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Covers: Bitterweed (*Hymenoxis* sp.) by Ron Spomer

Fishing Ethics

It was the last hour of the day, a late May afternoon so calm I could see the wake of my line as it cut through the water. The two of us had slipped out the kitchen door with our rods after dinner mainly to soak up some of the evening's quiet, but we were willing to take a few bluegill home if we had the chance. Dad walked down to a low cutbank where a massive white oak shaded the water, and I headed toward the dam. I don't suppose I was quite ten, but I had fished this pond consistently for two or three summers, and I had a new box of Mepps spinners which allowed me to fish on my own without running back to the old man's tackle bag every time I lost a lure. He was glad to have the peace, and I relished the independence.

At least I thought I did until he started catching fish. Actually, the action on his side of the lake wasn't all that spectacular, but at the end of half an hour he had put eight or ten bluegill on the stringer and released a two-pound bass while I had caught one three-inch green sunfish. Since the cutbank was obviously the place to be, I pulled stakes and eased around the shore to the oak. The old man didn't look around from his fishing until I made a cast.

"What are you up to?" he asked.

"Well, you were catching fish, and so I thought . . ." My comment trailed off as I saw his expression, that serious, lecture-to-follow look that always let me know that, while I wasn't exactly wrong, I wasn't exactly right either.

"Son, you're old enough to tie your own clinch knot and keep your own tackle. That means you're old enough to give another fisherman some room. When I'm done here, you can fish it. In the meantime, you'd better move down the bank a little."

And I did, grumbling under my breath about the injustices a ten-year-old suffers at the hands of his parents. Four or five casts later, I looked over at the oak. Dad had moved around to the next cove, and I got my chance at the fish.

Some forms of recreation survive crowding better than others. If your idea of a good time is watching a good pro football game, you can make a day of it quite comfortably on twenty or thirty acres with 60,000 other people in attendance; in fact, you'll probably have a better time in the crowd than you would alone. If you're a backpacker, on the other hand, you couldn't fit that many people into the Colorado Rockies without ruining everybody's fun. Like backpacking, fishing tends to be a low density sport. A fisherman can stand a few other people, but, given a choice, he would just as soon have the water to himself. Unfortunately, he seldom has that choice anymore.

Increasing pressure on public fishing areas demands an increasingly stringent code of ethics. The idea of a fishing ethic is hard to define; it will change with time, location, and the expectations of the fishermen involved. Behavior that is perfectly acceptable during a Kansas white bass run might get a man in a fist fight on the flats of the Madison River in Wyoming. If a fisherman has no better guide to ethical behavior, the Golden Rule will do, but it's possible to go wrong simply doing unto others as you would have them do. The best fishing ethics grow out of a knowledge of the sport. You need to know what the other fisherman is after, what he's trying to do, in order to avoid interfering with him. If you manage to keep from stepping on his toes, you'll have earned his respect for two reasons – he will appreciate your concern and will probably be impressed by your knowledge.

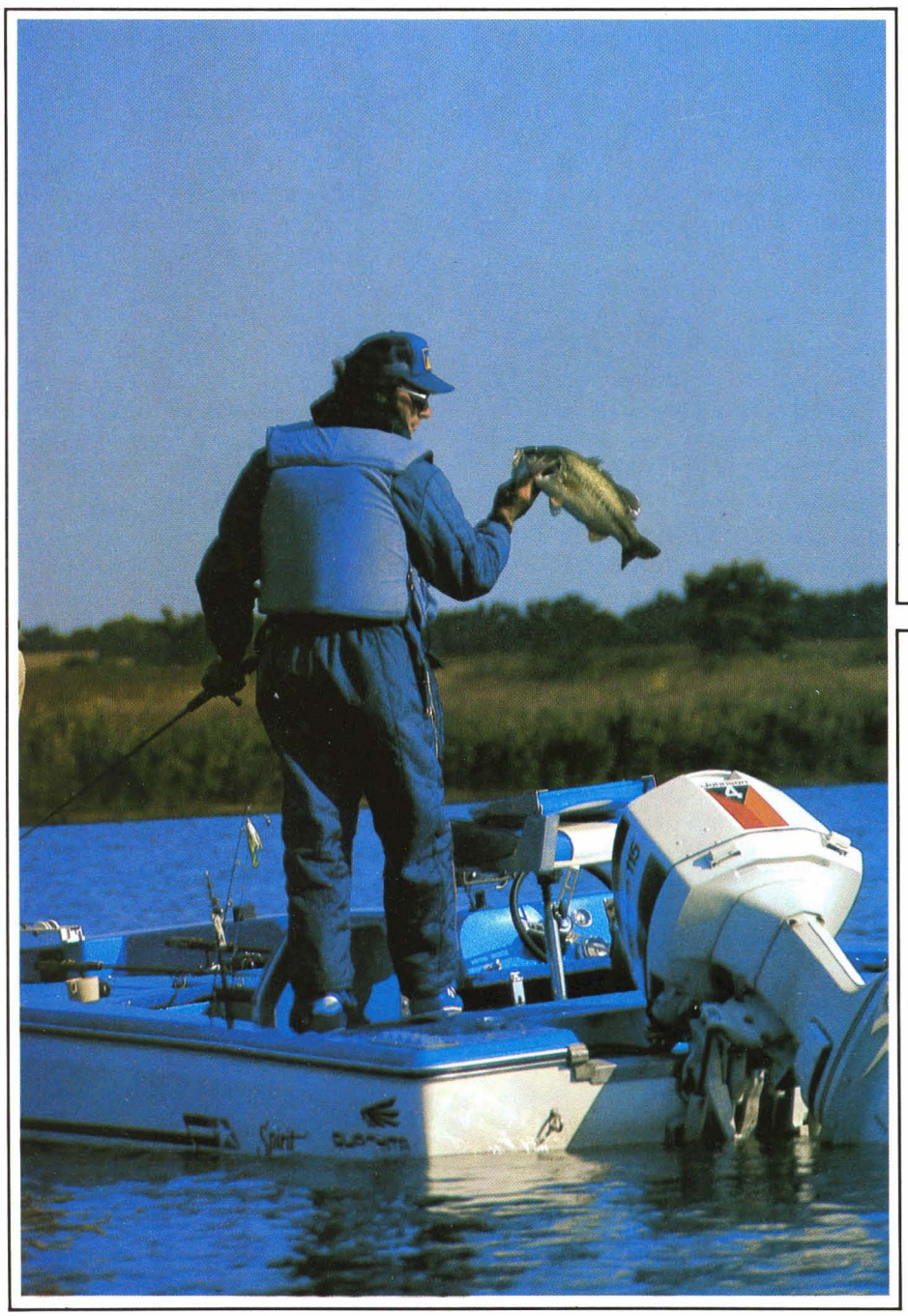
The best parts of a fishing trip are also the most delicate. Fishing is an alternative to noise, crowds, traffic jams. It has a way of quieting the swarm of details that trail after us all. Lacking a tight line with a trophy bass at the far end, most fishermen would admit that a calm, clear afternoon and a little blackbird music are reason enough for fishing but only if the people who share them give each other a little room and consideration. There are times and places where any fisherman worth the title needs to move down the bank a little. □

Are bass fishermen, specifically bass tournament fishermen, a threat to the black bass resource in Kansas? Are they destroying our bass fishing? Bass tournaments have sparked controversy among many Kansas anglers in the past few years. It is time to clear up this issue and let everyone know just what the situation is concerning the black bass in the state.

To many fishermen in the United States, Kansas is a flat, dry state that lies somewhere west of the Mississippi River and north of Texas. Many don't think Kansas has enough water to float a boat, let alone support quality black bass fishing and even professional bass tournaments. But, with its twenty-three federal reservoirs ranging in size from 1000 to 16,200 surface acres, forty state fishing lakes, numerous city, township, and county lakes and over 90,000 watershed lakes and farm ponds, Kansas has plenty of fishing water, much of which provides high quality fishing.

The black basses are natives of Kansas waters. There are three species: the largemouth bass, the smallmouth bass, and the Kentucky (spotted) bass. Anglers have been pursuing these popular sport fish for many years. They are the 'kings of the underwater world.' To fisheries biologists of the state, bass are highly efficient aquatic predators—living, swimming management tools that are used to assist in the development of quality panfish populations.

In the past few years, say since the mid-1970s, the supply of bass has not kept up with the demand. Overharvest and size distribution problems have reduced bass numbers to a point noticeable by the most casual fisherman. Conservation measures were needed and many were developed by fisheries biologists throughout the state. A variety of management techniques have been applied—water level manipulation in reservoirs, habitat improvement, minimal clearing of timber in new lakes, imposition of both minimum and slot length limits, and a reduction of the daily



"Competitive bass anglers are a tiny minority, and we release practically all the fish we catch. It's hard to understand how any fisherman can have a problem with that."

Tommie

Are Bass To
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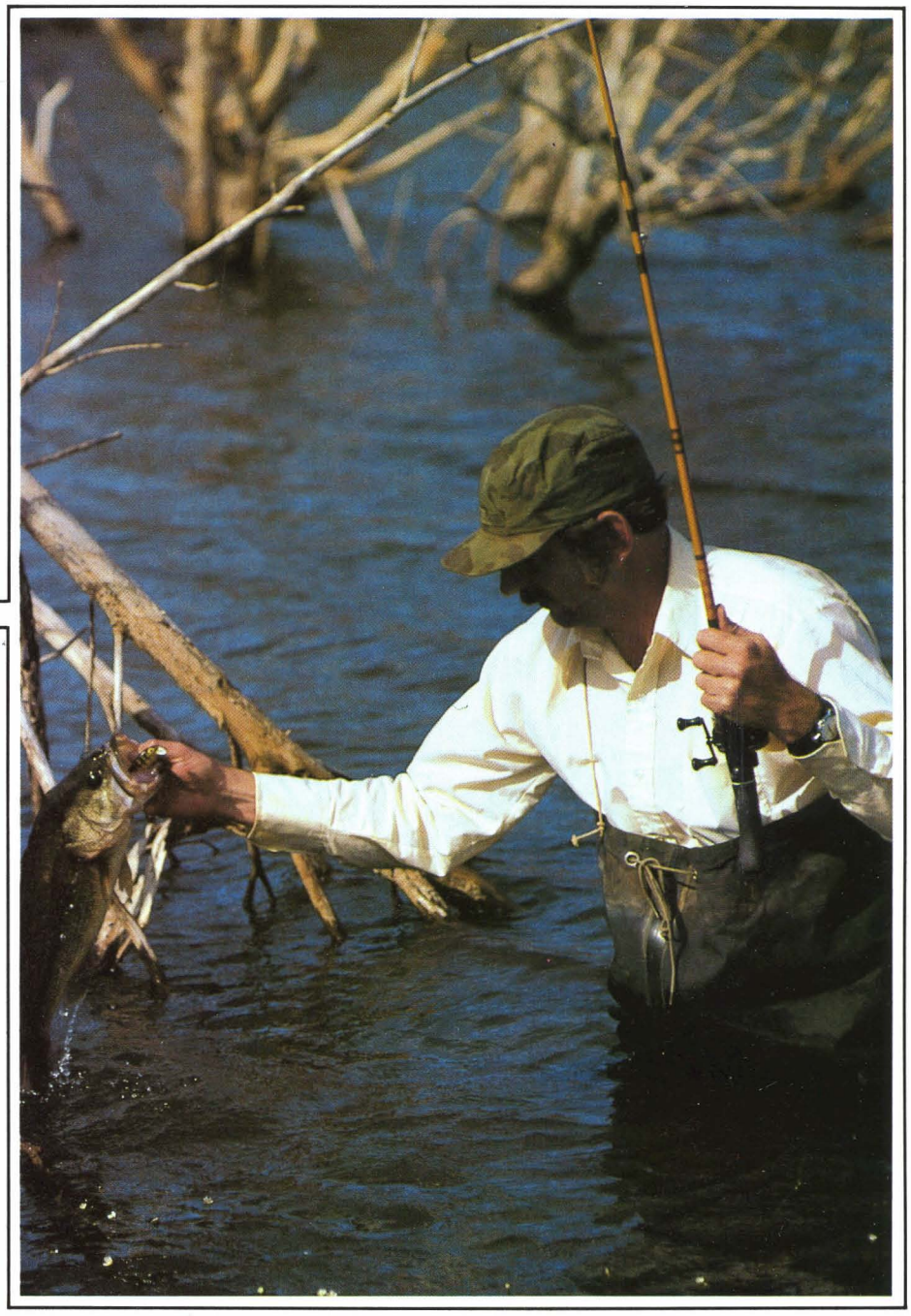
creel limit from ten to five bass per day.

These measures haven't stirred the controversy. The controversy has developed over who gets the blame for that initial decline in black bass numbers and whether those fishermen are continuing to damage the resource. Hopefully, I can produce some facts, figures, and opinions that will help clarify the issue. An article entitled "Are Fishing Tournaments Killing Our Bass?" in the February 1981 issue of *Kansas Fins And Feathers* implies that tournament anglers are damaging our bass resource and that catch-and-release programs should be questioned. This article was based on information from several studies and an opinion of a fisheries biologist (none from Kansas), but it did not mention recent research that shows tournament fishing in a different light.

First, let's look at what caused the decline in bass numbers in the mid-1970s. It was about this time that outdoor recreational opportunities were becoming very popular. Shorter work weeks, good paying jobs, increasing amounts of water, and a lively economy gave the casual and the professional fisherman more time and dollars to spend on his sport. Fancy bass boats were brand new and appealing, all decked out with new-fangled gadgets such as depth locators, temperature meters, trolling motors, aerated live wells, and push-button trim-and-tilt motors. Fishing became an easy and exciting sport.

As a result of these changes, fishing pressure on our lakes began to increase. About this same time, the Fish and Game Commission expanded its staff of biologists who documented these increases in fishing pressure with creel census data on many lakes and reservoirs. Higher angler use meant more hooks in the water, more opportunities to catch more fish. More fishing time meant that anglers were practicing more and becoming more proficient at their sport.

Harvest of black bass increased tremendously because they are a very popular fish and are relatively



"Tournament fishermen use fast boats and sophisticated electronic equipment to find fish. They may release the bass they catch, but that doesn't mean those fish survive."

Berger

urnaments r Bass?

easy to catch, especially on artifical lures. (I'm sure I'll get some comments from some bass fishermen on that statement.) As an example, 1974 creel census data from Clark State Fishing Lake indicated that 14.1 bass per acre were harvested, 23.7 pounds per acre. Since the average standing crop (total bass per acre) in our lakes is thirty pounds per acre, it's fairly obvious that this was overharvest. In 1976, data showed a harvest of 11.3 bass per acre, 17.8 pounds per acre, and 1978 data showed a harvest of just .7 bass per acre, 1.7 pounds per acre. (In 1978, a fifteen-inch minimum length limit was in effect for the first time.)

This overharvest happened on many of our state lakes and reservoirs, and it was done by the average fisherman, not the professional guys with their high-dollar bass rigs and sophisticated equipment. Another study conducted by Fish and Game biologists during the opening of a new lake, Nemaha State Fishing Lake, in the mid-1970s showed that over seventy percent of the total bass population was harvested during the initial fishing season. Of the bass caught, sixty-seven percent were taken by fishermen who showed no preference for bass and were just fishing for anything they could catch.

So, anyone who tries to lay the blame for this initial damage to the bass resource on the tournament bass fisherman is mistaken. The average, every-evening or weekend angler who has found more time and money to spend fishing seems to be the culprit. Some of the blame could even be laid on the new fisheries biologists who came on in 1973. In their eagerness to do their jobs, they issued weekly fishing reports, wrote articles to help anglers improve their technique. and installed fish habitat structures which concentrated the bass for easier harvest, all of which made it easier for fishermen to catch bass. In doing this, the fisheries staff learned the hard way that some species of fish, including bass, can be overharvested.

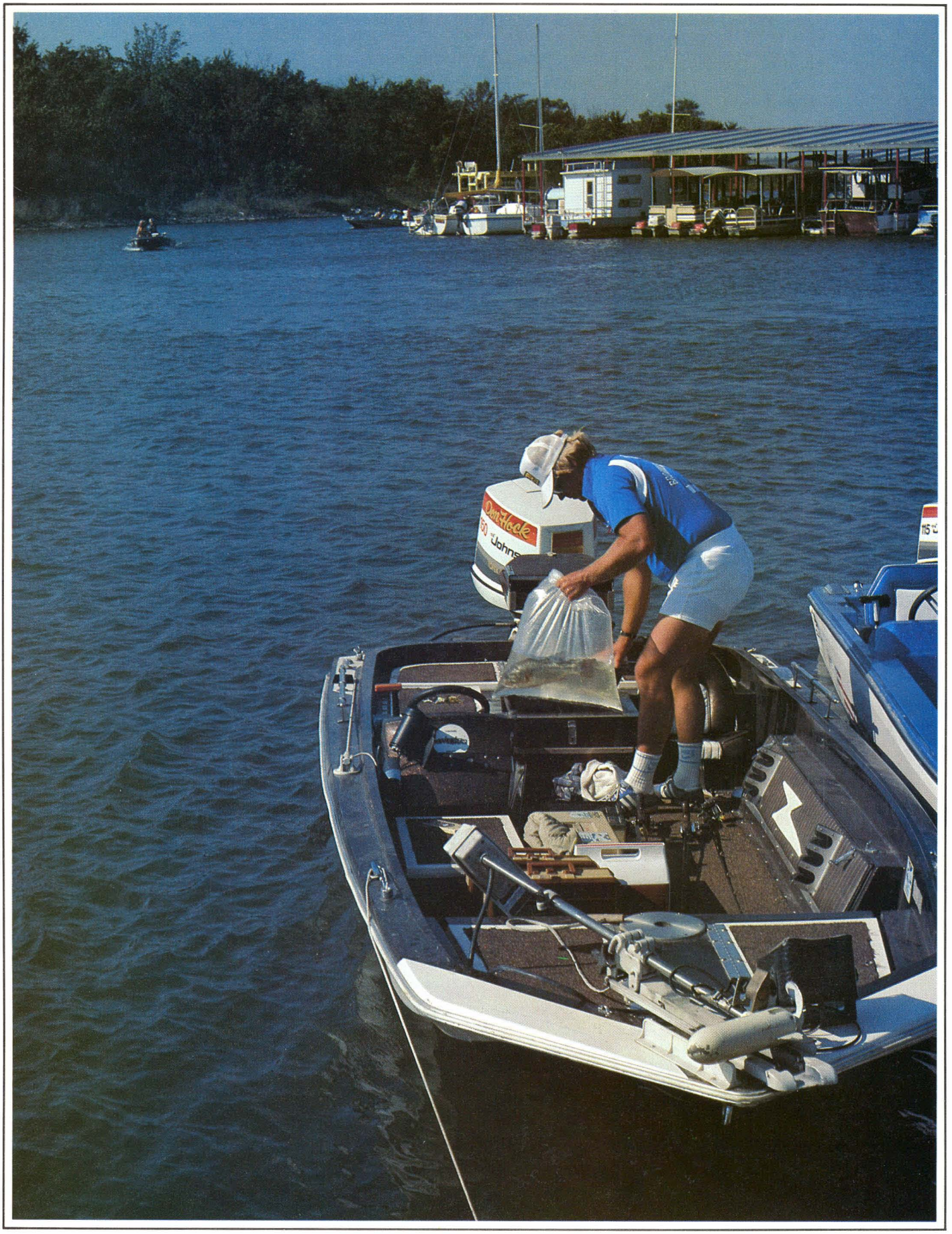
Many dedicated bass fishermen do not *harvest* bass, anyway. Most are firm believers in a catch-and-release program and return their bass to the water, except for a lunker or two for the den wall. This brings up another point of controversy, the idea of catch-and-release, but I'll get back to that a bit later.

