Carson Cox, Fisheries Biologist
Emporia Research & Survey Office
1830 Merchant St., P.O. Box 1525
Emporia, KS 66801

Kansas Department of Wildlife, Parks and Tourism

Phone: (620) 342-0658
Fax: (620) 342-6248
www.kdwpt.state.ks.us
carson.cox@ksoutdoors.com

Robin Jennison, Secretary

Sam Brownback, Governor

Fall River/Toronto Fisheries District Newsletter

Foreign Invaders

No, this isn't an article about immigration reform in the U.S. In January, I attended the Kansas Natural Resource Conference in Wichita. I heard many fascinating anecdotes in the presentations about zebra mussels in Kansas. Now hopefully, I'm not going to bore you with a bunch of information you should probably already know about zebra mussels. There's already lots of really good information available on the KDWPT web site at this link: http://kdwpt.state.ks.us/Fishing/Aquatic-Nuisance-Species/Aquatic-Nuisance-Species-List/Zebra-Mussels Instead, I want to share with you some of the crazy myths and rumors I learned about zebra mussels and the fascinating facts of reality about this foreign invader.

Thankfully, lakes and reservoirs in the Fall River/Toronto Fisheries District have not yet fallen victim to zebra mussels. However, the Neosho and Cottonwood Rivers that flow through the district and converge near Emporia do have zebra mussels. These two rivers got infected from Marion and Council Grove Reservoirs upstream. Subsequently, John Redmond Reservoir and Coffee County Lake downstream were infected by July, 2012. One of the concerns I've heard from anglers is that the zebra mussels will clog the cooling pipes and screens at Wolf Creek Nuclear Power Generating Station and cause it to shut down. This is a genuine concern. Zebra mussels do indeed clog pipes as pictured above.

However, I've asked the environmental biologist at the plant about this and he said they had developed a macro-fouling prevention plan, which includes a four chemical cocktail for treating the water inside the piping system to keep the plant running safely.

I'm often asked, "Why don't you just use chemicals to kill the zebra mussels in lakes?" There is a long list of chemicals that can be used to kill zebra mussels. However, not only do they also kill desirable aquatic organisms, it would cost a lot of money to treat the volume of water in even a small lake. For example, Lyon State Fishing Lake is 135 surface acres, and contains 616 million gallons of water. To treat it with two parts per million of 5 percent chlorine bleach (the lethal dose for zebra mussels and everything else) would require 30,644 gallons and would cost $122,576 @ $4/gal.

When zebra mussels do infect a water supply lake, you know who ends up paying to

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treat the water so they don't clog the pipes. When the North Texas Municipal Water District water supply, Lake Texoma, became infected with zebra mussels, the cost of water went up 14 percent to begin paying off $350 million in bonds for zebra mussel control. That worked out to about $8 a month increase in the average bill. They had 1.8 million customers to spread the cost out. The cost to small water districts in the Fall River/Toronto Fisheries District with only a few thousand customers could be catastrophic.

One solution would be for the water districts to stop using lake water and install wells. This brings me to the next myth. Have you heard someone ask, "What's going to happen to the underground aquifers when the zebra mussels get in there?" Zebra mussels are not going to clog underground aquifers because they can't live there. It's not a matter of sunlight, because zebra mussels have been reported at the dark depths of 148 feet in Germany. They are limited by oxygen (they need one part per million to survive) and nutrients. Zebra mussels are filter feeders. They eat phytoplankton, zooplankton, and rotifers. They are even cannibalistic on their own veligers. But, without plankton, they will starve.

The clear water also allowed for more light penetration and increased growth of aquatic plants. Dense aquatic vegetation causes fish population imbalance by allowing too much cover for small fish and inhibiting predators from finding their food. It also interferes with boaters, anglers, and swimmers. Zebra mussel infestations may also promote the growth of potentially deadly blue-green algae, since they avoid consuming this type of algae but not others. By consuming vast amounts of phytoplankton, zebra mussels increase phosphorous, an essential nutrient of both phytoplankton and blue-green algae. Less phytoplankton means more phosphorous available for blue-green algae.

