

# In the Spotlight:

## Sinkhole/depression marsh

By Brian Yahn, Vegetation Ecologist



KSNPC's "Community Spotlight" is on a rare type of wetland that occurs across Kentucky, known as Sinkhole/depression marsh. This community has an extended hydroperiod meaning it holds water and often has standing water during the wettest of seasons. Due to these periods of prolonged saturation, the community (usually treeless) is dominated by herbaceous wetland plants and may also support wetland shrubs. Soils are hydric with dark, fertile layers referred to as "muck." The abundance of this community prior to Euro-American settlement is not easy to determine as occurrences are naturally small scale and scattered irregularly across the landscape. This community usually forms over small, poorly-drained depressions above impermeable bedrock (sandstone of ridgetops) or plugged sinkholes within rolling to flat karst areas.

Since settlement, the conversion of land to agriculture and other development (including wetland drainage or altering marshes to create open-water ponds) and suppression of natural fire has reduced this community's "footprint" on the landscape. Higher frequency of landscape-level fire prior to the time of settlement likely played a role in shaping the community, especially the (less saturated) margins; this enabled fire to carve out a more open herbaceous community. In a fire-laden past, one can imagine an expanse of prairie and open woodland transitioning into marsh (especially in areas across the Pennyroyal Plain). Today, only the wettest parts of this marsh community remain open, with closed forests on the margins. With such a shift from prairie and woodland to closed forests, many unique prairie and wetland plants that were once a vibrant part of Kentucky's native flora, are today quite rare. Thus, due to so many changes in the natural landscape, Kentucky's Sinkhole/depression marshes and adjacent barrens are extremely rare.

Outside of Kentucky, depression marsh communities extend across the U.S. but vary in species composition, representing many different types. Some types of depression

marshes are globally rare while others are more common. One type that occurs in Kentucky also occurs in Missouri and Indiana (and possibly Tennessee). This type is the most unique of its kind within the Commonwealth and found predominately in the Interior Low Plateau Region (an area that spans from the Bluegrass to Land Between the Lakes). It is considered globally vulnerable (=G3G4) by NatureServe (the national authority on the status of rare species and natural communities). KSNPC lists this Sinkhole/depression marsh as state endangered (S1S2). Very few intact examples are known in the entire State.

A description of the natural condition of this community is defined by the remaining examples left in Kentucky. The margins of these communities have been continually disturbed by unnatural conditions (logging, plow lines, berms, non-native spp. invasion, etc.). The best Sinkhole/depression marsh communities that occur in Kentucky are dominated by wetland grasses, sedges and forbs. They often have healthy populations of conservative (sensitive to unnatural soil disturbances) native species scattered throughout. Common native grasses include rice cutgrass, Virginia cutgrass and redbud panic grass. Common native sedges include hop sedge, cat-tail sedge, three-way sedge, blunt spike-rush, square-stem spikerush, soft rush, soft-stem bulrush and many others. Native shrubs and small trees include red maple, common buttonbush, silky dogwood, and swamp rose. High quality remnants are also diverse with aquatic herbs (i.e. forbs) and can include an array of species. Characteristic herbs include upright burhead, halberd-leaf rosemallow,



Sinkhole/depression marsh—Larue County  
~ KSNPC photo by Brian Yahn

marsh seedbox, taperleaf bugleweed, mild water-pepper, broadleaf arrowhead and many others (KSNPC 2013).

In Kentucky, Sinkhole/depression marsh communities provide habitat for rare plant and animal species, a few found nowhere else outside of this community. At least 13 KSNPC-listed plants have been documented on, or in close association with, Sinkhole/depression marshes (KSNPC 2013). These associated rare species (not previously highlighted in the article) include blue mud-plantain, grassleaf arrowhead, pickerel-weed, sessile-fruited arrowhead, shaggy hedgehys-sop, spotted pondweed, tall beaked-rush, zigzag iris and several others (KSNPC 2013). Unique herps found in association include eastern mud turtles, eastern narrowmouth toads, eastern spadefoot toads, marbled salamanders, and wood frogs (J. MacGregor, KDFWR pers. com.). A couple of rare and interesting invertebrate species that have been documented in such wetlands in Kentucky include the world's second smallest dragonfly, the elfin skimmer, and the double-ringed pennant, a species more common in states south of Kentucky. In addition, most species of bats in Kentucky, including rare ones, will use the open water to drink and also to forage on many insects that utilize depression wetlands (KSNPC 2013).