The new management techniques and regulations adopted over the last few years are bringing bass populations back, and we are now in a period of rebuilding. But there is room for controversy even so. Are there still some segments of our bass fishing public that are slowing the rebuilding process? Is a catch-and-release program (which is the basis of our length limit regulation) effective? And, what do bass tournament statistics tell us about bass tournament fishing pressure on our lakes and reservoirs?

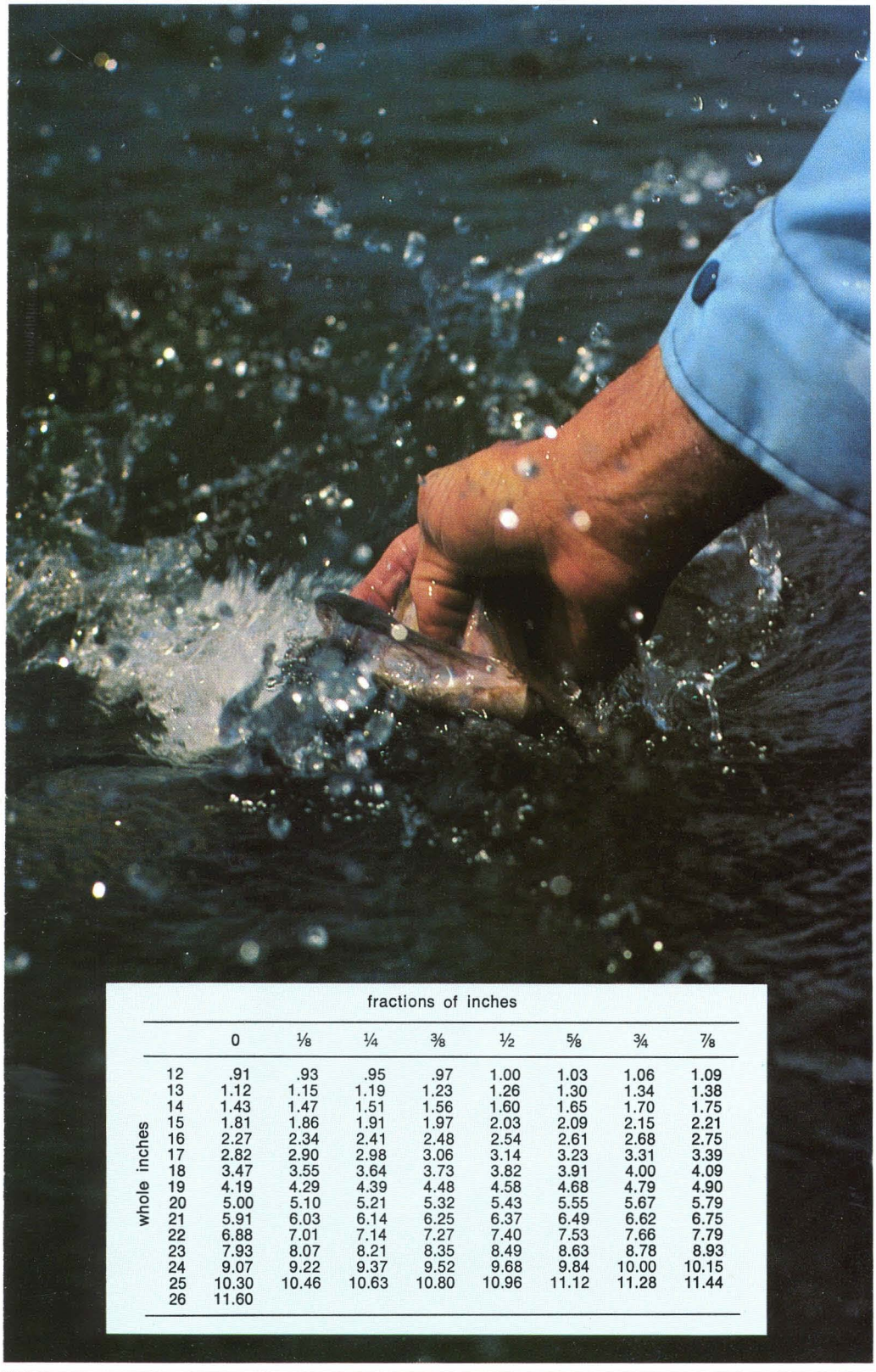
The *Fins And Feathers* article makes the following statement: "Professional fishermen are just that—highly skilled technicians far ahead of the casual or weekend fishermen in skill and knowledge. They have spent hours honing their skills and spent unlimited funds on securing and adapting proper gear to enhance their catch rate. Fishing isn't recreation to them; it's hard-core work. There's an old adage that ten percent of the fishermen catch ninety percent of the fish and these are the guys they have in mind."

A few comments are in order. First, the number of "professional" fishermen as they call them, is probably much less than one percent of the total angler population in this state. Second, these professional fish-for-cash bass fishermen are generally those who fish the high-dollar, nationwide professional Bass Anglers Sportsmen's Society (B.A.S.S.) tournaments and try to make a living at it. If one looks down a list of entrants to the six annual B.A.S.S. tournaments held across the country, the number of different fishermen adds up to maybe 800 or so, a far cry from the millions of American anglers who fish for fun. I don't know of one bass angler from Kansas who earns enough to live on

Bass tournament officials and professionals are sensitive to public criticism. They are careful to avoid overcrowding in their live wells and to handle their fish gently during weigh-in. The bass are usually moved in plastic sacks to avoid damage to the fishes' slime coat and internal organs. (Photo by Ron Spomer).



Kansas fisheries biologists have eliminated the need for weigh-in at many of the state's bass tournaments. They have developed a table that accurately estimates a fish's weight from its length (below). Whole inches are shown on the left; fractions of inches across the top. The body of the table shows the average weight of Kansas bass of a given length. (Photo by Lloyd Brockus).



whole inches	fractions of inches							
	0	1/8	1/4	3/8	1/2	5/8	3/4	7/8
12	.91	.93	.95	.97	1.00	1.03	1.06	1.09
13	1.12	1.15	1.19	1.23	1.26	1.30	1.34	1.38
14	1.43	1.47	1.51	1.56	1.60	1.65	1.70	1.75
15	1.81	1.86	1.91	1.97	2.03	2.09	2.15	2.21
16	2.27	2.34	2.41	2.48	2.54	2.61	2.68	2.75
17	2.82	2.90	2.98	3.06	3.14	3.23	3.31	3.39
18	3.47	3.55	3.64	3.73	3.82	3.91	4.00	4.09
19	4.19	4.29	4.39	4.48	4.58	4.68	4.79	4.90
20	5.00	5.10	5.21	5.32	5.43	5.55	5.67	5.79
21	5.91	6.03	6.14	6.25	6.37	6.49	6.62	6.75
22	6.88	7.01	7.14	7.27	7.40	7.53	7.66	7.79
23	7.93	8.07	8.21	8.35	8.49	8.63	8.78	8.93
24	9.07	9.22	9.37	9.52	9.68	9.84	10.00	10.15
25	10.30	10.46	10.63	10.80	10.96	11.12	11.28	11.44
26	11.60							

with his tournament winnings. Most "professional" bass fishermen in Kansas belong to local bass clubs, may fish the Kansas Professional Bass Anglers (K.P.B.A.) tournament circuit, enjoy the competitiveness of tournament angling and, if money is involved, most winnings are barely enough to defray expenses of the trip.

There seems to be a misconception of the professional bass fisherman. Just because a fellow has an $8000 bass rig, thousands of dollars invested in fishing equipment, and attends local bass club meetings or K.P.B.A. tournaments, that doesn't make him a Jimmy Houston or a Harold Ensley (although he might like to be!). Your local "professional" may be your next-door neighbor, your postman, your fisheries biologist, or the fellow who owns your local bait shop. He may be better than average at catching bass, may set his priorities differently and put more money into his favorite sport, but he still baits his hook just like everyone else.

On the other hand, many bass anglers look at the casual fisherman as a perch jerker, a bank stomper, or a river rat. Many a casual angler is just as proficient at his sport as is the bass fisherman. When it comes to putting fish on the table, the casual angler wins hands down! Like all too many other controversies, the face-off between the two bass fishing camps is the result of deep-seated prejudices and is a little ridiculous.

The real roadblock in the way of our attempts to revive bass populations and bass fishing is the poacher, the law-breaking angler who does not abide by the length limits and creel limits, the fellow who takes a basketful of ten-inch bass while fishing for crappie, who fillets short bass in his boat, who catches and takes home ten or twelve bass per day when they are biting good. In the process, he steals from every other fisherman in the state.

Let's get back to catch-and-release programs. The catch-and-release idea for bass gained a lot of attention back in 1972 when B.A.S.S. initiated a "Don't-Kill-Your-Catch" program. The idea was based on the premise that sport fish such as bass can be

caught, handled correctly, and returned to the lake to be caught another day. All professional B.A.S.S. tournaments, K.P.B.A. tournaments, and most local club tournaments release all bass that have a good chance of survival. Extra point incentives are given in the bigger tournaments for bass weighed in alive.

Prior to 1972, I'm sure many anglers followed their own informal catch-and-release policies. Anglers have been returning fish too small to clean for centuries. The idea has caught on with larger fish, and it has become the focus of public attention and controversy.

The controversy stems from the angler's handling of bass when he plays and lands them and the condition of the fish when they are returned to the water. Some contend that most anglers do not handle fish correctly and that most die sometime after they are returned to the lake. The *Fins And Feathers* article discussed a study in Arkansas that showed that most of the fish caught, weighed in, and released in a B.A.S.S. tournament there died. Other studies have been done with different results. In a Missouri study, about ninety-three percent of the bass weighed in were released alive with a delayed mortality of another four percent. Kansas biologists have made similar studies after K.P.B.A. tournaments and found that well over eighty percent of the bass weighed in survived to be caught again.

Don Gablehouse, pond research biologist at the Emporia office, is the Fish and Game expert on length limits in Kansas. He found some interesting information while working with the evaluation of the fifteen-inch minimum length limit at Melvern Reservoir. During the collection of bass with an electro-fishing unit, Don found that he could recognize hook scars on some of the bass, especially those over twelve inches long. Data show that thirty-five percent of the bass taken had obvious hook scars or marks. Data also show that year-class strength (numbers of bass of the same age) remains fairly constant until the bass reach fifteen inches, which is the legal limit in Melvern. So, to quote Don, "Based on the numbers of fish we see with hook marks at Melvern, it appears that mortality due to catch-and-release is insignificant."

Proper handling of a bass can certainly increase its chance of survival. When an angler removes his hook from a bass, he should hold the bass firmly by the lower jaw and gently work the barbs free. If the fish is measured, wet the measuring board and measure the fish quickly. A live well is a great part of a boat, but it can be a death trap to a bass. Aerators should be used often, and a plug should be kept in the live well drain when traveling from one fishing location to another. Don't overcrowd a live well. The rule of thumb is no more than three quarters of a pound of bass per gallon of water.

Many non-tournament fishermen worry about weigh-ins. Do bass tournaments have to conduct a weigh-in at day's end that require anglers to carry around bass all day in the boat? Prior to the mid-1970s, all tournaments, even local club tournaments, generally had end-of-the-tournament weigh-ins. But, in 1975, the Blue Valley Bass Anglers Club of Manhattan and I devised a length-weight table for bass using a curve which allows an angler or biologist to figure a relatively accurate weight for a bass from length alone. The table has solid scientific backing and has proven to be quite popular.

Improvements were made in the table as years passed, and the table included with this article is the one currently being used by many individuals and clubs in Kansas. Everyone must realize that this is a relative system, but, if everyone uses the same table, it becomes quite accurate. A close inspection of the table indicates even inches on the left, one-eighth-inch increments along the top, and weights in the remaining columns. According to the table, a fourteen-inch fish weighs 1.43 pounds and a nineteen-and-three-eighths-inch fish weighs 4.48 pounds. Use of this table eliminates the need for end-of-the-tournament weigh-ins. Bass used to design the table came from lakes and reservoirs throughout the state, so it is a statewide average of bass and can be used anywhere. Biologists can also make up an individual table for each reservoir if need be.

Larger fish-for-money tournaments, such as K.P.B.A. and B.A.S.S. circuits, require daily weigh-ins. Some contend that, since sizeable sums of money are involved, a few ounces can make a big difference. Also, if the length-weight table were used, some say, there would be more opportunity for cheating. And some feel that the public attention of the weigh-in is a valuable part of this type of sport fishing. Tournament directors of these weigh-in tournaments are under fairly intense public scrutiny, so they make special efforts to keep bass alive by providing plastic bags for carrying the fish, water-filled tanks along the weigh-in line where fish can be placed for extra support during long waits, aerated and chemically treated holding tanks for fish after weigh-in, and special point incentives for live fish. Be sure to recall the over eighty percent survival figure that Kansas biologists have documented for weighed-in bass.

One other controversy concerning catch-and-release is the question of what to do with an injured fish that is below the legal length limit. Sometimes a bass swallows the hook or gets hooked in the gills and will surely die. The law says that the bass must be returned and it seems a waste. Still, if Fish and Game allowed one angler to keep an illegal dead bass, soon some anglers would intentionally kill a bass so he could keep it.

Finally, what do bass tournaments statistics tell us about bass tournament fishing pressure on our lakes and reservoirs? A study of tourna-

In top-dollar tournaments where weigh-ins are still required, Fish and Game biologists move the fish back to good habitat after they have been weighed. Measurements taken during bass tournaments yield valuable information to fish managers. (Photo by Ron Spomer).

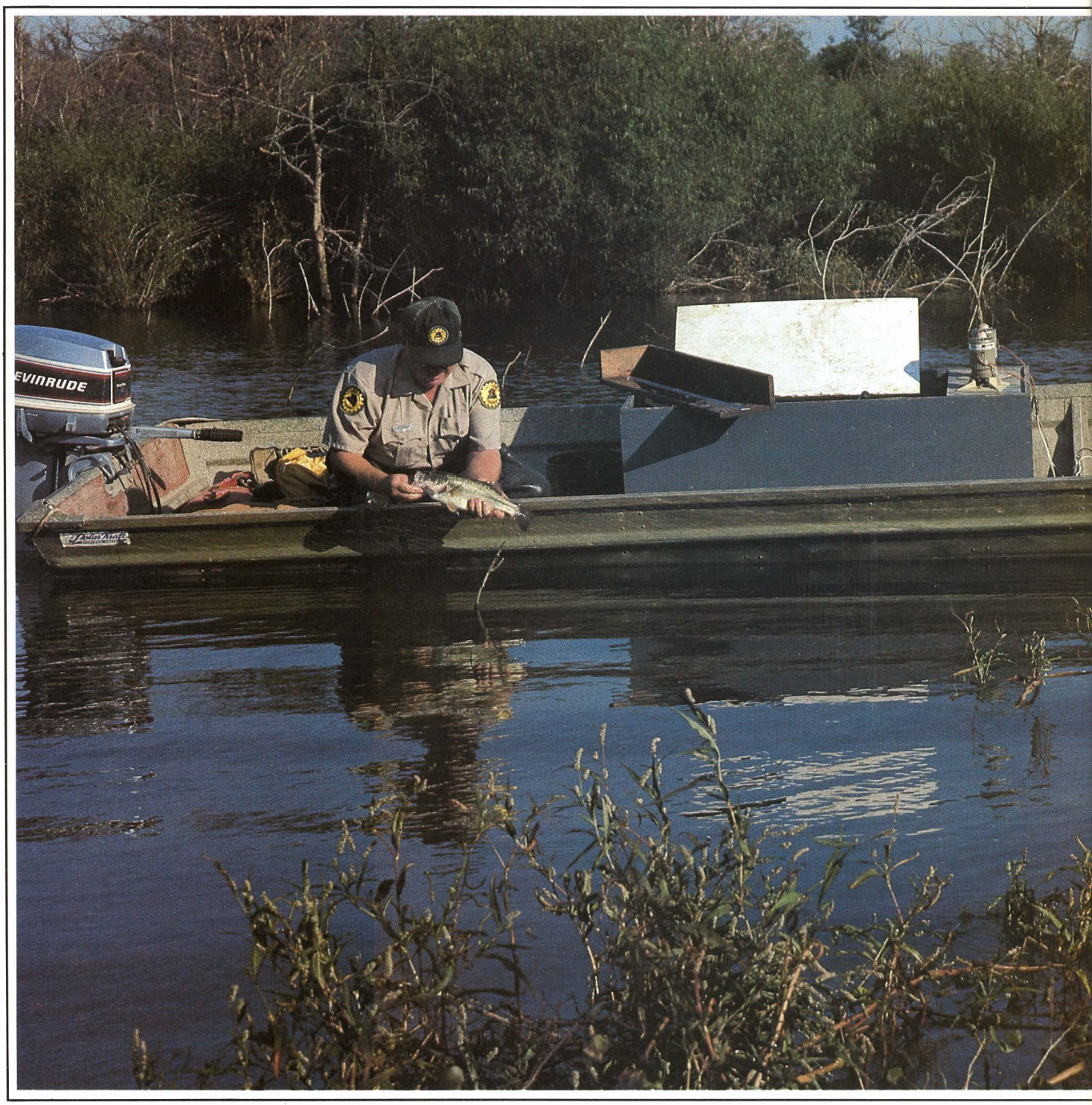
ment data is published in a Fish and Game booklet entitled, *Kansas Black Bass Tournament Monitoring Report, 1977-81.* I would like to quote some interesting data from this booklet.

