a stream or river bank to a wetland or to a barrow ditch only holding a drop of water outside your front door, frogs and toads have adapted to live in a variety of environmental situations, even though they are sensitive to habitat change. You have probably heard frogs and toads calling in the early spring and weren't even sure what the sound was. This group of animals can easily be overlooked unless we happen to see them hopping right along in front of us. Tree frogs and some toad species for example, can be regularly found in our own backyards and can provide great benefits such as controlling pesky bug populations and preventing them from getting into our homes!

Frogs and toads belong to the order Anura. Therefore they are sometimes referred to as "anurans," which is ancient Greek for "without a tail." Frogs and toads depend on water to reproduce and lay their eggs, and they also depend on sufficient land habitat to carry out their life cycle. Anurans have a very unique life cycle in which males and females gather at breeding sites and males call to attract females — very similar to how a male bird attracts a female bird by its song or call just before nesting season. Every species of anuran has a distinct call and, like birds, can be identified by their call alone. After the male pro-

duces a number of calls and successfully attracts a female, the male will grasp on to the female in a process called "amplexus" where the male begins to fertilize the eggs that are laid in the water source. Most anurans are capable of laying thousands of eggs in order to increase their chances of survival. The egg eventually hatches into a vulnerable larva known as a tadpole, which grows a tail that serves as its main form of locomotion. The tadpole soon begins a process known as metamorphosis. During this process, which can sometimes only last a couple of weeks, the larvae forms front and hind legs and the tail begins to disappear and transform into the back of the animal. This aquatic and terrestrial life cycle is what sets anurans and other amphibians apart from many other groups of animals.

Anurans in Oklahoma can be broken up into five main groups: true toads, narrow-mouthed toads, spadefoots, tree frogs and chorus frogs, and true frogs. True toads are characterized by the presence of parotid glands, which secrete a toxin to deter predators. Most have cranial crests that can be used for identification by researchers. Narrow-mouthed toads are smooth-skinned burrowers, and most species specialize in eating ants. Tree frogs, chorus frogs, and cricket frogs belong to the same group and can be found in many different habitat types throughout Oklahoma. Tree frogs specialize in climbing trees, which they will use as their calling territories. Cricket frogs are one of the smallest in size but are also one of the most common frog species. They are mostly encountered jumping along the banks of ponds and lakes. Chorus frogs are very secretive and can be difficult to find but are the first group of frogs to start calling for mates in the early spring. True frogs can be distinguished by webbing between the hind toes, muscular legs for long jumping, and gland like ridges running down both sides of the back.

Oklahoma is home to nearly 30 species of anurans, and they all possess some very unique anatomical features. All have an external ear opening and eardrum called a tympanum, which is visible on both sides of the head. This feature allows for precise deciphering of species specific calls to attract mates. Because at a particular water source there may be several species of frogs or toads present, individuals must be able to detect the call from the opposite sex of the same species without confusion of other calls. All adult anurans have the ability to breathe or respire through their skin, whereas the tadpole larvae use gills to breathe under water. The diet shift between the tadpole and the adult also is a dramatic change. Most tadpoles are strictly herbivorous feeding on algae and small plant fragments. On the other hand, all adult anurans in Oklahoma are opportunistic carnivores, feeding on just about any insect or small vertebrate that it can fit in its mouth. During the winter months, some frogs and toads seek a hibernacula where they will wait out the cold weather. Some will also send their bodies into a state of torpor, where their metabolism is slowed down to conserve energy in the body. Frogs and toads are clearly a diverse and distinctive group of animals that inhabit many different habitats. Some anuran species are of conservation need, and protection of habitat types that these species rely on will ensure their successful future in our great state! ■

