



Aquatic Habitat Fact Sheet

- Several distinct aquatic habitats occur on Konza Prairie: groundwater, springs & seeps, old cattle ponds, bison wallows, and streams.
- The Flint Hills region is distinguished by alternating layers of semi-permeable and fractured limestone and impermeable shale. As rainfall filters into the soil, it moves in many directions through cracks in the limestone. Most water storage occurs on top of the shale layers and moves through to the creek in a few days or months.
- Other water may be stored for longer periods, slowly moving horizontally to the edge of a hill, forming seeps and springs. The headwaters of Kings Creek are perennial springs, which begin in the upland prairie. The perennial springs and pools are important shelter for stream organisms such as fish, crustaceans and insects during periods of drought and are known to the wildlife as dependable water sources.
- Food webs in groundwater rely upon bacteria, which use organic molecules (dead stuff) that washes into the system from above. Protozoa (e.g. amoeba) and small crustaceans (e.g. isopods/rotipolys and amphipods) rely on these bacteria as a source of food. Predators are rare; however there is a large unpigmented planarian (flatworm) that may be an important predator at times.
- Old cattle ponds were created by ranchers to collect rainwater as it runs off the land. Springs are sometimes “developed” by man into ponds for use by cattle. The limestone layers that frequently have springs are the Cottonwood and the Neva.
- Bison wallows are an important aquatic habitat on the prairie, offering moisture to numerous water-loving plants, insects, amphibians and other creatures. Wallows contain unique species that contribute to diversity on the prairie. They are also additional breeding places for species more often seen at the creek. Some wallows hold water for several days to weeks if periodic rains replenish them. Bison drink, bathe and take mud baths at wallows. Other mammals and birds use them as well.
 - Bison have little effect on stream water chemistry and biota. This is because, in contrast to cattle, they do not require shade in the summer heat and have a lower demand for water. Bison do not forage on the stream banks and most bison walk single file across a stream.
- A prairie stream is a unique ecosystem, which supports organisms that otherwise could not survive in the dry prairie climate. Prairie streams are characterized by periodic drought, intermittent flow, and flash floods (high water event), with specialized inhabitants able to withstand the variable conditions.
 - Algae, invertebrates and fish quickly colonize streams when they start flowing after a dry period. Within a week the first representatives of these groups usually are present, within a month or two, the communities have stabilized.
- Localized thunderstorms can dump large amounts of rainfall causing flash flooding. Plant and animal life in Kings Creek must be adapted to the variable climate to survive. In a high-water event, the water rises quickly up to ten or fourteen feet, and forms a swell, which

moves rapidly downstream. The stream channel is scoured, which means the fast moving water carries rocks, debris, tree trunks, plants, and organisms downstream.

- Up to 95% of the macroinvertebrate population can be washed away in a high water event. Depending on the frequency of high water events, plant life, such as algae, and macroinvertebrates often fully recover within two weeks.
- Prairie stream fauna include fishes, crustaceans, insects, macroinvertebrates, and other non-insect invertebrates. The location of stream invertebrate communities varies between three Kings Creek prairie stream habitats. As Kings Creek flows from the upland headwaters, to the middle reaches, and through the lower reaches or gallery forest, the stream channel, stream bed and streamside vegetation changes. Invertebrates prefer particular habitats depending on how they feed.
- Macroinvertebrates act as biological indicators because they react quickly to changing water quality conditions. Ecologists can determine if a stream is ecologically healthy by knowing which species live in a particular reach of the stream and how sensitive they are to contaminants.
- The largest impacts on water quality of Flint Hills rivers, streams and groundwaters are related to agriculture. Agricultural practices such as row cropping and cattle grazing lead to increased sediments and nitrate in streams and nitrate in groundwater. Konza research has shown that these water quality problems probably did not exist before European agricultural practices were introduced and have been exacerbated since the advent of inorganic fertilizers more than 50 years ago.
- Research on groundwater occurs at several sites on Konza Prairie. Wells have been installed in a prairie watershed (N4D), in lowland prairie and in an agricultural field. A significant amount of research also has been conducted on Edler Spring (across the valley from the ranch house). Stream research sites include four watersheds that are monitored for discharge and water chemistry, an artificial stream and a research site at Edler Spring.
- Aquatic research on KPBS includes:
 - Dr. Walter Dodds – nutrient cycling
 - Dr. Keith Gido – fish communities
 - Dr. Jim Koelliker - hydrology
 - Dr. Gwen MacPherson – biogeochemistry
 - Dr. Matt Whiles – stream invertebrate communities
 - Graduate students – see individual theses