—Bass in the eight- to twelve-inch length range have not been taken in tournaments in the same proportion as in electro-fishing by fisheries biologists. Tournament anglers generally select against this size range.

—Bass in the twelve- to fifteen-inch range appear to be just the reverse, that is, selected for by tournament anglers.

—The fifteen- to twenty-inch range is uniformly taken by both tournaments and electro-fishing.

—The number of bass over the



twenty-inch range taken by either method is low.

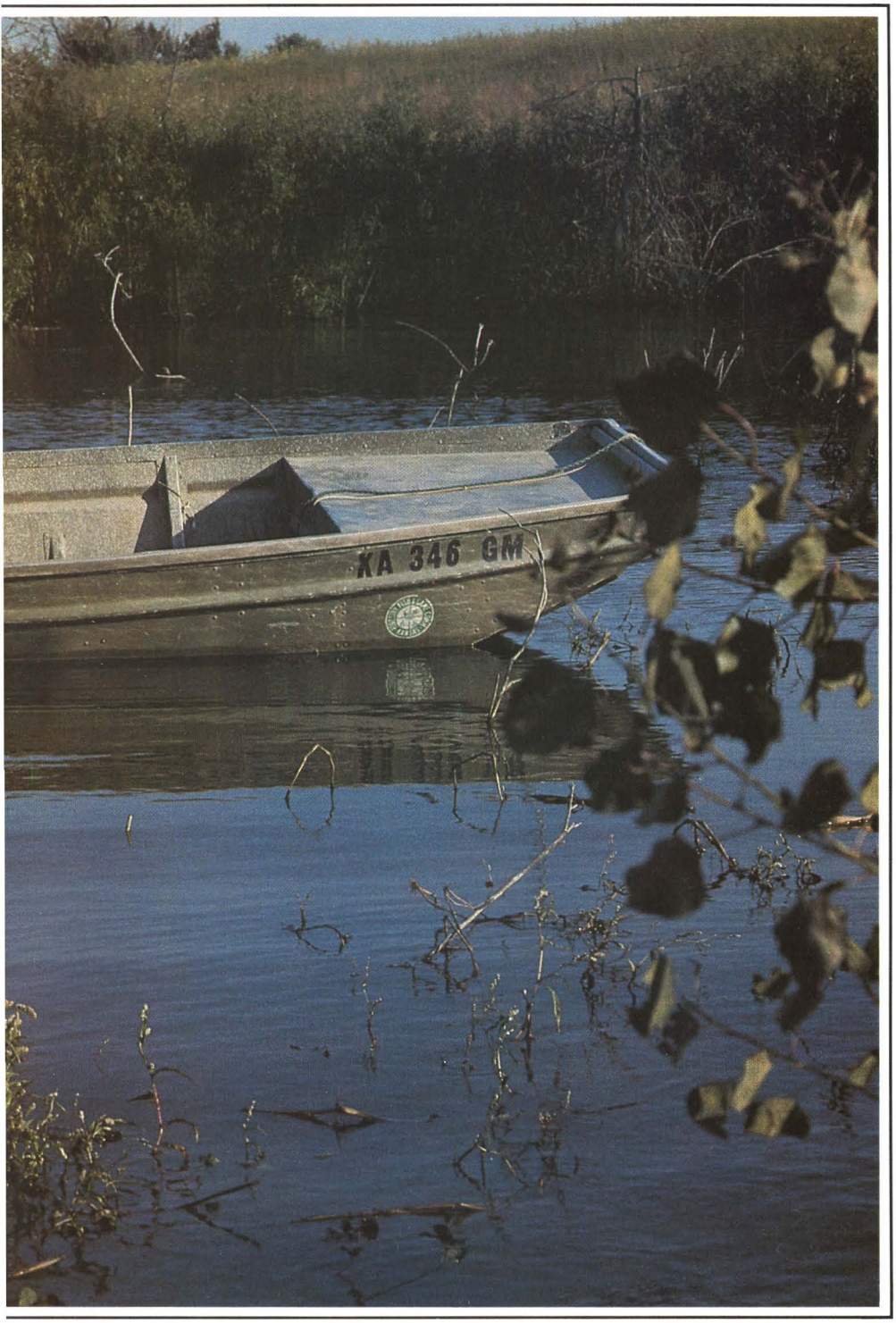
Texas, a popular bass fishing state, has kept similar reports for their tournaments, and a comparison of Texas and Kansas tournament fishing is interesting:

—The average weight of bass caught during Kansas tournaments is lower than in Texas tournaments.

—Kansas tournament fishermen consistently catch more pounds of bass per hour of fishing than Texas anglers. The Kansas catch rate has improved since the adoption of length limits.

—Kansas fishermen also catch more bass per hour fished.

—A comparison of fishing quality was also encouraging; Texas anglers must fish an average of 1508 to 2353 hours per bass over six pounds while Kansas anglers collect a bass over five pounds in 101 to 1998 hours of angling effort. Both reports are based on solid data collected by research biologists.



The Texas biologists go on to make the following statements:

—The general fishing public need not worry about the effect of tournament fishing on bass populations.

—Harvest by bass club competitors is still far from that believed detrimental to healthy bass populations.

—Most of the bass "harvested" during tournaments are actually released and become available to other fishermen.

—Most of this information is provided voluntarily by bass clubs and tournament organizations who are eager to assist fish and game agencies with monitoring and improving bass populations.

This comparison clearly indicated that, even at the present time, bass fishing in Kansas is better than in Texas. And, we are not yet seeing our bass population at its full potential; it is still rebuilding from a severe decline brought about by a simple increase in fishing pressure from the average fishing public. Length limits designed to encourage catch-and-release fishing have been adopted along with other management techniques to speed the recovery of bass fishing. Bass tournaments are just an intensified version of the fishing sport and are providing some valuable information on our bass populations.

So, I think that this article can be summed up in one fairly simple answer to a fairly complicated question. Are fishing tournaments killing our bass? In Kansas, the answer is "No!"

Tommie Berger, district fisheries biologist in Dodge City, has worked many Kansas bass tournaments and has even competed in a few. He has also seen first hand the public's impact on bass populations in a number of western Kansas lakes. As a result, he is unusually well qualified to consider the merits on both sides of the tournament fishing controversy.

More cover, better fishing

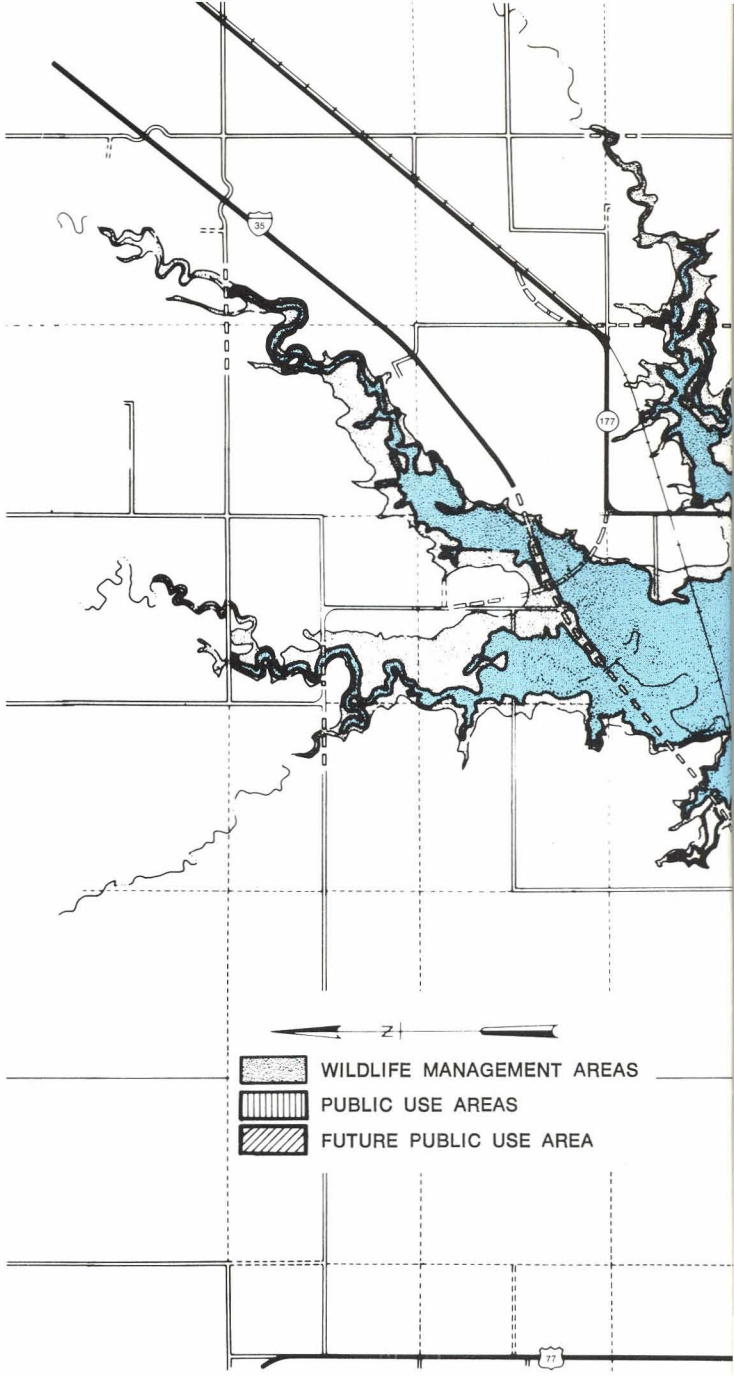
El Dorado

Dave Willis

During June of 1981, the gates were closed on newly completed El Dorado Reservoir just northeast of the city of El Dorado. The reservoir will be fairly large, covering about 8000 acres and inundating both old El Dorado and Bluestem lakes.

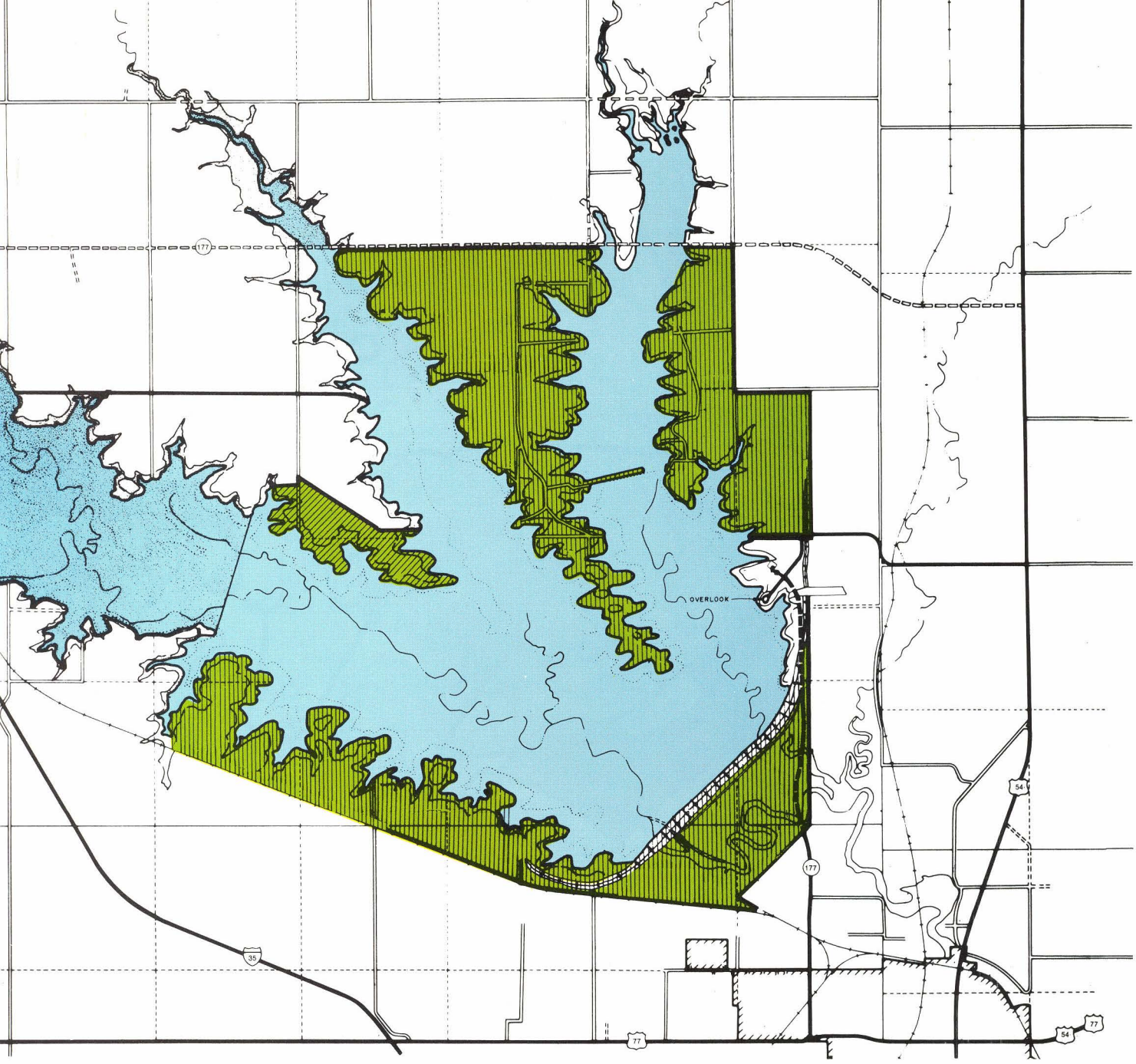
Thanks to diligent work by many Kansas Fish and Game Commission biologists and good cooperation from the U.S. Army Corps of Engineers, especially personnel in the Tulsa office and project manager Jim Fry, the new reservoir will be a delight from a fisheries point of view. Because of the work of these people, a tremendous amount of structure has been left or built in the reservoir. This structure is a tremendous aid to fishermen because it concentrates fish and makes them more vulnerable to a variety of angling techniques. A large amount of standing timber was left in the reservoir while, in areas where trees were cleared for boating safety reasons, the trees were often pushed into piles and cabled down. Such sites provide excellent fish habitat. The east end of the dam has a steep rock ledge, and the west end has a series of gravelled cuts running from the shallows out into deeper water. Haul roads used by construction contractors along the face of the dam were also left to attract fish. The new railroad bed across the upper end of the reservoir has rock riprap along its trestle; the old railroad bed was left in place and still runs directly into the reservoir from the upper end. All of these areas should provide excellent fishing in years to come.

There is also a staged filling plan for El Dorado Reservoir. This plan may be the most important management tool we have for assuring the initial success of the reservoir's fishery. Last fall, the reservoir contained slightly more than 800 acres of water. This spring, the water level will be brought up to about 5,000 surface acres, and the final filling will occur by degrees until the lake reaches a size of about 8,000 acres by the spring of 1985.



All newly flooded reservoirs experience an initial boom when fishing is excellent, mainly because expanses of drowned vegetation furnish excellent living and breeding habitat for most game species. After this vegetation breaks down and is covered by silt, fishing success declines, and people wonder what has happened. At this time, a water level fluctuation plan is critical to maintaining a productive fishery. A problem with fluctuation plans often develops in Kansas because so many agencies are involved in reservoir management, and each agency has its own priorities for the water. A working fluctuation plan depends on good cooperation among these agencies—and we feel there is such cooperation at El Dorado.

Stocking began at the reservoir during the summer



of 1981. Approximately 110,000 largemouth bass and 162,000 bluegill were released. Beginning this spring, the Fish and Game Commission plans to stock walleye, largemouth bass, bluegill, and black crappie. Fish already present in the Walnut River flowing into the reservoir will also have an impact on the fishery. The river is almost certain to contribute a few spotted bass, white crappie, and flathead catfish, and white bass may show up as well. The all-important forage base will also come from the river. Gizzard shad already present should reproduce readily in the new lake, providing a tremendous food supply which will be augmented by small carp and a wide variety of minnows. As the lake ages, the red shiner will probably become the most abundant small bait fish.

The key to success with the El Dorado fishery will be water quality. If the water remains fairly clear, we should be able to develop a good bass population. Since the reservoir is on the edge of the Flint Hills where most drainages are in pasture, it is reasonable to expect a clear reservoir; however, the old lakes in the drainage are quite muddy for some reason. If the new reservoir takes after its predecessors, we may still be able to improve water quality with the water level fluctuation plan. If that doesn't help enough, we may have to settle for a walleye-crappie-channel catfish reservoir. In either case, we'll do our best to build a productive fishery with the tools at our disposal.