Growing Season Prescribed Fire (Summer Burns) in Western Oklahoma

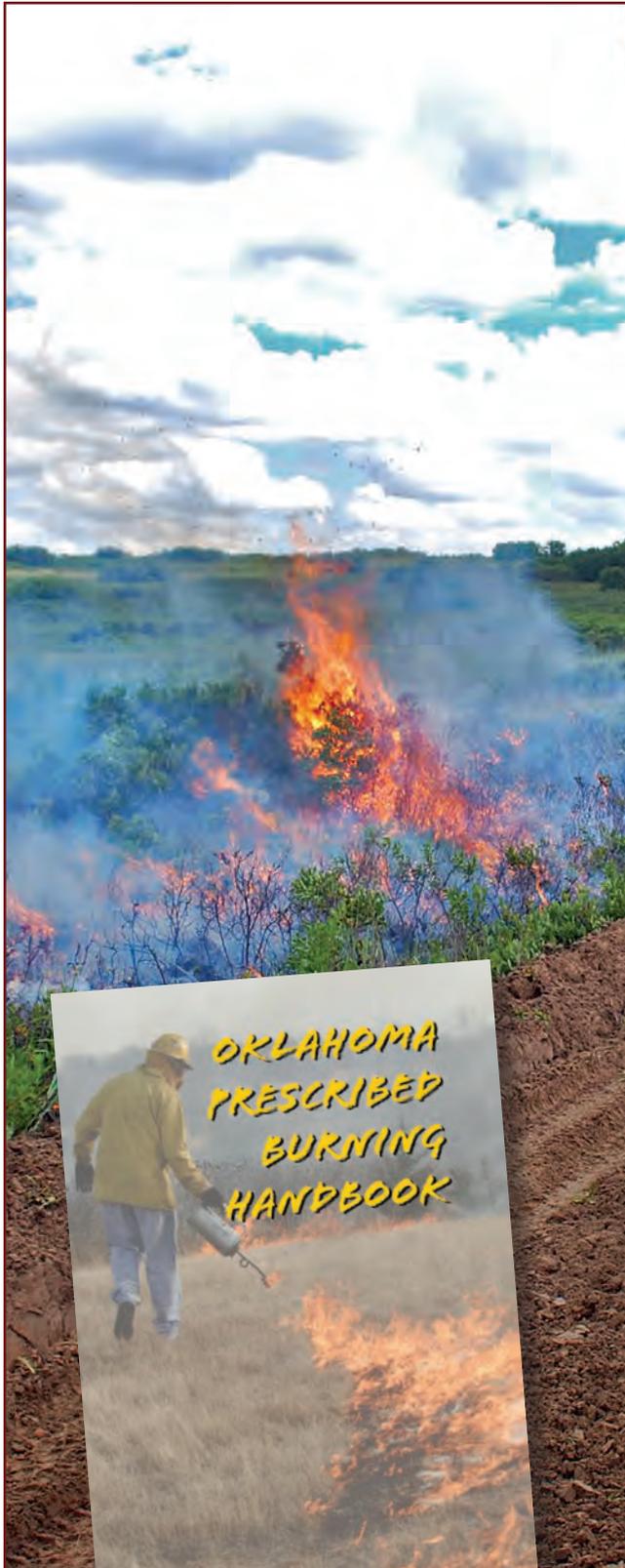
By Scott Parry, Wildlife Biologist

Traditionally, we think of prescribed fire season occurring in late winter and spring months. This is when most of the plants are beginning to come out of winter dormancy and start their growth cycles for the year. Removing the dead plant material and previous years' growth through burning was thought to encourage new growth and open the ground to stimulate different plant seed germination better this time of year than in other seasons. Also, this is the time of year that weather variables combined with dead plant material make the fuels most volatile, thus probably when fire historically was most prevalent.

In reality, a prescribed fire conducted at any time of the year can provide positive results in terms of managing habitat. There has been some research done to verify plant responses at different timing of burns (OSU extension fact sheets E-1010, NREM 2885), and it seems that regardless of the time of year of the burn, we'll likely see some beneficial results to wildlife habitat. The question arises then, if results are only subtly different at different timings in a prescribed fire, why would you want to burn outside of what we think of as the "traditional" prescribed fire months of February-April? Following is some comparisons and pros vs. cons of conducting prescribed fires at different times of the year.