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To affect the primary productivity of a lake's entire ecosystem, it's obvious that zebra mussels grow in massive colonies. Nearly a half million individuals may grow on each square meter of substrate. A single individual can filter one liter of water each day, and a colony covering one square meter of substrate can filter 47.6 million gallons of water per year. If zebra mussels were to infect Lyon State Fishing Lake, it would only take a 139 ft^2 size colony to completely filter the entire 616 million gallons of water in the lake in one year, removing the plankton in the process.

One of the real problems of high density zebra mussel populations is that they grow on every hard surface. This includes native mussels. Zebra mussels can grow five layers thick before suffocating the ones underneath. When attaching to native mussels, they not only out-compete them for food, but suffocate them in a short period of time. Where zebra mussels invaded lakes and reached high densities, native mussels were wiped out.

Many of you may have already encountered these massive colonies of zebra mussels. When an angler's lure or bait comes into contact with a zebra mussel, the sharp edge cuts the line. Where zebra mussels are present, anglers are going to have to switch to expensive Spiderwire type fishing line to prevent line cuts. And forget walking barefoot on the beach anymore. I was on a tour of Winfield City Lake to see the impact of zebra mussels. One of the men on the tour sliced his finger tip open when he simply touched a zebra mussel shell that was attached to the boat dock!

For a creature with no legs, you may be wondering how these pests got spread around from the Great Lakes so quickly. As previously discussed, before people knew how destructive these things are, people who wanted clear water may have intentionally stocked them.

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I've even had people in Kansas tell me they wanted to stock them in every muddy lake in the state to "clean them up". The first lake to become infected with zebra mussels in Kansas was El Dorado Reservoir in 2003, and its transparency hasn't changed. I've had people tell me that zebra mussels and their microscopic veligers are spread around on ducks and geese. Scientists have busted this myth. Researchers marched domestic waterfowl through wading pools filled with known densities of zebra mussel veligers then across 15 feet of land and back into clean wading pools. They didn't even take flight to dry their feathers, and no veligers were transported to the clean pools.

Perhaps the myth that ducks spread zebra mussels arose from people seeing them eat mussels. Diving ducks including scaups, pochards, tufted ducks, buffleheads, goldeneyes, common coots, oldsquaws, and white-winged scoters, even herring seagulls all feed significantly on zebra mussels. However, since birds have gizzards that are very efficient at crushing the shells, zebra mussels don't survive being eaten.

The typical way zebra mussels get moved around is by attaching to boats, docks, boat lifts, and microscopic veligers in water. Zebra mussels that are attached to boats and things can close up and live out of water for 30 days in a cool humid environment. Out of site is out of mind. People may clean the zebra mussels off the outside of boat lift tanks, jet skis, and wake boarding boat ballast tanks, but don't consider the ones that live inside the tanks and jet drives. Jet skis can retain a gallon of water in the jet drive. The maximum veliger density at Cheney Reservoir was 1200/gallon or 19/tablespoon. It only takes two to start a new population.

Outboard Lower units are self-draining to prevent freeze damage, so they don't hold water. But have you seen the damage leaving the lower unit in the water can do? It only

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takes 72 hours for zebra mussels to begin attaching. It wouldn't take long to reduce the cooling flow and cause overheating from zebra mussels both inside and outside on the lower unit.

There are three biological vectors that could spread zebra mussels: turtles, crayfish, and fish. Below are pictures of zebra mussels attached to the shell of a turtle and a crayfish.

There are many species of fish that eat zebra mussels: redear sunfish, blue catfish, channel catfish, freshwater drum, common carp, redhorse suckers, river carpsuckers, and smallmouth buffalo. But unlike birds, some zebra mussels pass through the stomach and intestines of these fish undigested and are excreted. Therefore, zebra mussels can go anywhere a fish can go, including home with you. That's one reason we have the regulation prohibiting moving live fish from waters that contain any aquatic nuisance species.