Dave Willis is an investigations biologist in charge of reservoir fisheries in the state.

A fisheries man in search of a fabled catfish bait . . .

Green Worms

Jim Goudzwaard

Illustrated by Bruce Cochran

"Green worms?! What in the . . . Say, you can't put that kind of thing over on *me*, even if I am just off the bus from Ann Arbor."

It was nine years ago, and I had just moved from Michigan to Kansas to take a biologist's job with the Fish and Game Commission when I first heard about green worms. I was a little suspicious. As far as I could tell, there were only two plausible explanations for this green worm talk: either northeast Kansas fishermen were using a new artificial in a provocative shade of lavender or chartreuse, or someone was pulling my leg.

A number of years passed and the green worm stories continued. On several occasions, I tried to get the truth out of the well-seasoned anglers who were coming into the office to sing the praises of green worms, but I couldn't convince any of them to come clean. In fact, they grew more persistent. Once in a while, they almost talked me into believing that there really was such an animal, even though I knew the whole idea was ludicrous. It took a good friend of mine to convince me that I ought to investigate green worms. He offered to act as a guide, but I turned him down. There was no sense in exposing myself to public ridicule.

Upon arriving on the Delaware River bottoms north of Topeka (a supposed green worm haven), I commenced to bulldoze a couple of acres of topsoil in search of green worms, and, as I suspected, found nothing at all! I had been victimized, made a fool of—there were no green worms. Righteously indignant, I stormed back to my friend's house and accused him of working a cruel hoax at my expense. He shook his head patiently, and when I had calmed down, explained that I would have caught all the worms I had wanted—if I had been looking in the right place.

Green worm hunting is a real art, almost like mushroom hunting except that mushrooms don't move. There is one piece of information that is critical to the success of any green worm expedition: Do green worms inhabit the area you're searching?

After discussions with fisheries biologists across Kansas, I have found that green worms are a phenomenon common only to the extreme northeast part of the state.

Green worm reports as far west as Riley County and as far south as Osage County were noted by biologists. Of course, the range may be slightly larger. Accurate reports are hard to come by since dedicated green worm fishermen go to nearly any length to keep favorite worm spots a secret.

The angler interested in baiting up with green worms may be able to find them along the Kansas River in Pottawatomie, Wabaunsee, Riley, Shawnee, Jefferson, Douglas, Johnson, and Wyandotte counties; on the Wakarusa and Marais des Cygnes rivers and Dragoon Creek in Osage and Shawnee counties; on Mill and other flowing creeks in Wabaunsee county; along most bigger streams in Brown, Doniphan, Atchison, Jackson, Jefferson and Leavenworth counties; and on the banks of the granddaddy of all green worm refuges—the Delaware River in Jefferson, Atchison, and Brown counties.

As habitat is critical for quail, pheasants, and fish, so it is for green worms. Search in areas with moist ground, dense tree and weed growth, and lots of mosquitos. Secluded stream banks right after a fairly heavy rain seem to be good green worm producers. The soil should be a slightly muddy clay. One old-time green wormer told me there was an easy way to test for proper soil moisture. Just pick up a handful of topsoil and squeeze it. If water oozes out or the dirt crumbles to dust, you're not in the right spot. The ideal soil moisture lies somewhere between the two extremes.

So out again I went in search of the elusive green worm. I had already taken the precaution of getting the landowner's permission to dig along his stream bank. This might have been a mistake, for I received the same disbelieving look that I'm sure I had given others with green worm stories. Apparently, he felt sorry for anyone who could be so gullible and granted me permission. My friend was kind enough to advise me that hip boots should be worn on a green worm hunt, and he had an excellent point. Wow, talk about gooey!! I see now why he also recommended a good potato fork for worming—this wet clay would be awfully hard to turn and break up with a spade.

Holes?? Holes!! These are the telltale signs of green worms and here I was—in the midst of hundreds of holes. With anticipation, I turned over a good chunk of gumbo. Nothing. I reinserted the fork into the chunk and broke it into several smaller pieces and could not believe my eyes. There it was—a tightly coiled worm. And yes, IT WAS GREEN!!

In the next thirty minutes, I found about twenty-five green worms. Most of them were the size of a regular earthworm; the biggest were somewhere between earthworm and nightcrawler dimensions. It was interesting that, although holes were everywhere, I found relatively few worms. I supposed that this was quite similar to all the tracks just one rabbit can make. In subsequent discussions with other green wormers, I found out that these unusual animals often hang out just underneath a heavy decomposing leaf cover on the ground.

Another oddity was apparent to me after picking up this bait for several minutes—these animals had a nasty smell. I assumed this is why most channel catfish anglers are green wormers and vice versa.

Being a biologist, I developed a strong curiosity as to what these animals were. Not being trained in the scientific identification of worms, I turned to the Kansas State Biological Survey at the University of Kansas. They forwarded the specimens to an eastern university that had its own worm identification specialist. Apparently, worms must be sectioned and the setae (microscopic bristles on the body) structure and arrangement studied in order to identify the correct species.

Although the species was not determined due to poor specimens, these animals were thought to be in the Phylum Annelida (segmented worms) and Class Oligochaeta (earthworms).

In the absence of any concrete testimony from a green worm expert, I have come up with my own theory about the origins of the green worm. It seems to me that they may be a fairly common species of earthworm that has picked up a green color and unpleasant odor from the moist clay in which it lives. Or maybe the color and smell have more to do with the worm's diet than its housing. In any case, green worm ecology and taxonomy seem to offer a fertile area for research. Perhaps we can look forward to some future PhD. enlightening us concerning greenwormology.

All technical matters aside, a bait is only a good bait if it catches fish. Green worms generally work best in streams associated with the area where you find them. They worked well for me! After hooking three or four worms on a hook in no particular method (a rather smelly job) and angling as a typical catfish fisherman would, I had more action than I had expected. Boom, boom, boom—three fish in less than ten minutes. This strange bait seemed to not only catch catfish, but also carp, bullhead, and drum.

I can now say that I am a true believer in green worms. Not only have I dug them, but also fished with them and done very well. I would highly recommend their use to anyone interested in catching fish, but I want to offer one piece of advice that I picked up from a seasoned green wormer: be careful not to get the juice from the worm in your eyes—rumor has it that you'll go blind!! □

Jim Goudzwaard is district fisheries biologist stationed in Valley Falls.

Artist and cartoonist Bruce Cochran of Prairie Village has placed work with AUDOBON, SIERRA, FIELD AND STREAM, and a number of other nationally circulated magazines.

the YELLOW Pages

INSIDE

LETTERS to the editor

APOLOGY

Some 17 years ago I came to Kansas as a college student and have enjoyed the wonderful outdoors of this state ever since.

What has made the real difference in this state is the friendship and kindness extended by its rural residents. I can't think of the last time I was turned down by a farmer when I have asked to hunt. Over the last several years I, along with other hunting friends, have enjoyed the friendship of several farm families who have allowed us to hunt their land.

What I really want to say is that I want to apologize to all the farmers and ranchers who have had less than pleasant experiences with some 'sportsmen.' I want to thank all who have extended their hospitality to me and others who enjoy and respect their land. I trust that with mutual respect and understanding my children will enjoy all that Kansas has to offer.

Jim Weaver
Overland Park

BUZZARD BALLET

First, thanks for a very good magazine. We look forward to each issue. You have some very good writers and photographers. That story about John Redmond Dam was very well written.

I live seven miles east of Melvern Lake (the nicest lake in the country). There are around 50 buzzards roosting in some sycamore trees about one-quarter mile from our house. In the early morning they fly up to two old barns and a walnut tree. They sit there awhile before taking out for the day. In the evening, they come back to their roost. If the weather is right (and usually just before a storm) they sure put on a flying exhibition. It is almost like watching ballet. They are most interesting to watch. And they would make a good story for your magazine sometime.

Otis Patterson
Melvern

TRIBUTE

Sign me up for a three-year subscription to KANSAS WILDLIFE. I want to thank you and your staff for the fantastic job you do in publishing your magazine. I think it is excellent and thoroughly enjoy each issue. Keep up the good work.

Jacques D. Gray, Sr.
Arkansas City

LIKES AND LACKS

I just wanted to say how much I enjoy reading your magazine. I look forward to each issue.

One thing I greatly appreciate is the lack of advertisements. It is nice to know that you're not out to make a buck, but to provide the people of Kansas with a well-written, beautifully photographed magazine about the wildlife and the outdoors found close to home. This is especially important with today's higher cost of travelling.

I am renewing my subscription for three more years. Please keep up the good work.

Jerry W. Timmons
Wichita

QUICK KUDO

You have an outstanding publication. I have not read one better. Well done.

W. Herrick
Wichita

OBSERVATIONS

I personally know Johnny Ray, the game protector in our area, and he is a fine fellow with a million friends. We have more pairs of quail this spring than we have had in ten years; also have an extra lot of cottontails. I was a game protector at Lone Star Lake back in the 1930s. I have taken your magazine ever since you started sending it out. It gets better every year. Keep up the good work. Glad to hear the law caught Claude Lafayette Dallas, Jr. Hope they give him 99 years at hard labor.

L. A. Fuqua
Pomona

SUGGESTIONS

I'm renewing my subscription for three years. I've had it for years and enjoy it. I also have

40 acres in game reserve on two different farms. I've had three different deer permits but was unfortunate enough to be in the hospital during all three of them. I would suggest shortening the hunting season, especially on pheasant and quail, and having a closed season on cottontail.

Peter Unterbuger
St. George

THE RIGHT WAY

I have heard and seen it all now in Kansas. Every lake I have been to is overrun with Orientals. I went to Clinton recently. As a rule, you cannot fish the spillway there without being checked by a game warden. But there were these Orientals there snagging anything that was swimming, from three-inch fish to nice white bass and walleyes. The guy next to me snagged three and did not turn any back.

Also, I went to Antioch Park one evening and there were about 20 Orientals there and they were keeping fish that were just a little bigger than a minnow. But, just like at Clinton, no game warden was there to stop them.

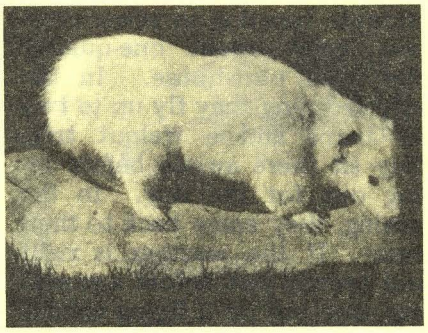
I have been up to Perry Reservoir and it is the same there. Don't the rules apply to all people? I spend about $200 or $300 a year on licenses in different states. I even buy my wife one in Kansas and she doesn't even fish. I think it is awful that it is happening here as I am a lifelong Kansan. I have never even caught a walleye, so I was mad at this guy and tried to tell him he had to turn it loose. He said (as much as I could understand) that it was legal for him to fish like that. Something has got to be done about people who take fish any way but the right way.

John Vaughan
Kansas City

There is a huge demand for outdoor recreation, especially near our larger cities. During the peak of fishing season some lakes are crowded with people. (Of all races.) The law applies equally to all and is enforced equally. We also are concentrating more effort in the state's two largest urban centers--Kansas City and Wichita--to educate people on the proper, and legal, methods for catching fish.

RARE CATCH

I caught this possum in a leg trap just before Christmas 1981.



Thought you might like to see it. The taxidermy work was done by Elden Ninemire of Denton. The possum was caught near Robinson.

Alan Terry
Robinson

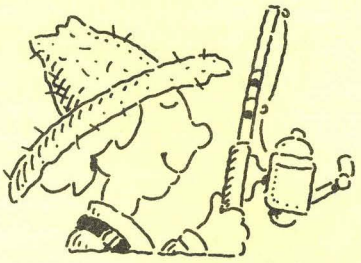
NEVER MISSES

Your magazine is great. I don't want to miss a single issue. The photography is excellent, to name only one of the high qualities of the publication.

Mrs. Clarence A. Schmidt
McPherson

COMMENDATION

Count me among those who sincerely appreciate and enjoy every aspect of your magazine. I think you do a fine job of presenting information and viewpoints important to wildlife conservation and development, positive relations between landowner and hunter, and so on. The



photographs and illustrations are always excellent from cover to cover.

John R. Rundle
Wichita

POOR JUDGMENT

Recently a Coffey County citizen called in a complaint of poaching to the game protector. The poacher was caught and sentenced. He was fined $100, but he did not lose his hunting license and retained a current firearms license. In my opinion, this judicial decision is a nightmare.

The man poached a deer only a week before he could have hunted legally. Hunting organizations, such as the Kansas Bowhunters Association and the Kansas Wildlife Federation, are prepared to pay more in rewards for information on poachers than this man was fined. Game wardens work all hours of the day to catch violators, only to have lenient sentences like this for their reward.

Robert L. Rainbolt
Burlington

We welcome letters to the editor, and ask only that they be kept as short as possible. We reserve the right to edit for clarity and brevity, when necessary. Please address all correspondence to: Editor, Kansas Wildlife, Rt. 2 Box 54A, Pratt, Kansas 67124.

GUEST SPEAKER

THREE DOLLARS' WORTH

By Mike Stewart

Not very long ago, I was talking with a fellow fisherman who had this to say: "I remember when my Granddad used to take me fishing up on the Delaware River. We'd stay out all night and we always caught so many fish we'd get tired of cleaning them the next morning."

I imagine you've also heard one or two "I Remember When" stories. And, if you're a bit older than the average Kansas fisherman, you probably can tell a few "I Remember When" stories of your own. I'd like you to remember one more thing about those good ol' days. There weren't very many other guys fishing the same water at the same time, were there? And they darn sure weren't elbow-to-elbow like they are in many places today.

Today, Kansas has a staggeringly large number of fishermen --- a third of a MILLION! Of all the people in this state over the age of nine, forty percent fish.

There's another facet of the past you need to look at. Remember when milk, cheese, or other goods were delivered by friendly folks with old Ford pickup trucks? But then there got to be more and more people in the community who wanted the milk, and the guy delivering it had to work harder and harder to keep up. It finally got to the point where demand simply couldn't be met, and the delivery man could do one of two things: he could keep on delivering the same amount of milk, knowing that it was not enough to meet the demand, or he could buy a bigger and better truck, and then maybe a whole fleet of bigger and better trucks as the demand kept increasing.

Kansas Fish & Game is like that milk delivery man, only they deliver fish to our streams, lakes, and ponds for us to catch. They could keep up quite easily back in the old days but the demand that is placed on our waters by a third of a million fish-hungry anglers is more than they or Mother Nature can supply.

We currently have three fish hatcheries run by Kansas Fish & Game--one at Pratt, one at Meade, and one at Farlington. Meade and Farlington are our most modern facilities, having been constructed in 1938 and 1939. The Pratt hatchery is a real antique, having been started in 1911 and finished in 1917. If you'll think back to the kind of cars available in 1917 or 1939 and compare that to the moon rockets of today you'll have some idea of the scope of the technological advances we've made in a half-century. Fisheries biology has made the same advances.

"But, dammit, do they have to increase our fishing license fee again? We just had one of those!" Boy, have I heard that comment. My first fishing license cost $3.00. After a while, it rose to $5.00, then $7.00, and now $8.00. But gasoline, food, housing, and just about everything else has gone up, too. I don't think any but those with the hardest noggins will disagree that America's inflation rate would have to affect our Fish and Game budget as much as it has our own. The $3.00 hatchery punch, in my mind, is a separate entity from my license fee. We obviously can't expect our congressmen to sink their fangs into the taxpayer another nine million dollars for a fish hatchery.

So, how important is this three-dollar annual contribution to me? Or the whole ten-year amount of $30? Let's see, the last minnows I bought were $1.25 per dozen. I always buy three dozen to go crappie fishing, so that's $3.75. The last nightcrawlers I purchased at the bait store were on special at $1.00 per dozen ($1.25 regularly) and I bought $3.00 worth to go walleye fishing. Bass fishermen all know that the price of the average lure nowdays is $2.50 and many sell for $3.50 or $4.00.

Let's expand this idea. A tank of gas for the fishing buggy (25-gallon capacity) runs about $27.00. A new fishing rod and reel can run over $30.00 quite easily. Forget boat costs for a moment...the *insurance* on my boat costs $48.00 per year. And it's not a very fancy or expensive rig. So you see the $3.00 per year or even the whole $30.00 in one lump is really not enough to worry about. It's certainly not enough of a bite to listen to someone gripe about, and woe be to him who bends my ear in complaint of this project. I'm just thankful there are a third of a million people like me who can kick in a few bucks apiece so we can afford this expensive new project in tight times like these. Without each of us sharing the cost we'd be doomed to more and more people catching less and less fish and telling fewer and fewer "I Remember When" stories.

(Mike Stewart, Topeka, is a lab biologist and chemist for Topeka Testing Laboratories. He is a member of the Topeka Bass Club, and an avid outdoorsman.)

how new home construction helped save the wood duck

Among the most spectacularly plumaged of all waterfowl, the wood duck, unlike most other waterfowl species, makes its nest in the cavity or hollow of mature hardwood trees. With its historic range predominantly in eastern woodlands, the wood duck soon felt the impact of advancing civilization. Hardwood forest cuttings, drainage and commercial exploitation had a drastic effect on populations and, by the turn of the century, the wood duck's future was in doubt. Fortunately, the efforts of state and federal wildlife agencies, together with sportsmen's organizations, began before it was too late. The wood duck was given full protection, and a major "construction program" began, resulting in thousands of wood duck nesting boxes being placed in the breeding areas favored by the ducks. These artificial nesting sites, readily accepted by the ducks, were necessary because the hardwood trees that provided natural nesting hollows had largely disappeared.