The traditional burn window months of February-April provides a limited amount of time to accomplish a prescribed fire. In addition to a limited amount of time in this window of opportunity, this is a time of year that the weather can be fairly unpredictable with several variables falling outside of safe parameters of conducting a prescribed fire — mostly wind and humidity. Also, wind shifts are common along with frontal passages during the late winter and early spring months. All of these factors combined only allow for a marginal amount of days within this time period that are within the parameters of conducting a prescribed fire. During the growing season months, the weather patterns tend to be much more stable and consistent, allowing for many more days that meet the parameters of the fire prescription during the same window of time. So not only do we add more days within a year for a larger window of opportunity, but those days added are more likely to be within the parameters of conducting a prescribed fire than in the late winter – early spring months (NREM 2885).

We think of the dormant season and early spring as being a good time to burn, because a lot of our fine fuels (grasses, etc.) are dormant and burn easily. This is true for igniting a fire, but our objective is to keep it contained within a set boundary — not just igniting a fire. During the growing season, we still have some dead fine fuels, but some of these fuels are actively growing with some moisture in them. This slows the rate of spread of a fire and tends to make the fire more predictable and less volatile. The pasture will burn, provided fuel load, fuel moisture, relative humidity, and other factors are within good parameters. At the same time, the potential for spot fires and escapes tends to be minimized because overall higher fuel moisture in actively grow-



This publication is online at tinyurl.com/burninghandbook

ing fuels combined with more stable weather will reduce some unusual fire behaviors that we sometimes see in the “traditional” months. Thus, a growing season burn tends to be more predictable, slower pace and overall safer burn, in respect to keeping containment.

It has also been shown that forage quality of grasses and forbs have potential to be improved more following a growing season burn than a dormant season burn (OSU Extension E-927, E-1010, NREM 2877). Quality of the pasture in subsequent years can be improved more as a result of a growing season burn than burning at other times of the year. Impacts to woody plants appear to be similar across different seasons of fire.

There are some other impacts to consider when looking at what time of the year to conduct a prescribed fire — things such as recent moisture/rainfall; how active the plants are growing; ambient temperatures; size of the burn unit; fuel for fire at ground level, mid-story and canopy; desired results; as well as a few other factors. All of these things should be considered in helping to make a determination of when the best time should be to most effectively and safely conduct a prescribed fire. As mentioned earlier, the rate of spread of a growing season burn is much slower than in the dormant season. If we are looking at burning a 2,000 acre unit, we’ll have to consider that it may take more than one day of burning in the growing season to complete; whereas, in the dormant season this could take less than one day to accomplish. On the other hand, a 100 acre unit could easily be completed during any season within 1 day. Higher air temperatures during the growing season make it more critical to keep personnel hydrated and to take plenty of breaks. There is also an increase in smoke production because of the increase in moisture due to the actively growing plants. This can be managed with timing the burn with good dispersion days and proper transport wind direction.

Listed below are some points to consider when deciding on what time of year to burn:

- The window of opportunity to safely conduct prescribed fire is extended when including the growing season.
- There is more likely to be increased number of days within a 30-day window during the growing season compared to the dormant season.
- Forage quality can be increased with growing season burns.
- Weather tends to be more stable, predictable and within prescribed fire parameters during the growing season.
- Prescribed fire tends to be slower rate of spread, less “flashy” or less volatile and more predictable during the growing season.
- Smoke management may be more critical during the growing season.
- Air temperature can be a factor on personnel engaging in prescribed fire, especially during the growing season.
- Adding different seasons of burns can greatly increase the opportunity to conduct burns and add “mosaic” to property being managed across years. ■

