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Turtles are among the most imperiled groups of organisms across the globe, requiring frequent assessment to monitor healthy populations and manage those in decline. Riverine turtles have been subject to varying degrees of habitat degradation, including damming and channelizing rivers, leading to habitat fragmentation and reduced population connectivity. Assessing the status of isolated or peripheral populations can be difficult if their relationships to other populations, including their taxonomic (i.e. species or subspecies) identities, are unclear or if they utilize habitats different from those typical of the core range. To investigate the distributions and abundances of four map turtle taxa (*Graptemys*) at the edges of their ranges, surveys were conducted in waterways of 36 counties in eastern Kansas in 2017–2019, using baited hoop-nets and visual surveys with scope and camera. A total of 1646 map turtles were recorded over 1428 trap nights and 42 days of scoping. With respect to the state-threatened *G. geographica,* previously known from only 18 specimens or vouchered photographs from 12 locations, 92 individuals were detected in visual surveys, six were caught in traps, and two were obtained from local herpetologists. These 100 individuals came from 53 locations, 48 of them where the species had not been documented previously. Survey data were used to estimate relative abundances and absolute densities of *Graptemys* spp. by drainage. To further evaluate the extent to which *Graptemys* occurs in Kansas as phenotypically distinct types that correspond

to geographically coherent populations and currently recognized taxa, I examined all museum specimens from the state. Many had been incorrectly identified according to currently recognized species limits. Together, survey data and taxonomic reassessment of museum records generated a simpler and better resolved pattern of *Graptemys* occurrence in the region; findings were consistent with existence of four taxa with partially overlapping distributions.

Keywords: integumentary color patterning, False Map Turtle Complex, *Graptemys*, museum specimen reclassification, turtle conservation, visual survey

DISTRIBUTIONS AND STATUSES OF MAP TURTLES (*GRAPTEMYS* SPP.) IN KANSAS

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PREFACE

This thesis is divided into two chapters, the first covering the status of the Northern Map Turtle (*Graptemys geographica*) in Kansas and the second covering geographic distributions and taxonomic limits within the False Map Turtle Complex. Both chapters were prepared following manuscript submission guidelines of *Herpetological Review*.

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CHAPTER 1

Conservation status of the Northern Map Turtle (*Graptemys geographica*) in Kansas

ABSTRACT

The Northern Map Turtle (*Graptemys geographica*) is listed as threatened in Kansas, a state on the western periphery of its range. When listed in 1993, the species was known from only 11 vouchered specimens plus photographs or reports of 8 other individuals, all found within the Marais des Cygnes River drainage (excepting two 1911 specimens lacking precise locality information) from 1911–1991 and was unknown from adjacent portions of Missouri. No subsequent records were obtained from 1992–2015. To investigate the current distribution and abundance of the species in Kansas, we conducted surveys in 2017–2019 utilizing two methodologies—trapping with baited hoop-nets and visual surveys with a spotting scope and camera. We set traps at 236 locations in rivers of eastern Kansas for a total of 1428 net nights in 2017–2019, resulting in six captures at six locations. Visual surveys were conducted at 1105 locations during 42 days in the field in 2018–2019 and yielded 92 northern map turtles at 43 locations. Our results greatly expand the known range of the species in Kansas, including in the Blue and Spring river drainages and in many portions of the Marais des Cygnes River drainage. By comparing numbers of Northern Map Turtles to counts of other species, we estimated its overall relative abundance in drainages in which it occurs to be approximately an order of magnitude lower than that of the Red-eared Slider (*Trachemys scripta elegans*), the species most frequently observed basking in the surveyed area. Altogether, our findings suggest that the Northern Map Turtle is more widespread and abundant in Kansas than previously suspected. As an extant regular component of the region's herpetofauna (though still unreported from corresponding portions of Missouri), its conservation merits continued attention.

INTRODUCTION

Reptiles and amphibians have experienced population declines across the globe throughout the last half-century (Garber and Burger 1995; Araújo et al. 2006; Todd et al. 2010; Winter et al. 2016). Declines have been linked to changing climate, environmental alterations, a growing pet trade, exploitation for food, and the introduction of non-native species coupled with subsidization of predators (Foufopoulos and Ives 1999; Gibbons et al. 2000; Luiselli et al. 2016; Karson et al. 2019). While these declines are observed among many orders of reptiles and amphibians, most imperiled are the Testudines—the turtles and tortoises (Rhodin et al. 2018). Members of the family Emydidae, composed primarily of aquatic turtles, are highly vulnerable to habitat modifications in riverine systems (Bodie 2001; Moll and Moll 2004). As species exhibit continued declines in abundance and their distributions become increasingly limited to refugia within their former ranges (Driscoll 2004; Popescu et al. 2013; Rohr and Palmer 2013), conservation of isolated populations is of the utmost importance to ensure persistence. Knowledge of local occurrences of populations and estimates of local abundance are essential for conservation planning.

Graptemys geographica (Northern Map Turtle) is a medium-sized, semi-aquatic freshwater turtle endemic to eastern North America (Vogt et al. 2018). One of the most widespread species within the genus *Graptemys*, it has a range extending from eastern Minnesota and northern Wisconsin to southern Ontario and southern Quebec in the north, with isolated populations nearly reaching the Atlantic Coast in New York and New Jersey in the east, all the way to northern Louisiana in the south and to eastern Kansas in the west (Lindeman 2013; Environment Canada 2016). Throughout this vast range, *G. geographica* inhabits larger bodies

of water, such as rivers, lakes, and oxbows, with a preference for well-oxygenated conditions with low to moderate flow (Pluto and Bellis 1986; Carriére et al. 2009; COSEWIC 2012), an abundance of aquatic vegetation, and soft substrates (Ernst and Barbour 1989; Carriére and Blouin-Demers 2010). Access to suitable basking locations is key for this species—it has been identified as a habitual basker (Waters 1974; Pluto and Bellis 1986), often perching on snags above flowing water (Lindeman 1997; Lindeman 1999).

Currently listed by the International Union for the Conservation of Nature (IUCN) as of "least concern" and stable overall, the conservation status of *G. geographica* nevertheless varies across its range. It is listed as a species of special concern in Canada, which encompasses nearly 10% of its distribution, and is considered nationally vulnerable there (Seburn 2007; Environment Canada 2016). Though not federally protected in the United States, it is listed as endangered in Maryland, threatened in Kansas, and as a species of special concern in Vermont and Oklahoma (Sievert and Sievert 2011; Richards-Dimitrie 2012; Lindeman 2013; Rohweder 2015). NatureServe ranks it as critically imperiled in Georgia, Maryland, North Carolina, Mississippi, Oklahoma, and West Virginia, as imperiled in Kansas and Quebec, and as vulnerable in Alabama, New York, Ontario, Vermont, and Virginia (2020).

G. geographica is not thought to be declining throughout its range, but small-scale declines of local populations have been observed (Nickerson and Pitt 2012; Lindeman 2013; Pitt and Nickerson 2013). Habitat alteration, recreational powerboating, and by-catch from commercial fishing are known causes of decreased adult survivorship in parts of its range (Buhlmann and Gibbons 1997; Bulté et al. 2010; Midwood et al. 2015). Waterfront development along critical habitat corridors is widespread from Canada through the core of the species range, causing habitat degradation and loss, including reduction of suitable nesting sites (Ernst et al.

1994; Carriére r and Blouin-Demers 2010). Overwintering sites are degraded where aquatic vegetation that serves as shelter is lost, resulting in increased risk from predators (Ernst and Lovich 2009). Another possible threat is collisions with motors vehicles as females cross roads in search of nesting habitat (Haxton 2000). In addition, water pollution can threaten populations of the mollusks on which *G. geographica* feeds (Ernst et al. 1994). As urbanization and other development increases, top predators are displaced and mesopredators such as Raccoons (*Procyon lotor*) exhibit population growth (Mitchell and Klemens 2000) resulting in increased predation of nests and juvenile turtles, thus shifting population structures toward adult ages classes (Bernier and Rouleau 2010).

Populations of *G. geographica* in Kansas represent the western-most within the species' range (Ernst and Lovich 2009). Little is known or has been published on the population status of the species in the state. Cragin (1880) reported second-hand sightings from Franklin County in the Marais des Cygnes River drainage. Smith (1956) described the species' range as being the eastern third of the state based on seven specimens collected between 1911–1952 in Anderson, Crawford, Franklin, and Osage counties in the Marais des Cygnes River drainage, Wilson and Montgomery counties in the Verdigris River drainage (Fig. 1), and a report (Burt 1928) of a specimen from Riley County in the Kansas River drainage; the records from Crawford (Hall and Smith 1947) and Riley counties, presumably lost, cannot be confirmed and were not accepted subsequently (e.g. Collins 1993; Collins et al. 2010). Following collection of a single specimen in Osage County in 1952 (Clarke 1953), *G. geographica* was not reported again until 1990. In 1987, since the species had not been reported for 35 years, state wildlife officials classified it as extirpated from Kansas (Edds et al. 1990).

In 1990, surveys were conducted to determine if *G. geographica* was still present in Kansas. Using baited hoop-nets in waterways of 21 counties over 892 net-nights, Edds (1991) and his field crew captured 10 individuals at six locations. Those sites were all in the greater Marais des Cygnes River drainage, two of them with historical records, but one was in a part of that drainage very distant from previous records—the Marmaton River in Allen County (Fig. 2). Places in Kansas with *G. geographica* were described as smaller rivers and creeks with few basking areas and little to no vegetation (Fuselier and Edds 1994), a finding contradictory to descriptions of the species' habitat elsewhere, where deep, slow-moving water is preferred (Pluto and Bellis 1986). In 1993, the Kansas Department of Wildlife, Parks, and Recreation (KDWPT) listed *G. geographica* as threatened, a status reflected in the 2015 Kansas Wildlife Action Plan (Rohweder 2015) which designates nine areas in five eastern counties, all within the Marais des Cygnes watershed, including the main stems of the Marmaton and Little Osage Rivers, as critical habitat for the species as of the last review by the Threatened and Endangered Task Committee in July 2018 (KDWPT 2020).

Following a nearly 30-year absence of vouchered records in Kansas, we conducted surveys for *G. geographica* from May 2017 to July 2019 to investigate the current status of the species in the state—the first such effort since 1990. This study had five major objectives: (1) revisit locations from the 1990 study (Edds 1991) and survey other locations in the Marais des Cygnes River drainage—which encompasses ~6,850 km^2 in southeastern Kansas (Kansas Water Office 2015)—to check for continued presence of *G. geographica*, (2) survey other drainages where the species might occur, especially that of the Verdigris River, from which two 1911 specimens lacking specific locality information were putatively obtained, (3) estimate the abundance of *G. geographica* in each drainage relative to other turtle species, (4) describe the

habitat of *G. geographica* and gain insights into issues relevant to persistence of its populations, and (5) test the utility of visual surveys and photography for detecting the species and documenting its presence.

MATERIALS AND METHODS

Trapping surveys. —We conducted live-trapping surveys of semi-aquatic turtle populations in the eastern third of Kansas (Fig. 3). Surveys were mainly conducted in rivers, creeks, and streams (1403 net nights)—though lakes, ponds, and oxbows were sampled to a lesser extent (25 net nights)—from May–August in 2017, May–November in 2018, and May–July in 2019. Sites sampled were within the Kansas, Blue, Marais des Cygnes, Neosho, Verdigris, and Spring river drainages, at 236 locations, spanning 26 counties. These sites included all known locations of past records gleaned from museum collections and the last focused survey for the species (Edds 1991), in addition to some others compiled in books (Collins 1993; Collins et al. 2010) and the Kansas Herpetological Atlas (Taggart 2020).

For population sampling, we employed two sizes of hoop-net turtle traps, primarily those that were 1.83 m × 0.76 m with 50-mm mesh in size, and less so some that were 4.27 m × 1.07 m with 50-mm mesh (Memphis Net and Twine, Memphis, Tennessee). We used fresh mussel and canned creamed corn (Voorhees et al. 1991; Mali et al. 2014) as bait at each location, while thawed fish, chicken liver, shrimp, fresh fruit, frozen vegetables, canned clams, commercial dog and turtle food, and Colby jack cheese cubes were utilized more sporadically. Baits were suspended at the rear of each trap in a perforated can or pill bottle that allowed their scents to be carried in the current (Nall and Thomas 2009; Brown et al. 2011). Three to six traps were set at each site, facing downstream to minimize bycatch of suspended debris. To quantify survey effort at each site, each period that a trap was left baited overnight and had not collapsed upon return,

was counted as a net night. We set traps as early as 09:00 CDT and no later than 18:00 CDT to allow for access during evening and morning foraging (Mali et al. 2014).

Each turtle captured was identified to species, measured, and then released. All turtles were sexed and weighed (to nearest 10 g with H-100 Digital hanging scale, American Weigh Scales Inc. Cumming, Geogia), carapace and plastron lengths were recorded (to nearest mm, using meter stick), and photographs were taken of carapace and plastron. Additionally, for each *Graptemys* spp., photographs of head patterns, including both sides, top, and bottom were taken. Specimen locations were georeferenced using a handheld GPS unit (eTrex 10 or GPSMAP 64st, Garmin Ltd., Olathe, Kansas).

Visual surveys.—We conducted visual surveys from August 2018–October 2019, at 1105 locations during 42 days and across 36 counties (Fig. 1-3), using methods similar to those of Lindeman (1999; 2014). Most surveys were conducted from bridges over waterways or at low-water crossings. At each location where turtles were detected using eyes and binoculars upon arrival, we spent a minimum of 15 minutes looking upstream and downstream to find as many individuals as possible. We used a spotting scope (Cronus 20–60×86 UHD, Athlon Optics, Olathe, Kansas) to see details of color pattern features so as to identify turtles, and we held a camera (Olympus E-M10 Mark II with 45 mm f/1.8 lens, Olympus Corp., Japan) to the scope eyepiece to photograph them. At locations where turtles were not present but basking spots were abundant, we sometimes returned during better conditions or times of day. Most turtles were detected while they were basking or otherwise hauled out, though many were observed at the surface of the water while foraging or between diving bouts. The very few individuals that were unidentified (due to distance or that fled into the water before being identified and did not reappear) were not reported among totals.

Acquisition of additional records.—To supplement our survey efforts, we contacted academics and agency employees who work with wildlife to ask for information regarding occurrences of Northern Map Turtles in Kansas. Additionally, we checked citizen science venues such as iNaturalist (iNaturalist.org) and the Kansas Herpetological Society Facebook group (Facebook.com) for records of the species (Boone and Basille 2019).

Stream order analysis. —To describe the sizes of streams occupied by *G. geographica*, we obtained the Strahler stream order (Dodd 1990; Hawkins et al. 1993; Pierson et al. 2008) of each surveyed location from the Kansas Biological Survey at the University of Kansas (Lawrence, Kansas). Streams of a given order were grouped together by drainage to compare relative turtle abundance based on records obtained from all survey methods combined. For waterways that switch order but retain their name, the waterway was assigned the order corresponding to the location at which each *G. geographica* was observed or captured, such that the same named waterway was included in multiple stream order groupings. Using the visual survey data, for each stream order and drainage, the relative abundance of each basking species was estimated and standardized in terms of the number detected per hundred *Trachemys scripta elegans* detected. Abundance was also described in terms of density as measured according to individuals detected per km of river surveyed. For that calculation, each visual survey site was considered to cover 150 m of channel distance—an estimate that accounts for limitations on identification with distance and which averages locations with long straight portions of open water and those with views obstructed by vegetation or curvature of the stream.

Habitat modeling.—We used ArcMap (Esri, Redlands, California) with the Kansas Land Cover Patterns, Level 3 (Kansas Applied Remote Sensing Program, Lawrence, Kansas) to describe land use and land cover of areas surrounding sections of waterways in which *G.*

geographica was and was not detected and thereby explore their relationship to its occurrence (Carriére and Blouin-Demers 2010). For each location, we analyzed an area defined by a 100-meter buffer to either side of the waterbody and extending 200 meters upstream and 200 m downstream to identify the immediate land cover type surrounding each location. A 100-meter buffer was selected because the species rarely ventures far from water and because that buffer size encompasses the average distance females have been documented traveling from water to nest (Steen et al. 2012; Nagle and Congdon 2016). The selected areas were resolved according to a 30 m^2 raster with pixels assigned to 17 classes. For our analysis, those classes were binned into (1) pastureland, (2) agricultural land, (3) woodlands and, (4) urban lands. Pastureland encompassed both warm and cool-season native and non-native grasses used for grazing livestock or cut for hay. Agricultural lands were those used to produce any crop or any similar product other than hay, such as sod. Woodlands were wooded areas with a canopy closure of ≥50%. Urban lands were those that fell within the bounds of a city or town, including both residential and undeveloped land.

RESULTS

Trapping surveys.—Our trapping effort (Table 1-1; Fig. 1-3) yielded a total of six *G. geographica* from six locations (Fig. 1-4), four of them in the Marais des Cygnes River drainage (including the Marmaton River) and two in the Blue River drainage. The species had never previously been reported at five of those locations, whereas one capture represented confirmation of continued presence of the species at one of the 8 sites known from specimens collected in 1911–1952 (Fig. 1-1) and one of six sites where it was detected during surveys in 1990 (Fig.1-2). In terms of county representation, two of six locations were in Osage County, where the species is known via historic specimens and the 1990 surveys, but the remaining captures were from

counties where the species had not previously been documented—Bourbon (1 site), Johnson (2 sites), and Miami (1 site).

In total, we caught 684 turtles of 10 taxa, representing nine species, at 167 locations (Table 1-2). Among those 10 taxa, *G. geographica* ranked 9th in terms of numbers caught and accounted for 0.9% of all turtles captured (Table 1-2). The most frequently detected taxon, *Trachemys scripta elegans*, was ~60× more numerous than *G. geographica*. More specifically, the four individuals captured in the Marais des Cygnes drainage made up 1.0% of all turtles captured there, whereas the two individuals from the Blue River drainage composed 2.8% of all captures (Table 1-1). The Marais des Cygnes River drainage accounted for most trapping effort (64% of net nights) and turtle captures (59% of individuals), but catch per unit effort was highest in the Verdigris River drainage at 0.92 turtles per trap night as compared to 0.48 individuals per night for all species combined across all drainages (Table 1-1). For *G. geographica*, the catch rate was 0.004 individuals per net night survey-wide and in the Marais des Cygnes drainage, and it was 0.012 individuals per net night in the Blue River drainage. Three *G. geographica* were caught in traps baited with fresh mussel, and one each was caught with canned creamed-corn, fish, or mixed vegetables (Table 1-3).

Of the six *G. geographica* captured, one was a tiny juvenile (8.4 grams) that could not be sexed. It was caught in Long Creek in the Marais des Cygnes drainage at a location where species was found in 1990 (Edds 1991) and in 1952 (Clarke 1953). Two of the captures were large mature females, one from Long Creek in the Marais des Cygnes River drainage and the other from Indian Creek—a tributary of the Blue River. The remaining three individuals were fully grown males, one from the Marmaton River and the second from South Wea Creek—both

within the greater Marais des Cygnes River drainage—and the third from the Blue River, where the species had recently been discovered (Eric Kessler, pers. comm.).

Visual surveys.—Our visual survey effort yielded 92 *G. geographica* at 52 locations, including 85 individuals at 48 locations in the Marais des Cygnes River drainage, six individuals at four locations in the Spring River drainage, and a single individual in the Blue River drainage (Fig. 1-5). The species was widespread within upper reaches of the Marais des Cygnes River drainage, and it was observed there in the mainstem and in headwater tributaries—including both above and below Pomona Lake and Melvern Lake—as far west as Wabaunsee County and including both the Marmaton and Little Osage rivers and their tributaries, but it was not detected in lower portions of the mainstem of the Marais des Cygnes River (i.e. east of Osage County) despite conducting surveys at 24 such locations. In the Spring River drainage, five individuals were found at three locations along Shoal Creek and one was seen in Shawnee Creek, but none was found in the river mainstem.

All but four locations where we detected *G. geographica* in visual surveys were sites where the species had never previously been reported. One location served as confirmation of its continued presence at one of the 8 sites known from specimens collected in 1911–1952 (Fig. 1-1) and where it was also detected during surveys in 1990 (Fig. 1-2), though that same site in Osage County on Long Creek had already yielded a different individual (the previously described juvenile) in our live-trapping survey. The other locations where we confirmed its continued presence, two of them in Osage County on Long Creek and one in Allen County, matched three of four sites where the species was first detected during the surveys in 1990 (Fig. 1-2). In terms of county representation, we confirmed the species' continued presence in Allen (2 locations), Franklin (1 location), and Osage (13 locations) counties where the species is known from historic

specimens and the 1990 surveys, but the remaining locations were in 8 counties where it had not previously been documented—Bourbon (17 locations), Cherokee (4), Coffey (1), Johnson (1), Linn (3), Lyon (4), Miami (1), and Wabaunsee (2). Notably, we did not detect the species in Wilson or Montgomery counties—from which it is known from single specimens putatively collected therein in 1911—or anywhere else in the Verdigris River drainage.

In total, we saw 3423 turtles of 11 taxa, representing 10 species, at 486 of 1105 surveyed locations during visual surveys (Table 1-4). Among those 11 taxa, *G. geographica* ranked 7th in terms of numbers seen and accounted for 2.7% of all turtles detected (Table 1-5). The most frequently detected taxon, *Trachemys scripta elegans*, was ~14× more numerous than *G. geographica*. More specifically, the 85 individuals seen in the Marais des Cygnes drainage made up 7% of all turtles seen there, the single individual from the Blue River drainage composed 8% of all sightings there (Table 1-4), and the 5 individuals seen in the Spring River drainage constituted 1% of all sightings there. The Marais des Cygnes River drainage accounted for most effort (580 of 1105 = 52% of survey locations) and the largest number of turtle sightings (1293 of 3423 = 38% of individuals), but sightings per unit effort were highest in the Neosho River drainage at 6.8 turtles per survey location as compared to 3.1 individuals per location for all species combined across all drainages (Table 1-4). For *G. geographica*, the sighting rate was 0.08 individuals per location survey wide; in the Marais des Cygnes, Blue, and Spring river drainages these rates were 0.15, 0.09, and 0.07 individuals per location, respectively, which translate to estimated densities of 0.98, 0.61, and 0.45 individuals/km of river channel length.

A wide range of sizes and ages of individuals of both sexes were represented among the 92 *G. geographica* detected in visual surveys. Medium-small individuals (including sexually mature males and subadult females) that were seen only while swimming could not be reliably

sexed because relevant details were not observable. Of those individuals that we were able to see well, including most that were basking, approximately 35 appeared to be females and approximately 30 were males judging from head size, overall body size, and tail length and girth (Lindeman 2013). Eight individuals, all of them seen in the Marais des Cygnes drainage, were tiny juveniles, some hardly larger than hatchlings.

Acquisition of additional records.—We received two *G. geographica* specimens from other observers. The first, a deceased juvenile (that could not be sexed) obtained from Jennifer Rader on 6 June 2018, was captured in Shoal Creek at Schermerhorn Park, Cherokee County on 1 March 2016, making it the first known collection from the Spring River drainage in Kansas. The second specimen, a fully-grown male obtained from Eric Kessler on 22 June 2018, was captured on 30 April 2018 along the Blue River (a tributary of the Missouri River) in Johnson County. That individual prompted, in the course of this study, the first comprehensive survey of the Blue River and its tributaries for *G. geographica*, which led to finding three more individuals there. Using iNaturalist (iNaturalist.org), we learned of a large adult female seen by Steve Hofhine at a pond at the Great Plains Nature Center on 26 April 2019, in the Arkansas River drainage, Sedgewick County (https://www.inaturalist.org/photos/34714094). We conducted visual surveys at 52 locations in portions of the Arkansas River drainage in that region but did not detect the species there.

Stream order analyses.—Visual survey locations by stream order ranged from 1st to 7th order, with 2nd to 6th orders best represented (Table 1-6). Absolute numbers of *G. geographica* detected in visual surveys were highest by far in 4th order streams (43 of 92 individuals; Table 1-6), but when considered relative to numbers of surveyed locations within the three drainages in which the species occurred, we found it similarly abundant in 4th–6th order waterways; the

numbers found per location in 1st–6th order waterways were 0, 0.03, 0.05, 0.22, 0.24, and 0.19, respectively, which translate to estimates of 0, 0.17, 0.32, 1.47, 1.61, and 1.24 individuals per km of channel length.

The relative abundances of obligate basking species—*G. geographica*, *T. s. elegans*, *G. ouachitensis*, *G. p. pseudogeographica*, *G. p. kohnii*, and *P. c. concinna*—based on visual detections (Table 1-6), were compared as ratios per hundred *T. s. elegans* (the most frequently encountered and abundant species). Survey-wide, the ratios of these species in visual surveys was 7:100:75:6:31:21 but these ratios varied considerably from drainage to drainage and by stream order (Table 1-7). Among the three drainages in which *G. geographica* was detected, it was relatively most abundant in the Blue River drainage (33 per 100 *T. s. elegans*) and relatively least abundant in the Spring River drainage (4 per 100 *T. s. elegans*; Table 1-7). Among stream orders, when considered relative to other species, abundances of *G. geographica* were highest in 3rd–5th order waterways, especially when evaluated using only the three river drainages in which the species was detected (Table 1-7).