These efforts have really paid off for the wood duck. Today, these colorful woodland ducks are the most common breeding waterfowl in the eastern United States.

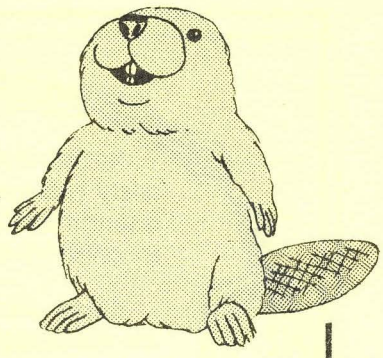
For more information, write for a free copy of "Un-endangered Species, The Success of Wildlife Management in North America," NSSF, Dept. A, 1075 Post Road, Riverside, CT 06878.

NSSF
National Shooting Sports Foundation
1075 Post Road
Riverside, Connecticut 06878

Nature's Notebook

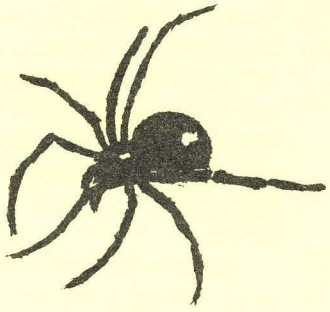
by Joyce Harmon

Wildlife Education Coordinator
Kansas Fish & Game Commission



Spiders are interesting creatures that are not always well liked or well known. The next four pages reveal some information and activities to learn more about those

SPECTACULAR SPIDERS



Scientists have named about 30,000 species (kinds) of spiders. There are thousands of others that are yet unnamed. What we know about spiders and their behavior fills several books but there is much more to be learned.

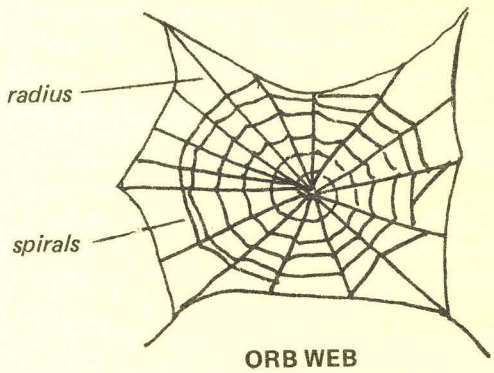
Spiders belong to the phylum Arthropoda, those animals with jointed legs and a hard outer skeleton. They are in the class Arachnida, which includes animals with four pairs of legs, two body sections (abdomen and cephalothorax), and no antennae or wings.

The abdomen of a spider is attached to the cephalothorax by a narrow stalk. The eight legs are attached to the cephalothorax and have two or three claws at their ends. The claws help web spiders to move along on the silk. Spiders have jaws with fangs at the ends to capture food. Between the jaws and the first legs are pedipalps, used in mating. Spiders usually have eight simple eyes and some have excellent vision.

Spiders are capable of producing silk that comes out of their bodies through the spinnerets located at the end of the abdomen. Different kinds of silk are used in building webs, snares, trap doors, egg sacks, and linings for burrows and tunnels. Most spiders make egg cases from silk and some even make a nursery from silk for their spiderlings. Prey is often wrapped in silk until the spider is ready to eat it. Silk may stretch 25 percent of its length without breaking. The silk of the ***Nephila*** spider is the strongest natural fiber known.

A spider must shed its exoskeleton (outer layer) in order to grow. It does this from four to twelve times before it is full grown. When molting, a spider may replace a lost leg with a new, smaller one. Most spiders live one or two years. The female of the ***Orthograph*** spider may live more than twenty years.

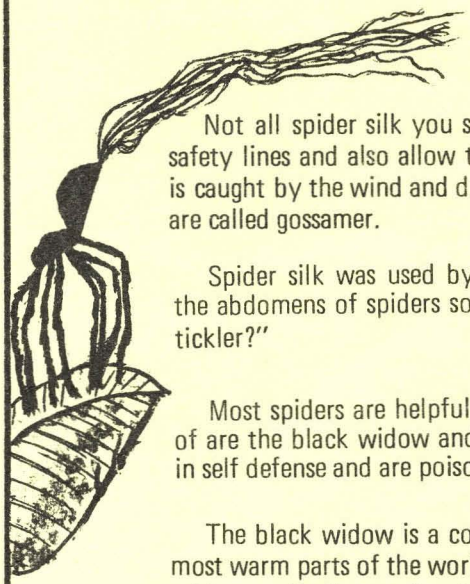
A spider's enemies include other spiders, some kinds of insects and birds. Predators, parasites, and the amount of available food keep spider populations in control. Spiders do their part in controlling the prey they eat. Most spiders eat insects and are, therefore, helpful to humans. The South American bird spider is big enough to catch small birds, lizards, or small snakes. Fishing spiders can catch tadpoles and small fish.



ORB WEB

Spiders may use a snare to capture their insect prey. Each kind of web-building spider has a special way to catch its food. Cobweb, sheet, funnel, triangular, and orb are different kinds of webs.

Orb webs are built by many species at night, each with slight variation. The radii and spirals of the web are generally replaced daily. Some species have a central decoration in the web; others make a hiding place at the side. The spiders are able to feel the vibrations made by insects caught in the web. Do you think a spider ever gets caught in its own web?



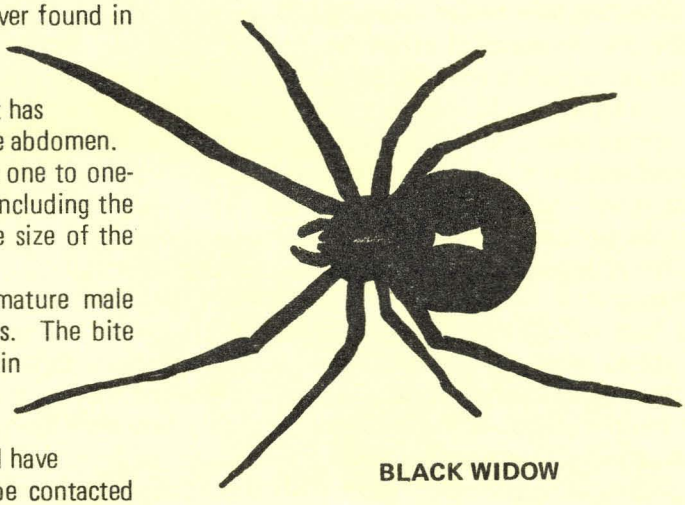
Not all spider silk you see is for a web or snare. Spiders lay down draglines as they travel. They are safety lines and also allow the spider to retrace its path home. Spiderlings (baby spiders) release silk which is caught by the wind and drifts the little spider to a new location. This is called ballooning and the threads are called gossamer.

Spider silk was used by rifle manufacturers for the crosshairs in scopes. People were hired to tickle the abdomens of spiders so that they would spin more silk. Can you imagine being an "arachnid tummy tickler?"

Most spiders are helpful to have around your yard and garden. Two spiders you should be more aware of are the black widow and the brown recluse. These spiders do not look for people to bite but will bite in self defense and are poisonous.

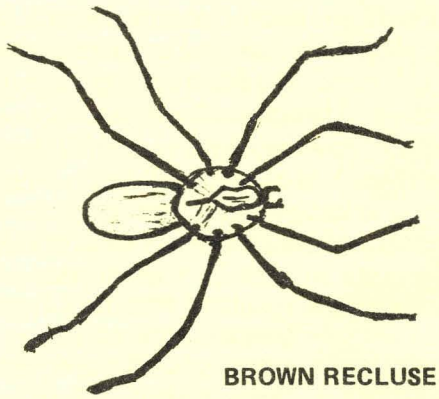
The black widow is a cobweb weaver found in most warm parts of the world. This spider usually lives under objects near homes, buildings, trash, and dumps. It has a solid black body with a red or orange abdomen. Female black widows measure about one to one-and-one-quarter inches in diameter, including the legs. The male is about one-half the size of the female.

The bite of the female and immature male black widow is poisonous to humans. The bite may not at first be noticed but results in abdominal muscle pain and difficulty in breathing and speaking. Victims may be nauseous, sweat profusely, and have swollen eyelids. Physicians should be contacted to relieve the severe pain produced by the nerve toxins.



BLACK WIDOW

Brown recluse spiders are generally found in the southern United States. A small brown spider with a darker brown fiddle-shaped mark on its back, the recluse has six eyes and weaves a sheet of sticky silk to capture its insect prey. The female brown recluse is about the size of a quarter. The male is slightly smaller. Their eggs are in a loose sac in the web. The brown recluse can be found near the foundations of buildings, or in dark places inside homes or sheds.



BROWN RECLUSE

In cases with severe bites, the venom results in the skin turning red at the site of the bite, which forms an open ulcer in one to two weeks. The wound may enlarge and not heal for several months. The victim may develop chills, fever, and nausea.

With any poisonous spider bite, a physician should be contacted when the symptoms appear. Victims should be kept inactive and warm until a physician can be reached. An ice pack may be applied at the location of the bite to localize the venom.

KID'S PAGE

(2, 4, 6, 8--Fill in the blank)

Spiders have ---- main body parts.

Spiders have ---- legs.

Spiders usually have ---- eyes.

Spiders have ---- (or three) claws at the end of each leg.

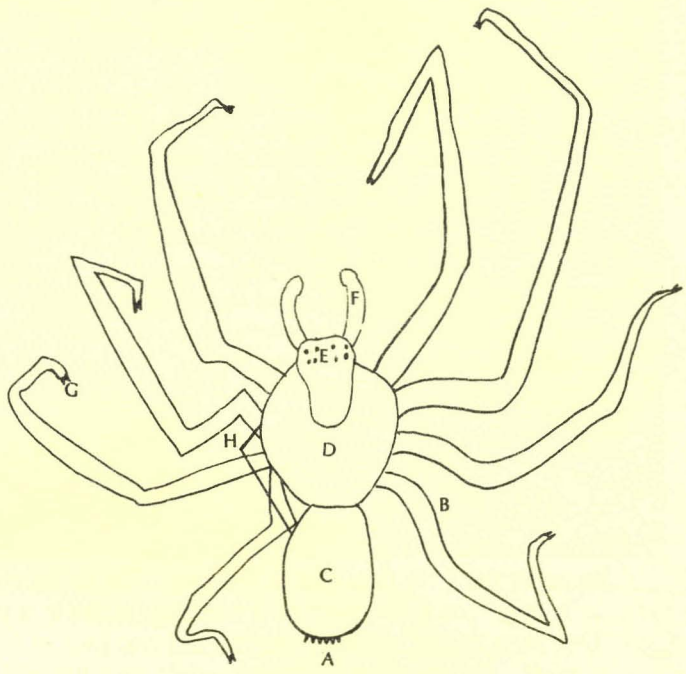
Spiders shed their exoskeletons ---- to 12 times before they are full-grown.

(KEY---2, 8, 8, 2, 4)

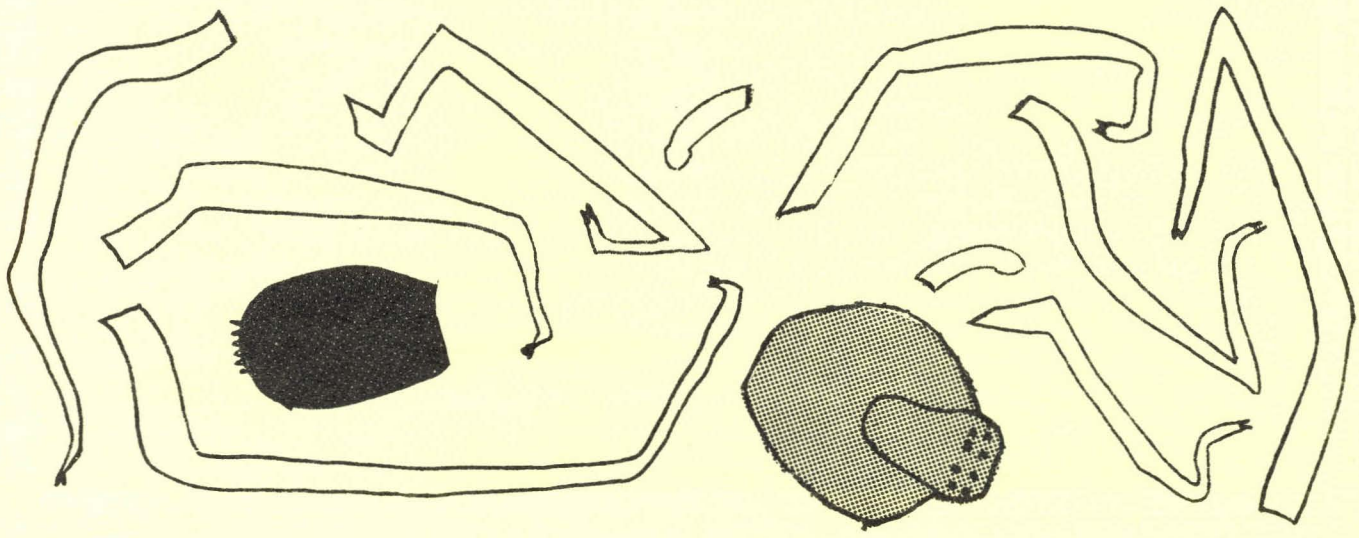
(The spider at right has letter on its body. Draw lines connecting letters in the column below left with the correct term in the column next to it.)

A	Eyes
B	Leg
C	Cephalothorax
D	Abdomen
E	Pedipalp
F	Claw
G	Spinnerets
H	Exoskeleton

(KEY---A, spinnerets; B, leg; C, abdomen; D, cephalothorax; E, eyes; F, pedipalp; G, claw; H, exoskeleton)



(Build your own spider from the pieces below)



Learn more about spiders and their habits by doing the following activities:

SPIDER WEB PRINTS

Find a spider web and gently remove the spider if present. Spray the web with a quality white enamel spray paint. Find a sheet of black construction paper that is a little larger than the web and spray the paper with a clear drying fixative spray or clear enamel spray until the paper is wet. Place the construction paper carefully against the painted web. Cut the strands of silk that attach the web to the supporting object. Display the captured webs. Make a study of the variety of spider webs.

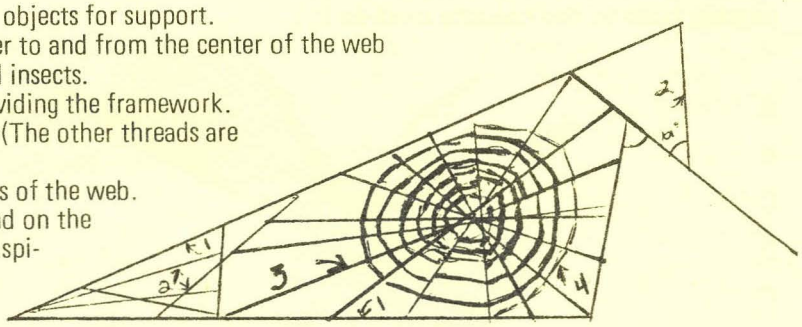
Morning dew makes webs more visible. Webs can be studied without being removed by gently spraying them with water from a plant mister.

SPIDER WEB ARCHITECTURE

Draw a spider web using four different colors of chalk. The four colors represent the four main parts of the web:

1. Cables-- The web is attached to nearby objects for support.
2. Roadways--Provide routes for the spider to and from the center of the web and send vibrations caused by captured insects.
3. Spokes--Give the web structure by providing the framework.
4. Sticky threads--Catch the insect prey. (The other threads are not sticky.)

Observe real spider webs and find the parts of the web. What routes did the spider use to move around on the web? Extend your study of geometry to the spider web by measuring the angles used to construct webs. What geometric shapes can be found in the webs?



SPIDER BEHAVIOR

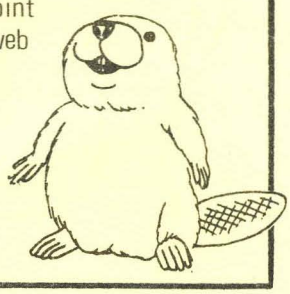
Divide group into teams of two to four. Each team gathers spider food such as flies, grasshoppers, and other insects and finds an active spider web. The teams will make careful notes about the reaction of the spider to the food they add to the web. The spider may move slowly toward the prey and wrap it in silk or it may ignore the food or it may stay where it is but move its legs, signifying awareness of the food. The teams should compare results. Did one kind of food work best? What kind of spiders were you observing? Do you think the spider would have behaved differently if you weren't there? Where were the webs located? Check an old web to see if it is still sticky.

REFLECTIVE EYES

Many nocturnal (active at night) animals have eyes that reflect light. The wolf spider is such an animal and the light that is reflected is bright white or green. You can find these spiders by scanning an open field with a flashlight at night. Hold the light at eye level and thoroughly scan the area, looking for small glimmers of green or white light. When you find what you think is a spider, keep your flashlight on the object and walk toward the spot. With practice you can spot spiders at a long distance.

WEB WEAVING STRING ART

Now that you know so much about web construction see if you can build one yourself. You may want to watch a spider in action before you begin. When you're ready, gather a piece of cardboard or plywood and pins or nails. (If you're using plywood, you'll need to use a hammer and nails.) Position your pins or nails on the board at the points where the cable threads are attached for support and at each point where two or more threads come together. When you complete this, the general shape of the web should be visible by the pins and you are ready to weave your web. Tie thread or string at one cable end and make the shape of the web by wrapping the string around each pin as you go. Add pins and string to make the web more intricate. Compare your work with a real web. Can you build one as quickly as a spider? The female is generally the web builder while the male builds a nest nearby. Can you find his nest?