Partnership of Landowners, Sportsmen and Game Wardens Is Key to Conservation

By Jennifer Bengé, Information and Education Technician

Landowners have always played an essential role in Oklahoma’s hunting and fishing heritage. Over 95 percent of the hunting and fishing opportunities in Oklahoma are on private land, so landowners are very important to the success of wildlife conservation and management. A great working relationship between landowners, sportsmen and wildlife law enforcement is crucial. It is important that these relationships be fostered to promote continuing opportunities for hunting and fishing. Title 29 of the Oklahoma Statutes, which is enforced by game wardens, helps protect this relationship.

It is up to landowners to decide who they want to allow on their land. By allowing someone to hunt or fish on their property, landowners can help manage the wildlife in Oklahoma. If a landowner has a farm pond, letting someone fish can help maintain healthy fish populations. Allowing someone to hunt coyotes or even deer can potentially prevent a nuisance or depredation problem down the road or help balance age structures of game populations. Plus, when a landowner allows someone to hunt or fish on their property, it literally preserves our state’s wildlife heritage and outdoor tradition. In Oklahoma, conservation is funded primarily by sportsmen through their purchase of hunting and fishing licenses and through federal excise taxes on certain sporting goods.

Naturally, landowners are encouraged to allow safe and ethical hunters and anglers to use their land for hunting and fishing. You can build strong relationships this way, while at the same time playing an active role in conserving wildlife.

According to state law, anyone who wants to hunt and fish on private property must obtain permission to enter any posted or unoccupied land or land primarily devoted to farming, ranching or forestry purposes. This law gives the landowner the right to say who can and cannot hunt and fish on their land. If someone is hunting or fishing on private property without proper consent, it is a violation of the law. Sometimes that consent must be in the form of written permission that is carried by the hunter, such for elk and antelope hunting during seasons open on private lands.

Getting permission to hunt or fish on private property does not remove the responsibility of the sportsman to follow the wildlife laws or any specific stipulations the landowner might require.

Landowners who want to help eliminate unwanted or illegal hunting and fishing should consider clearly posting their property with signs that are easy to read from the road and located on corners, entrances and at regular intervals along the property line.

If there are people on private property without permission, there are several options available to the landowner. First, they can ask trespassers to leave, which will usually

resolve the problem. Another option is to make a complaint in writing to a game warden, who can file charges against the person or persons violating the law. Game wardens who are called about this violation will usually ask if someone observed the people hunting or fishing. If the persons are still there, the warden may ask the landowner if they want to sign a complaint and prosecute the people for hunting or fishing without permission. Usually the warden will also ask questions about the details of what happened and what was seen. This will let the warden know if there are other violations to investigate. Normally, landowners will be required to sign the complaint and will have to testify in court if it goes to trial.

Remember it is up to the landowner or agricultural lessee to decide who they will allow on their property. There can be challenges that come with allowing others to use private property, but the reward of seeing a young sportsman or other legal and ethical sportsmen enjoy hunting or fishing success makes it all worthwhile.

The Oklahoma Department of Wildlife Conservation wants to thank every landowner who provides hunters and anglers with a place to enjoy the state's natural resources. We are committed to ensuring that hunting and fishing are available for future generations to appreciate, but generous landowners are key to making this possible.

In closing, landowners should remember that if they need help with a wildlife law enforcement-related issue on their land, a game warden is just a phone call away. A complete list of game wardens by county and their contact information is available online at wildlifedepartment.com.

Most common questions game wardens are asked by landowners:

- Q: I have a creek that flows through my property. Can people navigate their boat/canoe up the creek?
- A: Rivers and creeks are considered navigable as far as the boat can navigate, and therefore it is legal for them to be there. If they were to get out and access the land, they would be trespassing.
- Q: I have coyotes (predators) attacking my livestock. What can be done about this?
- A: Game wardens can issue depredation permits to landowners, or you can contact the Oklahoma Department of Agriculture's Wildlife Services about getting a local trapper to help with the problem.

