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Pure Headwaters in the Flint Hills

Walter Dodds

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GREAT BLUE HERON
Courtesy Audubon Royal Octavo Edition, 1839

Pure Headwaters in the Flint Hills



The most inviting and pleasant place on the prairie landscape is the stream. In the biting winter winds, the bison hunker down for shelter and if it is too hot, the cattle seek its coolness. Water is lifeblood.

No plant or animal can live without it. Streams, the ribbons of life, tie together the prairie landscape and all the plants and animals that are found there. The network of streams connects the landscape to all those below.

Perhaps you have seen a great blue heron flying across grassland and wondered what a wading bird could be doing here. Yet the spring-fed pools of the Flint Hills are home to the small fish that nourish those stately predators. The springs have supported the ranches and their livestock as they supported the bison in the dry times of the past. The springs collect into streams, small

rivers, and eventually the Kansas, Osage, or Arkansas rivers. Humans have depended on these rivers as long as they have been here. Native American settlements and most of today's major cities are on these permanent waters. People often ignore the streams of the prairies, and when they think of prairie they think of grass. However, the streams and rivers of the Great Plains and the tallgrass prairies have always been a key part of the ecosystem.

Grasslands cover roughly one third of the ground on our planet, and a fourth of the water flowing from land to sea originates from these ubiquitous biomes.

They are found on every continent except Antarctica, and they all have streams and rivers that flow from them. What happens in these streams matters here, in the Flint Hills, and everywhere else the grasses dominate the landscape.

Rocky soils have kept the Flint Hills from being ripped open by plows and converted to row crops. This geology has resulted in the Flint Hills being the last area with extensive tallgrass prairies and defines the grassland streams that drain the limestone catchments of the area. The glaciers only touched the edge of the Flint Hills. We do not have the lakes, ponds, and wetlands that the glaciers carved from the land. From the northern Flint Hills, the front of a huge continental ice sheet would have been visible during the time of the furthest southern extent of the glaciers. Then, there were spruce and aspen here, and the occasional glacial outburst flood scoured the river valleys. Once the glaciers receded, the grasslands started to form here, and the organisms in their streams, tolerant of the

increasing summer heat, assembled in the communities we find in the streams today.

The streams and rivers drain the rain and snow that falls, if we are lucky, on our hills. The stark contrast between flood and drought defines these streams. Thunderstorms bring raging floods that move rock and leave the stream looking like a bulldozer has moved the channel. A few months later the same channel may be completely dry. The hardy plants and animals that call these streams home have adapted to the extremes that only thunderstorms and extended drought can bring. These organisms are adapted to life on the edge, though humans have pushed them over the edge in many areas.

The streams of the Flint Hills are characterized by excellent water quality in areas where they have been only moderately disturbed. The water quality suffers in areas where cropland has been fertilized, septic tanks installed, or where cattle, pigs, or chickens are confined in large numbers. Fortunately, the history of the Flint Hills has been different



TOPEKA SHINER



ORANGE-THROAT DARTER (MALE)

*Drawings by Joe Tomelleri
Courtesy of the Artist*

from that of most tallgrass prairies in North America; burning by ranchers and grazing by cattle mimic the bison and fire that historically shaped the ecosystem. We know from our good quality streams what is possible for managers to attain in draining areas of streams that were formerly grasslands.

The streams of the Flint Hills have some inhabitants that few other streams possess. The Flint Hills streams hold many of the remaining Topeka Shiners (*Notropis Topeka*) as their relatively pristine flows have offered refuge to this once widespread prairie fish. The spring-fed pools in Flint Hills

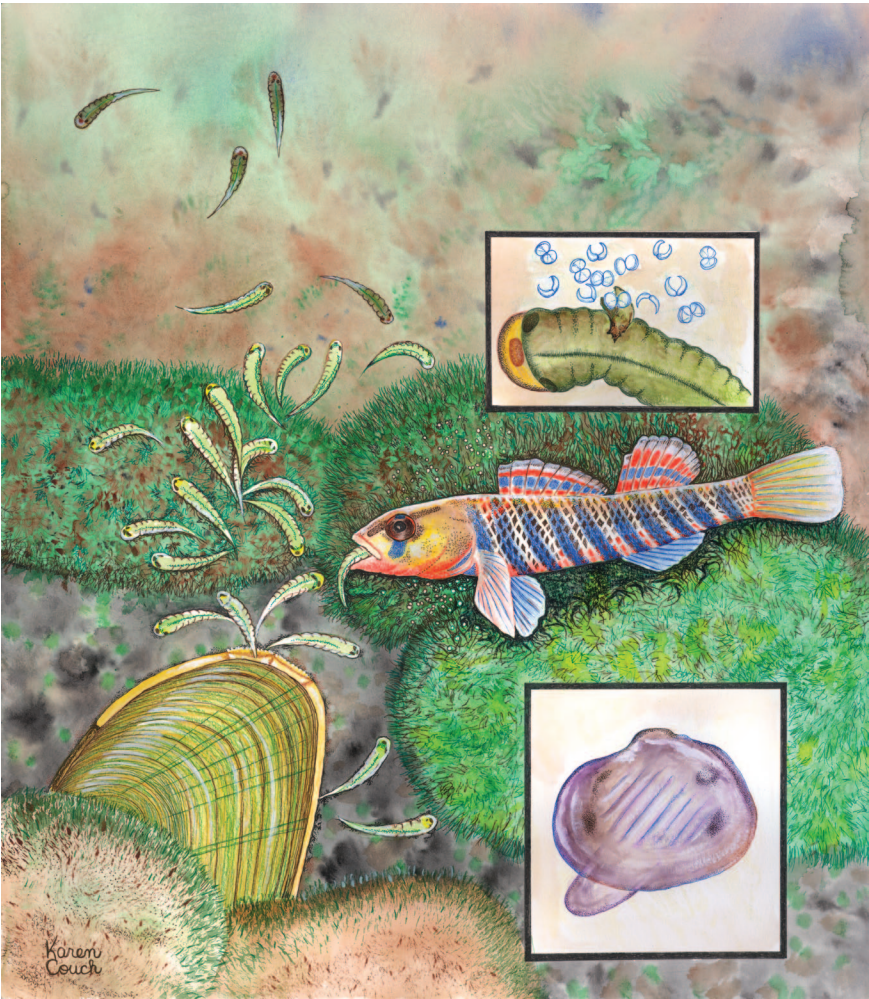
streams are the only place known where the mayfly, *Leptophlebia konza*, is found. These small insect larvae spend most of their lives in the water; the adults emerge and only live a few days, long enough to mate and lay their eggs in the same or in a nearby spring. Other notable inhabitants include the spectacular rainbow-colored *Etheostoma spectabile* (Orangethroat darter), crayfish, snapping turtles, and a variety of amphibians and other fishes.