Habitat modeling —Graptemys geographica was observed at 53 unique locations across the entire survey area, all methods combined. Our descriptive model of landcover adjacent to these locations encompassed 730,359 km^2 total area. The most common landcover surrounding locations where *G. geographica* was detected was pastureland, which totaled 348,354 km^2 or 48% of the total area. The second most common landcover class was agricultural land at 187,362 km^2 (26%), followed by woodland (102,600 km^2, 14%), and urban land (92,043 km^2, 13%). At the 1,052 locations where *G. geographica* was not detected, the model buffer encompassed 22,105,020 km^2, the most common land use being pasture at 9,848,457 km^2 or 45% of total area,

followed by agricultural land at 8,780,814 km^2 (40%), urban land (3,075,058 km^2, 14%), and woodland (400,689 km^2, 2%).

DISCUSSION

The primary goal of this study was to assess the population status of *G. geographica* in Kansas to inform conservation of the species. We found that, despite lack of vouchered records in nearly three decades, the species can be found readily in many locations within the Marais des Cygnes River drainage (from which it was known in the past) and that it also occurs within the Blue and Spring river drainages (where it was only recently discovered). We found the species at many locations where it was previously unknown (48 specific sites, including 8 new county records), and have thereby (1) discovered it to be more abundant than previously recognized, (2) expanded its known range in Kansas to the north, south, and west, and (3) confirmed its continued presence at or near all sites of historical occurrence within the Marais des Cygnes drainage with the notable exception of Pottawatomie Creek, from which several old museum specimens derive and where it was found during surveys in 1990 (Edds 1991). We were unable to find *G. geographica* in the Verdigris River drainage, from which two specimens were putatively collected in 1911, nor did we find it in the Neosho River (specimen records from the 1920s exist for Oklahoma; Lindeman 2014) or Arkansas River (one 2019 record exists for Kansas—see https://www.inaturalist.org/photos/34714094—which we suspect was released from captivity).

Our unprecedented success at finding *G. geographica* owed to the effectiveness of visual survey methods (not utilized in previous studies in Kansas) for detecting the species, not to increases in its numbers and distribution over the past few decades. Of the 100 individuals recorded in the course of this study, 92 were found at 52 locations in visual surveys (total effort

of 1105 locations, ~15 minutes observation per site, during 42 days in the field). By contrast, our live-trapping surveys yielded 6 individuals from 6 locations (total effort of 1428 trap nights at 236 locations), utilizing methods similar to the live-trapping survey conducted in 1990 (total effort 892 trap nights at 81 locations), which yielded 10 individuals from 6 locations (Edds 1991). Our trapping survey yielded 0.48 turtles per trap night (all species combined), of which *G. geographica* composed 0.9% of all turtles caught, whereas in the 1990 survey, which yielded 0.53 turtles per trap night, *G. geographica* composed 2.1% of all turtles caught (Edds 1991). Again, the similarity of our trapping results to previous similar efforts suggests that the overall distribution and abundance of *G. geographica* is much the same now as it was then.

What factors account for the relative success of visual survey methods? Although they have been employed elsewhere (Lindeman 1997; Shively 1999; Lindeman 2014; Selman and Smith 2017) ours is the first study to systematically employ them for detecting *G. geographica* and other turtles in Kansas. In comparison to live-trapping, visual methods allowed for surveying more locations per day in the field and were more effective for detecting species that bask or that rest and feed at the water's surface, especially if those species did not readily enter baited traps. The relatively modest amount of time we spent on visual surveys lead to detection of 3423 turtles as compared to 684 with trapping, and basking species rarely caught in traps (i.e. *Graptemys* spp. and *Pseudemys concinna*) composed a much larger percentage of all detections (compare Tables 1-2 and 1-5). Future studies of differences in detectability among species (e.g. based on their conspicuousness and the percent of time individuals are available for detection versus being completely hidden) would be useful for interpreting the extent to which survey numbers match the true magnitudes of relative abundances of different species.

Similarly, one might wonder about differences in detectability according to the sex, size, or age of individuals. Both trapping and visual surveys provided demographic insights. The numbers of each sex observed with each method was roughly consistent with a 1:1 ratio, though our confidence in discerning the sex of individuals in visual surveys was higher for females since many could be seen easily to be unambiguously larger than any males. We found very large and presumably reproductively active females in all three of the major drainages where *G. geographica* occurred—in Indian Creek in the Blue River drainage, in Shawnee and Shoal creeks in the Spring River Drainage, and throughout the Marais des Cygnes River drainage, including both above and below Pomona Lake and Melvern Lakes as well as in the Little Osage and Marmaton rivers. We received a report and photograph of a large female digging a nest in the backyard of a suburban house in the Blue River drainage on 10 July 2019 (Travis Barta, pers. comm.). Visual surveys were especially effective for detecting very small juveniles, which might otherwise have passed through the mesh of traps or which might not spend time in areas with the water depth needed for trap placement. We found very small juveniles throughout the Marais des Cygnes drainage, including in Long Creek, One Hundred and Forty-two Mile Creek, Paint Creek, and in the mainstem of the Marmaton River. Although we observed no males or juveniles in the Spring River drainage, only large females with enormous heads, we received a report and photographs (Jenn Rader, pers. comm.) of a hatchling and of a basking male from Shoal Creek at Schermerhorn Park, found on 1 March 2016 and 22 April 2018, respectively.

A significant practical advantage of visual surveys is that they can be conducted in a much wider range of circumstances (e.g. in both larger and smaller streams, under high flow conditions, during periods of unpredictable weather and changing water levels), including conditions in which setting traps is too dangerous (either for the researchers or for trapped

turtles). In fact, we found setting traps difficult at many locations in 2018 due to insufficient water depth during drought conditions, while nearly the entirely of our 2019 field season was unsuitable for trapping due to flood conditions and it would have been a complete loss if not for the option to utilize visual methods. Limitations on trap placement limit the extent to which they can be used to investigate the full range of habitat variables. For example, by using visual surveys, we were able to collect data on occurrence across a range of stream orders and habitat settings such that we can report that *G. geographica* was absolutely most abundant (i.e. in terms of individuals per survey site) in 4th–6th order waterways (Table 1-6) and absent or nearly so in those of 1st–3rd order (but note that abundance relative to other turtles was highest in 3rd order streams; Table 1-7), whereas we could not use traps to gather data in small and very large streams. A common feature of creeks with the highest densities of *G. geographica* was existence of deep pools between sections of riffle. These pools likely provide refugia when fleeing predators or serve as hibernacula during the winter months. Such pools were prominent in Long Creek, where *G. geographica* was the most commonly observed turtle (outnumbering *Trachemys scripta elegans* by about 20%) and reached a density of ~10 individuals per km.

Another feature of locations where *G. geographica* was found was surrounding land use dominated by native pasture and hay meadows, suggesting that the species benefits from areas with less agricultural runoff, siltation, and alterations to the stream core. The small percentage of woodland (14%) that we found within the buffer around occurrence sites is most likely an artifact reflecting inability of our modeling methods to identify pixels as tree cover when applying a 30×30-meter raster to the very narrow corridor of riparian woodland that is left to grow along most stretches of stream. Such riparian woodland aids in the reduction of erosion and runoff while providing critical nesting habitat for females. At locations where *G. geographica*

was not observed, percentages of pastureland and urban land were similar to locations where the species was found (46% versus 48%, and 12% versus 13%, respectively), but the percentage of agricultural land was higher (40% versus 26%) and the percentage of woodland was lower (2% versus 14%), which provides insight as to why *G. geographica* presence was not detected.

We believe that visual methods hold much promise for better documenting overall distributions and local occurrences of riverine turtles and for studies of their behavior and habitat use. However, with respect to limitations of visual surveying, although we found photography through the scope ("digiscoping") to be an efficient and effective means of diagnostically documenting our findings, our ability to extract size and other biometric data from photographs was limited compared to that possible with captured individuals. Consequently, future survey and monitoring efforts for *G. geographica* in Kansas will likely involve and benefit from capturing some individuals, which currently cannot be reliably accomplished. Basking traps and fyke nets have proven to be effective elsewhere for catching *G. geographica*. Both types are more conspicuous and obtrusive than baited hoop net traps, so would have to be placed away from public right-of-ways at bridges (to avoid theft) and would thus require (given that non-navigable waters in Kansas are privately owned) obtaining landowner permission for access to sections of river away from roads. Basking traps have been shown to be less effective in lotic environments compared to lentic ones, but they could probably be made to work in some of the river and creek situations that we have observed in Kansas. Due to their tendency to catch debris, fyke nets would likely be even more difficult to deploy in Kansas given that rivers there often carry large quantities of silt, detritus, and brushy material.

We were especially interested to find populations of *G. geographica* upstream of major reservoirs, including in Wabaunsee County above Pomona Lake and in Lyon County above

Melvern Lake, the latter of which may be the westernmost naturally-occurring records for the species anywhere. Although *G. geographica* is capable of navigating lock and dam systems in some river settings (Bennett et al. 2010), we are unable to confirm if anything similar is occurring in Kansas, but we expect not. The reservoirs and the dams used to create them (38-m high, in the case of Melvern Lake) are a formidable barrier to movement, so we suspect that those headwater populations pre-date construction of the reservoirs and are now isolated.

Two specimens, both collected in 1911—one each from Montgomery and Wilson counties—indicate historic presence of *G. geographica* in the Verdigris River drainage if they are valid (Both lack precise locality and date of collection information). We were unsuccessful at finding the species in that drainage despite conducting 197 net nights of trapping and 131 visual surveys there. The species may have declined substantially or have been extirpated. Anecdotally, we note that the mainstem of the Verdigris is much larger and has steeper banks as compared to the Marais des Cygnes River, suggesting that the habitat there has always been less suitable or that it has been negatively altered over the last century (Hooke 1980; Juracek 2001). Being a larger river with faster currents, snags are less frequent, limiting the basking opportunities upon which *G. geographica* relies. Looking into Oklahoma, *G. geographica* is not known from the Verdigris River, even historically, suggesting that it might not ever have been common there and indicating that source populations for the drainage outside Kansas are lacking. The establishment of large reservoirs in Oklahoma on the Verdigris and Neosho rivers may have contributed to decline of the species and may constitute barriers to movement of turtles into Kansas from further downstream in the Arkansas River drainage.

Based on our overall findings, we conclude that Kansas harbors much larger and more widespread populations of *G. geographica* than previously suspected. Although the absolute

densities that we found are low overall in comparison to figures from other regions (Vogt et al. 2018), the species can be found reliably in some drainages, and its abundance in comparison to other turtle species that are not of conservation concern is not dramatically lower. We would describe the species as a rare but regular member of turtle assemblages in the drainages in which it occurs.

Conservation recommendations.—Many of the concerns most relevant to conservation of *G. geographica* in other locations (see Vogt et al. 2018 for a review) do not seem applicable to Kansas, including collisions with power boats, disturbance of basking turtles by boat or canoe traffic, and commercial harvesting of turtles or mortality as commercial fishery by-catch. Kansas lakes that allow for powerboats or commercial fishing (including removal of rough fish) are not known to support populations of *G. geographica* and most rivers and creeks that harbor populations are either not navigable or are rarely used for recreational boating. Likely more relevant to Kansas are general issues of habitat quality (e.g. availability of basking and nesting areas, threats of siltation and chemical pollution to the turtles directly and to their prey), isolation of populations and impediments to movement imposed by dams and reservoirs, decline of mussels and effects of Zebra Mussel introduction, mortality from crossing roads in search of nesting sites, and possibly, mortality from being used for target practice by people shooting rifles from bridges and along river banks.

We suggest that (1) protecting critical habitat for the species, including good nesting areas, is crucial for its persistence in the state. This could be done by incentivizing protection or enhancement of the riparian zones and lands surrounding streams that harbor relatively dense populations. More study of habitat usage by the species is needed. (2) Populations above reservoirs (e.g. Melvern and Pomona Lakes) warrant monitoring and special attention as they

have likely been isolated since construction of those reservoirs and might be lost forever if extirpated. (3) Monitor the status of mollusk populations and manage waterways for their persistence. Female *G. geographica* are known for their dietary preference of mussels; however, we note that mussels are absent in Shoal Creek due to mining-related water contamination, yet it sustains a *G. geographica* population with some very large females which perhaps consume the snails that are abundant there. (4) Conduct visual surveys of riverine turtles on a regular basis in the range of *G. geographica* in order to describe population trends. (5) Use visual survey data to describe sex ratios and distributions of individuals among age classes. Knowing the demographic composition of local populations will foster understanding of whether mortality of particular classes is limiting population success overall and will thus help identify targets for management intervention. (6) Educate the general public of the species' presence and vulnerability given its limited distribution. Informing Kansans of the differences between map turtles, specifically *G. geographica*, and more common turtles such as the Red-eared Slider, could foster appreciation and concern for the species. (7) Reassess the status of the species in the state every five years. Establishing whether the species is experiencing growth or decline across the state will determine whether *G. geographica* should receive a different level of protection.

Finally, we think it would be very useful to know the status of *G. geographica* in adjacent areas of Missouri given that it has never been reported in several waterways that cross the state line despite being found on the Kansas side (Edmond and Daniel 2020). Quite possibly, robust populations have been overlooked, but it is conceivable that it is not as common in Missouri along the mainstems of the Marais des Cygnes, Marmaton, Little Osage, and Blue rivers there, the surrounding landscapes of which are dominated more by row crops rather than by the pasture and grassland that surrounds most locations where it is found in the headwater tributaries of the

same rivers in Kansas. Interestingly, *G. geographica* is known from Shoal Creek and the Spring River in Missouri (Edmond and Daniel 2020), both of which flow from their headwaters in that state into Kansas, but it is known from only two records in the Spring River in Oklahoma (Lindeman 2014), again suggesting that it is most abundant in headwaters. Based on the paucity of past records in Kansas, it might have been supposed that the species was of peripheral occurrence, only wandering in occasionally from source populations in adjoining Missouri or Oklahoma. Instead, we believe that populations in Kansas are “home grown”, that the species is a regular member of the state’s herpetofauna, and that populations here may be quite isolated and in need of protection and management to ensure their persistence, which cannot be attributed to populations elsewhere.

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Table 1-1. Total numbers of turtles, according to drainage and catch per unit effort, captured in baited hoop-nets at 131 of 169 surveyed locations in waterways of eastern Kansas, 2017–2019.

Drainage	Turtles	Net Nights	Number/Net Night
Marais des Cygnes	402	921	0.44
Blue	71	167	0.43
Neosho	15	90	0.17
Spring	14	53	0.26
Verdigris	182	197	0.92
Total	684	1428	0.48

Table 1-2. Relative abundances of semi-aquatic turtles caught in baited hoop-nets in waterways of eastern Kansas, 2017–2019

Species	Number	Percent
Trachemys scripta elegans	358	52.2
Graptemys ouachitensis	88	12.8
Chelydra serpentina	79	11.5
Apalone spinifera	58	8.5
Sternotherus ordoratus	37	5.4
Chrysemys picta bellii	26	3.8
Graptemys pseudogeographica kohnii	16	2.3
Graptemys p. pseudogeographica	14	2.0
Graptemys geographica	**6**	**0.9**
Pseudemys concinna concinna	2	0.3
Total	684	

Table 1-3. Baits with which turtles were caught in waterways of eastern Kansas, 2017–2019.

	Species									
Bait Type	*Apalone spinifera*	*Chelydra serpentina*	*Chrysemys picta bellii*	***Graptemys geographica***	*Graptemys p. pseudo-geographica*	*Graptemys p. kohnii*	*Graptemys ouachitensis*	*Pseudemys concinna*	*Sternotherus odoratus*	*Trachemys scripta elegans*
Fish	23	43	12	**1**	0	0	12	2	6	106
Mussels	9	9	10	**3**	1	13	49	0	13	102
Shrimp	4	4	0	**0**	0	0	0	0	0	9
Liver	1	1	0	**0**	0	0	0	0	0	8
Dog food	0	4	0	**0**	0	0	0	0	0	4
Canned clams	0	1	0	**0**	0	0	0	0	0	4
Turtle pellets	1	0	0	**0**	0	0	0	0	0	2
Corn	15	16	0	**1**	0	3	7	0	18	114
Fruit	0	1	0	**0**	0	0	1	0	0	2
Vegetables	0	0	0	**1**	0	0	0	0	0	1
Mixed bait	5	0	4	**0**	0	0	2	0	0	6
No Bait	0	0	0	**0**	13	0	17	0	0	0
Total	58	79	26	**6**	14	16	88	2	37	358

Table 1-4. Total numbers of semi-aquatic turtles, according to drainage and number per location, seen during visual surveys at 486 of 1105 surveyed locations in waterways of eastern Kansas, 2018–2019.

Drainage	Turtles	Locations	Number/location
Marais des Cygnes	1293	580	2.2
Blue	12	11	1.1
Neosho	939	138	6.8
Spring	364	88	4.1
Verdigris	466	137	3.4
Kansas	129	99	1.3
Arkansas	220	52	4.2
Total	3423	1105	3.1

Table 1-5. Relative abundances of semi-aquatic turtles detected during visual surveys in waterways of eastern Kansas, 2018–2019.

Species	Number	Percent
Trachemys scripta elegans	1278	37.3
Graptemys ouachitensis	956	27.9
Graptemys pseudogeographica kohnii	396	11.6
Pseudemys concinna concinna	268	7.8
Apalone spinifera	187	5.5
Chrysemys picta bellii	123	3.6
Graptemys geographica	**92**	**2.7**
Graptemys p. pseudogeographica	78	2.3
Chelydra serpentina	41	1.2
Apalone mutica	2	< 0.1
Sternotherus ordoratus	2	< 0.1
Total	3423	

Table 1-6. Results of visual surveys for riverine basking turtles, according to drainage and stream order, conducted in waterways of eastern Kansas, August–October 2018 and May–October 2019.

River Drainage	Order	Sites Surveyed	***G. geographica***	*T. s. elegans*	*G. ouachitensis*	*G. p. kohnii*	*G. p. pseudo-geographica*	*P. c. concinna*
Marais des Cygnes	1st	9	0	0	0	0	0	0
Blue	1st	1	0	0	0	0	0	0
Neosho	1st	5	0	0	0	0	0	0
Spring	1st	12	0	0	0	0	0	0
Verdigris	1st	2	0	0	0	0	0	0
SubTotal		**29**	**0**	**0**	**0**	**0**	**0**	**0**
Kansas	2nd	25	0	6	0	0	16	0
Marais des Cygnes	2nd	66	2	38	13	0	0	11
Blue	2nd	2	0	0	0	0	1	0
Neosho	2nd	13	0	0	0	0	0	0
Spring	2nd	11	0	0	0	0	0	0
Verdigris	2nd	16	0	1	0	0	0	0
SubTotal		**133**	**2**	**45**	**13**	**0**	**17**	**11**
Kansas	3rd	50	0	13	1	0	15	0
Marais des Cygnes	3rd	205	11	68	1	0	0	3
Blue	3rd	3	0	0	0	0	0	0
Neosho	3rd	46	0	30	0	9	0	3
Spring	3rd	16	0	0	0	0	0	0
Verdigris	3rd	37	0	72	0	4	0	3
SubTotal		**357**	**11**	**183**	**2**	**13**	**15**	**9**
Arkansas	4th	2	0	4	6	0	0	0
Kansas	4th	7	0	0	0	0	1	0
Marais des Cygnes	4th	155	37	177	29	3	0	13
Blue	4th	5	1	3	0	0	2	0
Neosho	4th	25	0	105	1	33	0	35
Spring	4th	35	5	63	0	17	0	57
Verdigris	4th	38	0	57	11	38	0	14

SubTotal		**267**	**43**	**409**	**47**	**91**	**3**	**119**
Kansas	5th	16	0	4	0	0	31	0
Marais des Cygnes	5th	116	28	210	84	1	0	13
Neosho	5th	20	0	40	71	56	0	1
Verdigris	5th	44	0	57	85	87	0	6
SubTotal		**196**	**28**	**311**	**240**	**144**	**31**	**20**
Arkansas	6th	42	0	43	97	16	0	2
Marais des Cygnes	6th	29	8	165	123	35	0	41
Neosho	6th	29	0	52	340	83	0	15
Spring	6th	14	0	68	64	14	0	51
SubTotal		**114**	**8**	**328**	**624**	**148**	**0**	**109**
Arkansas	7th	8	0	2	30	0	0	0
Kansas	7th	1	0	0	0	0	12	0
SubTotal		**9**	**0**	**2**	**30**	**0**	**12**	**0**
Total		1105	92	1278	956	396	78	268

Table 1-7. Relative abundances of obligate-basking riverine turtle taxa according to drainage and stream order, based on visual surveys conducted in waterways of eastern Kansas, August–October 2018 and May–October 2019. Numbers given are ratios per hundred *T. s. elegans*.

	G. geographica	*T. s. elegans*	*G. ouachitensis*	*G. p. pseudo-geographica*	*G. p. kohnii*	*P. c. concinna*
Survey-wide	**7**	100	75	6	31	21
Drainage						
Arkansas	**0**	100	271	0	33	4
Kansas	**0**	100	4	326	0	0
Marais des Cygnes	**13**	100	38	0	6	12
Blue	**33**	100	0	100	0	0
Neosho	**0**	100	181	0	80	24
Spring	**4**	100	49	0	24	82
Verdigris	**0**	100	51	0	69	12
Stream order						
1st	**0**	0	0	0	0	0
2nd	**4**	100	29	38	0	24
3rd	**6**	100	1	8	7	5
4th	**10**	100	11	1	22	29
5th	**9**	100	77	10	46	6
6th	**2**	100	190	0	45	33
7th	**0**	100	1500	600	0	0
Stream order for the Marais des Cygnes, Blue, and Spring river drainages only						
1st	**0**	0	0	0	0	0
2nd	**5**	100	34	3	0	29
3rd	**16**	100	1	0	0	4
4th	**17**	100	12	1	8	29
5th	**13**	100	40	0	0	6
6th	**5**	100	75	0	21	25

Table 1-8. Locations, according to drainage and stream order, where *G. geographica* was detected in the course of the present study, conducted in waterways of eastern Kansas, 2017–2019.