## Sinkhole/depression marsh continued

Since the time of Euro-American settlement, wetlands have been disappearing from Kentucky at an alarming rate. Estimated at 1.5 million acres at the time of settlement, today wetlands have been reduced to less than 300,000 acres in Kentucky (Abernathy et al. 2010). Draining, logging, plowing, grazing, construction of ponds and reservoirs, development of roads and buildings, suppression of fire, succession to forest, all these activities continue to degrade and often eradicate natural wetlands. Better understanding and protection is needed to keep these wetlands healthy and on the landscape. For more information on wetland communities in Kentucky contact commission ecologists Brian Yahn ([brian.yahn@ky.gov](mailto:brian.yahn@ky.gov)) or Martina Hines ([martina.hines@ky.gov](mailto:martina.hines@ky.gov))

### References

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Sinkhole/depression marsh—Cooley's Meadow—Wayne County  
~ KSNPC photo by Brian Yahn



## Species associated with Sinkhole/depression marsh:

### Four-toed Salamander

*Hemidactylium scutatum*

**KSNPC Status:** None

**USFWS Status:** None

**General Description:** A secretive, slender salamander up to 4 inches in length. The species is identified by having four toes on each hind foot, a constriction at the base of the tail, and a white belly with bold black spots. The back is mottled brown and the sides of the body are grayish with light flecking. The tail can be voluntarily disconnected at the point of constriction; leaving it to wiggle as a distraction to predators.

**Habitat:** Adults are terrestrial and live in forests surrounding wetland depressions or small streams. They find shelter under woody debris, rocks, moss, or leaf litter. Females lay and attend egg clusters near the edges of ponds, woodland pools, seeps, or sluggish boggy headwater streams. Nests are typically hidden in sphagnum moss, but may also be found in clumps of grasses and sedges, in and under woody debris, or in leaf litter. Larvae make their way to water after hatching from eggs. After about a month in an aquatic larval stage, they transform into the terrestrial body form and move into the forest.

**Range:** The four-toed salamander has a highly disjunct range; occurring from Nova Scotia west to Minnesota, and south to eastern Louisiana and the Florida panhandle. In Kentucky, the species is most common in the Appalachian Highlands with isolated colonies found in the western half of the state.



Photo by John R. MacGregor

### Blue Dasher

*Pachydiplax longipennis*

**KSNPC Status:** None

**USFWS Status:** None

**General Description:** Mature males have brilliant green eyes with a white face, bluish abdomen coated with chalky white and a black tip, and a dash of amber color sprinkled throughout wings. Females and immature males have reddish brown eyes with white face, abdomen mostly black with thin interrupted stripes, and amber color restricted to wing bases. All individuals have brown or black multi-striped thorax.

**Habitat:** Ponds, lakes, marshes, and streams with slow current.

**Flight Season:** In Kentucky, April-September.

**Range:** Widely distributed across parts of Canada and Mexico, most of the United States, and even Bermuda and the Bahamas.



KSNPC photo by Ellis Lauder milk

### Cypress Knee Sedge

*Carex decomposita*

**KSNPC Status:** Threatened

**USFWS Status:** None

**Habitat:** Swamps, sinkhole ponds, often on floating logs or growing on elevated stems of buttonbush.

**Management:** Avoid changes in hydrologic conditions at the site. Changes could result from overstory removal, stream alteration or impacts due to erosion. Exotic pest plants are a threat to this species.

**Diagnostic characteristics:** Cypress knee sedge can be distinguished by the combination of dark-colored (dark green to brown) perigynia, and leaf sheath that is dotted with purple or red. The perigynia also contract abruptly into a short beak.

**Range:** A southern species once ranging from New York to Michigan, and southward to northern Florida and eastern Texas. The range has retreated within the last century, particularly in the north and east. Most northerly extant site is in southern Ohio. Possibly extirpated in New York, Michigan, Virginia, Maryland and North Carolina. In Kentucky, it is found in cypress swamps in the coastal plain in far western Kentucky, and in sinkhole depression ponds in the Shawnee Hills.

BONAP - distribution map



Photo from Allen Co. Indiana

Accounts written by Dan Cox, Ellis Lauder milk and Tara Littlefield, respectively.