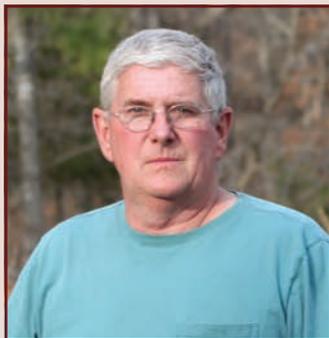


The relationship between landowners, sportsmen and game wardens is crucial. Most land in Oklahoma is privately owned, so landowners who legally and ethically hunt and fish on their land or let others hunt and fish on their land play an important role in Oklahoma conservation.

- Q: Feral hogs are tearing up my wheat fields. What can be done?
- A: The best methods for controlling feral hogs are trapping, daytime hunting and fencing. Attempting to shoot feral hogs at night is the least effective method. The Oklahoma Department of Agriculture's Wildlife Services have trappers that can trap and/or use helicopters to kill hogs. The Oklahoma Feral Swine Hunter/Trapper Directory is available at www.oda.state.ok.us/ais/feralswine.htm. If these methods do not work you can talk to the game warden in your county about a nighttime permit to alleviate damage.
- Q: Do I have to post my property and if so how do I do it?
- A: Land primarily used for farming, ranching or forestry does not have to be posted; however, it is recommended that you post it for clarity. Put the signs where they are not easily torn down but are easy to see.
- Q: I received fish from the Oklahoma Department of Wildlife Conservation's Farm Pond Stocking Program. Do I have to let people fish?
- A: No, you do not have to let anyone on your property to fish. However, allowing someone to fish on your property is a great opportunity to introduce young people to the joys of fishing and to play an active role in conservation.
- Q: Do I have to have a license to hunt/fish on my own property?
- A: Resident landowners don't have to have a hunting or fishing license but they do have to have the appropriate licenses for deer, elk, turkey, etc. unless exempt. Complete details are available in any current "Oklahoma Hunting," "Oklahoma Fishing" or "Oklahoma Waterfowl" regulations guide.
- Q: What should I do if I catch someone hunting/fishing on my property without permission?
- A: The best thing to do is call your county game warden and ask for assistance. ■

Landowner Spotlight

Joe Hutchison: Big Results on Smaller Acreage



By RosaLee Walker, Private Lands Biologist

Joe Hutchison started squirrel and rabbit hunting when he was 10 years old along with his four older brothers. That passion soon led to deer hunting and to Hutchison harvesting his first deer when he was 14 years old.

However, around 1986, his son was born with spina bifida, and his time and interest invested in hunting shifted. Several years later, though, his son came home from school and said, “Dad, I want to go hunting.”

Hutchison had a friend build a tree stand with a winch for his son, and he was able to harvest his first deer, also at age 14.

With hunting now a family event again, Hutchison decided to purchase some property for family recreation. About seven years ago, they were able to purchase 140 acres in Delaware County. There were only some whitetail deer in the area and no wild turkeys. He decided to figure out how to improve the land for wildlife. Mr. Hutchison contacted the Oklahoma Department of Wildlife Conservation and was told about the Wildlife Habitat Improvement Program (WHIP) which aids

private landowners in improving their properties for wildlife habitat. He signed up for the program and has been continuously improving the wildlife habitat on his property. Some of the efforts to improve habitat on his property include thinning out thick understory, removing Eastern red cedar trees, creating wildlife openings in thick hardwoods, allowing natural regeneration of native herbaceous vegetation, building fire-breaks, prescribed burning, and building ponds.

Hutchison has vastly improved the quality of wildlife habitat on his property since he began working with WHIP. Turkeys have begun using his property and deer sign has increased. Not only has Hutchison noted more deer sightings, but more sightings of mature bucks as well.