			Species (number of individuals)							
Drainage	Waterbody	Stream Order	***G. geographica***	*T. scripta elegans*	*G. ouachitensis*	*G. pseudo-geographica kohnii*	*C. p. bellii*	*P. concinna*	*C. serpentina*	*A. spinifera*
Marais des Cygnes	Little Osage	2nd	**2**	21	13	0	0	10	1	2
Marais des Cygnes	One Hundred and Forty-two Mile Creek	3rd	**1**	1	0	0	0	0		0
Marais des Cygnes	Dragoon Creek	3rd	**2**	0	1	0	0	0	4	4
Marais des Cygnes	Frog Creek	3rd	**1**	4		0	0	1	1	
Marais des Cygnes	Limestone Creek	3rd	**3**	2	1	0	0	0	1	0
Marais des Cygnes	Little Sugar	3rd	**1**	4	1	0	2	1	1	1
Marais des Cygnes	Marmaton River	3rd	**1**	10	0	0	6	1	5	12
Marais des Cygnes	Plum Creek	3rd	**1**	4	1	0	0	0	0	0
Marais des Cygnes	Salt Creek	3rd	**1**	5	0	0	4	1	0	0
Marais des Cygnes	South Wea Creek	3rd	**1**	4	1	0	0	1	1	4
Marais des Cygnes	One Hundred and Forty-two Mile Creek	4th	**6**	22	1	0	0	0	0	1
Marais des Cygnes	Dragoon Creek	4th	**2**	1	1	0	1	0	1	2
Marais des Cygnes	Elm Creek	4th	**1**	13	3	0	1	0	1	0
Marais des Cygnes	Little Osage	4th	**4**	15	15	0	0	4	0	3
Marais des Cygnes	Long Creek	4th	**20**	17	0	0	5	0	0	3
Marais des Cygnes	Marmaton River	4th	**5**	36	3	1	2	6	3	3
Marais des Cygnes	Big Sugar Creek	5th	**2**	14	0	0	0	0	0	3
Marais des Cygnes	Hundred and Ten Mile Creek	5th	**1**	0	0	0	0	0	0	0
Marais des Cygnes	Little Osage River	5th	**14**	41	43	0	1	6	1	11
Marais des Cygnes	Marmaton River	5th	**1**	8	0	0	1	3	0	2
Marais des Cygnes	Paint Creek	5th	**4**	20	0	0	3	3	1	0
Marais des Cygnes	Marais des Cygnes River	5th	**6**	97	25	0	33	0	0	4
Marais des Cygnes	Marmaton River	6th	**8**	135	82	35	0	41	0	3

Marais des Cygnes	Marais des Cygnes River	6th	**1**	30	41	8	2	0	0	0
Blue	Indian Creek	3rd	**1**	10	0	0	0	0	1	9
Blue	Blue River	4th	**3**	13	0	0	3	0	7	2
Spring	Shawnee Creek	4th	**1**	35	0	7	0	9	1	1
Spring	Shoal Creek	4th	**6**	8	0	0	0	38	0	7
Total			**100**	613	234	46	66	124	30	73

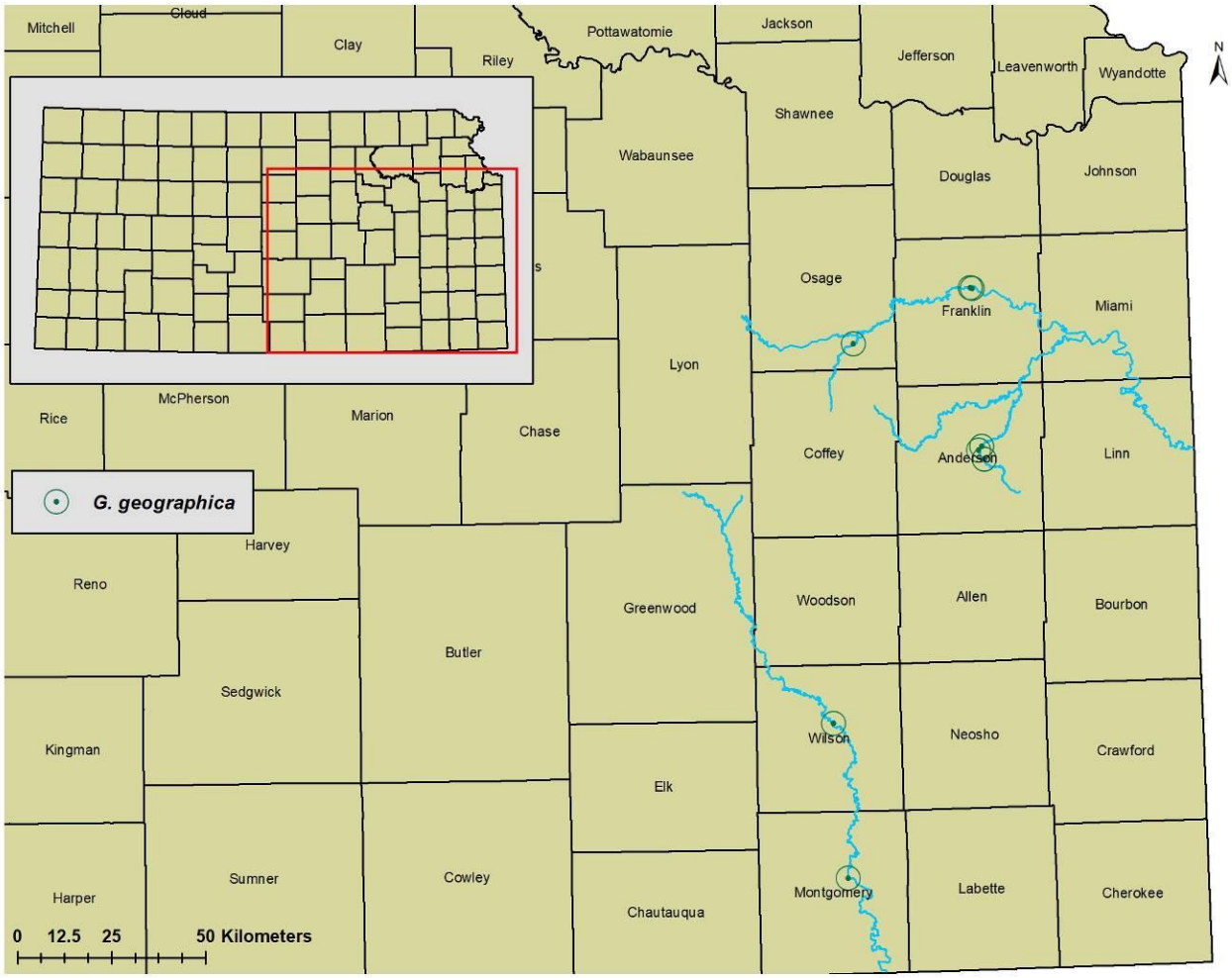

Fig. 1-1. *Graptemys geographica* collection locations (n = 8) in Kansas, 1911–1952, based on museum specimen records (N = 8). Counties of occurrence include Anderson (3 records), Franklin (2), Montgomery (1), Osage (1), and Wilson (1). Records from Montgomery and Wilson counties are plotted near the centers of those counties as precise locality information was lacking.

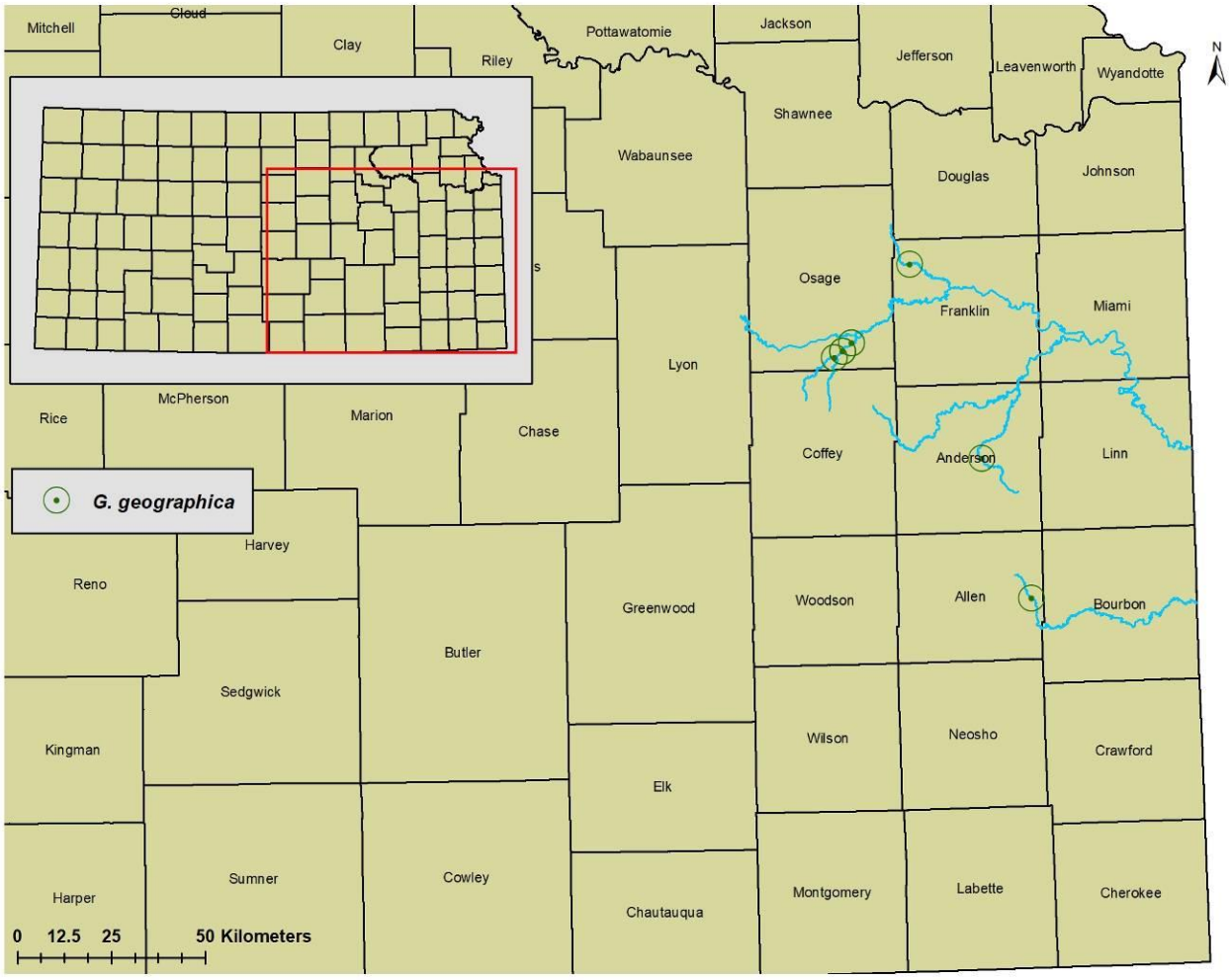

Fig. 1-2. *Graptemys geographica* capture locations during live-trapping surveys conducted in 1990 (Edds 1991).

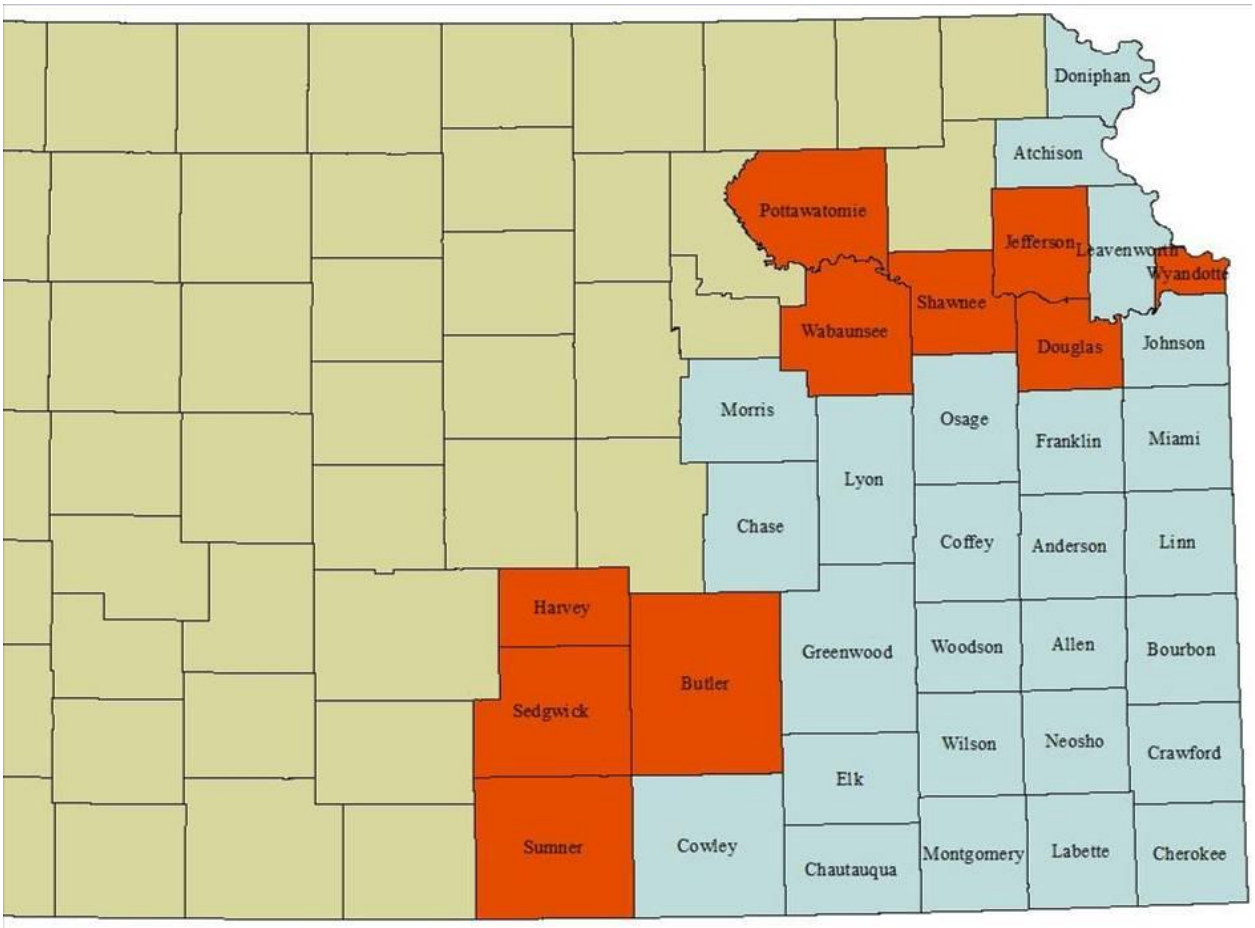

Fig. 1-3. Geographic extent, by county, of the present study of the distribution of *Graptemys geographica* in Kansas, conducted 2017–2019, using live-trapping and visual surveys. Counties in which only visual surveys were utilized are colored red.

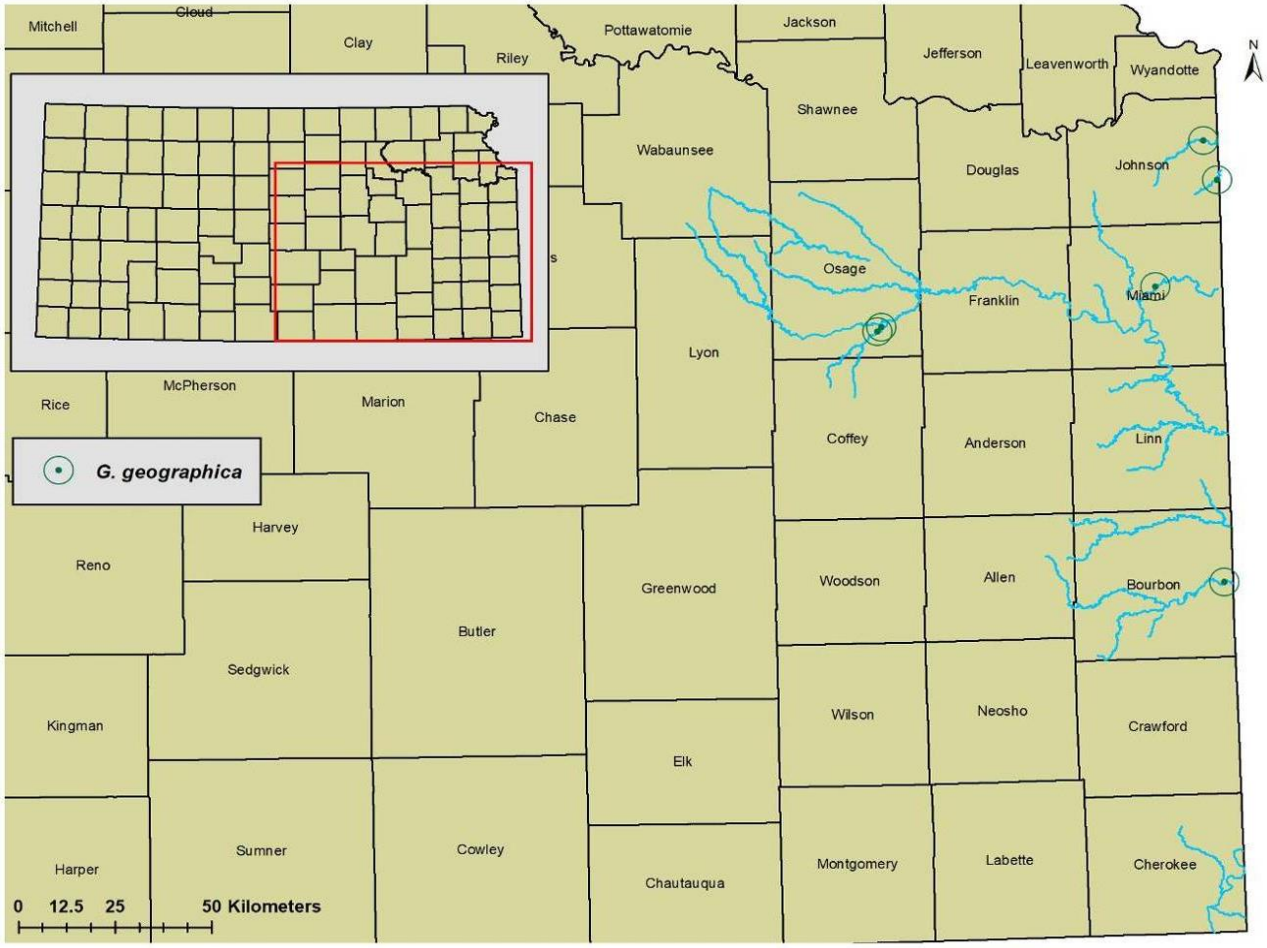

Fig. 1-4. *Graptemys geographica* capture locations during live-trapping surveys conducted during the present study in 2017–2019.

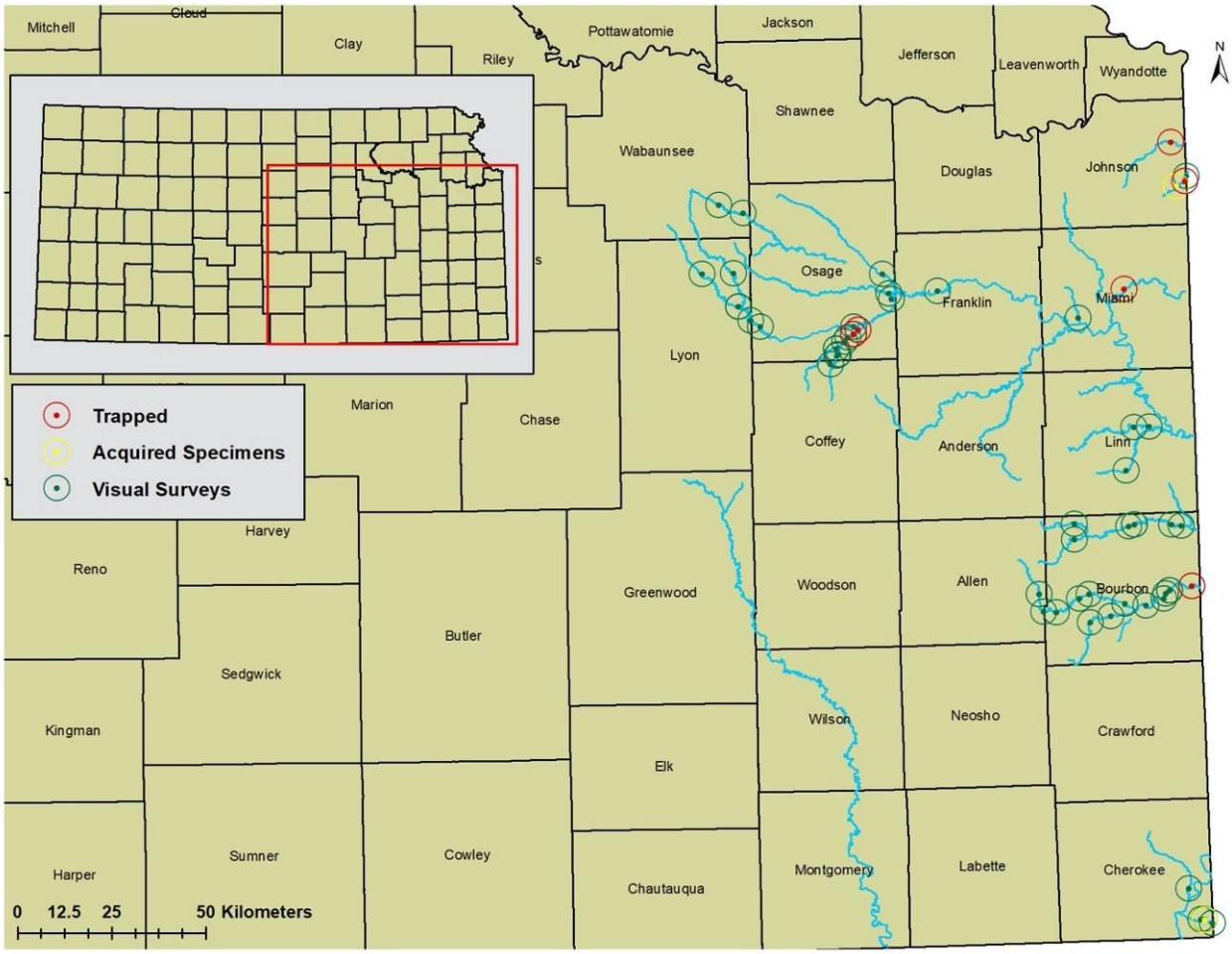

Fig. 1-5. Locations of all recorded *G. geographica* captures and observations in Kansas from 2017–2019.

APPENDIX A. List of live-trapping survey sites for turtles in eastern Kansas, 2017–2019 (N = 236).

Site reference	Date assessed	County	Drainage	Waterbody	Latitude	Longitude	Net nights	Turtles (N)	Historic site?
ST-18-074	2018-2-2	Osage	Marais des Cygnes	110 mile creek	38.63273	-95.52658	6	0	
ST-18-172	2018-7-10	Franklin	Marais des Cygnes	110 mile creek	38.60818	-95.51155	6	8	
DGKP-17-003	2017-05-26	Franklin	Marais des Cygnes	Appanoose Creek	38.67937	-95.45273	20	2	
DGKP-17-013	2017-06-27	Franklin	Marais des Cygnes	Appanoose Creek	38.67980	-95.45280	30	6	Yes
ST-18-169	2018-7-9	Franklin	Marais des Cygnes	Appanoose Creek	38.64330	-95.36041	6	1	
ST-18-171	2018-7-9	Franklin	Marais des Cygnes	Appanoose Creek	38.66631	-95.41691	6	4	
ST-18-170	2018-7-9	Franklin	Marais des Cygnes	Appanoose Creek	38.65255	-95.39060	6	5	
DGKP-17-032	2017-08-04	Miami	Marais des Cygnes	Bull Creek	38.57890	-94.89730	11	1	
ST-18-177	2018-7-16	Miami	Marais des Cygnes	Bull Creek	38.50531	-94.85338	6	4	
ST-18-178	2018-7-16	Miami	Marais des Cygnes	Bull Creek	38.53423	-94.85421	6	4	
ST-18-179	2018-7-16	Miami	Marais des Cygnes	Bull Creek	38.56052	-94.87757	14	19	
ST-18-180	2018-7-16	Miami	Marais des Cygnes	Bull Creek	38.57655	-94.89600	6	9	
ST-18-181	2018-7-16	Miami	Marais des Cygnes	Bull Creek	38.60694	-94.88398	6	4	
ST-18-196	2018-7-25	Anderson	Marais des Cygnes	Cedar Creek	38.32725	-95.26239	6	0	
DGKP-17-010	2017-06-15	Osage	Marais des Cygnes	Dragoon Creek	38.69330	-95.72560	26	6	
ST-18-205	2018-8-6	Osage	Marais des Cygnes	Dragoon Creek	38.67587	-95.68251	10	4	
ST-18-204	2018-8-1	Bourbon	Marais des Cygnes	Fish Creek	37.97945	-94.75321	6	3	
DGKP-17-005	2017-05-26	Osage	Marais des Cygnes	Frog Creek	38.44872	-95.72114	19	4	
DGKP-17-027	2017-08-02	Osage	Marais des Cygnes	Frog Creek	38.46270	-95.69190	9	0	
ST-18-202	2018-8-1	Bourbon	Marais des Cygnes	Limestone Creek	37.97982	-94.98880	6	9	
ST-18-122	2018-5-30	Bourbon	Marais des Cygnes	Little Osage River	38.00996	-95.06016	6	3	
ST-18-123	2018-5-30	Bourbon	Marais des Cygnes	Little Osage River	38.00705	-94.95142	6	2	
ST-18-124	2018-5-30	Bourbon	Marais des Cygnes	Little Osage River	37.98099	-94.91524	10	7	
ST-18-125	2018-5-30	Bourbon	Marais des Cygnes	Little Osage River	37.99897	-94.87872	29	0	
ST-18-201	2018-7-30	Bourbon	Marais des Cygnes	Little Osage River	38.00638	-94.95135	6	2	
ST-18-199	2018-7-30	Bourbon	Marais des Cygnes	Little Osage River	38.02091	-95.04118	6	14	
ST-19-284	2019-6-10	Bourbon	Marais des Cygnes	Little Osage River	38.00318	-94.66403	8	0	
ST-19-285	2019-6-10	Bourbon	Marais des Cygnes	Little Osage River	38.00780	-94.69459	24	11	
ST-19-286	2019-6-10	Bourbon	Marais des Cygnes	Little Osage River	38.01930	-94.71357	8	0	
ST-19-287	2019-6-10	Bourbon	Marais des Cygnes	Little Osage River	38.01220	-94.80575	12	1	
ST-18-200	2018-7-30	Bourbon	Marais des Cygnes	Little Osage River	38.01779	-94.98791	6	1	
DGKP-17-004	2017-05-26	Osage	Marais des Cygnes	Long Creek	38.49702	-95.63762	55	4	Yes