ART ON LOAN

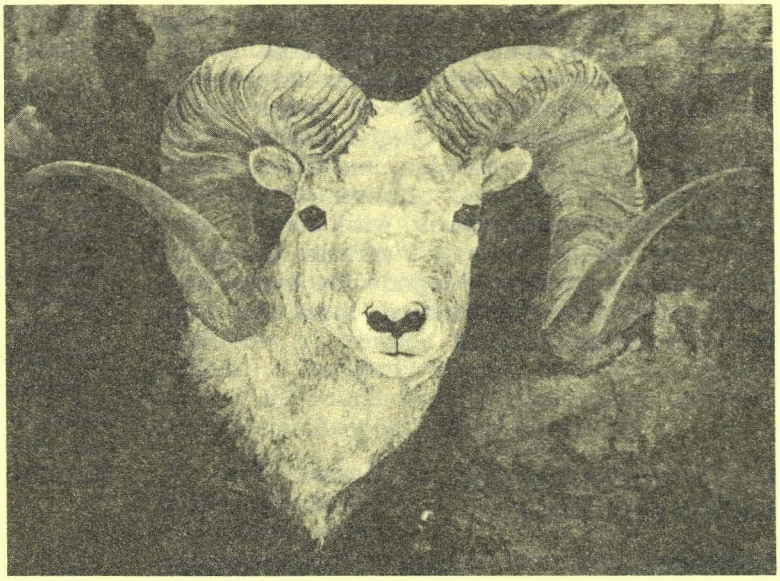
Carla Scott Martindale has been a professional artist for 19 years. The Oklahoma native spent several years in commercial art, advertising, and fine art before turning her attention to wildlife art in 1974.

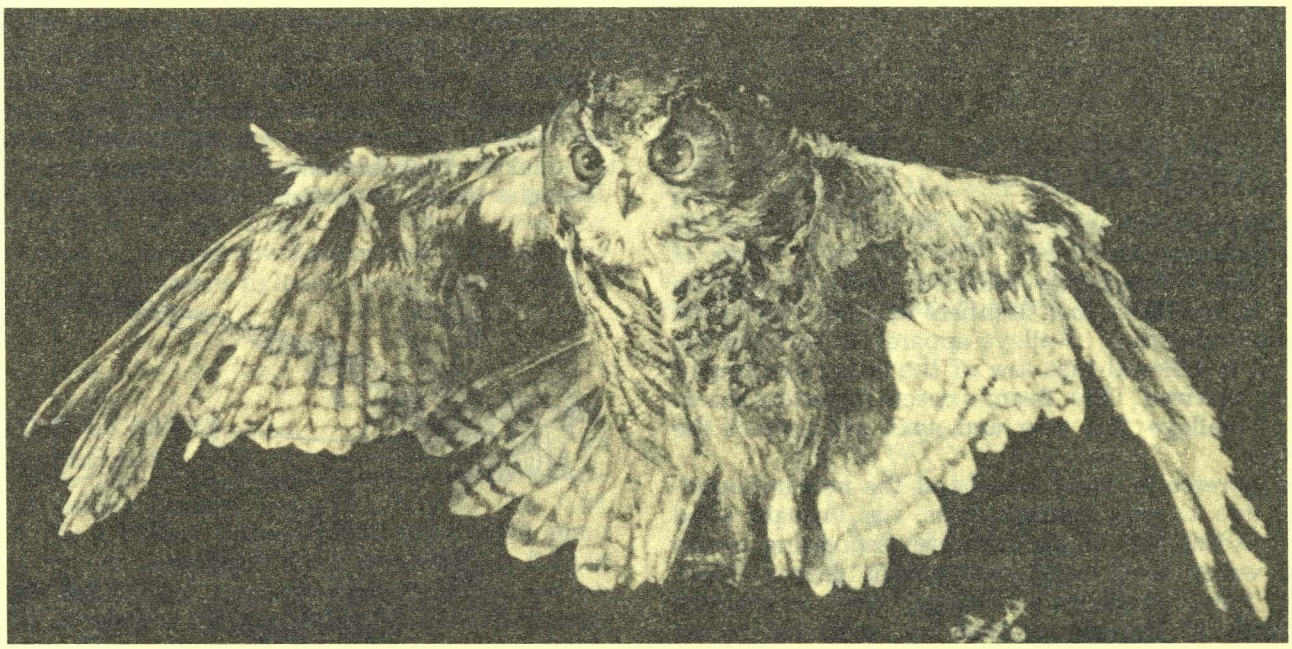
She was the Western Sportsmen's Association's 'Wildlife Artist of the Year' in 1980 and 1981. Her work has appeared in the Ducks Unlimited National Wildlife Art Show, and she has supported Kansas Ducks Unlimited for two years. During the past four years, Carla's paintings have been displayed in numerous museums, galleries, and private shows throughout a six-state area.

A self-taught artist, Carla strives to portray total realism in her paintings. She spends many hours in the wild with her camera and notebook, concentrating on the details that contribute to that realism.

Carla is married and has three teenage children. She and her family live in Amarillo, Texas.

For the next few weeks, her art will be on display at Fish & Game headquarters in Pratt, at several Pratt businesses, and in state government offices in Topeka. Original paintings and prints of Carla's work can be obtained by contacting: Jan Royston, Kansas Fish & Game, Rt. 2 Box 54A, Pratt, KS 67124.





ACROSS KANSAS

HEDGE ROW TREATMENT IMPROVES CROP YIELDS

Farmers worried that hedge rows are sapping moisture from adjacent crops have sometimes bulldozed the trees in an attempt to reserve soil moisture for their crops. But a hedge row treatment technique developed by Kansas Fish & Game and the Kansas State Forester has yielded results indicating hedge rows and crops can be made more compatible.

Employees of the two state agencies have experimented with a two-mile stretch of Osage Orange trees near Marion Reservoir. They found that cutting the trees' roots on one side, and severely pruning branches from one side of some of the trees reduced the trees' competition with crops. The treatment resulted in dramatic increases in yields of grain sorghum growing alongside the hedge row. Even five years after root-cutting, there was little sign the roots had grown back.

WANTED: INFORMATION ON HERON COLONIES

Kansas Fish & Game is censusing heron nesting colonies other than the great blue heron (black-crowned night heron, yellow-crowned night heron, little blue heron, cattle egret, snowy egret, etc.). Persons with information on known locations are asked to contact: Marvin Schwilling, Nongame Project Leader, 832 E. Sixth, Emporia, KS 66801.

SAMPLING YIELDS GOOD, BAD NEWS AT BIG HILL

Spring sampling of the Big Hill Reservoir fish population has brought both good and bad news, reports biologist Jim Beam. The low water levels of 1981, and subsequently reduced stocking rates, resulted in relatively low numbers of adult fish in the current population. Walleye apparently suffered the most; it is believed that few of the initial stocking of walleye survived. But Beam expects fingerling stockings of walleye this year and next will correct the situation.

The increase in water acreage at the new impoundment, due to this spring's rains, has brought good news. Adult fish in the lake are responding to the rising water levels with tremendous reproduction. Beam found numerous schools, each containing thousands of largemouth bass fry, scattered in the reservoir. He expects other species, except walleye, enjoyed similar reproductive success.

Peak fishing should arrive in the new lake by mid-1984 or early 1985, Beam says.

OUTDOOR RECREATION ORGANIZATION FORMING

The former executive director of the Kansas Wildlife Federation has assumed the same position with a new citizens group dedicated to outdoor recreation.

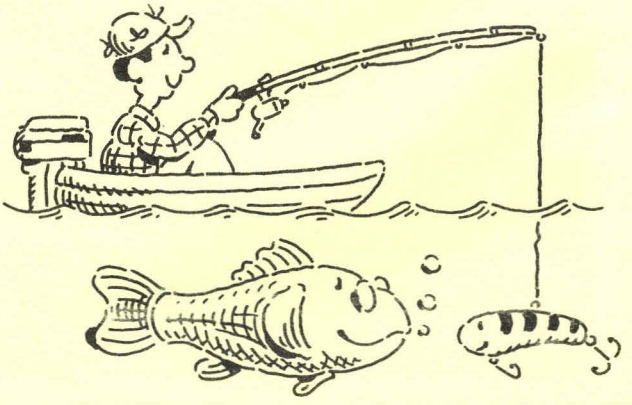
Outdoors Unlimited is being organized to "...maintain, enhance and protect outdoor recreation in Kansas," said Ted Cunningham, executive director. The group will be heavily involved in state and local issues of interest to hunters, fishermen, campers, and other outdoor recreationists. One of the primary functions of the group will be its involvement in legislative action pertaining to outdoor recreation.

Individual memberships cost $30. Persons interested in joining or finding out more about the group can contact Cunningham at Rt. 1, Box 353, Wamego, KS 66547.

THREE ANGLERS BOOST STATE FISH RECORDS

Three Kansas anglers have claimed new state fish records this spring. James Clark, a Liberal resident, took a 25-pound 4-ounce white amur from the waters of Meade State Fishing Lake. The species is seldom caught by fishermen, due to its vegetarian diet. White amur have been stocked in many Kansas ponds and lakes in recent years, primarily for their ability to rid lakes of troublesome aquatic vegetation.

Douglas Smith, Wakefield, boosted the state record



ACROSS KANSAS

for shortnose gar with his 5-pound 4-ounce catch. Smith took the gar while bowfishing at Milford Reservoir.

Tim Pulliam of Wichita was the latest angler to add his name to the record books. He hooked a 29-pound 5-ounce drum while fishing at Boeing Employees Recreation Lake.

HILL CITY OFFICER TAKES TOP HONORS

Game Protector Bud Crumrine of Hill City was the Outstanding Wildlife Conservation Agent for 1981, reports Shikar-Safari Club International. The award is presented annually to the top conservation officer in each of the 50 states. Shikar-Safari is a sportsmen's group founded in 1952. The organization is dedicated to promoting wildlife conservation around the world.

GARDEN CITIANS WIN HUNTER SAFETY HONORS

Two Garden City men have been honored for their work in Kansas Hunter Safety programs. Dale Barnum, a master instructor in hunter training of Garden City area youths, was named Hunter Safety Instructor of the Year by the Kansas Rifle Association. Barnum was chosen for the award for his work in coordinating the hunter training program in Garden City, said Royal Elder, statewide hunter training coordinator. Barnum has been active in hunter training since the state program was initiated in 1973.

Richard Harrold, also of Garden City, was named Liaison Officer of the Year. Harrold, an area law enforcement supervisor for Kansas Fish & Game, was chosen for his assistance in local hunter safety work.

LIFETIME LICENSES AVAILABLE JULY 1

Kansas residents will be able to buy lifetime hunting and fishing licenses beginning July 1. The cost is $200 for a fishing license, $200 for a small game hunting license, and $400 for a combination fishing and hunting license. Applications for the licenses are available at county clerk's offices, Fish & Game regional offices, and the agency's central office in Pratt.

The sale of lifetime licenses will benefit both sportsmen and Fish & Game, explains agency Director Bill Hanzlick. "Sportsmen who buy the lifetime licenses obtain a hedge against any future price increase in fishing and hunting licenses. Depending on his age, a hunter or fisherman could save substantially by buying a lifetime license now instead of buying a license every year for the rest of his life."

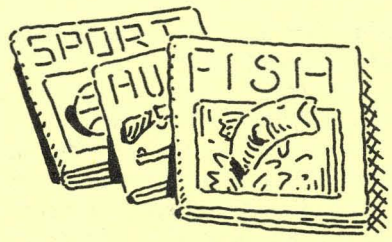
Revenues produced by sale of lifetime licenses will be put in interest-bearing accounts, providing an important source of much-needed funds to help pay for fish and wildlife enhancement in Kansas.

Once a lifetime license is obtained, it is valid even though its purchaser eventually moves out of the state. Holders of lifetime licenses still must apply for special permits if they are interested in hunting deer, antelope, or wild turkey; the lifetime hunting license applies to small game hunting only. Similarly, purchasers of lifetime fishing licenses will need to purchase a 'hatchery punch,' the revenue-producing method by which Fish & Game plans to finance a new fish hatchery at Milford Reservoir.

ANTELOPE POACHING BRINGS HEAVY FINES

Poaching an antelope was a particularly expensive game for two Galva men. Brian M. Helgeson and Larry Joe Thiessen were each fined $750 on charges of hunting antelope illegally and hunting from a motor vehicle. McPherson County District Judge Carl B. Anderson assessed the punishment, which also included a 30-day suspended jail sentence for each man.

The arrest followed an anonymous telephone tip to Verle Warner, Maxwell Game Refuge manager. Game Protector Jerry Almquist, assisted by the McPherson County sheriff's office and Galva police, arrested the two men after finding antelope meat wrapped in plastic bags in a shed in Galva.



SHORT STUFF

GAME GOURMETS—Utah's Department of Natural Resources has sponsored publication of what may be the most high-falutin' game recipe book yet. GAME COOKERY: GOURMET STYLE contains more than 150 recipes for entrees, soups, pastries, and hors d'oeurves selected by ambassadors of countries famous for gourmet foods. The book is authored by world traveler-gourmond Joseph H. Smart, and illustrated by wildlife artist Clark Bronson. If you're interested in how they cook their gooses in Germany, or elsewhere, send $6 to: Heritage Arts, 1925 Imperial Street, Salt Lake City, Utah 84105.

MONEY MATTERS—The National Wildlife Federation has been awarded a $125,000 grant from the William H. Donner Foundation to strengthen the Federation's efforts to discourage the use of the oceans as dumping grounds for harmful wastes. The project will work to maintain strong federal regulations for ocean dumping, and will seek out environmentally-sound alternatives to the disposal of sewage sludge and dredge spoils.

PASS IT ON—The 11th annual observance of National Hunting and Fishing Day is set for September 25. The theme of this year's observance--"Pass It On"--urges the nation's 55 million hunters and fishermen to help pass on the outdoor tradition to the millions of young people and adults who have never had the opportunity to experience the outdoors. NHF Day activities range from open houses at sportsmen's clubs to regionwide sportsmen's jamborees attended by thousands of people.

KC WILL HOST—The Radisson Muehlebach Hotel in Kansas City, Mo. will be the site for the 48th North American Wildlife and Natural Resources Conference. The event is scheduled for March 18-23, 1983. The meeting's theme is "Many People, Many Demands, One Land." The annual convention, sponsored by the Wildlife Management Institute, is the premier gathering of wildlife and natural resource managers.

ENDRIN LIMITS—The Montana Department of Agriculture has adopted rules limiting the use of endrin for pest control purposes, the Wildlife Management Institute reports. Relatively high levels of the pesticide were discovered in several wildlife species last year, causing the state's Department of Fish, Wildlife and Parks to warn hunters to limit consumption of certain animals. Endrin has been used to control wheat cutworms and grasshoppers. The new rules prohibit endrin use for grasshopper control but allow continued use on cutworms. Endrin sales will have to be reported to the Department monthly, and applicators will have to report within a week when endrin is used.

OSCEOLA SUIT—In a move to protect the Osceola National Forest in northern Florida from the "devastating impacts of strip mining," the National Wildlife Federation has filed suit against Interior Secretary James Watt and Agriculture Secretary John Block. The Federation joined U. S. Sen. Lawton Chiles (D-Fla.) and five other environmental groups in asking that Interior cancel its proposed plans to issue phosphate mining leases in the Osceola because of overwhelming evidence that the national forest would suffer irreparable harm.

WATERFOWL PLAN—The first national plan ever developed for cooperative management of waterfowl in the U. S. has been prepared by the federal Fish and Wildlife Service in consultation with state fish and wildlife agencies. The document is intended to guide the efforts of federal, state, and private agencies that cooperate with the Service in migratory bird management activities. It will contribute to the eventual development of a comprehensive North American waterfowl management plan. The plan is organized around the three major concerns of waterfowl management: habitat, populations, and utilization.

ENTRY FEE—Entrants in the U. S. Fish and Wildlife Service's popular Duck Stamp art competition will pay a $20 entry fee from now on. The non-refundable fee was imposed to help offset the administrative costs of the annual contest to select the design for the stamp. The proposal to require an entry fee followed three years of rapid growth in the total number of yearly entries and steadily escalating administrative costs associated with the staging of the contest. Last year, there were 2,099 entries in the contest, compared to only 373 as recently as 1978. Last year's contest cost the Fish and Wildlife Service $50,000 to sponsor. The 1982 competition opens for entries July 1.

PRIVATE INITIATIVES—Interior Secretary James Watt has launched a private sector task force to seek transfer of wetlands or development rights on wetlands to private, state, or federal entities that will assure that America's wetlands are dedicated to migratory bird habitat. Watt has asked organization and corporate officials interested in migratory birds and wetlands protection to join him on the special task force he calls 'Protect Our Wetlands and Duck Resources (POWDR).' The goals of the task force will be to advise and counsel public and private officials on wetlands protection and to lead an effort to encourage owners of wetlands, duck hunting clubs, and others to make gifts of their lands or the development rights on those lands.

Ron Spomer

get to know Kansas' "other" wildlife...

As eye-catching and fascinating as any group of wild things on the plains, reptiles and amphibians have an image problem. Most of what is said about them is built on generations of speculation and very few hard facts. Find out more about these unique animals in KU's new book, *Reptiles and Amphibians of Kansas*.

(Leonard Lee Rue III)

The osprey —

One of a Kind

Ron Spomer

You can't blame people for not understanding the fish eagle. Sure it looks like an eagle, is almost as big as an eagle and builds a huge nest like an eagle, but it isn't. It's really one-of-a-kind. An osprey. The only raptor that disappears underwater to grab its fish dinner.

The osprey, from its global distribution right down to its reversible toes, is unique among predatory birds. Taxonomists (scientists who classify living things so the rest of us know the difference between mosquitoes and elephants) insist this fish-eating raptor with the six-foot wing span isn't a member of the eagle family. Certain parts of its internal structure are different, and its outer toes can be reversed like an owl's so it can clutch prey between two forward and two backward projecting talons. The often misnamed "fish hawk" isn't a hawk either. Its black talons, longer than any hawks', curve into one-third of a circle and are round instead of grooved underneath. Its feet are covered with rough, spiny projections (spicules) which help it hold slippery fish. It isn't a falcon because, among other things, it flies too slow and has no notched or toothed beak. And it certainly isn't an elephant. In fact, it really is a bird unto itself. *Pandion haliaetus,* the only member of the Pandionidae family in the world.