Hutchison says that it doesn’t matter whether you have 10 acres or 1,000 acres, you can still manage for and improve wildlife habitat and see successful results. Over several years of habitat management, he has found that “native vegetation is the best food source available.” He is proud of all he has accomplished and will continue to manage for wildlife. Hutchison is grateful that his family and future generations “will have a place to see wildlife and their habitat.”

To learn more about how you can improve habitat on your property through landowner programs such as WHIP, contact private lands biologist Doug Schoeling at (405) 590-2584 or RosaLee Walker at (918) 607-1518. ■





Male Cardinal shiners in a northeastern Oklahoma stream. These are Ozark endemics not found anywhere else in the world.

Oklahoma Streams: A Place for Diversity

Story and Photos by Brandon Brown, East Central Region Fisheries Biologist

Although not generally thought of as a “fishy” state, Oklahoma actually has one the nation’s most unique and diverse fish assemblages. That said, surprisingly few people are aware of this diversity and most can name only about a dozen or so of our state’s approximately 175 fish species. That means



Neosho smallmouth bass are a unique subspecies of smallmouth that are only found in Ozark streams.

that roughly 90 percent of our native fish are unknown to the majority of Oklahomans – even though they’re some of our state’s most beautiful and interesting residents.

According to fisheries supervisor Jim Burroughs, “Most of these little known species are nongame fish that live in rivers and streams. For example, most people have never heard of a darter before, but they are some of the most colorful fish in North America and we have about 30 species of them scattered throughout the state. To put the extent of this diversity in perspective, streams like the Illinois and Kiamichi rivers are home to more fish species than some entire states. This relatively high species richness is largely due to Oklahoma’s uniquely varied climate, geology and topography, all of which contribute to habitat diversity. Generally speaking, as habitat diversity increases, so does species diversity. And though few people realize it, Oklahoma is one of only four states with more than 10 ecoregions (or broad habitat types).”

In fact, Oklahoma is tied with Texas and California for the No. 1 spot with 12 ecoregions. **Per square mile, this makes Oklahoma the most habitat-diverse state in the contiguous United States.**”

Rainfall is lowest in western Oklahoma and precipitation increases by about one additional inch for each 15 miles traveled to the east. As a result, stream diversity and water resources are more abundant in the eastern half of the state. According to Burroughs, “Our most unique fish assemblages are found in extreme northeast and southeast Oklahoma. Both of these regions contain species on the fringes of their range and not normally associated with Oklahoma.”

He goes on to say that “our Ozark streams are the most distinctive because many of those species are endemic (not found anywhere else) and have such demanding habitat requirements.”



Male orangethroat darter, a common inhabitant of many Oklahoma streams.

Some of these fish require near pristine conditions and are very sensitive to change. Unfortunately, the water quality and instream habitat of some of our Ozark streams is at risk, and there is a very real chance that some of those species won't be around in the future.

Stream degradation and species loss are problems not limited to Oklahoma. According to the American Fisheries Society (AFS) about 40 percent of North America's freshwater fish species are considered imperiled, with virtually all of the risk due to habitat degradation. **In Oklahoma about one-third of our fish species are considered species of greatest conservation need or higher.**



Neosho smallmouth bass eggs. Excess sediment can suffocate both eggs and fry.

Nearly all of the land and most of the rivers and streams in Oklahoma are privately owned. Consequently landowners play a crucial role in maintaining the health and future of our streams. According to Burroughs, landowners are our biggest environmental stewards. Many of them care deeply about wildlife, and in northeastern Oklahoma, landowners are extremely proud of their streams and concerned about their well-being. He adds, "We spend a lot of time talking to our landowners, and it's obvious that many of them feel a strong connection – even an emotional attachment – to the streams on their property. They tell us what it was like growing up on the stream and the satisfaction they've had watching their kids or grandkids having the similar experiences and enjoying the same stream. They want to make sure the resource is there for future generations to enjoy."