DGKP-17-012	2017-05-26	Osage	Marais des Cygnes	Long Creek	38.49710	-95.63780	15	0	
DGKP-17-011	2017-06-21	Osage	Marais des Cygnes	Long Creek	38.50660	-95.62530	36	21	
DGKP-17-014	2017-06-29	Osage	Marais des Cygnes	Long Creek	38.47800	-95.66670	39	7	
ST-18-173	2018-7-10	Osage	Marais des Cygnes	Long Creek	38.46318	-95.69183	8	0	
ST-18-174	2018-7-10	Osage	Marais des Cygnes	Long Creek	38.44881	-95.68565	10	0	
ST-18-175	2018-7-11	Osage	Marais des Cygnes	Long Creek	38.41397	-95.71037	6	6	
ST-18-176	2018-7-11	Osage	Marais des Cygnes	Long Creek	38.41966	-95.70155	6	0	
ST-18-203	2018-8-1	Bourbon	Marais des Cygnes	Lost Creek	38.02656	-94.82370	6	6	
ST-18-112	2018-5-16	Osage	Marais des Cygnes	Marais des Cygnes River	38.57978	-95.52096	6	3	
ST-18-113	2018-5-16	Osage	Marais des Cygnes	Marais des Cygnes River	38.51593	-95.69178	6	0	
ST-18-138	2018-6-11	Miami	Marais des Cygnes	Marais des Cygnes River	38.50412	-94.95226	6	2	
ST-18-139	2018-6-11	Miami	Marais des Cygnes	Marais des Cygnes River	38.52066	-95.03307	6	1	
ST-18-140	2018-6-11	Franklin	Marais des Cygnes	Marais des Cygnes River	38.61074	-95.20626	6	2	
ST-18-141	2018-6-12	Franklin	Marais des Cygnes	Marais des Cygnes River	38.61764	-95.29424	6	1	
ST-18-142	2018-6-13	Franklin	Marais des Cygnes	Marais des Cygnes River	38.58947	-95.41567	14	4	
DG-KP-17-015	2017-06-28	Osage	Marais des Cygnes	Marais des Cygnes River	38.51470	-95.63780	12	7	
DGKP-17-019	2017-07-19	Anderson	Marais des Cygnes	Marais des Cygnes River	38.56710	-95.15270	6	4	
DGKP-17-028	2017-08-02	Osage	Marais des Cygnes	Marais des Cygnes River	38.53620	-95.56420	16	2	
DGKP-17-029	2017-08-03	Franklin	Marais des Cygnes	Marais des Cygnes River	38.58310	-95.45780	12	4	
DGKP-17-030	2017-08-03	Franklin	Marais des Cygnes	Marais des Cygnes River	38.58770	-95.41970	6	0	
DGKP-17-063	2017-12-31	Franklin	Marais des Cygnes	Marais des Cygnes River	38.59705	-95.37858	10	5	
ST-18-072	2018-1-26	Franklin	Marais des Cygnes	Marais des Cygnes River	38.61834	-95.29312	6	0	
ST-18-075	2018-2-2	Franklin	Marais des Cygnes	Marais des Cygnes River	38.58642	-95.48139	6	0	
ST-18-079	2018-2-16	Franklin	Marais des Cygnes	Marais des Cygnes River	38.58141	-95.15101	6	0	
ST-18-080	2018-2-16	Franklin	Marais des Cygnes	Marais des Cygnes River	38.57557	-95.10257	6	5	
ST-18-081	2018-2-16	Franklin	Marais des Cygnes	Marais des Cygnes River	38.53528	-95.07147	6	4	
DGKP-17-021	2017-07-20	Bourbon	Marais des Cygnes	Marmaton River	37.80860	-95.02480	6	0	
DGKP-17-022	2017-07-20	Bourbon	Marais des Cygnes	Marmaton River	37.83090	-94.88740	20	2	
DGKP-17-023	2017-07-20	Bourbon	Marais des Cygnes	Marmaton River	37.85610	-94.64040	26	32	Yes
ST-18-159	2018-6-25	Bourbon	Marais des Cygnes	Marmaton River	37.86304	-94.67896	6	5	
ST-18-160	2018-6-25	Bourbon	Marais des Cygnes	Marmaton River	37.84645	-94.70505	30	9	
ST-18-161	2018-6-25	Bourbon	Marais des Cygnes	Marmaton River	37.82826	-94.72654	10	12	
ST-18-162	2018-6-26	Bourbon	Marais des Cygnes	Marmaton River	37.82794	-94.72680	10	6	
ST-18-164	2018-6-27	Bourbon	Marais des Cygnes	Marmaton River	37.81972	-94.84373	6	1	
ST-18-165	2018-6-27	Bourbon	Marais des Cygnes	Marmaton River	37.83554	-94.98119	6	5	

ST-18-187	2018-7-23	Bourbon	Marais des Cygnes	Marmaton River	37.82020	-95.01082	6	1	
ST-18-188	2018-7-23	Bourbon	Marais des Cygnes	Marmaton River	37.80405	-95.05113	6	1	
ST-18-189	2018-7-23	Allen	Marais des Cygnes	Marmaton River	37.80516	-95.08958	6	1	
ST-18-190	2018-7-23	Allen	Marais des Cygnes	Marmaton River	37.84823	-95.10087	6	0	
DGKP-17-008	2017-06-08	Osage	Marais des Cygnes	Melvern Lake	38.49999	-95.71385		2	
ST-18-198	2018-7-30	Allen	Marais des Cygnes	Middle Fork Little Osage River	38.02580	-95.09656	6	6	
DGKP-17-009	2017-06-14	Osage	Marais des Cygnes	Mud Creek	38.69830	-95.77780	30	1	
ST-18-163	2018-6-26	Bourbon	Marais des Cygnes	near Marmaton River	37.82760	-94.72550	6	14	
ST-18-197	2018-7-30	Allen	Marais des Cygnes	North Fork Little Osage River	38.03043	-95.09209	6	0	
ST-18-185	2018-7-18	Miami	Marais des Cygnes	North Weah Creek	38.65051	-94.75570	6	9	
ST-18-186	2018-7-18	Miami	Marais des Cygnes	North Weah Creek	38.65352	-94.71312	6	1	
DGKP-17-024	2017-07-20	Bourbon	Marais des Cygnes	Osage River	38.01970	-94.71360	6	2	
ST-19-288	2019-7-02	Bourbon	Marais des Cygnes	Paint Creek	37.79275	-94.85071	8	3	
ST-19-289	2019-7-02	Bourbon	Marais des Cygnes	Paint Creek	37.78998	-94.88756	8	2	
ST-19-290	2019-7-02	Bourbon	Marais des Cygnes	Paint Creek	37.78652	-94.90404	8	0	
ST-19-291	2019-7-02	Bourbon	Marais des Cygnes	Paint Creek	37.78627	-94.93332	8	5	
ST-19-292	2019-7-02	Bourbon	Marais des Cygnes	Paint Creek	37.77599	-94.95123	8	0	
DGKP-17-006	2017-06-07	Osage	Marais des Cygnes	Pomona Lake	38.65694	-95.59338		1	
DGKP-17-016	2017-07-18	Anderson	Marais des Cygnes	Pottawatomie Creek	38.21300	-95.25310	6	1	Yes
DGKP-17-017	2017-07-18	Anderson	Marais des Cygnes	Pottawatomie Creek	38.23420	-95.26520	10	4	Yes
DGKP-17-018	2017-07-18	Anderson	Marais des Cygnes	Pottawatomie Creek	39.33370	-95.24880	6	9	
DGKP-17-034	2017-08-18	Anderson	Marais des Cygnes	Pottawatomie Creek	38.29170	-95.17470	6	2	
ST-18-114	2018-5-21	Miami	Marais des Cygnes	Pottawatomie Creek	38.48530	-94.95089	6	1	
ST-18-115	2018-5-21	Miami	Marais des Cygnes	Pottawatomie Creek	38.48646	-95.01201	6	1	
ST-18-116	2018-5-21	Franklin	Marais des Cygnes	Pottawatomie Creek	38.44377	-95.08376	6	0	
ST-18-191	2018-7-25	Anderson	Marais des Cygnes	Pottawatomie Creek	38.37761	-95.13661	6	0	
ST-18-193	2018-7-25	Anderson	Marais des Cygnes	Pottawatomie Creek	38.35275	-95.17762	6	1	
ST-18-194	2018-7-25	Anderson	Marais des Cygnes	Pottawatomie Creek	38.34908	-95.20345	6	10	
ST-18-195	2018-7-25	Anderson	Marais des Cygnes	Pottawatomie Creek	38.33952	-95.27287	6	6	
DGKP-17-007	2017-06-07	Osage	Marais des Cygnes	Salt Creek	38.59393	-95.52706	20	8	
ST-18-192	2018-7-25	Anderson	Marais des Cygnes	South Fork Pottawatomie Creek	38.36055	-95.13067	6	0	
ST-18-182	2018-7-17	Miami	Marais des Cygnes	South Weah Creek	38.56334	-94.84642	6	8	
ST-18-183	2018-7-17	Miami	Marais des Cygnes	South Weah Creek	38.58483	-94.80927	6	8	

ST-18-184	2018-7-18	Miami	Marais des Cygnes	South Weah Creek	38.59589	-94.76898	6	0
DGKP-17-020	2017-07-19	Anderson	Marais des Cygnes	Tavi Creek	38.63010	-95.19890	10	1
ST-18-222	2018-9-29	Doniphan	Missouri	Browning Lake Oxbow	39.75860	-94.90368	16	17
ST-18-218	2018-9-11	Atchison	Missouri	Independence Creek	39.59468	-95.09566	10	2
ST-18-154	2018-6-22	Johnson	Missouri/Blue	Blue River	38.83190	-94.63550	6	0
ST-18-155	2018-6-22	Johnson	Missouri/Blue	Blue River	38.84232	-94.61242	24	4
ST-18-156	2018-6-22	Johnson	Missouri/Blue	Blue River	38.85497	-94.60805	6	0
ST-18-157	2018-6-22	Johnson	Missouri/Blue	Blue River	38.81317	-94.67101	20	5
ST-18-212	2018-8-10	Johnson	Missouri/Blue	Blue River	38.84417	-94.61209	30	0
ST-18-213	2018-8-10	Johnson	Missouri/Blue	Blue River	38.83067	-94.63029	6	6
ST-18-158	2018-6-23	Johnson	Missouri/Blue	Coffee Creek	38.82156	-94.70527	10	1
ST-18-219	2018-9-18	Johnson	Missouri/Blue	Indian Creek	38.93837	-94.64020	6	1
ST-18-220	2018-9-18	Johnson	Missouri/Blue	Indian Creek	38.93839	-94.64323	6	3
ST-18-221	2018-9-18	Johnson	Missouri/Blue	Indian Creek	38.93889	-94.64879	10	17
ST-18-153	2018-6-22	Johnson	Missouri/Blue	near Blue River	38.83149	-94.63878	12	13
ST-18-214	2018-8-11	Johnson	Missouri/Blue	Tomahawk Creek	38.91246	-94.63414	15	2
ST-18-215	2018-8-11	Johnson	Missouri/Blue	Tomahawk Creek	38.91563	-94.63179	6	1
ST-18-076	2018-2-13	Chase	Neosho	Cottonwood River	38.38802	-96.39185	6	1
ST-18-077	2018-2-13	Chase	Neosho	Cottonwood River	38.39771	-96.35664	6	0
ST-18-111	2018-5-14	Lyon	Neosho	Cottonwood River	38.38666	-96.29431	6	1
ST-18-109	2018-5-14	Chase	Neosho	Cottonwood River	38.36970	-96.52612	6	2
ST-18-110	2018-5-14	Chase	Neosho	Cottonwood River	38.36825	-96.46483	6	1
ST-18-166	2018-7-2	Neosho	Neosho	Hickory Creek	37.36925	-95.10345	10	0
ST-18-167	2018-7-2	Neosho	Neosho	Hickory Creek	37.45665	-95.05210	6	1
ST-18-168	2018-7-2	Neosho	Neosho	Hickory Creek	37.47111	-95.05542	6	1
DGKP-17-001	2017-05-18	Lyon	Neosho	Neosho River	38.42175	-96.17537	9	0
DGKP-17-002	2017-05-18	Lyon	Neosho	Neosho River	38.42669	-96.17201	6	1
ST-18-065	2018-1-9	Labette	Neosho	Neosho River	37.17622	-95.10309	6	0
ST-18-092	2018-3-19	Labette	Neosho	Neosho River	37.26593	-95.11532	6	3
ST-18-093	2018-3-19	Labette	Neosho	Neosho River	37.34056	-95.10900	6	0
ST-18-129	2018-6-05	Labette	Neosho	Neosho River	37.04788	-95.08297	6	1
ST-18-127	2018-6-04	Cherokee	Spring	Shawnee Creek	37.10432	-94.68422	6	1
ST-18-128	2018-6-04	Cherokee	Spring	Shoal Creek	37.04212	-94.64394	6	2
DGKP-17-037	2017-07-20	Cherokee	Spring	Shoal Creek	37.04190	-94.64120	9	1
DGKP-17-025	2017-07-20	Cherokee	Spring	Spring River	37.17650	-94.64730	10	3

DGKP-17-026	2017-07-20	Cherokee	Spring	Spring river	37.06210	-94.70630	16	9
ST-18-126	2018-6-04	Cherokee	Spring	Spring River	37.26510	-94.72475	6	1
ST-18-131	2018-6-05	Labette	Verdigris	Altamont Idle Hour Lake	37.13894	-95.28953	1	1
ST-18-207	2018-8-8	Osage, OK	Verdigris	Caney River	36.99270	-96.27768	6	1
ST-18-210	2018-8-8	Chautauqua	Verdigris	Caney River	37.00385	-96.31628	8	2
ST-18-146	2018-6-18	Greenwood	Verdigris	Cedar Creek	37.81820	-95.95245	6	4
ST-18-206	2018-8-8	Chautauqua	Verdigris	Cedar Creek	37.00960	-96.25524	10	0
ST-18-208	2018-8-8	Osage, OK	Verdigris	Cedar Creek	36.99843	-96.24098	10	0
ST-18-209	2018-8-8	Chautauqua	Verdigris	Cedar Creek	37.01663	-96.26259	6	0
ST-18-211	2018-8-8	Chautauqua	Verdigris	Coon Creek	37.01136	-96.22707	6	22
ST-18-150	2018-6-20	Wilson	Verdigris	Fall River	37.45768	-95.72859	6	7
ST-18-151	2018-6-20	Wilson	Verdigris	Fall River	37.50765	-95.83348	6	12
ST-18-152	2018-6-20	Wilson	Verdigris	Fall River	37.53144	-95.92490	6	0
ST-18-216	2018-8-13	Greenwood	Verdigris	Fall River	37.85069	-96.35383	6	1
ST-18-217	2018-8-13	Greenwood	Verdigris	Fall River	37.75350	-96.18843	6	1
ST-18-130	2018-6-05	Labette	Verdigris	Idle Hour Lake	37.13984	-95.29234	1	1
ST-18-136	2018-6-07	Chautauqua	Verdigris	Little Caney River	37.09417	-96.02329	6	8
ST-18-137	2018-6-07	Chautauqua	Verdigris	Middle Caney Creek	37.09078	-96.09575	10	10
ST-18-135	2018-6-06	Montgomery	Verdigris	Montgomery County State Lake	37.16482	-95.69205	9	28
ST-18-133	2018-6-06	Montgomery	Verdigris	Pumpkin Creek	37.06359	-95.51608	6	2
ST-18-117	2018-5-23	Greenwood	Verdigris	Verdigris River	38.14613	-96.13874	6	0
ST-18-118	2018-5-23	Greenwood	Verdigris	Verdigris River	38.13484	-96.10293	6	2
ST-18-119	2018-5-23	Greenwood	Verdigris	Verdigris River	38.08450	-96.05045	6	2
ST-18-120	2018-5-23	Greenwood	Verdigris	Verdigris River	38.05613	-96.05116	6	1
ST-18-121	2018-5-23	Greenwood	Verdigris	Verdigris River	37.99663	-96.02369	6	2
ST-18-132	2018-6-06	Montgomery	Verdigris	Verdigris River	37.03331	-95.58039	6	10
ST-18-134	2018-6-06	Montgomery	Verdigris	Verdigris River	37.03463	-95.55298	6	0
ST-18-143	2018-6-18	Greenwood	Verdigris	Verdigris River	37.98239	-96.02278	6	5
ST-18-144	2018-6-18	Greenwood	Verdigris	Verdigris River	37.89529	-96.01263	6	6
ST-18-145	2018-6-18	Greenwood	Verdigris	Verdigris River	37.85823	-95.98607	6	2
ST-18-147	2018-6-18	Wilson	Verdigris	Verdigris River	37.66964	-95.83266	14	25
ST-18-148	2018-6-19	Wilson	Verdigris	Verdigris River	37.59443	-95.72741	6	8
ST-18-149	2018-6-19	Wilson	Verdigris	Verdigris River	37.54460	-95.68205	6	5
ST-19-293	2019-10-1	Greenwood	Verdigris	Toronto Lake dam	37.74104	-95.93229	0	12

CHAPTER 2

Phenotypic variation, distributions, and taxon limits within the False Map Turtle Complex (*Graptemys pseudogeographica* and allies) in Kansas

ABSTRACT

Four members of the genus *Graptemys* occur in Kansas—*Graptemys geographica*, *G. p. pseudogeographica*, *G. p. kohnii*, and *G. ouachitensis*—the latter three of which are often grouped together as the False Map Turtle Complex. That complex is currently treated as a collective unit within herpetological references for Kansas, ostensibly because distinguishing between component taxa is too problematic owing to inadequate criteria for diagnoses, historical instability of taxonomic limits, and because most museum specimens are shells only and thus lacking diagnostic features. To investigate which taxa within the complex occur in Kansas, the degree to which they exist as distinct versus intergrading forms, and to describe their separate distributions, we examined all available museum specimens (125 in total) to reassess their identities according to current knowledge of taxon limits and diagnostic criteria. We also conducted field surveys throughout most of the collective range of the complex in the state to examine many more individuals, which we caught in live-traps (124 individuals) or detected through visual surveys (1522 individuals) using spotting scope and camera. We found that *G. ouachitensis*, *G. p. kohnii*, and notably, *G. p. pseudogeographica*, all occur in the state, that the taxa were easily distinguished, that all individuals were unambiguously assignable to a taxon, and that distributions of each taxon based on reclassified museum records (most of which are, in fact, whole specimens, not shells only) were consistent with those derived from field surveys. Given these results, we conclude that distinguishing among component taxa of the False Map Turtle Complex in Kansas is possible and, going forward, should be presented as such.

INTRODUCTION

The southeastern United States is one of the most taxon-rich regions for turtles in the world, hosting 42 species (Mittereier et al. 2015). The genus *Graptemys*, endemic to the central and eastern United States and southeastern Canada (Ernst and Barbour 1989; Ernst and Lovich 2009), is the most diverse turtle genus in North America (Stephens and Wiens 2003), comprising 13 or 14 recognized species or subspecies (Powell et al., 2016, Thomson et al. 2018). Members of *Graptemys* are semi-aquatic turtles and rarely leave waterways except when females lay eggs (Ernst and Barbour 1989). Many species are endemic to single drainages of limited extent that empty into the Gulf of Mexico between Texas and the Florida panhandle (Lydeard and Mayden 1995). The taxa *G. geographica*, *G. p. pseudogeographica*, *G. p. kohnii*, and *G. ouachitensis*, found in the expansive Mississippi River drainage, which covers more than 2.9 million square km (Seaber *et al*. 1987), are much more widely distributed.

Graptemys ouachitensis, *G. p. pseudogeographica*, and *G. p. kohnii* compose the False Map Turtle Complex, within which taxonomic divisions have been fluid. These taxa have similar head color patterning and other physical features, and they are not reciprocally monophyletic for the markers that have been utilized in molecular phylogenetic studies (Lindeman 2013; Praschag *et al*. 2017; Thomson *et al*. 2018). Vast and complexly overlapping geographic ranges within the Mississippi River drainage (Lindeman 2013) and historically complex population histories may contribute to the imperfect differentiation of these forms; by contrast, *Graptemys* species limited to smaller drainages exhibit monophyly and distinctive head patterns (Thomson et al. 2018). Lack of reciprocal monophyly and low levels of genetic divergence among members of the complex might result from incomplete reproductive isolation (Godwin *et al*. 2014; Mitchell *et al*.

2016) in addition to long coalescence times due to large population sizes and generation times of ~25 years (Bennett *et al*. 2010; Praschag *et al*. 2017; Thomson *et al*. 2018).

Locality data from museum specimens suggest that the taxa that compose the False Map Turtle Complex exhibit sympatry (Lamb et al. 1994; Praschag et al. 2017; Rhodin et al. 2018; Thomson et al. 2018). For example, their distributions overlap in many areas of the upper Mississippi River system (Johnson and Briggler 2012), notably in Wisconsin where Vogt (1993a) investigated complexities of the head patterns of *G. p. pseudogeographica, G. p. kohnii,* and *G. ouachitensis*. Vogt described an intergrade zone between *G. p. pseudogeographica* and *G. p. kohnii* in Kansas within the Kansas and Missouri rivers and observed similar intergrades across the state of Missouri and extending into Illinois, Kentucky, and Tennessee (1993b). Kansas also harbors populations of *G. ouachitensis* within the Missouri and Arkansas river drainages. The most recent herpetofaunal guidebook for Kansas (Collins *et al*. 2010) and the online Kansas Herpetofaunal Atlas (Taggart 2020) treat those three taxa as a collective, and, while acknowledging that multiple taxa may be involved, provide no guidance on identification of component taxa or details of their separate distributions. They state that most museum specimens are shells only, lacking the soft parts needed for species identification, and so cannot be used to investigate which taxa occur in the state and where. Authorities have not agreed on characteristics that can reliably be used to distinguish taxa within the False Map Turtle Complex even as other characteristics exhibit regional variation (Hibbits and Hibbits 2016) or are less useful in northern areas (Thomson et al. 2018). However, most authorities agree that these taxa can generally be distinguished based on geographic location in combination with head patterning, pattern color, and presence or absence of an eye-bar (Dundee 1974; Vogt 1993; Myers 2008; Lindeman 2013; Powell et al. 2016).

The primary goals of this study were to determine which taxa within the False Map Turtle Complex occur in Kansas and to describe their geographic ranges. To accomplish those goals, we reviewed museum specimens and conducted surveys of turtles in the field with the aim of assigning each individual to a taxon according to current knowledge of species limits and diagnostic criteria. An outstanding question was whether such diagnoses could be made unambiguously. Do museum specimens preserve diagnostic features, or are most of them shells only (as stated by Collins et al. 2010) and thus without the head patterns needed for their identification? Do individuals exhibit multiple distinctive features consistent with a particular taxon or do many individuals have intermediate or conflicting sets of characteristics as expected for intergrading or incompletely differentiated forms? Do individuals belonging to apparently different taxa occur in the same river drainages, and if so, are intermediates also found?

MATERIALS AND METHODS

Museum specimens.—We examined all available *Graptemys* specimens from Kansas within collections at the University of Kansas Biodiversity Institute & Natural History Museum (n = 95) and the Sternberg Museum of Natural History (n = 30). Specimens were placed in a water-filled tray and photographed with a 12-megapixel camera (iPhone XS, Apple, Cupertino, California). The head of each specimen was photographed dorsally and on both left and right sides to document its patterning. Head color patterning was then assessed to assign each specimen to a taxon based on features currently considered diagnostic for the region (Vogt 1993b; Johnson and Briggler 2012; Lindeman 2013; Tumlison & Surf 2015; Powell et al. 2016; Vogt 2018; Vogt et al. 2018) as follows:

- *G. geographica* (Fig. 2-1)—largest postorbital marking on each side of head is a small, roughly triangular yellow to light green blotch, separated from the eye by at least one stripe;

single hooked line on each side of the neck, curving upwards towards the postorbital mark; interorbital marking with medial longitudinal stripe; chin marked with longitudinal lines; yellow iris sometimes tinged copper, bisected by a black stripe.

- *G. p. pseudogeographica* (Fig. 2-2)—largest postorbital marking on each side of head typically a narrow vertical bar not contacting small supramandibular spot, usually continuous with neck stripe; neck stripes reach orbits; interorbital mark with a medial longitudinal stripe, typically flanked by one to three thinner longitudinal lines; chin marked with small anterior spot and small (smaller than the iris) submandibular spot on each side of head; iris yellow, bisected by black stripe.
- *G. p. kohnii* (Fig. 2-3)—largest postorbital marking on each side of head a narrow crescent, curving under eyes and subsuming or fused with supramandibular spot; crescent marking separates head stripes from eye so they do not reach orbit; prominent midline interorbital marking; white iris without eye-bar.
- *G. ouachitensis* (Fig. 2-4)–largest postorbital markings on each side of head a wide vertical bar which may or may not be continuous with the upper neck stripe; large sub and supramandibular spots (greater in size than iris); no connection between postorbital blotch and supramandibular spot (as seen in some northern populations; Powell et al. 2016; Vogt 2018), allowing several lines to reach orbit; interorbital mark a medial longitudinal stripe, typically flanked by one to three thinner longitudinal lines; iris white, bisected by black stripe.

Each specimen was examined and scored according to presence of key diagostic features (Table 2-1). Some *G. ouachitensis* have postorbital blotches connected to stripes on the dorsum of the neck, similar to *G. p. pseudogeographica*, making the size and (often) square shape of the

blotches and the sizes of the supra- and submandibular spots especially important for their identification.