Is there anything good or beneficial about zebra mussels? Well, as a matter of fact there is. Scientists are researching the adhesive power of the byssus threads that hold zebra mussels to surfaces. One researcher has three pending patents on glues made from zebra mussels. He found that the sticky stuff was made of a protein that contained a high level of phenolic hydroxyls. These biochemists were able to synthesize this unique adhesive protein by adding molecules with phenolic hydroxyl groups to soybean flour. They now have a new and superior polymer from which they can make plywood, OSB (oriented strand board), particle board, and laminated flooring.

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AD ASTRA PER ASPERA
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This new polymer is biodegradable and doesn't cause cancer like the old petroleum based formaldehyde resins currently in use. The plywood they make with this new zebra mussel based adhesive can be boiled for several hours and the adhesive holds as strong as ever. As anyone who's had a water leak knows, the current laminate flooring and plywood products fall apart when wet. That's amazing; we now have waterproof glue made from zebra mussels and soybeans!

Researchers have also been studying the mussel's byssus to find an artificial substitute for replacing damaged ligaments and tendons. The byssus of a mussel is about five times stronger and fifteen times more flexible than human tendons. Zebra mussel byssus is being used to develop synthetic materials for surgical sutures that could be used to repair blood vessels or intestines that need to stretch and move. Though not made from zebra mussel byssus, it was thought that the 'golden fleece' sought by the legendary Greek hero Jason, was woven from the byssus threads of the pen shell.

Although it appears that some good may come from these alien invaders, the most likely result of their introduction into your favorite fishing water will be higher water bills and reduced sport fish. Thank you for taking this time to learn about some of the lesser known facts and fiction about this invasive species. Please help spread the word.

Crappie Spawn 2014

In the last newsletter I reported how the crappie populations at Fall River and Toronto Reservoirs ranked among all Kansas reservoirs. Now I'm going to provide you with specific population characteristics as well as fishing locations for this spring's crappie spawn at Fall River and Toronto Reservoirs. Since the last issue of the newsletter was released, I've been getting lots of phone calls from anglers asking me questions about the crappie spawn like: "When, where, and at what temperature will they spawn?" I've even been asked if crappie spawn early in the heated water at Coffee County Lake and La Cygnes Reservoir. This article is going to focus specifically on Fall River and Toronto Reservoirs.

You can pick up any book about the subject and find that crappie begin spawning in the spring when the water temperature reaches

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about 56 degrees. However, crappie don't spawn at the same time every year. There are several other variables that influence this annual ritual. Photo period is a key trigger to spawning. Dr. Fred Vasey, fisheries biologist at Missouri's Table Rock Lake, reported that crappie began spawning when there were 13.2 hours of daylight. Table Rock Lake has about the same latitude as Fall River and Toronto Reservoirs. That day will occur on April 15, 2014 at Fall River and Toronto Reservoirs. Vasey also observed the last crappie spawn when there was 14.6 daylight hours, which will occur on May 31.

Some, but not all crappie may be multiple spawners. That is, if a female is in good condition, she won't lay all her eggs at one time. Instead, she may deposit the first batch of eggs early in the spawning season then return to the spawning beds later after ripening a second batch. Some years, crappie are up on the spawning beds only to retreat to deeper water after a cold front comes through. They may stay in deeper water for days or even weeks waiting for favorable spawning conditions to return. If conditions are too unstable, they sometimes won't return at all and reabsorb their eggs. This may explain why anglers catch females with eggs late in the season.

Changing water level will also alter crappie spawning behavior. Crappie at Fall River and Toronto Reservoirs are especially susceptible because the drainage basins are so large compared to the reservoirs' storage capacity. It only takes a 4.3 inch rain over the 730 square mile drainage basin to completely fill Toronto Reservoir. When the gates are open, the water level can fall a foot per day, desiccating eggs. Crappie eggs need a week of stable water levels to hatch and for the fry to absorb the yolk sack and swim away from the nest. Raising water levels will cause crappie to abandon spawning activities at traditional sites. When the reservoirs are in flood stage, crappie prefer to lay their adhesive eggs on the flooded terrestrial vegetation.