Four-day-old Neosho smallmouth bass fry.

Many of our landowners feel as if they have a duty or obligation to take care of the streams, doing what they can to prevent bank erosion or protect springheads – activities that are extremely beneficial for maintaining biological integrity in streams. They realize that everything that happens in the watershed has an effect on the stream.

"We talk to landowners who've spent their whole lives on the stream, and they all agree there have been some dramatic changes over their lifetimes," said Jon West, fisheries technician for the Wildlife Department. "They tell us that gravel accumulation, sediment, and water temperatures have all increased, while the number of fish, especially species like chubs and suckers, have decreased. They also all agree that streams have gotten wider, shallower, warmer and more turbid. Unfortunately these are all symptoms of degradation; they're all changes for the worse."

According to the Oklahoma Comprehensive Wildlife Strategy, the condition of stream and riparian habitat in Oklahoma Ozark streams is currently poor with a declining trend. Furthermore, the National Fish Habitat Action Plan found that **most of Oklahoma's aquatic habitat is at moderate risk, with**

almost 10,000 miles of stream considered impaired and in need of restoration.

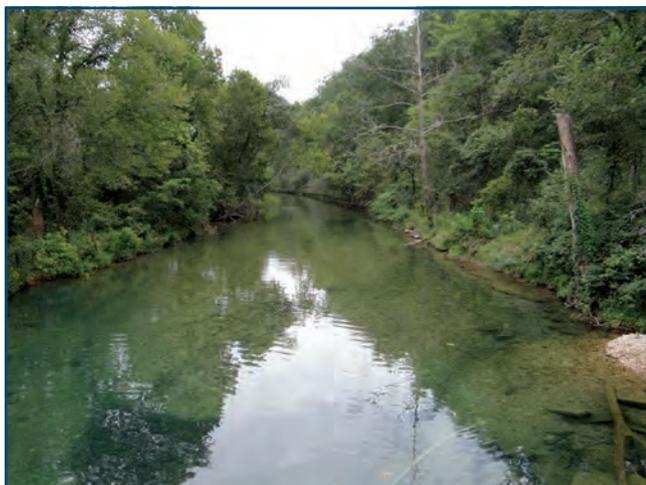
Perhaps the biggest change to Ozark streams over the last 100 years has been a dramatic increase in the amount of gravel in the stream bed. Gravel occurs naturally in the floodplain and is a normal part of a healthy stream. The problem is that most of it is usually covered by a layer of topsoil. But years of heavy erosion has washed the soil away and left the gravel. It also washes in from surrounding fields and the small tributaries in waves or pulses during high rainfall events. Streams naturally meander and change course over time, scouring pools and deep holes as they go.

“These pools and holes are always changing in depth and size, but our landowners unanimously agree that those holes aren’t as deep as they used to be,” West said. “Where they used to have pools 10 to 12 feet deep, we now have pools with six feet of water and six feet of gravel. These excess gravel accumulations also act like a giant sponge, sometimes to the point that the stream will completely stop flowing above ground and instead travel underground through the interstitial pores in the gravel.”

Unfortunately Burroughs says there aren’t any easy fixes to the gravel problem.



Upstream head cutting due to gravel mining. Note how wide and shallow the stream is.



The same stream in an unaffected area. Note how deep and narrow the channel is, also the vegetated banks. This is good stream habitat.

“Improved land use practices can reduce the influx of new gravel, but this is something we’re going to be dealing with for a long time,” said Burroughs. He goes on to say that most landowners intuitively think the best way to get rid of the gravel is just to remove it from the stream, but research conducted in Arkansas and Missouri has conclusively shown that gravel extraction does far more harm than good.