Trapping surveys.—We sampled semi-aquatic turtle assemblages throughout the eastern third of Kansas. Surveys were conducted in rivers, creeks, streams, lakes, ponds, and oxbows from May–August in 2017, May–November in 2018, and May–July in 2019. Sites sampled were within the Kansas, Blue, Marais des Cygnes, Neosho, Verdigris, and Spring river drainages, at 236 locations in 26 counties, totaling 1428 trap nights.

For population sampling, we employed two sizes of hoop-net turtle traps, primarily those that were 1.83 m × 0.76 m with 50-mm mesh in size, and less so some that were 4.27 m × 1.07 m with 50-mm mesh (Memphis Net and Twine, Memphis, Tennessee). We used fresh mussel and canned creamed corn (Voorhees et al. 1991; Mali et al. 2014) as bait at each location, while thawed fish, chicken liver, shrimp, fresh fruit, frozen vegetables, canned clams, commercial dog and turtle food, and Colby jack cheese cubes were utilized more sporadically. Baits were suspended at the rear of each trap in a perforated can or pill bottle that allowed their scents to be carried in the current (Nall and Thomas 2009; Brown et al. 2011). Three to six traps were set at each site, facing downstream to minimize bycatch of suspended debris. To quantify survey effort at each site, each period that a trap was left baited overnight and had not collapsed upon return, was counted as a net night. We set traps as early as 09:00 CDT and no later than 18:00 CDT to allow for access during evening and morning foraging (Mali et al. 2014).

Visual surveys.—We conducted visual surveys from August 2018–October 2019, at 1105 locations during 42 days and across 36 counties, using methods similar to those of Lindeman (1999, 2014). Most surveys were conducted from bridges over waterways or at low-water crossings. At each location where turtles were detected using eyes and binoculars upon arrival,

we spent a minimum of 15 minutes looking upstream and downstream to find as many individuals as possible. We used a spotting scope (Cronus 20–60×86 UHD, Athlon Optics, Olathe, Kansas) to see details of color pattern features so as to identify turtles, and we held a camera (Olympus E-M10 Mark II with 45 mm f/1.8 lens, Olympus Corp., Japan) to the scope eyepiece to photograph them. At locations where turtles were not present but basking spots were abundant, we sometimes returned during better conditions, i.e. lower water levels and warmer times of the day. Most turtles were detected while they were basking or otherwise hauled out, though many were observed at the surface of the water while foraging or between diving bouts. The very few individuals that were unidentified (due to distance or that fled into the water before being identified and did not reappear) were not reported among totals.

RESULTS

Museum specimens.—Of the 125 museum specimens examined, 8 were shells only (Fig. 2-5). All specimens, including shells, had been given taxonomic assignments (on specimen label or in collection catalog), according to various past understandings of taxon limits, as follows: 10 *G. geographica*, 5 *G. ouachitensis*, 93 *G. pseudogeographica*, 1 *G. p. kohnii*, and 16 *G. kohnii* (Table 2-2). After reassessing specimens, we categorized them as follows: 10 *G. geographica*, 43 *G. ouachitensis*, 45 *G. p. pseudogeographica*, 19 *G. p. kohnii*, and 8 shell-only specimens that we could not identify (Table 2-2).

Our assessment confirmed all 10 *G. geographica* specimens as correctly identified (Table 2-2, Fig. 2-6); only slight variation was detected among their head patterns and each exhibited triangular-shaped postorbital blotches and a hook-shaped neck line. Many of those specimens were more than 50 years old with deteriorated eyes, making confirmation of eyebars impossible.

The 93 specimens labeled *G. pseudogeographica* were collected 1911–2015. We categorized 44 as *G. p. pseudogeographica*, 3 as *G. p. kohnii*, 40 as *G. ouachitensis*, and 6 were shells that we could not assess (Table 2-2). Of those identified as *G. p. pseudogeographica*, all but two were an unambiguous match to that taxon. Specimens KU 159408 (Fig. 2-7) and KU 159409 (Fig. 2-8) deviated from typical *G. p. pseudogeographica* by having, respectively, supra- and submandibular spots greater in size than the pupil of the eye. All *G. p. pseudogeographica* specimens were collected from the Kansas River drainage or immediately adjacent to or directly from the Missouri River.

All 17 specimens originally labeled *G. kohnii* or *G. p. kohnii*, were confirmed to be *G. p. kohnii*, except two specimens that were shells only (Table 2-2). Each of the diagnostic head pattern features (Table 2-1) was present in 18 of the 19 of the *G. p. kohnii* specimens (Table 2-2). In a single specimen, FHSM 16926, the postorbital blotch and supramandibular spots were not quite fused, but other features were as expected for *G. p. kohnii*, including the lack of lines reaching or extending from the orbit and a single prominent interorbital mark on the top of the head (Fig. 2-9).

At the outset of our review, *G. ouachitensis* seemed poorly represented in collections—the 5 specimens, collected 1994–2016, included 3 that we could confirm as that taxon, 1 shell, and 1 *G. p. pseudogeographica*—however, as previously noted, 40 specimens labeled *G. pseudogeographica*, of which *G. ouachitensis* was long considered a subspecies, were also that taxon. Of the 43 specimens we identified, all but three (Table 2-2) had all 5 of the head pattern features on which our diagnoses focused (Table 2-1). KU 187864, a very small juvenile, has tall and narrow postorbital blotches (suggesting *G. p. pseudogeographica*) and few if any neck lines reach the orbit (suggesting *G. p. kohnii*), but the supramandibular spot is large (Fig. 2-10). KU

217266 has postorbital blotches that are taller than wide, suggesting *G. p. pseudogeographica* when viewed dorsally, but the supra- and submandibular spots are large as in *G. ouachitensis* (Fig. 2-11). KU 217269 exhibits postorbital and supramandibular spots that are nearly connected, blocking postorbital stripes from reaching the orbit (Fig. 2-12), suggesting *G. p. kohnii*; however, the bisecting black bar through the eye is present and the size and shape of the postorbital blotches (in addition to dorsal head and neck lines patterning) match *G. ouachitensis*. Specimens of *G. ouachitensis* came from the Kansas (including Tuttle Creek Lake), Marais des Cygnes, Neosho, Verdigris, Arkansas, and Spring rivers drainages.

Trapping surveys.—We caught 124 map turtles in live traps, including 6 *G. geographica*, 88 *G. ouachitensis*, 14 *G. p. pseudogeographica*, and 16 *G. p. kohnii* (Table 2-3). All individuals unambiguously matched diagnostic criteria. *Graptemys geographica* was captured at four locations in the Marais des Cygnes drainage and two locations in the Blue River system. *G. p. pseudogeographica* was captured near the Missouri River at Browning Lake (n = 13) and Independence Creek (n = 1). *G. p. kohnii* was found in the Marais des Cygnes drainage (but only in the Marmaton River; n = 2), in the Cottonwood (n = 1) and Neosho (n = 1) rivers in the Neosho drainage, and in the Caney (n = 1), Fall (n = 2), and Verdigris (n = 9) Rivers in the Verdigris River drainage. *Graptemys ouachitensis* was captured in the Marais des Cygnes drainage (n = 27) in the Marmaton River, Little Osage River, Bull Creek, and Pottawatomie Creek, and in the Verdigris drainage (n = 61) from the Verdigris, Fall, and Caney rivers.

Visual surveys.—We found 1522 map turtles during visual surveys, including 92 *G. geographica*, 956 *G. ouachitensis*, 78 *G. p. pseudogeographica*, and 396 *G. p. kohnii* (Table 2-3). We could not examine all individuals in the field as rigorously as museum specimens, and we observed considerable individual variation, yet we had little difficulty assigning individuals to

taxa because diagnostic characteristics rarely graded into one another and were rarely incongruent. Visual survey results reinforced our findings as to the distributions of taxa as described from museum specimens and field captures and, notably, confirmed presence of *G. p. pseudogeographica* in the Kansas River drainage, the near (but not complete) absence of *G. ouachitensis* there, and the near absence of *G. p. kohnii* from the Marais des Cygnes River drainage outside the Marmaton River and its tributaries.

DISCUSSION

Based upon our examination of museum specimens and reclassification of them according to current taxonomy (Table 2-2), along with our field observations, we found that four *Graptemys* taxa occur in eastern Kansas, namely *G. geographica* and three members of the False Map Turtle Complex—*G. ouachitensis*, *G. p. pseudogeographica*, and *G. p. kohnii*. We found much range overlap (Figs. 2-16, 2-17) and no evidence of phenotypic intergradation between *G. ouachitensis* and *G. pseudogeographica*, as expected for species-level taxa. By contrast, as is often the case for subspecies, we found no overlap between the distributions of *G. p. pseudogeographica* in the north and *G. p. kohnii* in the south; in fact, much of the Marais des Cygnes River drainage effectively constituted a latitudinal gap between the drainages where those subspecies were abundant (Figs. 2-16, 2-17). Although the Missouri and Kansas rivers have been described as a zone of integradation between those subspecies (Vogt 1993; Powell et al. 2016), all individuals that we observed from those rivers fit our diagnostic criteria for *G. p. pseudogeographica*. Notably, that subspecies has not previously been recognized as occurring in Kansas except perhaps in the Missouri River in the extreme northeastern corner of the state (Conant and Collins 1991; but see Collins 1993).

Given that ours is the first modern effort to review all available *Graptemys* specimens from Kansas, we think it is important to note that shell-only specimens (and thus lacking diagnostic pattern features) constitute 8 of 125 specimens, not "most" of them as claimed in references for the state (Collins et al. 2010; Taggart 2020). Nearly all are, in fact, whole fluid-preserved specimens (Table 2-2) collected 1911 to 2016. Classifications of museum records were often left at species level and not to subspecies (i.e. *G. pseudogeographica* and not *G. p. pseudogeographica* or, when it was recognized as such, *G. p. ouachitensis*), perhaps because of the instability of taxonomic boundaries in the False Map Turtle Complex. Labeling specimens as *G. pseudogeographica* has been done throughout the history of the collection, whereas the first specimen labeled *G. ouachitensis* was collected in 1994 (KU 222268). Of the four map turtles found in Kansas, only *G. geographica* has always been recognized as a species, whereas each of the remaining three has been recognized as a species less consistently.

Of the four map turtles that occur, *G. ouachitensis* has the most widespread distribution across Kansas, occurring in all major drainages. However, only one specimen record (KU 222411) exists for the Kansas River drainage, which was collected at Tuttle Creek Lake, Pottawatomie County. Single records of turtles well outside their established distributions is a common phenomenon for freshwater turtles (Teillac-Deschamps et al. 2009; Masin et al. 2014) due to pet releases and other human-facilitated introductions, so a single individual does not constitute existence of that taxon drainage-wide. It is therefore notable that during our field effort, we obtained a sight record of *G. ouachitensis* from the Kansas River drainage on Mission Creek, which is ~50 kilometers southeast of Tuttle Creek.

G. pseudogeographica kohnii is widely distributed among southern and western drainages within eastern Kansas, including the Spring, Neosho, Verdigris, and Arkansas river

drainages. Of all the museum specimens, the westernmost was a *G. p. kohnii* (FHSM 6737) collected at Fort Larned in the Pawnee River, a tributary of the Arkansas River (Fig. 2-16). This taxon appears to be largely absent from the Marais des Cygnes River drainage with the exception of the Marmaton River, where we made 32 observations. Its presence specifically in that river of that drainage may be due to its proximity to tributaries of the Neosho River in Allen County. A number of specimens were collected at locations well away from the drainages in which *G. p. kohnii* was abundant. A specimen collected from Long Creek in 1911 (KU 3164, Fig 2-13) is the only record from the Marais des Cygnes River drainage outside the Marmaton River. A specimen collected at Lake Wabaunsee in 2002 (FHSM 7751, Fig. 2-14) is the only record from the Kansas River drainage; however, as an only occurrence, taken from a lake with public access, it likely represents a pet release or unintentional introduction.

We found that Kansas populations of *G. p. pseudogeographica, G. p. kohnii, and G. ouachitensis* exhibit variation within each taxon that can make distinguishing these taxa from one another difficult, especially in the case of *G. p. pseudogeographica* versus *G. ouachitensis*. Given the overall similarities of the head patterns of those two taxa—where the size and shape of the postorbital blotches and the sizes of the supra- and submandibular spots can be variable, identification can be difficult without the specimen in hand. Based on our experiences during field surveys, *G. ouachitensis* is more likely to be misidentified as *G. p. pseudogeographica* as a result of uncharacteristically thin or small postorbital blotches. By contrast, we think that *G. p. pseudogeographica* is not likely to be misidentified as *G. ouachitensis*, as its postorbital blotches and supra- and submandibular spots are consistently small in size.

Visual survey efforts reinforced findings from the museum specimen analyses and allowed investigation of the purported intergrade zone between *G. p. pseudogeographica* and *G.*

p. kohnii within the Kansas River. While *G. p. pseudogeographica* was observed throughout the Kansas River and further north, *G. p. kohnii* was not documented in the mainstem of the Marais des Cygnes or north of the Neosho River (Fig. 2-17). However, *G. ouachitensis* was abundant throughout the Marais des Cygnes River drainage and was observed at two locations in the Kansas River drainage. These results show a gap in the distributions of *G. p. pseudogeographica* and *G. p. kohnii*, in Kansas, where the two do not appear to be intergading as suggested by Vogt (1993). Vogt used museum specimens from the University of Kansas as part of his study on the False Map Turtle Complex but we do not know how he classified them.

Our results illustrate the importance of reviewing historic specimens as taxonomic boundaries shift. We found that a majority of the Kansas specimens were incorrectly labeled according to current knowledge. Revisiting specimen catalogs and ensuring they reflect current understanding is essential for their successful use as bioinformatics databases. Similar methods could be used elsewhere to reclassify historic specimens. This study also demonstrates the feasibility of identifying map turtles based on head color pattern features at a given location. Our efforts to clarify the occurrences and distributions of the several map turtle taxa found in Kansas has broader applicability for resolving the False Map Turtle Complex range wide.

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Table 2-1. Integumentary color pattern features used to identify *Graptemys* taxa in Kansas. Diagnostic possession of a feature by a taxon is indicated with a plus sign (+).

	False Map Turtle Complex		
	G. p. pseudo-geographica	*G. p. kohnii*	*G. ouachitensis*
Postorbital blotch			
Large (squarish)			+
Small (tall, narrow)	+		
Fused to supramandibular spot		+	
Supramandibular spot			
Area ≥ pupil			+
Area ≤ pupil	+		
Submandibular spot			
Area ≥ pupil		+	+
Area ≤ pupil	+		
Postorbital lines reach orbit			
Yes	+		+
No		+	
Eyebar			
present	+		+
absent		+	
Interorbital marking			
Several	+		+
Single		+	

	G. geographica
Postorbital blotch (rounded triangle shape)	+
Vertical line separates orbit and postorbital blotch	+
Neck line curls up and points toward postorbital blotch	+
Eyebar	+

Table 2-2. List of *Graptemys* museum specimens from Kansas, with taxonomic assignments before and after reassessment, indicating the number of diagnostic features present (as listed in Table 1, excepting presence or absence of eyebars unless noted in comments), and with comments on unusual features or noting presence of eyebars when they were visible.

New classification	Original classification	Specimen*	Diagnostic features	Comments
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7377	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7378	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7379	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7380	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7381	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7382	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7383	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7384	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7385	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7386	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7387	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7388	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7389	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7390	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7391	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 7995	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 14724	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	FHSM 17546	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 21532	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 40115	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 52290	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 159404	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 159405	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 159406	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 159407	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 159408	4 of 5	Supramandibular area ≥ pupil

G. p. pseudogeographica	*G. pseudogeographica*	KU 159409	4 of 5	Submandibular area ≥ pupil
G. p. pseudogeographica	*G. pseudogeographica*	KU 159410	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 159411	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 159412	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 159413	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 159415	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 159416	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 159417	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 188351	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 189240	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 206432	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 218788	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 218789	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 218790	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 218898	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 220810	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 221474	5 of 5	
G. p. pseudogeographica	*G. pseudogeographica*	KU 221474	5 of 5	
G. p. pseudogeographica	*G. ouachitensis*	KU 224654	5 of 5	
G. p. kohnii	*G. kohnii*	KU 3164	4 of 4	
G. p. kohnii	*G. kohnii*	KU 3257	4 of 4	
G. p. kohnii	*G. kohnii*	KU 3287	4 of 4	
G. p. kohnii	*G. pseudogeographica*	FHSM 6737	4 of 4	
G. p. kohnii	*G. kohnii*	FHSM 7751	4 of 4	
G. p. kohnii	*G. pseudogeographica*	FHSM 16926	3 of 4	Postorbital and supramandibular spots not fused.
G. p. kohnii	*G. pseudogeographica*	FHSM 16928	4 of 4	
G. p. kohnii	*G. kohnii*	KU 46746	4 of 4	
G. p. kohnii	*G. kohnii*	KU 187862	4 of 4	
G. p. kohnii	*G. kohnii*	KU 188350	4 of 4	
G. p. kohnii	*G. kohnii*	KU 199736	4 of 4	
G. p. kohnii	*G. kohnii*	KU 217261	4 of 4	

G. p. kohnii	*G. kohnii*	KU 217262	4 of 4	
G. p. kohnii	*G. kohnii*	KU 217263	4 of 4	
G. p. kohnii	*G. kohnii*	KU 217264	4 of 4	
G. p. kohnii	*G. kohnii*	KU 217265	4 of 4	
G. p. kohnii	*G. kohnii*	KU 218572	4 of 4	
G. p. kohnii	*G. kohnii*	KU 218573	4 of 4	
G. p. kohnii	*G. kohnii*	KU 288640	4 of 4	
G. ouachitensis	*G. pseudogeographica*	KU 3288	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 3297	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 3298	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 3299	5 of 5	
G. ouachitensis	*G. pseudogeographica*	FHSM 8768	5 of 5	
G. ouachitensis	*G. pseudogeographica*	FHSM 8769	5 of 5	
G. ouachitensis	*G. pseudogeographica*	FHSM 9336	5 of 5	
G. ouachitensis	*G. pseudogeographica*	FHSM 9337	5 of 5	
G. ouachitensis	*G. pseudogeographica*	FHSM 16927	5 of 5	
G. ouachitensis	*G. pseudogeographica*	FHSM 17461	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 48252	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 48253	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 48254	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 48255	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 48256	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 48257	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 159816	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 170636	6 of 6	Eyebar present
G. ouachitensis	*G. pseudogeographica*	KU 187863	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 187864	4 of 5	Postorbital blotch tall and narrow; juvenile
G. ouachitensis	*G. pseudogeographica*	KU 187865	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 187866	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 187867	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 193299	6 of 6	Eyebar present

G. ouachitensis	*G. pseudogeographica*	KU 199737	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 193396	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 217266	4 of 5	Postorbital blotch tall and narrow
G. ouachitensis	*G. pseudogeographica*	KU 217267	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 217268	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 217269	5 of 6	Postorbital lines do not reach orbit. Eyebar present
G. ouachitensis	*G. pseudogeographica*	KU 217270	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 217271	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 217272	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 217273	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 217274	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 218574	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 218575	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 218576	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 218577	5 of 5	
G. ouachitensis	*G. pseudogeographica*	KU 218578	5 of 5	
G. ouachitensis	*G. ouachitensis*	KU 222268	5 of 5	
G. ouachitensis	*G. ouachitensis*	KU 222411	5 of 5	
G. ouachitensis	*G. ouachitensis*	KU 342676	5 of 5	
(unassessed shell)	*G. pseudogeographica*	KU 2466	NA	
(unassessed shell)	*G. p. kohnii*	KU 2679	NA	
(unassessed shell)	*G. pseudogeographica*	FHSM 6873	NA	
(unassessed shell)	*G. pseudogeographica*	KU 16405	NA	
(unassessed shell)	*G. pseudogeographica*	FHSM 17224	NA	
(unassessed shell)	*G. pseudogeographica*	KU 23323	NA	
(unassessed shell)	*G. pseudogeographica*	KU 192100	NA	
(unassessed shell)	*G. ouachitensis*	KU 224655	NA	
G. geographica	*G. geographica*	KU 3225	3 of 3	
G. geographica	*G. geographica*	KU 3265	3 of 3	
G. geographica	*G. geographica*	KU 3267	3 of 3	
G. geographica	*G. geographica*	KU 3285	3 of 3	

G. geographica	*G. geographica*	KU 3742	3 of 3
G. geographica	*G. geographica*	KU 15881	3 of 3
G. geographica	*G. geographica*	KU 15882	3 of 3
G. geographica	*G. geographica*	KU 187861	3 of 3
G. geographica	*G. geographica*	KU 217149	3 of 3
G. geographica	*G. geographica*	KU 217260	3 of 3

* Museum catalog numbers. Abbreviations: FHSM = Fort Hays State University Sternberg Museum of Natural History, KU = University of Kansas Biodiversity Institute and Natural History Museum.

Table 2-3. Total counts of map turtles (*Graptemys* spp.) detected in waterways of eastern Kansas during the present study using live trapping and visual surveys in August–October 2018 and May–October 2019. Missouri drainage refers to the Missouri River and its tributaries and adjacent water bodies excluding the Kansas River and Marais des Cygnes River drainages.

Species	Visual Surveys	Live-trapping	Drainage						
			Arkansas	Kansas	Marais des Cygnes	Missouri	Neosho	Spring	Verdigris
G. geographica	92	6	0	0	89	3	0	6	0
G. p. pseudogeographica	78	14	0	75	0	17	0	0	0
G. p. kohnii	396	16	16	0	41	0	183	31	141
G. ouachitensis	956	88	133	1	277	0	412	64	157
Total	1522	124	149	76	407	20	595	101	298

Fig. 2-1. Color pattern features used to identify *G. geographica* include (a) eyebar, (b) postorbital spot, (c) vertical lines separating postorbital spot from eye, and (d) single line on each side of neck curling upward and pointing at postorbital spot. Female captured in Indian Creek (Johnson County) on 20 September 2018.

Fig. 2-2. Color pattern features used to identify *G. p. pseudogeographica* include (a) eyebar, (b) tall narrow postorbital spot that forms hockey stick shape, (c) supra- and (d) submandibular spots smaller than pupil of eye, (e) postorbital lines reaching orbit, and (f) multiple interorbital lines on top of head. Male captured at Browning Lake (Doniphan County) on 4 October 2018.

Fig. 2-3. Color pattern features used to identify *G. p. kohnii* include (a) broken or lack of eyebar, (b) fusion of supramandibular and postorbital spots to form crescent shape behind eye, (c) submandibular line or spot larger than pupil of eye, (d) postorbital lines not reaching towards orbit, and (e) single prominent interorbital line on top of head. Female captured in Verdigris River (Montgomery County) on 19 June 2018.

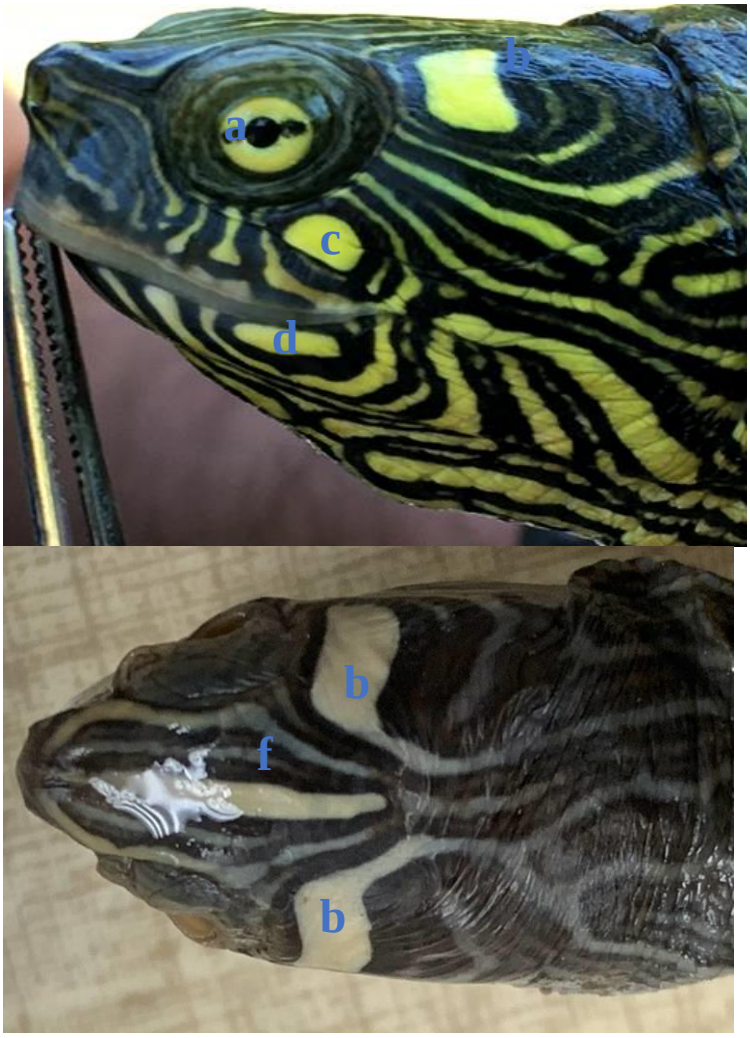

Fig. 2-4. Color pattern features used to identify *G. ouachitensis* include (a) eyebar; (b) large squarish postorbital spot enclosed by lines (above) or large postorbital spot connected to trailing neck stripes (below); (c) supra- and (d) submandibular spots larger than pupil of eye, and (f) multiple interorbital lines on top of head. Female captured in Marmaton River (Bourbon County) on 26 June 2018 (above); male collected from Neosho River (Crawford County) on 18 August 2008 (FHSM 9336, below)

Fig. 2-5. Examples of *Graptemys* spp. shell specimens, which could not be identified.