At one time, three or four species of osprey had been described from various parts of the world, but today all of them, including the Australian

fishing eagle, are considered ordinary ospreys. Which aren't all that ordinary.

The "fish eagle" has earned its nicknames by hunting almost exclusively for finned protein—and doing it in a most unusual style. Unlike bald eagles, which swoop gracefully over the water and pluck victims from it, ospreys aren't afraid to get more than their feet wet. They flap and glide slowly over lakes, rivers and seas, staying thirty to 200 feet above the water until they spot a fish. If they aren't in perfect striking position, they hover until the ideal moment, then fold their wings and drop, entering the water feet first with wings held high and back. They take fish near the surface, so the attack is a quick splash, grab and jump back into the sky. There are times, however, when they plunge so deep after meat that they completely submerge. Their oily plumage doesn't absorb much water, but they shake themselves briefly after lift-off anyway. "Just like a wet spaniel," someone once described it. They'll carry up to six pounds of fish. That's no small trick, for the heaviest osprey may push the scales to no more than four and one-half pounds.

Occasionally, an osprey will sink its efficient claws into a piscatorial heavy-weight that refuses to leave its element. What happens then? According to many reports, the bird drowns. Respected naturalists have seen these predators dive into the water and disappear—forever. More than one of the determined birds has been found "belly up" with too much fish clamped in a death grip.

Arthur Cleveland Bent, in his 1937 *Life Histories of North American Birds of Prey,* accepts this evidence, but finds it "incredible that such a skillful fisherman would be foolish enough to tackle a fish big enough and strong enough to drag under water so powerful a bird with such a broad expanse of wing. It seems still more inconceivable that a bird that can so easily drop a fish in the air or at its nest cannot release its claws under water, even to save its life." That's a good point. Maybe an osprey's hunting instinct won't let go while it's hooked to a potential dinner still in the kitchen.

Fortunately, most ospreys pick on little fish, which they invariably carry head forward, supposedly to lessen air drag during flight. This position is certainly more efficient than a sideways arrangement, but one must question whether there is any improvement over a tail-first alignment. R. I. Brasher suggested in *Birds of America* that the head-first posture results when the osprey places one talon ahead of the other on the fish to control its spasmodic jerking. But that could be accomplished just as well tail first, one would guess. There is also the argument that most fish are probably caught in a head-first position, since an aerial attack would be most successful from the rear. Still, that doesn't explain why the occasionally caught "tail first" fish is assiduously turned around before being airlifted to a feeding site. Whatever the reason for this unusual practice, it must work because ospreys around the world do it.

The list of species that ospreys eat reads like a lexicon of world fishes. Everything from brook trout to goldfish. In spite of this variety, most individual birds concentrate on two or three of the species available in their territories. Of course, the menu must be limited to underwater creatures that swim near the surface. Flounder, bottom dwelling flatfish of the oceans, are frequently seized, but only when they enter shallow waters. The fact that these extremely well camouflaged fish end up as bird food at all attests to the remarkable eyesight of the "ordinary" osprey.

Not every fish that swims within the striking range of an osprey is necessarily lost. Indeed, the blowfish or puffer of the Atlantic may escape even after it's felt the sting of those talons. As reported in Bent's *Life Histories,* one Walter B. Savary saw an osprey catch and lose four puffers (or the same puffer four times). The alarmed fish, in its instinctive defense posture, gulped air and inflated itself while being carried off. This supposedly forced the talons to slip out before the osprey could get more than ten feet off the water. Just how the fish could inflate itself after being punctured by four talons was not mentioned. Nor was any evidence presented that suggested a ten-inch (maximum size) puffer could generate enough "air pressure" to force open an osprey's grip. Perhaps the bird held the fish high on the back above the air filled portions of its body, and the unusual ballooning action surprised the predator into dropping its strange catch. Regardless of how it happened, the puffers reportedly made good their escape after floating briefly on the surface while deflating.

In spite of the occasional slip-up with a puffer, ospreys are excellent fishermen (fisherbirds?). Depending on the clarity and motion of waters, eighty to eighty-nine percent of their attacks are successful. Quite often, they'll hook two fish in one dive. The time devoted to looking for fish varies significantly with their relative abundance. Ospreys at Flathead Lake, Montana, spent an average of sixty-five minutes away from the nest while hunting the oligotrophic water (low in nutrients and productivity). In contrast, birds nesting near a mesotrophic lake (moderate dissolved nutrient levels and increased productivity) averaged only thirty-two minutes hunting time. Because of their superior fishing talents, ospreys are frequently forced to spend more time at it than they'd like. Bald eagles, in behavior most unbecoming the national symbol, often steal fish from the hard working fish hawk. When an osprey is laboring back to its perch with a heavy load of food, a bald eagle will attack it, forcing it to drop the meal or suffer the consequences. A twelve-pound eagle is pretty heavy consequence, so the osprey sacrifices its catch for the greater good—

staying alive. Magnificent frigatebirds or man-o'wars of the tropical seas play a similar game. There is one record of several of these big, long-winged ocean predators harrying an osprey into the water and pecking it until it drowned. An unfair way for such a hard-working and mild-mannered bird to die. But then nature has never specialized in being fair, just efficient.

While most birds of prey are delighted to feast on a variety of furred and feathered critters, ospreys rarely eat anything but fish. They have been known to attack snakes, frogs, sandpipers, ducks—and one barnyard chicken. That surprise raid on farm life might have succeeded save for the pugnacity of the hen and its owner. As recorded in Bent's *Life Histories,* an unidentified woman "had been disturbed by a commotion among her chickens, and on going into her yard, had found the Hawk (osprey) with its talons sunk in a hen, and flapping violently in an attempt to fly off with its prey. She had killed the robber with a stick and had freed the hen, which, however, died during the night. The Hawk . . . was in a starved and emaciated condition." Alas, hunger. The great precursor of ill-planned raids.

An osprey gets a good start in life from the security of a carefully guarded nest that may squat on a beach, balance on a pinnacle or project from the tip of a hundred-foot pine. As progress marches on, more and more utility poles are pressed into duty. On desert coasts, tall cacti cradle the nurseries. At the turn of the century, ornithologist Charles Bendire was amazed to find an osprey nest built atop a narrow pinnacle of rock jutting from a "swirling and foaming whirlpool" at the lip of American Falls on the Snake River, Idaho. The drama of that scene impressed Bendire, but was probably lost on the ospreys. Just a cozy, predator-proof home site for them.

Osprey nests are surprisingly enduring structures, partly because of their size and partly because they are refurbished year after year. One eyrie on Plum Island near New York eventually grew to eight feet across its bottom, tapering five feet up to a four-foot wide platform. It and others nearby contained a variety of building materials including barrel staves, seaweed, oars, life preservers, a toy boat, an axe, a carpenter's plane, a rag doll, crow's wings and bleached sheep skulls from a distant pasture. A nest on a bleak, Baja California island consisted entirely of shearwater wings (an oceanic bird). After years of remodeling, tree nests grow so heavy (as much as a ton) that they break their supports. Those that remain erect are used for generations. One artifically bolstered nest along the Atlantic coast babysat osprey chicks for forty-five consecutive years.

American ospreys frequently nest in colonies, which is common practice for fish-eating birds such as herons and terns but is a radical break with raptor tradition. Most

(Leonard Lee Rue III)

hawks, eagles, and owls require and defend large territories to insure they and their broods will get enough to eat. It's no fun running out of ground squirrels in the middle of July. But coastal ospreys don't have that problem. They raise their families with plenty of companions nearby, taking advantage of the abundant protein offered in their saltwater larder. That's why 3,000-acre Gardiner's Island off Long Island, New York, was able to host between 150 and 300 osprey pairs early in this century. According to observers in 1911, nests "were on trees by the scores; on rocks and boulders; on sheds and buildings; on fences and walls; on piles of debris; on old stumps, on a floating wooden platform; on a channel buoy; on sand bluffs; on pieces of wreckage, driftwood and fish-boxes."

Conditions near freshwater are different. Here, the ospreys must claim a territory large enough to produce throughout the breeding season. Whether through aggressive territorial defense or an innate sense of proportion, inland ospreys distribute themselves sparingly over available fishing waters. For instance, Kansas reservoirs the size of Milford or Tuttle Creek might harbor one or two pairs of these fish eaters. They don't, of course. Kansas, along with most of the plains states, has no record of nesting ospreys. Undoubtedly the dearth of large, fishy bodies of permanent water has had something to do with that. N. S. Goss, in his 1891 classic *History of the Birds of Kansas,* lists the osprey as a "not uncommon" summer resident arriving the first of April and laying eggs by the end of that month. He does not say where or if any nests are found. One would guess the Missouri River valley in the northeast the most likely place, but Richard Johnston's *Breeding Birds of Kansas* (1964) doesn't list osprey at all. The 1945 Kansas State Board of Agriculture Report *Birds of Kansas,* by Arthur L. Goodrich, Jr., states the osprey "seems never to have been reported nesting." Recent checklists of Kansas birds list Pandionidae as a rare to uncommon transient. That means they pass through the state in spring and fall, but not like flocks of geese. Ospreys journey quietly and usually alone. The first hint of one may be its shadow gliding over the water. The

(Karl Maslowski)

white underbody and long, narrow wings bent back deeply at the wrist are diagnostic field marks. It's not unusual to discover one sitting patiently atop a tall snag overlooking a good fishing hole. For a day or two it will harry the local carp and sunfish. Then it will disappear north, on the last leg of its return from wintering grounds in Central America, South America and the Caribbean.

Although most ospreys probably mate for life, fidelity to previous mates and nests is not always automatic. At least widowed birds are known to quickly find new partners. One, however, kept lonely vigil for two summers over the nest in which its incubating mate was killed by a lightning bolt.

Courtship displays consist of aerial gymnastics, soaring, screaming, chasing and diving. Male and female both remodel the old nest, carrying new materials to it in their feet. In May, the hen lays one to four (usually three) eggs at two-day intervals. Because she begins incubating immediately, they hatch at intervals twenty-eight to forty-three days later. Western birds have the longer incubation periods. The male may contribute up to thirty percent of the egg sitting time, but when the first one hatches, he abandons the brooding to the female and spends his time fetching fish back to her. She tears them into small pieces and gives them to the chicks. The smallest nestling is bullied by its siblings, but only in extremely lean years does it starve to death. Durings its first few weeks out in the cruel world, an osprey nestling defends itself from crows and other predators with a drab cover of down that blends effectively into the nest. Assisting that is the young bird's instinct to lie in a "death-freeze" when the proper warning call is given by the adults. The little fakers have been seen to hold their necks outstretched, heads hanging over the nest edge, for as long as an hour.

After four weeks of growing, they become bolder and often assume a threat pose with wings spread, head lowered, crest raised, and hooked beak gaping. Bluff, of course. They'll hold it as long as they can before slipping gradually into the old and more comfortable "dead" position.

After two months of home life, the fledglings are ready to try their wings. Short flights are the rule, and the comforting nest is always nearby for resting, roosting, and dining. During the remainder of the summer, the youngsters perfect their hunting skills and wean themselves of their parents and old home. By September, the adults start drifting south, tired of parenting and ready for another tropical vacation. The immature birds follow a few weeks later for their first taste of life south of the border. They'll stay for two years, sometimes three, living where it's easiest until they are old enough to breed at four. By then they've developed enough fishing skills to provide for a family. And they may have picked up enough DDT to prevent one.

DDT, the post-World War II panacea for bugs and mites and things that go bump in the night, helped American osprey populations slide to record low levels in many parts of the country during the 1950s and 1960s. Not that they wanted to. It's just that the fish they ate had eaten smaller fish that had eaten smaller critters that had eaten smaller plants that had been doused with DDT. Not on purpose. The chemical was squirted on mosquitoes, flies, roaches, and any other Creepy-crawlies that might disturb some gentle person's composure. But after it killed them, it did not bow politely and walk away. DDT doesn't work like that. Instead it drifts around the countryside, hitching rides on organic matter, flowing with the waters and blowing with the winds, looking for more things to poison. It does not break down or "rot" like most organic substances. So, like tumbleweeds against a fence, it stockpiles in the body fat of vertebrates.

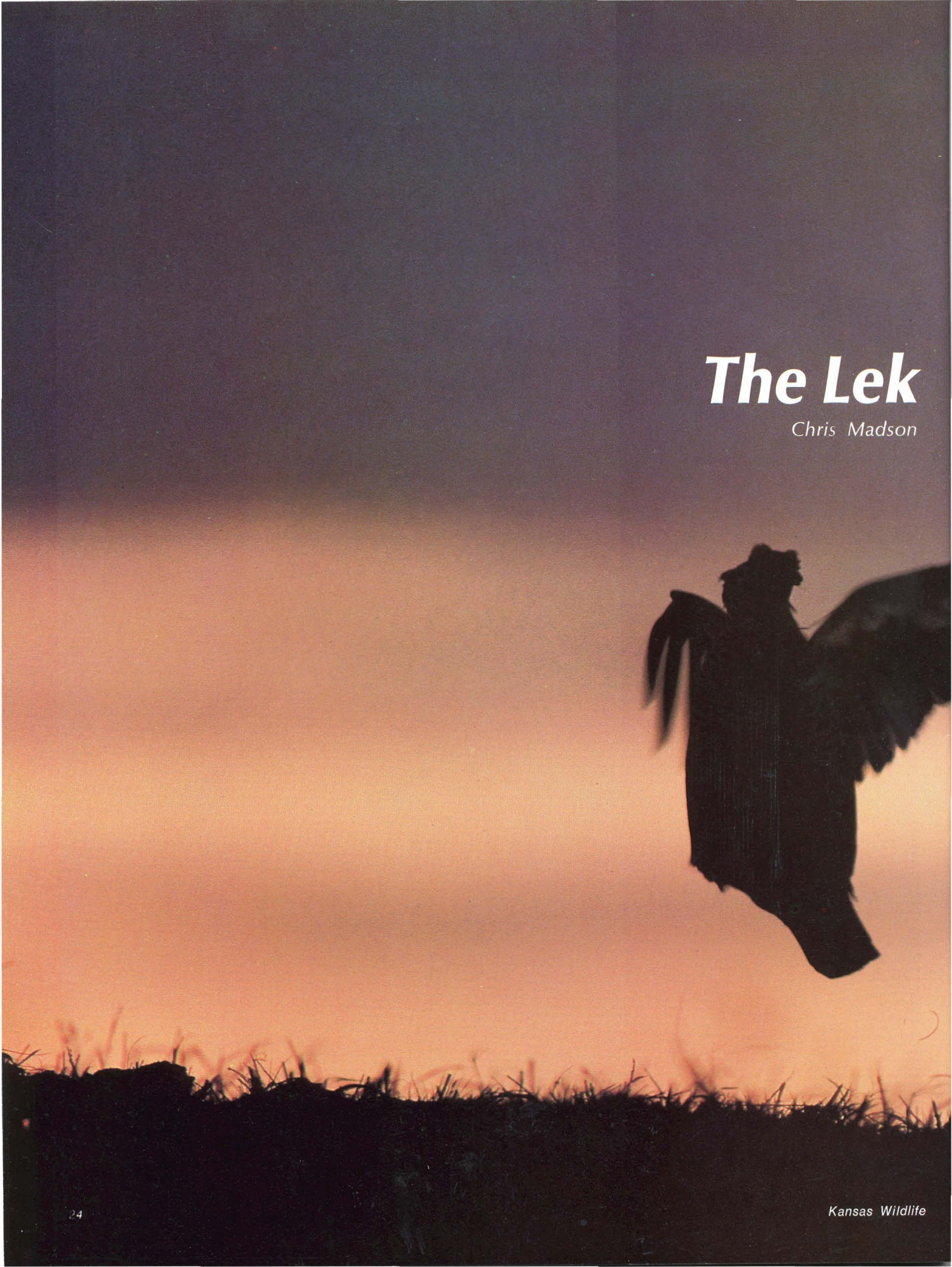
A tiny bit of plankton might have 0.04 ppm (parts per million) of DDT clinging to it. A small fish that eats it and hundreds of others like it will store the DDT, concentrating it several hundred times. A larger fish eating hundreds of the polluted small fish will concentrate it again. By the time this chain reaches the fish-eating osprey, it will be concentrated thousands of times. A study at Eagle Lake, California, showed fish with .355 ppm DDT, ospreys with 17.9 ppm. As many as fifty-six percent of the birds weren't able to hatch a brood.

A large dose of DDT kills outright by affecting the nervous system, but sublethal amounts, which plagued most of the fish-eating birds during the 1950's and 1960's, causes sterility, egg shell thinning, and other subtle disorders. That's why ospreys and dozens of other species declined sharply before people knew why. The bald eagle (southern), peregrine falcon, and brown pelican were put on the Federal endangered species list. The osprey, many feared, was doomed to follow. Fortunately, there were enough determined, hard-nosed environmentalists fighting during the 1960's and 1970's to get DDT and several closely related chlorinated hydrocarbon pesticides off the streets.

Today ospreys continue to rise from the ashes of the DDT debacle. But they are not free of its threat. No environmental extremists fought successfully to have DDT banned in Central or South America, so it's still sprayed on mosquitoes, flies and bugs that might eat bananas. Whether fish eagles pick up enough of it to suffer remains to be seen. One thing is certain. Since the DDT ban in this country in the early 1970's, osprey populations have been increasing steadily. And that's important for Kansans. At the rate those ospreys pass through this state, we'll need plenty of them if people are going to see first hand that they really do dive under water for dinner. Like no eagle ever dreamed of. □

The Lek

Chris Madson



The ridges are quiet now. The hens have hatched their clutches and are schooling their broods in the finer points of hunting grasshoppers. Occasionally, a cock will rouse himself at sunrise and sail up to the arena to kick a little sand and shadow box with imaginary rivals. Chances are he's a youngster stealing an opportunity to climb into the ring after the heavyweights have retired to their summer haunts and the ladies are busy with their housekeeping.