So when is the best time to start fishing the crappie spawn? I have seen pre-spawn fish move into the shallows as early as the last week of March and the first week of April if we have warm sunny days and a rain runoff that doesn't cause flooding. The reservoirs will still be too cold, but I've measured water temperatures in the rivers and feeder creeks 10 degrees warmer than the reservoir. During this time just before the actual spawn, crappie

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feed aggressively to boost their energy requirements for spawning. Male crappie move onto back water gravel shoals protected from wave action to begin staking out their nesting territory.

Male crappie aggressively defend their nests and are easily caught. Crappie follow the channel from deep water to shallow gravel shoals before dispersing on both sides of the channel spawning cover. You can find crappie next to any log, stump, or brush pile. But be stealthy, when crappie are shallow they are very wary and spook easily, even in muddy water. Young smaller males arrive on the gravel shoals first, while the larger pre-spawn fish school in the deeper water channel.

Once you locate the magical spawning grounds, don't expect to fish alone. According to interviewed anglers during the last creel survey, crappie ranked as the most popular fish to catch at Toronto Reservoir and the second most popular at Fall River Reservoir. The calculated angler trips per year were 8,723 at Toronto and 17,772 at Fall River. The creel survey revealed that anglers at Fall River caught 11,064 crappie per year or 4.5 fish per acre; while anglers at Toronto caught 10,607 crappie per year or 3.8 fish per acre. Overharvest was not an issue.

The table below summarizes the crappie populations sampled last October for both reservoirs.

Stats	FLRR	TORR
Total catch	1058	478
Catch > 5"	509	376
No. trap nets	16	16
Catch < 5"/trap net	34.31	6.38
Catch > 5"/trap net	31.81	23.50
Catch > 8"/trap net (density rating)	9.56	7.00
Catch > 10"/trap net (preferred rating)	5.13	3.69
Catch > 12"/trap net (lunker rating)	2.38	1.38
Percent* 5-8”	69.94	70.21
Percent* 8-10”	13.95	14.10
Percent* 10-12”	8.64	9.84
Percent* 12-15”	7.47	5.32
Percent* ≥15”)	0.00	0.53
Mean fish condition 5-8”	100.57	95.43
Mean fish condition 8-10”	95.73	92.13
Mean fish condition 10-12”	100.52	104.04
Mean fish condition 12-15”	103.86	100.62
*excludes fish <5"		

Fish condition measures fish fatness. The objective range is 80-100. Two-foot high water levels in June resulted in a high density gizzard shad spawn which was reflected in high fish condition of crappie.

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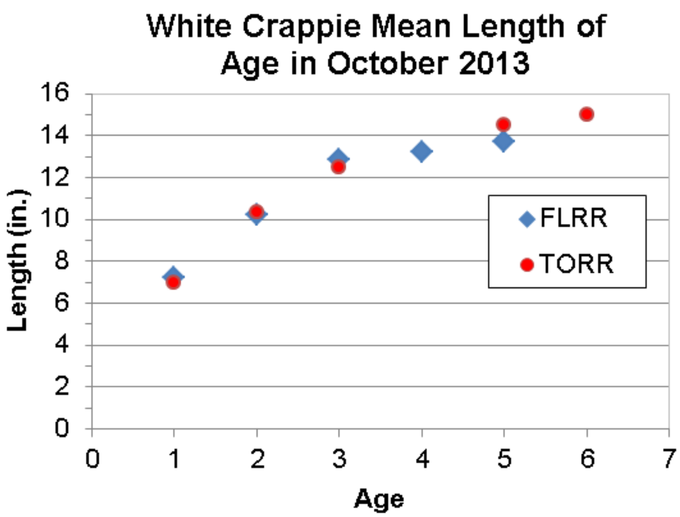
Age analysis from scale samples is shown in the chart below. Growth was similar for both reservoirs. However, crappie at Toronto lived about a year longer and grew larger.



Crappie grew faster in flood years due to increased food supply and nutrients washed into the reservoirs. However, crappie mortality rate increases in flood years (not from flushing out of the reservoir). In other words, they don't live as long. Reproduction was also higher in flood years.

The take home message here is that Toronto and Fall River Reservoirs have excellent crappie populations this year that traditionally have been under-utilized. Don't miss out on this year's best action. Be on the water when crappie are on their beds and take advantage of this spring fishing bonanza.