Fig. 2-6. Examples of *G. geographica* specimens (KU 3225, 3285, 3265, and 15882).

Fig. 2-7. KU 159408 collected in Douglas County, identified as *G. p. pseudogeographica* in this study even though, unusually, the supramandibular spot is larger than the pupil of the eye.

Fig. 2-8. KU 159409 collected in Douglas County, identified as *G. p. pseudogeographica* in this study even though, unusually, the submandibular spot is elongated, and its area is greater than that of the pupil of the eye

Fig. 2-9. FHSM 16926, collected in Chautauqua County, was identified as *G. p. kohnii* in this study even though, unusually, fusion of the postorbital blotch and supramandibular spot is lacking.

Fig. 2-10. KU 187864 collected from Emporia County Club Lake (Lyon County) was identified as *G. ouachitensis* in this study even though, unusually, its postorbital blotches are tall and narrow; note that this individual is a juvenile

Fig. 2-11. KU 217266 collected in Ottawa (Franklin County), was identified as *G. ouachitensis* in this study even though, unusually, its postorbital blotches are tall and narrow.

Fig. 2-12. KU 217269 collected on Big Caney River in Chautauqua County was identified as *G. ouachitensis* in this study even though, unusually, postorbital lines do not reach the orbit.

Fig. 2-13. The only record of *G. p. kohnii* from the Marais des Cygnes River drainage in museum collections, captured in 1911 in Osage County (KU 3164).

Fig. 2-14. The only record of *G. p. kohnii* from the Kansas River drainage in museum collections, captured at Lake Wabaunsee, Wabaunsee County, in 2002 (FHSM 7751).

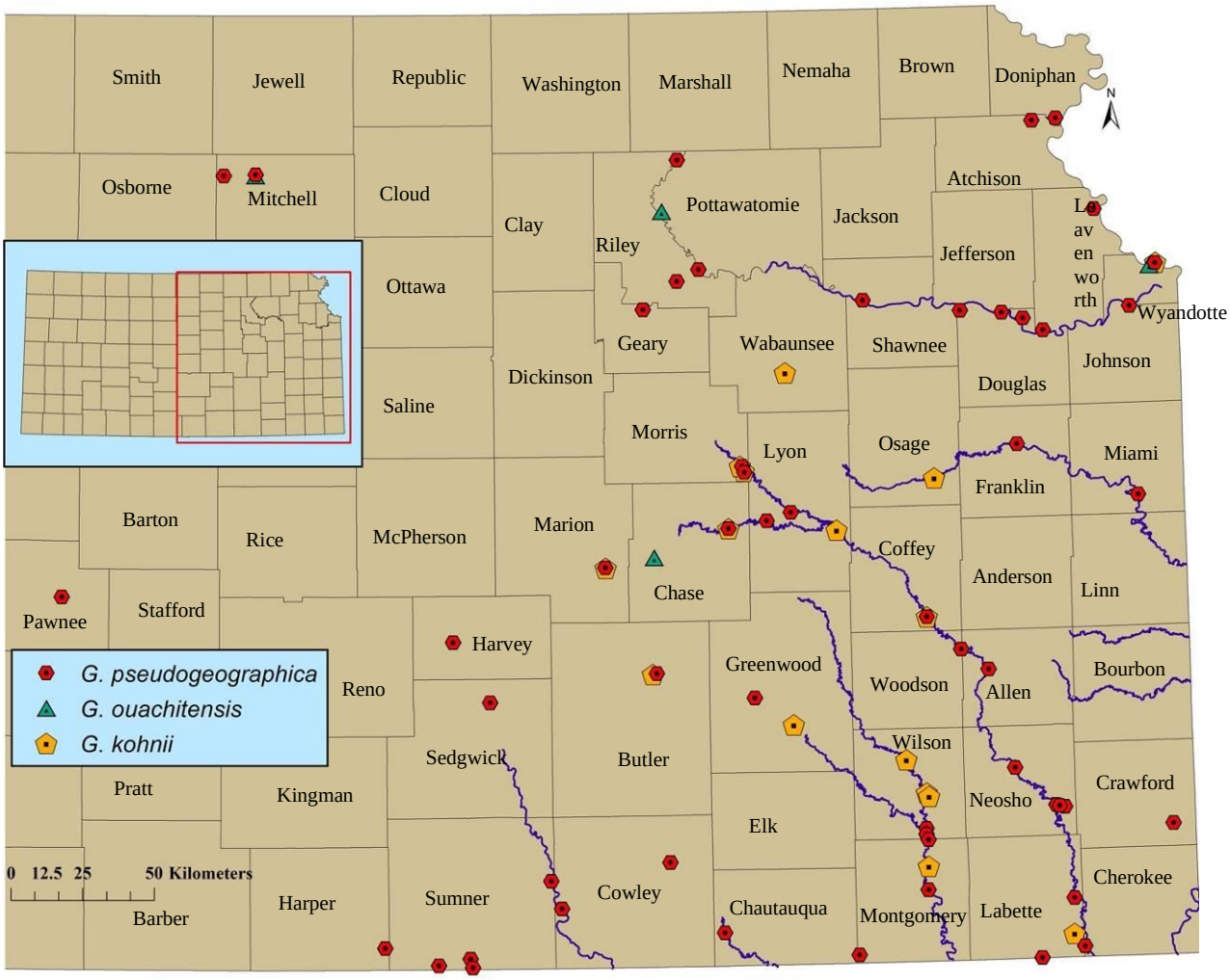

Fig. 2-15. Locations in Kansas where museum specimens of members of the False Map Turtle Complex were collected with taxon assignments according to specimen labels or museum records.

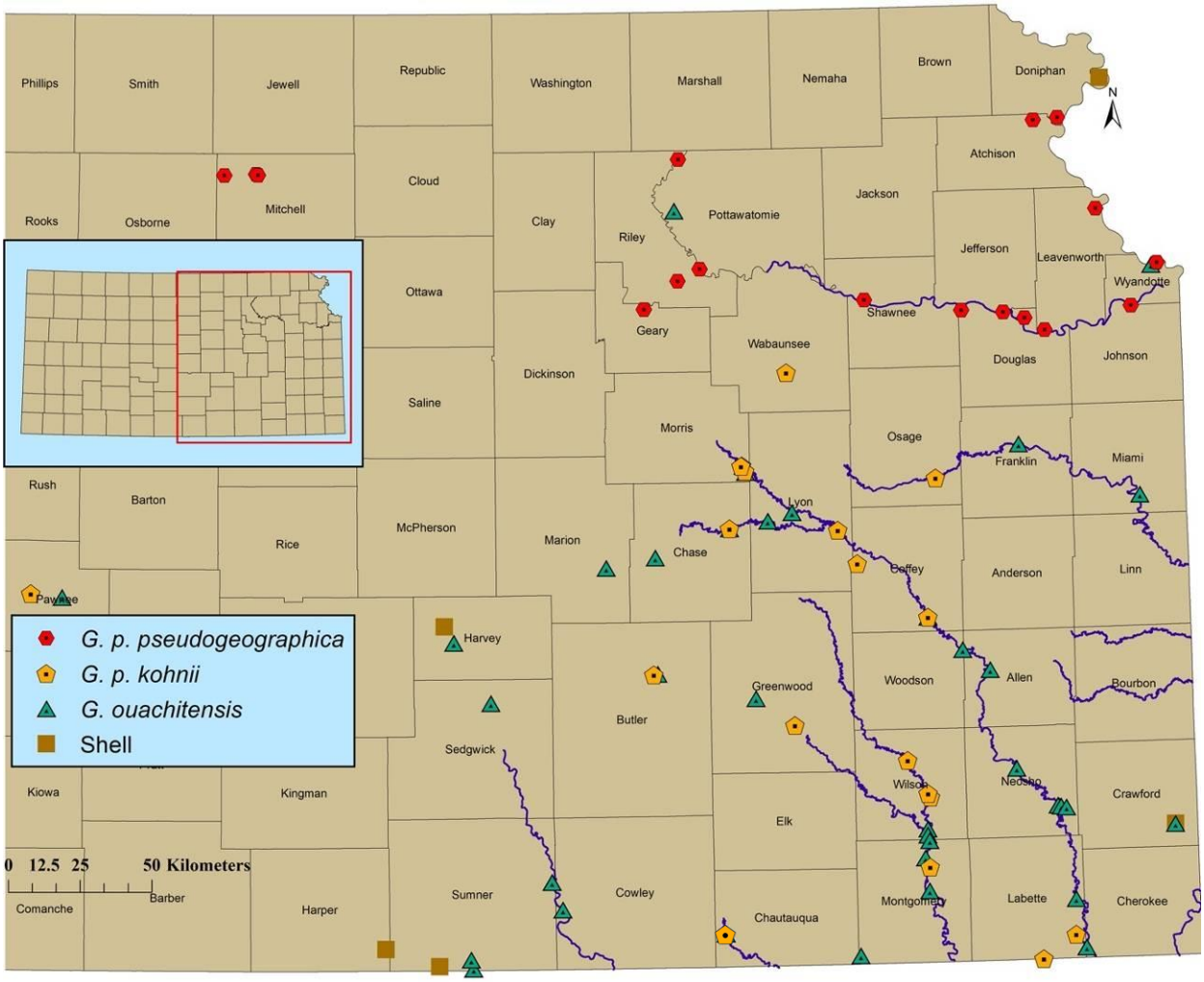

Fig. 2-16. Locations in Kansas where museum specimens of members of the False Map Turtle Complex were collected, with taxon assignments based on examination and reassessment of those specimens during the present study.

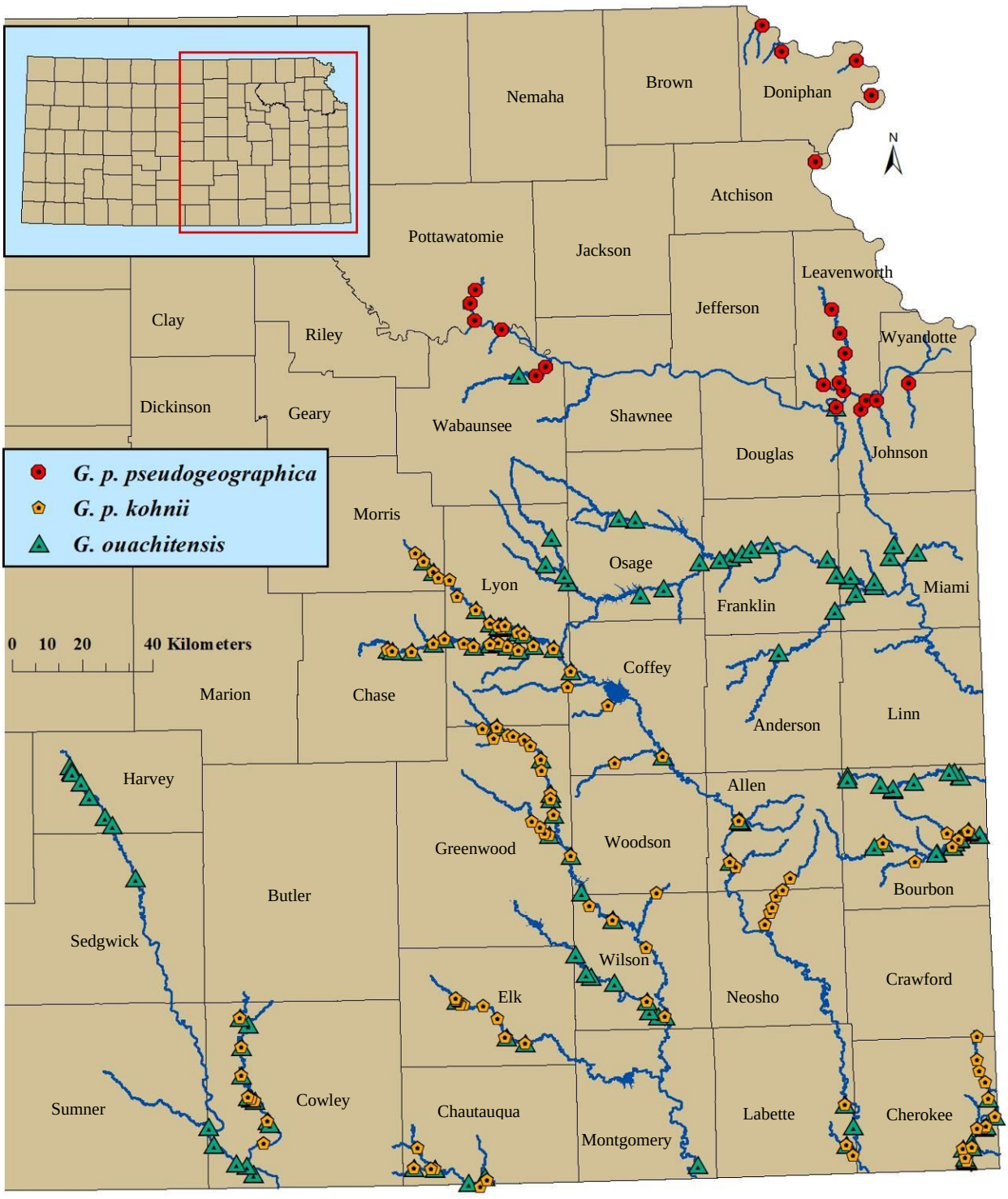

Fig. 2-17. Locations in Kansas where members of the False Map Turtle Complex were documented through trapping and visual survey efforts in the course this study, 2017–2019.

APPENDIX B. List of visual survey sites for turtles in eastern Kansas, 2018–2019 (N = 1105). Drainage and waterbody abbreviations: Br = branch, Crk = creek, E = east, Fk = fork, Lk = lake, M = middle, MdesC = Marais des Cygnes, N = north, R = river, S = south, W = west. Taxonomic abbreviations: Gg = *Graptemys geographica*, Gp = *Graptemys p. pseudogeographica*, Gk = *Graptemys pseudogeographica kohnii*, Go = *Graptemys ouachitensis*, Ts = *Trachemys scripta elegans*, Cp = *Chrysemys picta bellii*, Pc = *Pseudemys c. concinna*, Cs = *Chelydra serpentina*, As = *Apalone spinifera*, Am = *Apalone mutica*, So = *Sternotherus odoratus*.

Drainage	Waterbody	Date	Latitude	Longitude	Stream Order	Gg	Gp	Gk	Go	Ts	Cp	Pc	Cs	As	Am	So
Arkansas	Arkansas R	2019-09-04	37.03468	-97.00373	7th	0	0	0	6	0	0	0	0	0	0	0
Arkansas	Arkansas R	2019-09-04	37.06359	-97.05750	7th	0	0	0	13	1	0	0	0	3	0	0
Arkansas	Arkansas R	2019-09-04	37.11086	-97.12781	7th	0	0	0	1	1	0	0	0	1	0	0
Arkansas	Arkansas R	2019-09-04	37.18689	-97.12261	7th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Arkansas R	2019-09-04	37.47564	-97.26151	7th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Arkansas R	2019-09-04	37.54438	-97.27606	7th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Arkansas R	2019-09-04	37.57909	-97.30493	7th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	38.08691	-97.58180	6th	0	0	0	0	3	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	38.07249	-97.57582	6th	0	0	0	0	4	0	0	0	4	0	0
Arkansas	Little Arkansas R	2019-08-12	38.06840	-97.57377	6th	0	0	0	0	0	0	0	0	2	0	0
Arkansas	Little Arkansas R	2019-08-12	38.04333	-97.54625	6th	0	0	0	4	4	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	38.00806	-97.51866	6th	0	0	0	2	3	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	38.00737	-97.50585	6th	0	0	0	0	1	0	0	0	1	0	0
Arkansas	Little Arkansas R	2019-08-12	37.95603	-97.46816	6th	0	0	0	2	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.94141	-97.45094	6th	0	0	0	0	3	0	0	0	1	0	0
Arkansas	Little Arkansas R	2019-08-12	37.93431	-97.44545	6th	0	0	0	1	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.88322	-97.42531	6th	0	0	0	0	0	0	0	0	1	0	0
Arkansas	Little Arkansas R	2019-08-12	37.83223	-97.38801	6th	0	0	0	0	1	0	0	0	1	0	0
Arkansas	Little Arkansas R	2019-08-12	37.79811	-97.37192	6th	0	0	0	1	0	0	0	0	3	0	0
Arkansas	Little Arkansas R	2019-08-12	37.78140	-97.35881	6th	0	0	0	0	1	0	0	1	0	0	0
Arkansas	Little Arkansas R	2019-08-12	38.11252	-97.59207	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	38.05782	-97.56214	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	38.01397	-97.50837	6th	0	0	0	0	0	0	0	0	0	0	0

Arkansas	Little Arkansas R	2019-08-12	38.00881	-97.50594	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.99952	-97.49097	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.98496	-97.48765	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.98502	-97.49539	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.95688	-97.50057	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.95620	-97.48224	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.95585	-97.48092	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.95597	-97.47230	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.91572	-97.43689	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.88984	-97.42703	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.86066	-97.40857	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.83927	-97.40866	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Little Arkansas R	2019-08-12	37.81054	-97.37291	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Ninnescah R	2019-09-04	37.31453	-97.17898	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Ninnescah R	2019-09-04	37.33709	-97.24083	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Ninnescah R	2019-09-04	37.36399	-97.27645	6th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Slate Crk	2019-09-04	37.15823	-97.14438	4th	0	0	0	6	4	0	0	0	0	0	0
Arkansas	Slate Crk	2019-09-04	37.16796	-97.14940	4th	0	0	0	0	0	0	0	0	0	0	0
Arkansas	Walnut R	2019-09-04	37.05631	-97.02490	7th	0	0	0	10	0	0	0	0	0	1	0
Arkansas	Walnut R	2019-10-14	37.11441	-96.96789	6th	0	0	1	0	0	0	1	0	0	0	0
Arkansas	Walnut R	2019-10-14	37.17025	-96.95399	6th	0	0	3	21	1	0	0	0	0	0	0
Arkansas	Walnut R	2019-10-14	37.16382	-96.94870	6th	0	0	0	3	0	0	0	0	0	0	0
Arkansas	Walnut R	2019-10-14	37.22357	-96.99522	6th	0	0	4	18	0	0	0	0	0	0	0
Arkansas	Walnut R	2019-10-14	37.22837	-97.00750	6th	0	0	2	12	8	0	1	0	0	0	0
Arkansas	Walnut R	2019-10-14	37.23383	-97.01575	6th	0	0	1	8	1	0	0	0	0	0	0
Arkansas	Walnut R	2019-10-14	37.28873	-97.03706	6th	0	0	3	19	11	0	0	0	0	1	0
Arkansas	Walnut R	2019-10-14	37.36124	-97.03537	6th	0	0	1	1	0	0	0	0	0	0	0
Arkansas	Walnut R	2019-10-14	37.41923	-97.01351	6th	0	0	0	4	2	0	0	0	0	0	0
Arkansas	Walnut R	2019-10-14	37.43711	-97.04021	6th	0	0	1	1	0	0	0	0	0	0	0
Kansas	Adams Crk	2019-08-13	39.37085	-96.31504	2nd	0	0	0	0	0	0	0	1	0	0	0
Kansas	Adams Crk	2019-08-13	39.37720	-96.31681	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Adams Crk	2019-08-13	39.37710	-96.29906	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Adams Crk	2019-08-13	39.36256	-96.30701	2nd	0	0	0	0	0	0	0	0	0	0	0

Kansas	Adams Crk	2019-08-13	39.36087	-96.29515	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Adams Crk	2019-08-13	39.34794	-96.30013	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Adams Crk	2019-08-13	39.34807	-96.29196	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Adams Crk	2019-08-13	39.33307	-96.29264	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Adams Crk	2019-08-13	39.30443	-96.29499	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Adams Crk	2019-08-13	39.29148	-96.28681	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Adams Crk	2019-08-13	39.28661	-96.26830	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Adams Crk	2019-08-13	39.27553	-96.26290	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Camp Crk	2019-07-08	38.95638	-94.92314	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Captain Crk	2019-07-08	38.86961	-95.03798	3rd	0	0	0	0	0	1	0	0	0	0	0
Kansas	Captain Crk	2019-07-08	38.96434	-95.05412	3rd	0	2	0	1	1	0	0	0	1	0	0
Kansas	Captain Crk	2019-07-08	38.86961	-95.03798	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Cedar Crk	2019-07-08	38.97819	-94.92205	3rd	0	7	0	0	2	0	0	0	0	0	0
Kansas	Cedar Crk	2019-07-08	38.97819	-94.92205	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Cedar Crk	2019-07-08	38.95534	-94.91638	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Cedar Crk	2019-07-08	38.94758	-94.90618	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Coal Crk	2019-08-13	39.37688	-96.25178	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Coal Crk	2019-08-13	39.35383	-96.23978	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Coal Crk	2019-08-13	39.33972	-96.23071	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Coal Crk	2019-08-13	39.34775	-96.23426	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Indian Crk	2019-08-13	39.37710	-96.27842	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Indian Crk	2019-08-13	39.34804	-96.26775	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Indian Crk	2019-08-13	39.33346	-96.25635	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Indian Crk	2019-08-13	39.32665	-96.24975	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Indian Crk	2019-08-13	39.32487	-96.23995	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Indian Crk	2019-08-13	39.33320	-96.22132	4th	0	0	0	0	0	0	0	0	0	0	0
Kansas	Kill Crk	2019-07-08	38.95662	-94.97346	3rd	0	1	0	0	2	0	0	0	2	0	0
Kansas	Kill Crk	2019-07-08	38.97828	-94.95656	3rd	0	2	0	0	2	0	0	0	0	0	0
Kansas	Kill Crk	2019-07-08	38.93853	-94.97934	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Kill Crk	2019-07-08	38.95662	-94.97346	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Lost Crk	2019-08-13	39.23869	-96.17358	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Mill Crk	2019-07-09	39.01915	-94.81485	3rd	0	2	0	0	5	0	0	0	0	0	0
Kansas	Mill Crk	2019-08-05	39.07108	-96.09513	5th	0	0	0	0	0	0	0	0	4	0	0

Kansas	Mill Crk	2019-08-05	39.06684	-96.03961	5th	0	1	0	0	0	0	0	0	1	0	0
Kansas	Mill Crk	2019-08-05	39.08954	-96.00640	5th	0	8	0	0	0	0	0	0	0	0	0
Kansas	Mill Crk	2019-08-05	39.06844	-96.01422	5th	0	0	0	0	0	0	0	0	0	0	0
Kansas	Mission Crk	2019-08-05	39.01682	-95.86650	4th	0	0	0	0	0	1	0	1	0	0	0
Kansas	Mission Crk	2019-09-23	39.01698	-95.86727	4th	0	1	0	0	0	1	0	0	0	0	0
Kansas	Mission Crk	2019-09-23	39.00060	-95.89081	4th	0	0	0	0	0	2	0	0	0	0	0
Kansas	Ninemile Crk	2019-07-13	39.02313	-95.09348	3rd	0	1	0	0	0	0	0	1	0	0	0
Kansas	Post Crk	2019-08-05	39.09155	-95.93883	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Post Crk	2019-08-05	39.07895	-95.94665	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Post Crk	2019-08-05	39.05103	-95.96531	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Roberts Crk	2019-08-05	39.18805	-96.14753	2nd	0	16	0	0	6	0	0	0	0	0	0
Kansas	Roberts Crk	2019-08-05	39.18032	-96.15724	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Roberts Crk	2019-08-05	39.17340	-96.15916	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Roberts Crk	2019-08-05	39.16872	-96.16630	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Rock Crk	2019-08-13	39.23869	-96.27801	5th	0	0	0	0	0	0	0	0	2	0	0
Kansas	Sixmile Crk	2019-07-13	38.89146	-95.72424	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Spoon Crk	2019-07-08	38.87272	-95.00245	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Spoon Crk	2019-07-08	38.86948	-95.00357	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Spoon Crk	2019-07-08	38.88079	-94.99936	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Spoon Crk	2019-07-08	38.89973	-94.99260	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Spoon Crk	2019-07-08	38.90302	-94.99172	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Stanger Crk	2019-08-10	39.21573	-95.05972	5th	0	1	0	0	1	0	0	0	0	0	0
Kansas	Stranger Crk	2019-07-13	39.00586	-95.02842	5th	0	6	0	0	0	0	0	0	2	0	0
Kansas	Stranger Crk	2019-07-13	39.02754	-95.04248	5th	0	2	0	0	0	0	0	0	0	0	0
Kansas	Stranger Crk	2019-07-13	39.04251	-95.03751	5th	0	0	0	0	0	0	0	0	1	0	0
Kansas	Stranger Crk	2019-08-10	39.02754	-95.04248	5th	0	4	0	0	0	0	0	0	0	0	0
Kansas	Stranger Crk	2019-08-10	39.10167	-95.01911	5th	0	1	0	0	0	0	0	0	0	0	0
Kansas	Stranger Crk	2019-08-10	39.15313	-95.03367	5th	0	2	0	0	0	0	0	0	1	0	0
Kansas	Stranger Crk	2019-08-10	39.20050	-95.04308	5th	0	0	0	0	0	2	0	0	0	0	0
Kansas	Turkey Crk	2019-08-05	39.12978	-96.10609	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Vassar Crk	2019-08-05	39.05356	-95.91874	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Vassar Crk	2019-08-05	39.06572	-95.90747	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Vassar Crk	2019-08-05	39.07313	-95.90804	2nd	0	0	0	0	0	0	0	0	0	0	0