In the depths of the limestone there are rivulets of water and small blind and un-pigmented isopod crustaceans (related to the sow bugs that swarm our gardens). The limestone itself is the fossilized remains of long-gone animals that inhabited the seas covering Kansas 250 million years ago; the isopods are the biological trace of the past. These animals retreated into the ground as the sea level fell and the oceans retreated to the south. Yet they remain as a legacy of days when the reptilians swam the seas of Kansas. They have evolved to live in

completely dark habitats and now live with small creatures and predatory flat worms as long as your finger. If you are reading this anywhere in the Flint Hills, these creatures are probably crawling through the limestone channels deep below you.

The larger rivers draining the Flint Hills are also home to species of freshwater mussels. These long-lived bivalves are in the group of Unionid Mussels, one of the most endangered groups of animals on Earth. These animals were harvested by Native-Americans for their mother-of-pearl, and by Europeans for buttons before plastic was discovered. They survived exploitation to the early 20th century but now many of the species are facing extinction.

Unionid Mussels are unique in that they must propagate with larvae that hitch a ride as parasites on unsuspecting fishes. The mussels have evolved elaborate lures that look like small fishes or other food for larger fish. When the fish try to bite the lures, they encounter a cloud of larvae that attach to their gills. These mussel



UNIONID MUSSELS PROPAGATING IN A FLINT HILLS STREAM
Karen Couch
Courtesy of the artist

larvae latch on and grow until they are large enough to drop off and grow on their own in the river bottom. They live many years in one place and eventually reproduce. The dependence on specific species of fish for their larvae to survive and propagate means that the mussels are sensitive to decreases in the species they depend on. The fact that they grow and reproduce slowly means they are particularly susceptible to human disturbance.

As noted, some of the species found in our Flint Hills rivers are listed as endangered species. As people have disturbed the water quality and altered water flow by adding reservoirs and diversions, populations of these animals have dwindled. The recent droughts may cause the complete loss of some of these species - the final nail in the coffin.

So what were the untouched rivers and streams of the Flint Hills like? Our best information comes from the journals of early explorers. In 1843

the second expedition of John Frémont passed the junction of the Smoky Hill and Republican rivers and as they worked their way up the Republican River noted many clear streams and good stands of timber. This indicates the Great Plains commonly had wooded riparian zones, at least along the greater rivers on its eastern borders. Early land surveys also indicate that larger forests were rare around the smaller streams, but common along the river bottoms.

Now, in areas where the Flint Hills are not burned, the trees creep up into the prairie along the stream channels. This is changing those streams which were once open to the sunlight into those characterized by tree cover and leaf input, similar to streams farther east in Kansas. The resulting shift in light input alters the carbon sources that fuel the food web. In open grassland streams, algal production and animals that eat algae predominate. In wooded streams, invertebrates that can process dead

leaf material are most common. As we switch from traditional cattle ranching in the Flint Hills to other uses, fire becomes less frequent. Grasses have a physiological edge in dry times because they have the capacity to use carbon dioxide more efficiently without losing as much water. As the carbon dioxide in our atmosphere increases, the edge the grass has over the trees disappears. As a consequence, prairie streams are among the most endangered habitats on the continent. Even where large enough grasslands remain to encompass complete watersheds, the small streams are losing their unique character as riparian zones become dominated by forests.

As you wander around the Flint Hills, appreciate the fact that streams are our natural heritage and their beauty is a unique aspect. While prairie streams were once common in the remainder of the Midwest, the streams of Iowa, Illinois, Nebraska, and Kansas outside of the Flint Hills and the Smoky Hills have been channelized, influenced

by agricultural runoff, dried from groundwater extraction, and otherwise drastically altered from their original state. Avoid the poison ivy and the ticks, and pay attention to the aquatic life these streams support. Dragonflies hover above the streams, water striders scavenge the surface, and a whole world of aquatic animals and plants lives below. These are among the defining parts of grasslands; they tie the land together and tie humanity to the prairie.

Walter Dodds, university distinguished professor of biology at Kansas State University and coordinator of aquatic and hydrological research at the Konza Prairie Biological Station, has studied the effects of nitrogen contamination in stream waters. He has more than 130 publications in peer-reviewed journals, including Nature and Science. He also is author of four books, including Humanity's Footprint: Momentum, Impact and Our Global Environment.