The prairie grouse of North America are a diverse group scattered through a variety of habitats and climates, but they all share the spring ritual of the lek. The display goes by different names among different species – sharptails dance, sage grouse strut, greater prairie chickens boom, lessers gobble – but the essential nature of the lek is the same for all. For species living on a nearly featureless grassland swept by a wind that blots out all but the most penetrating sounds, the lek performance is a communal effort to announce the time and place of the mating rendezvous. The calls from males on the ground attract females, and there is some reason to believe that they may stimulate the ladies into breeding condition as well. In addition, the lek is a focal point of male confrontation where each cock tries to establish dominance over his opponents either by intimidation or a plain old-fashioned thrashing.

The males begin frequenting the display ground in early March and may continue to visit it until early June. In the white-hot excitement of April, they arrive an hour or more before sunrise and stay nearly all day. It's an impressive expenditure of energy, entertaining for those few wildlife enthusiasts who roll out of bed before first light to witness it and in some ways puzzling to biologists. While there are exceptions to every rule, it's generally safe to say that, when a species invests this much effort in an activity, there must be some profit in it. So the question arises: Why do prairie chickens display?

The easy answer is that they display in order to win

the right to mate. The lek may look like a free-for-all to the casual observer, but there are actually rigid boundaries on the area recognized only by the males who participate. In early March, nearly every male in flying distance of the booming or gobbling ground will try his luck at establishing a territory. The number of males on each ground declines as the season progresses and the youngest, faintest-hearted individuals are given the bum's rush by more dominant males. These unsuccessful cocks may fly to other leks to try again, but they usually find themselves excluded from center stage by the time the hens begin to show up in late March and early April.

For the cocks left on the display ground, the prize is a piece of centrally located real estate. Research done by Dr. R. J. Robel and his students at Kansas State University shows that the bantamweight champion in the middle of the ground may account for up to three-fourths of the mating that occurs. The runner-up in the dominance struggle may participate in another ten or fifteen percent of the mating. The dominant male may actually walk to the edge of the booming ground to meet an approaching hen and escort her to his territory just to make sure there's no intervening romance. The subordinate cocks may not like the arrangement, but they usually know better than to interfere.

Over the course of a few thousand years, the breeding success of these dominant males has probably resulted in a more aggressive prairie chicken. The selection for aggressiveness may be even more intense because there is evidence that female prairie chickens also have a system of dominance ranking. More aggressive females have often been observed interfering with the love lives of subordinate females. The dominant females usually breed first, and, since early nesting attempts are more successful than later ones, this probably means that they hatch more young. With both these selective processes at work, it's not surprising that the chicken is a mighty feisty bird.

The advantages of this innate aggressiveness are easy enough to appreciate when the chicken is on the lek; they aren't so clear during the rest of the year. There are nine months of living to be done between flings on the display ground, and the aggressive male is likely to find that his *machismo* doesn't help him fill his belly or intimidate a hunting coyote. He's like a highly tuned boxer – he may have all the tools he needs to be a contender, but those won't help him much if a bunch of hoods catch him in a dark alley.

As it turns out, a male's success on the display ground may be related to other characteristics that are more important to the breed. Dr. Robel and his students have found that all dominant males on their study areas were at least two and a half years old. It appears that experience on the lek may be part of the reason they are dominant. The only way they can get that experience is to make it through a couple of springs, not a particu-

Confrontations between males on the display ground may be very formalized as between the greater chickens at right or more violent as between the two lessers on the previous page. If the dominant male is removed from the ground, all other males shift their territories, and an additional male may be allowed onto the edge of the lek. In such cases, conflicts among the remaining males become much more frequent and often interfere with breeding. The object of struggle is to secure mating privileges with the female (right). Scientists have reason to believe that females may also establish a social hierarchy in which dominant females are bred first. (All photos by Ron Spomer).

larly easy task when you are a member of a species that has an average life span of about 1.6 years. The patriarchs of the lek may well be passing a cluster of useful traits down to their offspring – the aggressiveness they will need to win a mate and a general talent for survival that keeps them around to use it.

All of which is to say that the prairie chicken lek is a classic example of natural selection *a la* Darwin, survival of the fittest. But the system may have a few subtleties we don't fully understand. The lek and the aggressive displays that go with it may, in fact, be sensitive population control mechanisms that limit chicken numbers before they are limited by food or cover shortages. There is no doubt that subordinate males suffer higher spring mortality than the dominant birds on the lek. There seems to be safety in the numbers on the display ground, or it may be that the displaying birds are simply better equipped to handle trouble when it appears. In any case, there are only a limited number of territories available on the lek. When a large number of the previous summer's chicks survive the winter, many more of them are evicted from the lek; overall spring mortality is higher, and a potential population explosion is nipped in the bud.

The level of aggressiveness in male prairie chickens may play a part in population control, too. Continued selection for pugnacious males occurs on the display ground as long as subordinate males are willing to accept their inferior status. As long as they yield to the dominant males in the center of the ground, succeeding generations of chickens will become more and more combative. But at some point, a generation of subordinate chickens may become too aggressive. The dominant birds on such leks might be unable to breed; every time they turned their attention to a willing female, they could expect a peck in the back from one of the peripheral cocks. The ritual combat on the lek itself might finally occupy the fighters in the population so completely that females could go unbred. What few matings that occurred would be carried out by more peaceful males away from the fighting. Thus, as the overall population declined, more placid, law-abiding males would be hatched. At last, order on the lek would be restored, and the subordinate males would once again step aside for the kingpins in the middle of the ground. Breeding efficiency would increase as the studs were left to their work, and the chicken population would start to grow in numbers and aggressiveness. It's a neat hypothesis, though untested for the most part. If proven, it might account for the unexplained peaks and troughs in many grouse populations.

True or false, it's an interesting question to ponder next spring in the pre-dawn chill of a burlap blind while you wait for the first flurry of wings and the cackle that usher in another morning on the lek. □

Smallmouth bass like their cover rocky; Wilson and Milford reservoirs give them what they like . . .

Bronze Bass

Tom Bowman

Illustrated by Doug Schermer

Male smallmouth building nest

There are not many positive things to be said about the dog days of a Kansas summer, unless you're one of those individuals who simply likes to swelter. For me, it would never need to get above fifty degrees but, of course, that is not the case during our summers here.

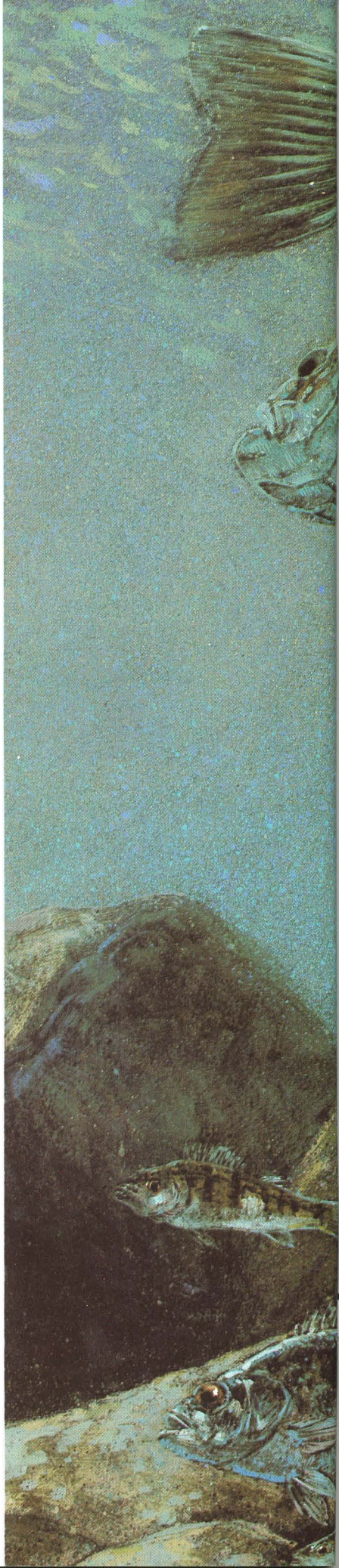
You've really got to love fishing to sit in a boat as the sun bakes your brains. Bass fishing on the big reservoirs can be especially futile, since most of the largemouths have long since moved off into the deeper areas of the lake.

But if it's smallmouth bass you're after, the story is quite different. Probably more smallmouth are caught during the summer than at any other time of year. The bigger ones are generally caught in the fall but, for sheer numbers of smallmouth on the stringer, summer is the time.

This is not to say that the mere presence of smallmouth in a lake will revolutionize fishing in the summer. But for those who take the time to learn the smallmouth and its habits, this little brown bombshell can provide some of the most exciting freshwater sportfishing anywhere.

Historically, the smallmouth in Kansas was native to only a few small streams in the southeast corner of the state. That was about as far west as the fish's range extended; smallmouth were originally found from northern Minnesota to Quebec south to the Tennessee River system of Alabama and west to eastern Oklahoma and southeast Kansas. With the advent of the larger reservoirs and some prudent stocking, however, the fish are becoming more common throughout many areas of the state.

Smallmouth were first introduced in the early 1960s to some small state lakes in the eastern part of the state. These early introductions were made with only a few fish and were never very successful. In the early



1970s they were introduced to Cedar Bluff Reservoir. Although that lake lies some 300 miles west of their historic haunts, they took to the new habitat better than anywhere else in the state. The clear, cool water and rocky, boulder-strewn shoreline provided much to their liking. Here they could grow and flourish.

Their success at Cedar Bluff convinced fisheries biologists that a couple of other large reservoirs in the state could provide even better habitat for the species. It is at those two reservoirs—Milford and Wilson—that the fish have really found their niche.

Smallmouth were first introduced at Milford in 1973, and at Wilson in 1978. Both impoundments produced phenomenal growth rates for smallmouth, producing fish over twelve inches in length the first year they were released. The Kansas record for smallmouth is four pounds one ounce. That fish was taken out of Milford Reservoir in the fall of 1978 by Blaine White of Downs. Although growth rates have since slowed somewhat as the bass populations have increased, the smallmouth there continue to grow much faster than the national average.

And they should, for the smallmouth occupies a niche in the reservoirs that no other fish fills and it encounters very little competition for either food or space as a result. Smallmouth are cousins of the largemouth but are quite different in their habits and habitat. There is some overlap, of course, but largemouth and smallmouth seldom occupy the same areas to any great extent.

Picture a quiet backwater area with clumps of lily pads surrounding submerged stumps and you have a good idea of what classic largemouth habitat looks like. Smallmouth, on the other hand, prefer largely unobstructed, clear, open water and require only the crevices and shadows provided by submerged rocks and boulders from which to ambush their prey.

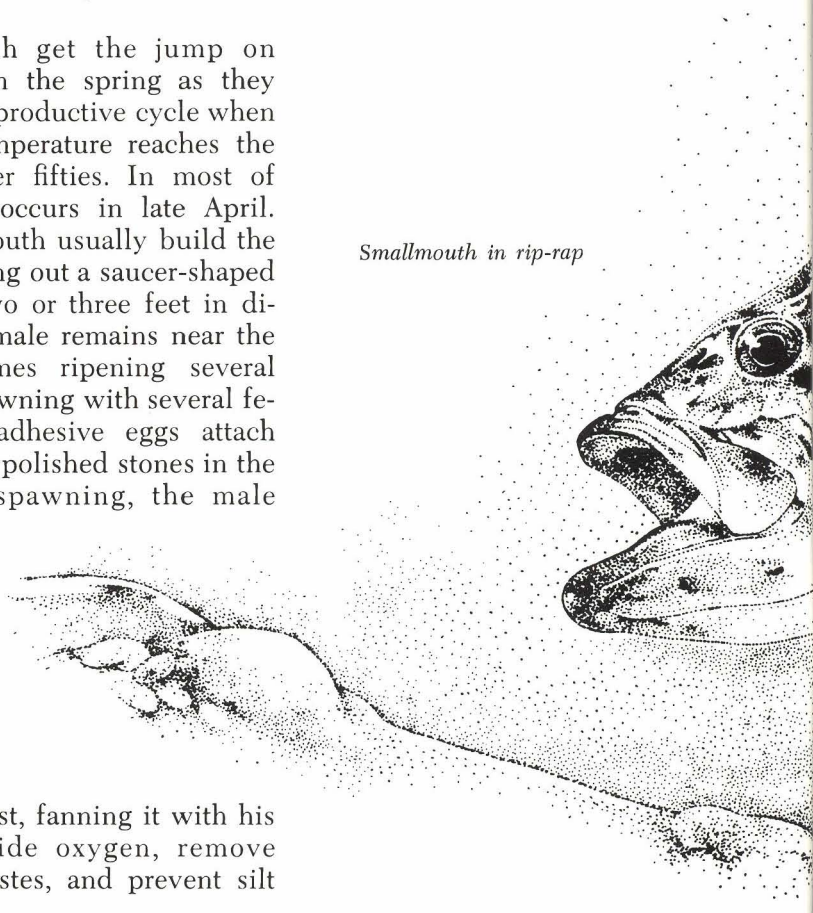
It is this feature of their lifestyle that has made the smallmouth so attractive to fishery managers attempting to provide bass fishing in our Kansas reservoirs. The kind of habitat required for largemouth bass exists only for the first few years of a reservoir's life. As natural aging occurs, the submerged stumps become silted over and the smaller brush decays and becomes part of the bottom strata. The weedy, brushy areas along the shoreline erode away, exposing the limestone boulders once hidden under the mantle of grass on the bluffs. Before long, it's not hard to see how areas that once were prime largemouth areas have become havens for smallmouth.

This same slow progression can be seen not only on Milford and Wilson but at other reservoirs as well. It's a phenomenon that is not all bad, however. As is often seen in nature, what is detrimental to one species can be beneficial to another. Walleye also reap some benefits as a lake ages since they, too, gain suitable habitat as rocky areas are exposed.

Smallmouth get the jump on largemouth in the spring as they begin their reproductive cycle when the water temperature reaches the mid- to upper fifties. In most of Kansas, this occurs in late April. Male smallmouth usually build the nest by fanning out a saucer-shaped depression two or three feet in diameter. The male remains near the nest, sometimes ripening several times and spawning with several females. The adhesive eggs attach themselves to polished stones in the nest. After spawning, the male guards the nest, fanning it with his fins to provide oxygen, remove metabolic wastes, and prevent silt deposition.

Normally, the smallmouth have moved away from their gravelly spawning beds before the largemouth even begin thinking about finding a mate. This is an important fact to remember if it is one of the big, old fish you are after.

Distinguishing the various black bass from each other can be difficult unless you've had a lot of bass fishing experience. Smallmouth can easily be mistaken for spotted bass due to their similarity in color and mouth shape. But there are some telling signs. The smallmouth has faint vertical bands along its sides; a spotted bass has a blotchy, lengthwise stripe along its flanks, with rows of small spots below this stripe. Distinguishing smallmouth from largemouth is an easier task. The corner of the mouth extends back to a point directly below the eye in a smallmouth, while it extends farther back in a largemouth. The largemouth possesses a definite horizontal stripe along its sides unlike the vertical barring of a smallmouth.



Smallmouth in rip-rap

Usually, any of the traditional bass lures will connect you with a smallmouth. Perhaps the most effective fishing lure for smallmouth has been the crank bait. These plugs are simply lures which are cast to a likely spot and cranked in. Sounds simple but it isn't necessarily so.

The important thing to remember is that you have to fish where the species lives to catch it. Smallmouth are notorious for lying very close to the surface, flat against a boulder or rock pile. It takes pinpoint casting to put the bait at the fish's mouth. You only have to slap your lure against a rock once or twice to learn that smallmouth fishing can get to be an expensive sport.

My favorite technique is to move quietly along the shoreline in a boat and cast right up in the submerged rocks. I then simply reel as fast as I can, making the bait dive as deep as possible and bump the rocks as it moves down the shoreline. It's simple and effective . . . but tiring. An hour or so of intensive smallmouth fishing and the ol' pitching arm tells me it just isn't what it used to be.

It's not uncommon to see a smallmouth following the lure right up to the boat. It's hard to get these fish to strike, even when you switch lures. I think they're mostly just curious. If you do coax them to strike you don't need to worry about feeling it. Smallmouth are not bashful. A couple of tangles with them will help you understand why one early angler described them as ". . . inch for inch and pound for pound, the gamest fish that swims."

So, if you want to catch a smallmouth bass, where is the best place to go? Without a doubt, your best bet for connecting with a smallmouth is at Milford and Wilson reservoirs. Nearly all of the rocky banks and points in the lower half of these reservoirs harbor some smallmouth, but the main concentration of fish still remains on the face of the dam. Other reservoirs containing smallmouth include Cedar Bluff, Clinton, and Melvern.

Some of the state fishing lakes can also provide some smallmouth action. Geary State Fishing Lake, located south of Junction City, supports a good population of smallmouth, as does Polk Daniels Lake in Elk County. All of these lakes have one thing in common. They possess the clear water and rocky substrate so necessary for smallmouth to flourish.

Will the smallmouth ever replace the largemouth? Not likely. Smallmouth require habitat so specific that they simply won't exist in much of our Kansas water. Some lakes will support them and some won't. Probably the best we can hope for is for smallmouths to make up about thirty percent of the bass population in most of our smallmouth lakes. Even so, that's thirty percent we didn't have before.

The future of smallmouth in Kansas looks fairly stable. Lakes with suitable habitat will continue to provide a home for smallmouth. As the lakes age and habitat expands, so will smallmouth populations. Undoubtedly, the fish will make up only a portion of the total fishing picture. But what an appealing portion! □