Kansas	Vermillion Crk	2019-08-13	39.29120	-96.23031	5th	0	1	0	0	1	0	0	0	0	0	0
Kansas	Vermillion Crk	2019-08-13	39.32217	-96.20585	5th	0	0	0	0	0	0	0	0	0	0	0
Kansas	Vermillion R	2019-08-13	39.25629	-96.24987	5th	0	5	0	0	2	0	0	0	0	0	0
Kansas	Vermillion R	2019-08-13	39.21343	-96.23551	7th	0	12	0	0	0	0	0	0	5	0	0
Kansas	Wakarusa R	2019-07-13	38.84962	-95.90927	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.84995	-95.87304	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.85340	-95.89165	3rd	0	0	0	0	0	0	0	1	0	0	0
Kansas	Wakarusa R	2019-07-13	38.86307	-95.96520	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.86680	-95.85394	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.86732	-95.98373	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.85541	-95.93106	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.87711	-95.76189	3rd	0	0	0	0	1	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.87887	-95.73365	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.88117	-95.69738	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.88966	-95.72317	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.89137	-95.68735	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.89429	-95.81485	4th	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.89682	-95.83562	4th	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wakarusa R	2019-07-13	38.89849	-95.85414	4th	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wells Crk	2019-08-05	39.15120	-96.24067	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wells Crk	2019-08-05	39.15175	-96.24005	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wells Crk	2019-08-05	39.16132	-96.22229	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wells Crk	2019-08-05	39.17351	-96.21071	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wells Crk	2019-08-05	39.17349	-96.20635	2nd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wells Crk	2019-08-05	39.17810	-96.20363	3rd	0	0	0	0	0	0	0	0	0	0	0
Kansas	Wells Crk	2019-08-05	39.18242	-96.18485	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	110 Mile Crk	2018-10-21	38.63230	-95.52732	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	110 Mile Crk	2018-10-21	38.64064	-95.54571	5th	1	0	0	0	0	0	0	0	0	0	0
MdesC	110 Mile Crk	2018-10-21	38.60841	-95.51228	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	110 Mile Crk	2019-04-06	38.60841	-95.51228	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	110 Mile Crk	2019-09-07	38.60841	-95.51228	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	142 Mile Crk	2019-04-09	38.58240	-96.02303	4th	0	0	0	0	2	0	0	0	0	0	0
MdesC	142 Mile Crk	2018-10-27	38.65195	-96.09524	3rd	0	0	0	0	0	0	0	0	0	0	0

MdesC	142 Mile Crk	2019-04-09	38.58389	-96.02259	4th	0	0	0	1	4	0	0	0	0	0	0
MdesC	142 Mile Crk	2018-09-22	38.57071	-95.98687	4th	3	0	0	0	10	0	0	0	0	0	0
MdesC	142 Mile Crk	2018-09-22	38.58389	-96.02259	4th	0	0	0	0	3	0	0	0	0	0	0
MdesC	142 Mile Crk	2018-10-27	38.65453	-96.09752	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	142 Mile Crk	2019-04-06	38.57071	-95.98687	4th	1	0	0	0	0	0	0	0	0	0	0
MdesC	142 Mile Crk	2019-04-09	38.57071	-95.98687	4th	2	0	0	0	3	0	0	0	0	0	0
MdesC	142 Mile Crk	2019-04-09	38.59684	-96.04233	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	142 Mile Crk	2019-06-17	38.57071	-95.98687	4th	0	0	0	0	0	0	0	0	1	0	0
MdesC	142 Mile Crk	2019-07-13	38.65195	-96.09524	3rd	1	0	0	0	1	0	0	0	0	0	0
MdesC	142 Mile Crk	2019-07-13	38.65453	-96.09752	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Appanoose Crk	2018-09-15	38.66639	-95.41678	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Appanoose Crk	2018-09-15	38.67937	-95.45275	4th	0	0	0	0	3	3	0	0	0	0	0
MdesC	Appanoose Crk	2018-09-15	38.68067	-95.42884	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Appanoose Crk	2018-09-15	38.64284	-95.36061	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Appanoose Crk	2018-09-15	38.64518	-95.37870	4th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Appanoose Crk	2018-09-15	38.65225	-95.39759	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Appanoose Crk	2018-10-21	38.67937	-95.45275	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Appanoose Crk	2019-04-06	38.67937	-95.45275	3rd	0	0	0	0	2	0	0	0	0	0	0
MdesC	Appanoose Crk	2019-04-06	38.73882	-95.50041	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Appanoose Crk	2019-09-07	38.67937	-95.45275	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Baldwin City Lk	2019-05-22	38.75573	-95.16128	2nd	0	0	0	0	12	3	0	0	0	0	0
MdesC	Big Sugar Crk	2019-06-06	38.24255	-94.72388	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Big Sugar Crk	2019-06-20	38.21850	-94.94547	5th	0	0	0	0	6	0	0	0	1	0	0
MdesC	Big Sugar Crk	2019-06-20	38.24781	-94.79748	5th	1	0	0	0	5	0	0	0	1	0	0
MdesC	Big Sugar Crk	2019-06-20	38.24784	-94.75096	5th	1	0	0	0	3	0	0	0	1	0	0
MdesC	Bull Crk	2019-06-03	38.60687	-94.88369	4th	0	0	0	1	2	0	0	0	2	0	0
MdesC	Bull Crk	2019-06-05	38.53424	-94.85426	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Bull Crk	2019-06-05	38.50536	-94.85343	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Bull Crk	2019-06-19	38.76756	-94.98267	2nd	0	0	0	0	0	1	0	0	0	0	0
MdesC	Bull Crk	2019-08-15	38.50542	-94.85340	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Bull Crk	2019-08-15	38.53429	-94.85427	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Bull Crk	2019-08-15	38.55305	-94.86378	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Bull Crk	2019-08-15	38.56199	-94.88408	4th	0	0	0	0	0	0	0	0	0	0	0

MdesC	Bull Crk	2019-08-15	38.57662	-94.89600	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Bull Crk	2019-08-15	38.60704	-94.88397	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Bunion Crk	2019-05-05	37.77602	-94.90085	3rd	0	0	0	0	2	0	0	0	0	0	0
MdesC	Chicken Crk	2018-10-21	38.52186	-95.67863	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Clever Crk	2019-07-18	37.99379	-94.77036	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Davis Crk	2019-06-06	38.24879	-94.87783	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.70856	-95.83847	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.72439	-95.85571	5th	0	0	0	0	0	4	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.78258	-95.94708	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.69858	-95.77880	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.74650	-95.87460	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.75374	-95.88883	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.78798	-95.94561	4th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.79597	-95.95855	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.79934	-95.96499	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.80039	-95.99968	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.81167	-96.02344	4th	0	0	0	0	0	1	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.81979	-96.03898	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.82608	-96.03802	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.82637	-96.05252	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.83740	-96.07613	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2018-10-27	38.84562	-96.09475	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.69858	-95.77880	5th	0	0	0	1	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.70865	-95.84190	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.72439	-95.85571	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.73933	-95.86862	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.74650	-95.87460	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.77113	-95.92761	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.78258	-95.94708	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.78798	-95.94561	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.79597	-95.95855	4th	0	0	0	0	0	0	0	1	2	0	0
MdesC	Dragoon Crk	2019-06-17	38.79934	-95.96499	4th	2	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.80039	-95.99968	4th	0	0	0	0	0	0	0	0	0	0	0

MdesC	Dragoon Crk	2019-06-17	38.81167	-96.02344	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.81979	-96.03898	3rd	2	0	0	0	0	0	0	1	2	0	0
MdesC	Dragoon Crk	2019-06-17	38.79603	-95.97749	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.80445	-95.97224	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.82608	-96.03802	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.82637	-96.05252	3rd	0	0	0	0	1	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.83740	-96.07613	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-06-17	38.84099	-96.08664	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-07-13	38.81979	-96.03898	3rd	0	0	0	0	0	0	0	0	2	0	0
MdesC	Dragoon Crk	2019-07-13	38.82608	-96.03802	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dragoon Crk	2019-07-13	38.82637	-96.05252	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dry Wood Crk	2019-07-14	37.68752	-94.68537	5th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Dry Wood Crk	2019-07-14	37.68752	-94.68537	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dry Wood Crk	2019-07-14	37.69216	-94.66748	5th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Dry Wood Crk	2019-09-02	37.68592	-94.61819	1st	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dry Wood Crk	2019-09-02	37.66697	-94.72160	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dry Wood Crk	2019-09-02	37.66146	-94.72179	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dry Wood Crk	2019-09-02	37.65839	-94.73661	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dry Wood Crk	2019-09-02	37.62406	-94.73387	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dry Wood Crk	2019-09-02	37.62485	-94.72120	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dry Wood Crk	2019-09-02	37.62999	-94.71902	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Dry Wood Crk	2019-09-02	37.64437	-94.71131	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Duck Crk	2018-09-25	38.54162	-95.98703	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Duck Crk	2019-04-06	38.53944	-95.98697	3rd	0	0	0	0	2	0	0	0	0	0	0
MdesC	Duck Crk	2019-04-09	38.54162	-95.98703	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Duck Crk	2019-06-17	38.54162	-95.98703	3rd	0	0	0	0	1	0	0	0	0	0	0
MdesC	E Fk Tauy Crk	2019-05-22	38.76036	-95.19401	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Eightmile Crk	2019-07-11	38.65224	-95.30934	4th	0	0	0	0	3	0	0	0	0	0	0
MdesC	Eightmile Crk	2019-07-11	38.63036	-95.28559	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Eightmile Crk	2019-07-11	38.63106	-95.28575	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Eightmile Crk	2019-07-11	38.63762	-95.28952	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Eightmile Crk	2019-07-11	38.66951	-95.32790	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Eightmile Crk	2019-07-11	38.68142	-95.33258	4th	0	0	0	0	0	0	0	0	0	0	0

MdesC	Eightmile Crk	2019-07-11	38.69523	-95.33991	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Eightmile Crk	2019-07-11	38.71519	-95.34512	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Eightmile Crk	2019-07-11	38.72763	-95.35238	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Eightmile Crk	2019-07-11	38.73887	-95.35464	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Eightmile Crk	2019-07-11	38.73812	-95.37816	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Eightmile Crk	2019-07-11	38.75319	-95.36955	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Eightmile Crk	2019-07-11	38.76431	-95.37473	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elk Crk	2019-07-18	38.06968	-94.82351	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elk Crk	2019-07-18	38.06643	-94.80722	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elk Crk	2019-07-18	38.05819	-94.78717	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elk Crk	2019-07-18	38.05186	-94.78725	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elk Crk	2019-07-18	38.04160	-94.78682	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elk Crk	2019-07-18	38.02841	-94.78155	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2018-09-25	38.62762	-95.99126	4th	0	0	0	0	3	1	0	0	0	0	0
MdesC	Elm Crk	2018-10-27	38.65178	-96.00003	4th	0	0	0	0	9	0	0	0	0	0	0
MdesC	Elm Crk	2018-10-27	38.62762	-95.99126	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2018-10-27	38.71110	-96.09419	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-04-09	38.62762	-95.99126	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-06-17	38.62762	-95.99126	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-06-17	38.65167	-95.93141	4th	0	0	0	0	0	0	0	2	0	0	0
MdesC	Elm Crk	2019-06-17	38.65178	-96.00003	4th	1	0	0	3	1	0	0	0	0	0	0
MdesC	Elm Crk	2019-06-20	38.43269	-94.68453	3rd	0	0	0	0	1	2	0	0	0	0	0
MdesC	Elm Crk	2019-07-11	37.90760	-95.38503	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-11	37.89748	-95.37248	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-11	37.90338	-95.35243	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-11	37.88876	-95.33570	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-11	37.88775	-95.31697	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-11	37.88922	-95.29910	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-11	37.88578	-95.28079	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-11	37.88970	-95.25759	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-11	37.89759	-95.24356	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-11	37.95598	-95.28047	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-11	37.95920	-95.29891	3rd	0	0	0	0	0	0	0	0	0	0	0

MdesC	Elm Crk	2019-07-13	38.71110	-96.09419	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-13	38.72464	-96.10449	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-13	38.73904	-96.10200	3rd	0	0	0	0	1	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-13	38.73907	-96.10507	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Elm Crk	2019-07-13	38.76096	-96.11203	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Fish Crk	2019-07-18	38.00829	-94.70573	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Fish Crk	2019-07-18	37.99990	-94.73201	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Frog Crk	2018-08-25	38.46040	-95.71036	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Frog Crk	2018-08-25	38.46277	-95.69176	3rd	0	0	0	0	2	0	0	0	0	0	0
MdesC	Frog Crk	2019-04-28	38.44870	-95.72199	3rd	0	0	0	0	1	0	0	0	0	0	0
MdesC	Hickory Crk	2019-06-12	38.63731	-95.10177	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Hickory Crk	2019-06-12	38.64031	-95.10246	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Hickory Crk	2019-06-12	38.66613	-95.06047	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Hill Crk	2019-07-13	38.62607	-96.09751	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Hilton Crk	2019-05-05	37.76514	-94.97870	4th	0	0	0	0	17	0	0	0	0	0	0
MdesC	Irish Crk	2019-07-18	38.02331	-95.00631	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Irish Crk	2019-07-18	38.05215	-95.03185	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Limestone Crk	2019-07-18	37.97993	-94.98888	3rd	3	0	0	0	2	0	0	1	0	0	0
MdesC	Limestone Crk	2019-07-18	37.93600	-95.03696	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Bull Crk	2019-07-09	38.81807	-94.89522	1st	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Bull Crk	2019-07-09	38.80373	-94.89040	1st	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Bull Crk	2019-07-09	38.79653	-94.88953	1st	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Bull Crk	2019-07-09	38.78188	-94.88858	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Bull Crk	2019-07-09	38.76756	-94.87972	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	37.97887	-94.91534	2nd	0	0	0	11	4	0	0	0	2	0	0
MdesC	Little Osage R	2019-05-27	37.98033	-94.91525	2nd	0	0	0	2	12	0	8	0	0	0	0
MdesC	Little Osage R	2019-05-27	37.98225	-94.91531	4th	0	0	0	5	2	0	0	0	3	0	0
MdesC	Little Osage R	2019-05-27	37.98701	-94.94301	4th	0	0	0	0	2	0	2	0	0	0	0
MdesC	Little Osage R	2019-05-27	37.99373	-94.95506	4th	0	0	0	1	0	0	1	0	0	0	0
MdesC	Little Osage R	2019-05-27	37.99902	-94.87873	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.00256	-94.95089	4th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.00431	-94.66452	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.00626	-94.82359	5th	1	0	0	0	1	0	1	0	0	0	0

MdesC	Little Osage R	2019-05-27	38.00635	-94.95147	4th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.00786	-94.69382	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.00992	-95.06015	4th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.01125	-94.80562	5th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.01724	-94.98794	4th	2	0	0	0	1	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.01874	-94.71363	5th	0	0	0	5	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.02214	-94.76265	5th	0	0	0	0	0	1	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	37.99326	-94.89728	4th	0	0	0	0	3	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	37.99359	-95.17054	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	37.99492	-94.62179	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.00787	-94.63526	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.01516	-94.63485	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.01707	-95.11500	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-05-27	38.02161	-94.80556	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	37.98513	-94.93313	4th	0	0	0	0	2	0	1	0	0	0	0
MdesC	Little Osage R	2019-06-05	37.99359	-94.65222	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	37.99374	-94.67444	3rd	0	0	0	0	2	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	37.99492	-94.62179	5th	0	0	0	0	2	0	0	1	1	0	0
MdesC	Little Osage R	2019-06-05	37.99806	-94.84531	5th	0	0	0	1	2	0	1	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.00431	-94.66452	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.00786	-94.69382	5th	2	0	0	10	9	0	0	0	3	0	0
MdesC	Little Osage R	2019-06-05	38.01125	-94.80562	5th	1	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.01125	-94.80562	5th	2	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.01874	-94.71363	5th	0	0	0	14	4	0	1	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.02014	-94.73173	5th	0	0	0	4	9	0	2	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.02702	-94.82356	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.03732	-94.85478	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.05181	-94.86772	3rf	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.06186	-94.87910	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	37.99849	-94.66109	3rd	0	0	0	0	1	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	37.99902	-94.87873	5th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.00449	-94.71337	3rd	0	0	0	0	2	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.00837	-94.76089	3rd	0	0	0	0	0	0	0	0	0	0	0

MdesC	Little Osage R	2019-06-05	38.02161	-94.80556	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.02214	-94.76265	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.04476	-94.86057	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-05	38.06781	-94.89732	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-10	38.00423	-94.66453	5th	1	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-11	38.00423	-94.66453	5th	0	0	0	0	1	0	0	0	2	0	0
MdesC	Little Osage R	2019-06-12	38.00423	-94.66453	5th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-13	38.00423	-94.66453	5th	1	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-10	38.00793	-94.69448	5th	0	0	0	7	6	0	0	0	3	0	0
MdesC	Little Osage R	2019-06-11	38.00793	-94.69448	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-12	38.00793	-94.69448	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-13	38.00793	-94.69448	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-10	38.01929	-94.71355	5th	0	0	0	2	2	0	1	0	1	0	0
MdesC	Little Osage R	2019-06-11	38.01226	-94.80575	5th	0	0	0	0	0	0	0	0	1	0	0
MdesC	Little Osage R	2019-06-12	38.01226	-94.80575	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-12	37.99789	-94.87863	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-13	37.99789	-94.87863	5th	5	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-10	37.98285	-94.91527	4th	2	0	0	7	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-06-10	37.98035	-94.91525	2nd	2	0	0	0	5	0	2	1	0	0	0
MdesC	Little Osage R	2019-07-18	37.99302	-95.09701	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-07-18	37.97955	-95.13256	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-07-18	37.97958	-95.13494	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-07-18	37.97556	-95.13410	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-07-18	37.96512	-95.14751	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-07-18	37.96191	-95.15190	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-07-18	37.98454	-95.15181	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-07-18	38.02590	-95.09657	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-07-18	38.01723	-95.11500	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-07-18	38.02300	-95.12957	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-07-18	38.02740	-95.14220	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-07-18	38.06754	-95.13061	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Osage R	2019-07-18	38.01058	-95.06008	4th	0	0	0	2	1	0	0	0	0	0	1
MdesC	Little Sugar Crk	2019-06-06	38.14771	-94.81283	3rd	0	0	0	0	0	0	0	0	0	0	0

MdesC	Little Sugar Crk	2019-06-06	38.18919	-94.79640	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Sugar Crk	2019-06-06	38.22790	-94.77835	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Little Sugar Crk	2019-06-20	38.14771	-94.81281	3rd	0	0	0	0	1	1	0	1	0	0	0
MdesC	Little Sugar Crk	2019-06-20	38.14284	-94.82557	3rd	1	0	0	0	3	1	1	0	1	0	0
MdesC	Long Crk	2018-08-25	38.44480	-95.69181	4th	1	0	0	0	0	0	0	0	0	0	0
MdesC	Long Crk	2018-08-25	38.44870	-95.72199	3rd	0	0	0	0	1	0	0	1	0	0	0
MdesC	Long Crk	2018-08-25	38.44883	-95.68625	4th	5	0	0	0	2	0	0	0	0	0	0
MdesC	Long Crk	2018-08-25	38.46277	-95.69176	3rd	1	0	0	0	2	0	0	0	0	0	0
MdesC	Long Crk	2018-08-25	38.47800	-95.66602	4th	2	0	0	0	2	0	0	0	1	0	0
MdesC	Long Crk	2018-08-25	38.48922	-95.65621	4th	5	0	0	0	3	1	0	0	1	0	0
MdesC	Long Crk	2018-08-25	38.49647	-95.63782	4th	2	0	0	0	3	0	0	0	0	0	0
MdesC	Long Crk	2018-08-25	38.44883	-95.68625	4th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Long Crk	2018-09-15	38.50704	-95.62518	4th	1	0	0	0	0	0	0	0	1	0	0
MdesC	Long Crk	2018-09-29	38.44883	-95.68625	4th	1	0	0	0	0	0	0	0	0	0	0
MdesC	Long Crk	2018-09-29	38.41415	-95.71037	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Long Crk	2018-09-29	38.44480	-95.69181	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Long Crk	2018-10-20	38.41415	-95.71037	4th	1	0	0	0	5	3	0	0	0	0	0
MdesC	Long Crk	2018-10-21	38.51444	-95.60994	4th	0	0	0	0	0	1	0	0	0	0	0
MdesC	Long Crk	2019-09-07	38.49647	-95.63782	4th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Lost Crk	2019-07-18	38.06793	-94.89723	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Lost Crk	2019-07-18	38.06178	-94.87919	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Lost Crk	2019-07-18	38.05183	-94.86771	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Lost Crk	2019-07-18	38.04459	-94.86053	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Lost Crk	2019-07-18	38.03734	-94.85463	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Lost Crk	2019-07-18	38.02661	-94.82356	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	M Fk Little Osage R	2019-05-27	38.02293	-95.12934	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	M Fk Tauy Crk	2019-05-22	38.73865	-95.23147	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-15	38.54628	-95.52737	5th	0	0	0	0	3	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-15	38.58366	-95.45355	6th	0	0	0	4	5	1	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-15	38.59631	-95.37859	6th	1	0	0	7	6	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-15	38.60843	-95.34962	6th	0	0	0	5	3	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-22	38.52071	-95.92232	5th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-25	38.52071	-95.92232	5th	0	0	0	0	0	0	0	0	0	0	0

MdesC	Marais des Cygnes R	2018-09-25	38.55553	-95.96101	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-25	38.56714	-95.96138	5th	0	0	0	0	3	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-29	38.52071	-95.92232	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-29	38.52071	-95.92232	5th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-29	38.53630	-95.94988	5th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-29	38.55026	-95.94944	5th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-29	38.57071	-95.98687	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-09-29	38.57071	-95.98687	5th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-20	38.51448	-95.63787	5th	0	0	0	0	4	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-20	38.52071	-95.92232	5th	2	0	0	0	3	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-20	38.53630	-95.94988	5th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-20	38.55026	-95.94944	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-20	38.56714	-95.96138	5th	0	0	0	0	3	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-21	38.54628	-95.52737	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-21	38.58366	-95.45355	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-21	38.51744	-95.69170	5th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-21	38.57975	-95.51996	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-28	38.53163	-95.02742	6th	0	0	0	1	1	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-28	38.53536	-95.07348	6th	0	0	0	3	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-28	38.57745	-95.10245	6th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-28	38.58041	-95.15269	6th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2018-10-28	38.61199	-95.20671	6th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-04-06	38.53630	-95.94988	5th	1	0	0	4	0	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-04-06	38.55026	-95.94944	5th	0	0	0	0	10	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-04-06	38.55050	-95.95443	5th	0	0	0	0	3	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-04-06	38.55553	-95.96101	5th	0	0	0	6	3	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-04-06	38.56714	-95.96138	5th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-04-06	38.57975	-95.51996	5th	2	0	0	1	1	4	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-04-07	38.51448	-95.63787	5th	0	0	0	8	35	12	0	0	3	0	0
MdesC	Marais des Cygnes R	2019-04-07	38.51744	-95.69170	5th	0	0	0	0	12	17	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-04-07	38.58366	-95.45355	6th	0	0	0	3	2	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-04-07	38.60843	-95.34962	6th	0	0	0	3	5	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-06-03	38.55243	-95.52728	2nd	0	0	0	0	1	1	0	0	0	0	0