Burroughs explains that streams function on a large scale nearly exactly the same as they do on a small one. “I think we’ve all used a garden hose to make a mini stream in our garden or flower bed. If we take our hand and scoop a handful of dirt out of our mini stream, sediment from upstream immediately rushes in to fill the hole. The exact same thing happens on a stream, just on a much larger scale. When gravel is removed, the velocity of the incoming water increases as the stream tries to fill the hole. That increased velocity creates more erosion; it’s a process known as head cutting and occurs as the stream erodes upstream in an attempt to regain equilibrium.”

In addition to causing erosion problems, gravel mining also releases large amounts of sediments that are bound up in the interstitial gravel spaces. This reduces stream aesthetics as well as biological diversity and production. For example, researchers on the Kings River in Arkansas documented a 50 percent decline in smallmouth bass abundance following a fifteen fold increase in silt and turbidity downstream from an active gravel mine.

“Gravel mining negatively affects the entire stream, including the property of both upstream and downstream neighbors. Erosion and head cutting also cause stream channels to widen, which reduces velocity and the ability to transport suspended solids. As a result, layers of fine sediment accumulate and increase turbidity and nutrient levels. Eventually this can degrade the habitat to the point that sensitive species like darters, chubs and smallmouth bass may no longer be able to persist,” Burroughs said.

According to the Oklahoma Conservation Commission’s (OCC) Gina Levesque, deforestation and clearing riparian zones (the land immediately adjacent to the stream) are two of the most destructive and far-reaching practices affecting our streams.

“Well-vegetated riparian zones are critical for preserving stream integrity and function,” Levesque said. “They’re the single biggest factor responsible for stabilizing banks and reducing erosion. They also greatly reduce the amount of sediment, nitrogen, phosphorus, and pollutants entering the water.”

She adds that “as populations, development and demand for water resources grow, it becomes increasingly important to protect our riparian zones.”

Fortunately, riparian zones (or buffers) can be rehabilitated by stabilizing banks and re-establishing vegetation. To help landowners manage their riparian zones, the OCC offers monetary assistance through their Conservation Reserve Enhancement Program (CREP) — a partnership between local, state, and federal partners that improves and protects water quality through voluntary retirement of environmentally sensitive land for up to 15 years. Levesque is the CREP program coordinator. Restoring and maintaining riparian zones are the



Bare, unvegetated banks experience very high erosion rates and contribute to high sediment and gravel loads. Note the band of gravel lying just beneath the topsoil.

primary focus of the program, she said, adding that research has shown that those practices alone can reduce the amount of pollutants (mainly sediment, nitrogen and phosphorus) entering a stream by 90 percent.

The CREP program is available to landowners in the Illinois River and Eucha/Spavinaw watersheds where OCC is working to protect over 9,000 acres of streamside riparian zones. Significant incentives are available to landowners who agree to remove streamside pasture or cropland from production for 15 years. Participants receive sign up and annual rental payments, as well as cost-share assistance for implementing conservation practices such as fencing, tree planting, stream crossings, alternative livestock watering and winter feeding operations.

Oklahoma's rivers and streams have great biological, aesthetic, recreational and economic value. They carry water that fills our reservoirs, generates our power, dilutes our waste and waters our crops and livestock. They also provide countless opportunities for outdoor recreation and are home to all of our state's approximately 175 fish species, including unique and endemic strains, five state or federally listed species and approximately 50 species of greatest conservation need.

Simply put, Oklahoma has some of the best streams in the nation. Unfortunately, they are also one of our state's most undervalued and under appreciated resources. Efforts to address the problems affecting our streams will likely have positive long term effects, not just on the fish community, but for everything living in the watershed.

For more information about Oklahoma streams and beneficial land management practices contact Jim Burroughs, north-east region fisheries supervisor for the Wildlife Department, at (918) 683-1031 or Don Groom, southeast region fisheries supervisor, at (918) 297-0153. For more information about the CREP program and beneficial land management practices please contact Gina Levesque at (918) 456-1919. ■



Similar stream bank after being rehabilitated and enrolled in CREP program. Note the sloping banks and erosion mats.