MdesC	Marais des Cygnes R	2019-09-07	38.51448	-95.63787	5th	1	0	0	6	2	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-09-24	38.60854	-95.34970	6th	0	0	8	0	1	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-09-24	38.58770	-95.41970	6th	0	0	0	6	1	1	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-09-24	38.58421	-95.45339	6th	0	0	0	9	4	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-09-24	38.58670	-95.48077	6th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-09-24	38.54683	-95.52620	5th	0	0	0	0		0	0	0	1	0	0
MdesC	Marais des Cygnes R	2019-09-24	38.53684	-95.56414	5th	0	0	0	0	4	0	0	0	0	0	0
MdesC	Marais des Cygnes R	2019-09-24	38.51515	-95.63785	5th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Marmaton R	2019-04-20	37.81245	-94.78140	6th	0	0	0	1	0	0	0	0	0	0	0
MdesC	Marmaton R	2019-04-20	37.82844	-94.72696	6th	2	0	15	25	8	0	10	0	0	0	0
MdesC	Marmaton R	2019-04-20	37.83987	-94.71939	6th	0	0	0	2	17	0	4	0	0	0	0
MdesC	Marmaton R	2019-04-20	37.84729	-94.70851	6th	1	0	0	15	12	0	10	0	0	0	0
MdesC	Marmaton R	2019-04-20	37.85651	-94.64032	6th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Marmaton R	2019-04-20	37.86233	-94.67889	6th	0	0	0	1	5	0	0	0	0	0	0
MdesC	Marmaton R	2019-04-20	37.86418	-94.67200	6th	0	0	3	1	15	0	1	0	0	0	0
MdesC	Marmaton R	2019-04-20	37.86603	-94.67445	6th	0	0	1	2	3	0	1	0	0	0	0
MdesC	Marmaton R	2019-04-20	37.81977	-94.84533	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marmaton R	2019-04-20	37.83022	-94.88732	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marmaton R	2019-04-20	37.87056	-94.68688	3rd	0	0	0	0	3	0	0	0	0	0	0
MdesC	Marmaton R	2019-05-04	37.80387	-95.05099	4th	2	0	0	0	0	0	1	0	0	0	0
MdesC	Marmaton R	2019-05-04	37.80563	-95.09018	4th	1	0	0	0	0	1	1	0	0	0	0
MdesC	Marmaton R	2019-05-04	37.80857	-95.02484	4th	0	0	0	0	0	0	0	0	1	0	0
MdesC	Marmaton R	2019-05-04	37.81245	-94.78140	6th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Marmaton R	2019-05-04	37.81974	-95.00983	4th	0	0	0	0	4	0	0	0	0	0	0
MdesC	Marmaton R	2019-05-04	37.81977	-94.84533	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marmaton R	2019-05-04	37.82415	-94.86900	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marmaton R	2019-05-04	37.83022	-94.88732	5th	0	0	0	0	4	0	2	0	0	0	0
MdesC	Marmaton R	2019-05-04	37.83462	-94.98131	4th	0	0	0	0	7	0	2	0	0	0	0
MdesC	Marmaton R	2019-05-04	37.84485	-94.95170	4th	1	0	1	2	14	0	1	3	2	0	0
MdesC	Marmaton R	2019-05-05	37.81974	-95.00983	4th	0	0	0	0	5	1	0	0	0	0	0
MdesC	Marmaton R	2019-05-05	37.83462	-94.98131	4th	1	0	0	1	4	0	1	0	0	0	0
MdesC	Marmaton R	2019-05-05	37.83464	-94.99609	4th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Marmaton R	2019-05-05	37.84897	-95.10114	3rd	1	0	0	0	3	0	0	0	0	0	0

MdesC	Marmaton R	2019-05-05	37.87781	-95.11616	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marmaton R	2019-05-05	37.90698	-95.13444	3rd	0	0	0	0	3	0	1	0	0	0	0
MdesC	Marmaton R	2019-05-05	37.92136	-95.14027	3rd	0	0	0	0	1	0	0	0	0	0	0
MdesC	Marmaton R	2019-05-05	37.83436	-95.01063	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marmaton R	2019-05-05	37.83445	-95.10085	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marmaton R	2019-05-05	37.91240	-95.13289	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Marmaton R	2019-05-05	37.92105	-95.15170	2nd	0	0	0	0	0	1	0	0	0	0	0
MdesC	Marmaton R	2019-05-05	37.92150	-95.15020	2nd	0	0	0	0	0	1	0	0	0	0	0
MdesC	Marmaton R	2019-07-16	37.85560	-94.63998	6th	1	0	0	2	3	0	1	0	0	0	0
MdesC	Marmaton R	2019-07-16	37.86320	-94.67847	6th	0	0	0	1	21	0	4	0	0	0	0
MdesC	Marmaton R	2019-07-16	37.84647	-94.70730	6th	1	0	1	6	1	0	1	0	0	0	0
MdesC	Marmaton R	2019-07-16	37.83988	-94.71932	6th	1	0	0	3	17	0	3	0	1	0	0
MdesC	Marmaton R	2019-07-16	37.82831	-94.72694	6th	0	0	7	20	20	0	5	0	0	0	0
MdesC	Marmaton R	2019-07-16	37.81313	-94.78038	6th	1	0	0	3	10	0	1	0	2	0	0
MdesC	Marmaton R	2019-07-16	37.81943	-94.84423	5th	1	0	0	0	0	0	0	0	2	0	0
MdesC	Marmaton R	2019-07-16	37.83054	-94.88709	5th	0	0	0	0	4	1	1	0	0	0	0
MdesC	Martin Crk	2019-07-09	38.75512	-94.96350	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Martin Crk	2019-07-09	38.76471	-94.94591	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Martin Crk	2019-07-09	38.76749	-94.94181	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Melvern L	2018-09-29	38.47743	-95.82965	2nd	0	0	0	0	2	0	0	0	0	0	0
MdesC	Middle Crk	2019-07-01	38.50683	-95.22956	4th	0	0	0	0	4	0	0	0	1	0	0
MdesC	Middle Crk	2019-07-01	38.54366	-95.17463	4th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Middle Crk	2019-07-01	38.53947	-95.20927	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Middle Crk	2019-07-01	38.54181	-95.19263	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Middle Crk	2019-07-01	38.54938	-95.16507	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Mill Crk	2019-04-20	37.84871	-94.70368	4th	0	0	1	5	6	0	0	0	0	0	0
MdesC	Mill Crk	2019-05-04	37.85467	-94.73176	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Mill Crk	2019-05-04	37.86214	-94.74249	4th	0	0	1	0	5	0	2	0	0	0	0
MdesC	Mill Crk	2019-07-14	37.88092	-94.76883	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Mine Crk	2019-06-06	38.20450	-94.61271	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Mine Crk	2019-06-06	38.18257	-94.64414	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Mine Crk	2019-06-24	38.19376	-94.63124	3rd	0	0	0	0	2	1	0	0	1	0	0
MdesC	Mine Crk	2019-06-24	38.16705	-94.65871	3rd	0	0	0	0	0	1	0	0	1	0	0

MdesC	N Branch Little Osage	2019-07-18	38.06946	-95.15096	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	N Fk Little Osage R	2019-05-27	38.03057	-95.09177	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	N Fork Little Osage	2019-07-18	38.04532	-95.11459	3rd	0	0	0	0	5	0	0	0	0	0	0
MdesC	N Wea Crk	2019-08-15	38.67947	-94.70913	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	N Wea Crk	2019-08-15	38.66040	-94.70864	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	N Sugar Crk	2019-06-06	38.32060	-94.65977	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	N Sugar Crk	2019-06-06	38.40215	-94.65305	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	N Sugar Crk	2019-06-06	38.40823	-94.65987	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	N Sugar Crk	2019-06-20	38.24751	-94.92918	4th	0	0	0	0	2	0	0	0	0	0	0
MdesC	N Sugar Crk	2019-06-20	38.28704	-94.70207	4th	0	0	0	0	2	2	0	0	1	0	0
MdesC	N Wea Crk	2019-08-15	38.70466	-94.68619	3rd	0	0	0	0	1	1	0	0	0	0	0
MdesC	N Wea Crk	2019-08-15	38.69462	-94.70035	3rd	0	0	0	0	0	1	0	0	0	0	0
MdesC	N Wea Crk	2019-08-15	38.65178	-94.73177	4th	0	0	0	0	0	1	0	0	0	0	0
MdesC	N Wea Crk	2019-08-15	38.65058	-94.75571	4th	0	0	0	0	1	2	0	0	0	0	0
MdesC	N Wea Crk	2019-08-15	38.60668	-94.78607	4th	0	0	0	0	1	0	0	0	1	0	0
MdesC	Ottawa Crk	2019-09-08	38.62273	-95.19788	4th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Paint Crk	2019-04-20	37.79331	-94.85074	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Paint Crk	2019-05-04	37.79331	-94.85074	5th	0	0	1	0	5	0	1	0	0	0	0
MdesC	Paint Crk	2019-05-05	37.78667	-94.93326	5th	0	0	0	0	0	0	1	0	0	0	0
MdesC	Paint Crk	2019-05-05	37.79045	-94.88752	5th	2	0	0	0	3	0	0	0	0	0	0
MdesC	Paint Crk	2019-05-05	37.72159	-94.97951	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Paint Crk	2019-05-05	37.76197	-94.99671	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Paint Crk	2019-05-05	37.77051	-94.96023	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Paint Crk	2019-05-05	37.77596	-94.95099	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Paint Crk	2019-07-02	37.79275	-94.85071	5th	0	0	0	0	3	0	0	0	0	0	0
MdesC	Paint Crk	2019-07-02	37.78998	-94.88756	5th	0	0	0	0	4	2	0	0	0	0	0
MdesC	Paint Crk	2019-07-02	37.78627	-94.93332	5th	0	0	0	0	5	0	0	0	0	0	0
MdesC	Paint Crk	2019-07-02	37.77599	-94.95123	5th	2	0	0	0	0	1	1	1	0	0	0
MdesC	Pawnee Crk	2019-04-20	37.77615	-94.82752	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pawnee Crk	2019-05-04	37.77615	-94.82752	4th	0	0	0	0	7	0	0	0	1	0	0
MdesC	Plum Crk	2019-06-19	38.53784	-94.95527	2nd	0	0	0	0	0	0	0	1	0	0	0
MdesC	Plum Crk	2019-06-19	38.51937	-94.95416	3rd	1	0	0	0	2	0	0	0	0	0	0

MdesC	Plum Crk	2019-06-19	38.51496	-94.95050	3rd	0	0	0	1	2	0	0	0	0	0	0
MdesC	Plum Crk	2019-08-15	38.51943	-94.95415	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.36895	-95.15466	5th	0	0	0	0	1	4	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.44295	-95.08409	5th	0	0	0	1	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.48698	-95.01152	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.19173	-95.23186	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.21064	-95.24897	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.21288	-95.25308	3rd	0	0	0	0	1	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.23426	-95.26527	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.24992	-95.24839	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.25030	-95.23963	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.25549	-95.23107	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.27349	-95.18475	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.28068	-95.17962	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2018-10-28	38.37736	-95.13613	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.26841	-95.42443	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.27381	-95.39408	5th	0	0	0	0	1	1	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.28855	-95.37827	5th	0	0	0	0	4	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.32078	-95.38124	5th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.32600	-95.35120	5th	0	0	0	0	4	0	0	0	0	0	1
MdesC	Pottawatomie Crk	2019-04-28	38.33387	-95.24875	5th	0	0	0	0	2	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.33892	-95.33580	5th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.34111	-95.26965	5th	0	0	0	3	8	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.34169	-95.32309	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.34555	-95.28596	5th	0	0	0	0	4	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.25892	-95.43720	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.27375	-95.51655	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.28835	-95.52227	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.29899	-95.52627	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.30211	-95.38335	5th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-04-28	38.31727	-95.54465	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Pottawatomie Crk	2019-06-19	38.44358	-95.08385	5th	0	0	0	11	0	0	1	0	0	0	0
MdesC	Rock Crk	2018-10-21	38.52170	-95.58206	3rd	0	0	0	0	0	0	0	0	0	0	0

MdesC	Rock Crk	2019-07-01	38.56481	-95.25864	3rd	0	0	0	0		5	0	0	0	0	0
MdesC	Rock Crk	2019-07-01	38.52646	-95.30471	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Rock Crk	2019-07-01	38.53317	-95.28617	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Rock Crk	2019-07-01	38.53573	-95.28085	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Rock Crk	2019-07-01	38.55027	-95.27248	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Rock Crk	2019-07-01	38.56493	-95.23664	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Rock Crk	2019-07-01	38.57945	-95.23603	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Rock Crk	2019-07-01	38.58633	-95.23017	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Rock Crk	2019-07-01	38.58674	-95.22891	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Rock Crk	2019-07-01	38.59403	-95.22272	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Rock Crk	2019-07-09	38.70660	-95.04724	2nd	0	0	0	0	2	2	0	2	0	0	0
MdesC	Rock Crk	2019-07-09	38.70222	-95.02874	2nd	0	0	0	0	0	1	1	0	0	0	0
MdesC	Rock Crk	2019-07-09	38.70660	-95.04724	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Rock Crk	2019-07-11	37.91415	-95.38794	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Rock Crk	2019-07-11	37.96218	-95.31732	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Rock Crk	2019-07-11	37.95106	-95.32037	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Fk Pottawatomie Crk	2018-10-28	38.19778	-95.23966	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Fk Pottawatomie Crk	2019-07-18	38.28079	-95.18020	4th	0	0	0	0	4	0	0	0	0	0	0
MdesC	S Fk Pottawatomie Crk	2019-07-18	38.29164	-95.17465	4th	0	0	0	0	1	0	0	0	0	0	0
MdesC	S Fork Little Osage R	2019-07-18	37.98676	-95.11544	3rd	0	0	0	0	7	0	0	0	1	0	0
MdesC	S Pottawatomie Crk	2019-07-18	38.18320	-95.19116	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Pottawatomie Crk	2019-07-18	38.19342	-95.20398	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Pottawatomie Crk	2019-07-18	38.19185	-95.23188	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Pottawatomie Crk	2019-07-18	38.19735	-95.23966	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Pottawatomie Crk	2019-07-18	38.21291	-95.25301	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Pottawatomie Crk	2019-07-18	38.23424	-95.26517	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Pottawatomie Crk	2019-07-18	38.25066	-95.23953	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Pottawatomie Crk	2019-07-18	38.25560	-95.23115	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Pottawatomie Crk	2019-07-18	38.27356	-95.18471	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Pottawatomie Crk	2019-07-18	38.30216	-95.16907	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Salt Crk	2018-10-21	38.59398	-95.52693	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Salt Crk	2018-10-21	38.60852	-95.65235	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Salt Crk	2018-10-21	38.60934	-95.63821	3rd	0	0	0	0	1	1	0	0	0	0	0

MdesC	Salt Crk	2018-10-21	38.61307	-95.58316	3rd	0	0	0	0	0	1	0	0	0	0	0
MdesC	Salt Crk	2018-10-21	38.60791	-95.61738	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Salt Crk	2019-04-06	38.59398	-95.52693	3rd	1	0	0	0	4	1	0	0	0	0	0
MdesC	Salt Crk	2019-04-07	38.59398	-95.52693	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Salt Crk	2019-09-07	38.60791	-95.61738	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Salt Crk	2019-09-07	38.60852	-95.65235	3rd	0	0	0	0	0	0	1	0	0	0	0
MdesC	Salt Crk	2019-09-07	38.60934	-95.63821	3rd	0	0	0	0	0	1	0	0	0	0	0
MdesC	Salt Crk	2019-09-07	38.61307	-95.58316	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-06-05	38.58484	-94.80929	4th	0	0	0	1	0	0	1	0	1	0	0
MdesC	S Wea Crk	2019-06-05	38.58488	-94.80929	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-06-05	38.58960	-94.80147	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-06-05	38.59811	-94.78776	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-06-05	38.59590	-94.76909	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-06-05	38.60143	-94.73190	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-06-05	38.60785	-94.71787	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-06-05	38.60546	-94.70848	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-06-05	38.59381	-94.68524	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-06-05	38.59078	-94.68390	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-06-05	38.58588	-94.68172	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-06-05	38.57776	-94.68922	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-06-05	38.55338	-94.85449	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-08-15	38.59384	-94.68526	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-08-15	38.60550	-94.70849	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-08-15	38.60787	-94.71784	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-08-15	38.60151	-94.73188	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	S Wea Crk	2019-08-15	38.55343	-94.85450	4th	0	0	0	0	2	0	0	0	0	0	0
MdesC	S Wea Crk	2019-08-15	38.59589	-94.76910	3rd	0	0	0	0	1	0	0	0	1	0	0
MdesC	S Wea Crk	2019-08-15	38.58491	-94.80930	4th	0	0	0	0	1	0	0	0	1	0	0
MdesC	S Wea Crk	2019-08-15	38.55343	-94.85450	4th	0	0	0	0	0	0	0	0	1	0	0
MdesC	Spring Crk	2019-05-22	38.74936	-95.16758	1st	0	0	0	0	0	0	0	0	0	0	0
MdesC	Spring Crk	2019-05-22	38.72507	-95.18626	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Spring Crk	2019-07-11	38.68902	-95.34664	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Spring Crk	2019-07-11	38.68879	-95.36065	1st	0	0	0	0	0	0	0	0	0	0	0

MdesC	Spring Crk	2019-07-11	38.69533	-95.37018	1st	0	0	0	0	0	0	0	0	0	0	0
MdesC	Spring Crk	2019-07-11	38.69680	-95.37160	1st	0	0	0	0	0	0	0	0	0	0	0
MdesC	Spring Valley Crk	2019-07-18	37.97950	-95.09019	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Sweetwater Crk	2019-06-12	38.70934	-94.81607	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Sweetwater Crk	2019-08-15	38.69476	-94.81872	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Sweetwater Crk	2019-08-15	38.70086	-94.81598	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Sweetwater Crk	2019-08-15	38.70933	-94.81606	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-05-22	38.81876	-95.28236	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-01	38.65201	-95.21633	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-01	38.63017	-95.19888	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-11	38.78356	-95.31627	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-11	38.76792	-95.29731	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-11	38.76046	-95.29845	1st	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-11	38.75315	-95.27898	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-11	38.79421	-95.27814	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-11	38.76772	-95.27891	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-11	38.76046	-95.27083	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-11	38.75315	-95.26964	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-11	38.74063	-95.26884	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-11	38.73864	-95.26582	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-07-11	38.71683	-95.25507	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.64130	-95.21152	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.65200	-95.21699	4th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.69507	-95.22066	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.70951	-95.25216	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.70954	-95.21452	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.73857	-95.26533	4th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.74015	-95.26843	4th	0	0	0	0	0	1	0	1	0	0	0
MdesC	Tauy Crk	2019-09-08	38.63015	-95.19918	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.71681	-95.25509	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.75309	-95.26936	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.76044	-95.27075	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.76768	-95.27904	3rd	0	0	0	0	1	0	0	0	0	0	0

MdesC	Tauy Crk	2019-09-08	38.78245	-95.28149	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.79426	-95.27844	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Tauy Crk	2019-09-08	38.81876	-95.28236	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Ten Mile Crk	2019-06-12	38.70923	-94.80092	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Ten Mile Crk	2019-08-15	38.66517	-94.84694	3rd	0	0	0	0	1	1	0	0	0	0	0
MdesC	Ten Mile Crk	2019-08-15	38.65016	-94.85485	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Ten Mile Crk	2019-06-03	38.70923	-94.80092	3rd	0	0	0	0	0	1	0	0	0	0	0
MdesC	Turkey Crk	2019-05-04	37.84889	-94.95182	4th	0	0	0	0	1	0	0	0	0	0	0
MdesC	Turkey Crk	2019-06-12	38.63031	-95.04683	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Turkey Crk	2019-06-12	38.62751	-95.02829	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-04-07	38.73857	-95.26533	4th	0	0	0	0	2	3	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-04-07	38.74015	-95.26843	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-04-07	38.75309	-95.26936	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-04-07	38.75313	-95.27870	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-04-07	38.76044	-95.27075	3rd	0	0	0	0	1	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-04-07	38.76768	-95.27904	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-05-22	38.73857	-95.26533	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-05-22	38.74015	-95.26843	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-05-22	38.75309	-95.26936	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-05-22	38.75313	-95.27870	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-07-01	38.68844	-95.24776	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-07-11	38.78240	-95.28097	3rd	0	0	0	0	1	0	0	0	1	0	0
MdesC	W Fk Tauy Crk	2019-05-22	38.76044	-95.27075	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-05-22	38.76768	-95.27904	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-05-22	38.78245	-95.28149	4th	0	0	0	0	1	0	0	0	0	0	0
MdesC	W Fk Tauy Crk	2019-05-22	38.79426	-95.27844	4th	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-06-03	38.66604	-95.10413	2nd	0	0	0	0	0	3	0	2	0	0	0
MdesC	Walnut Crk	2019-06-12	38.59502	-94.91858	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-06-12	38.58255	-94.90075	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-07-01	38.62880	-95.19310	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-07-01	38.63035	-95.18380	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-07-01	38.62786	-95.17455	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-07-01	38.63759	-95.16513	2nd	0	0	0	0	0	0	0	0	0	0	0

MdesC	Walnut Crk	2019-07-01	38.64017	-95.15596	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-07-09	38.70880	-95.08286	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-07-09	38.69492	-95.08424	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-07-09	38.68850	-95.08501	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-07-09	38.68096	-95.09169	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-07-09	38.66754	-95.10247	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-07-09	38.66639	-95.10398	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Walnut Crk	2019-09-08	38.62866	-95.19309	2nd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Wolf Crk	2018-10-21	38.52552	-95.63772	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Wolf Crk	2019-07-01	38.63021	-95.19535	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Wolf Crk	2019-07-01	38.64292	-95.19102	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Wolf Crk	2019-09-08	38.65206	-95.19009	3rd	0	0	0	0	0	0	0	0	0	0	0
MdesC	Wolf Crk	2019-09-08	38.63013	-95.19506	3rd	0	0	0	0	0	1	0	0	0	0	0
Missouri	Blue R	2019-07-09	38.83190	-94.63550	4th	0	0	0	0	0	0	0	0	2	0	0
Missouri	Blue R	2019-07-09	38.85497	-94.60805	4th	1	0	0	0	1	0	0	0	0	0	0
Missouri	Cedar Crk	2019-07-12	39.94773	-95.25708	4th	0	1	0	0	1	0	0	0	0	0	0
Missouri	Mill Crk	2019-07-12	39.94218	-95.25368	2nd	0	0	0	0	0	0	0	1	0	0	0
Missouri	Smith Crk	2019-07-12	39.85084	-94.94828	2nd	0	1	0	0	0	0	0	0	0	0	0
Missouri	Wolf Crk	2019-07-09	38.79047	-94.77938	3rd	0	0	0	0	0	0	0	0	0	0	0
Missouri	Wolf Crk	2019-07-09	38.79007	-94.76085	3rd	0	0	0	0	0	0	0	0	0	0	0
Missouri	Wolf Crk	2019-07-09	38.79290	-94.74222	3rd	0	0	0	0	0	0	0	0	0	0	0
Missouri	Wolf Crk	2019-07-09	38.78660	-94.74212	1st	0	0	0	0	0	0	0	0	0	0	0
Missouri	Wolf R	2019-07-12	39.87988	-95.19466	4th	0	1	0	0	1	1	0	0	0	0	0
Missouri	Wolf R	2019-07-12	39.82089	-95.19103	4th	0	0	0	0	0	0	0	0	2	0	0
Neosho	Badger Crk	2019-09-17	38.16735	-95.61023	1st	0	0	0	0	0	0	0	0	0	0	0
Neosho	Badger Crk	2019-09-17	38.16310	-95.62863	1st	0	0	0	0	0	0	0	0	0	0	0
Neosho	Badger Crk	2019-09-17	38.15506	-95.64728	2nd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Big Crk	2019-07-15	37.64524	-95.34204	4th	0	0	1	0	0	0	0	0	0	0	0
Neosho	Big Crk	2019-07-15	37.67492	-95.32274	4th	0	0	3	0	6	0	0	0	0	0	0
Neosho	Big Crk	2019-07-15	37.68889	-95.31556	4th	0	0	6	0	9	0	9	0	2	0	0
Neosho	Big Crk	2019-07-15	37.71809	-95.30368	4th	0	0	1	0	10	0	3	1	1	0	0
Neosho	Big Crk	2019-07-15	37.73257	-95.28135	4th	0	0	7	0	12	0	2	1	1	0	0
Neosho	Big Crk	2019-07-15	37.74801	-95.26857	3rd	0	0	0	0	1	0	1	1	0	0	0

Neosho	Big Crk	2019-07-15	37.76202	-95.25415	3rd	0	0	2	0	2	1	0	0	0	0	0
Neosho	Big Crk	2019-07-15	37.77643	-95.22848	3rd	0	0	0	0	6	0	0	1	2	0	0
Neosho	Big Crk	2019-07-15	37.78951	-95.21608	3rd	0	0	0	0	2	0	1	0	2	0	0
Neosho	Big Crk	2019-07-15	37.69484	-95.30677	1st	0	0	0	0	0	0	0	0	0	0	0
Neosho	Big Crk	2019-07-15	37.70349	-95.31029	4th	0	0	0	0	0	0	0	0	0	0	0
Neosho	Big Crk	2019-07-15	37.71575	-95.32507	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Big Crk	2019-07-15	37.71809	-95.32937	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Big Crk	2019-07-15	37.79095	-95.20822	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Big Crk	2019-07-15	37.80543	-95.19885	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Big Crk	2019-07-15	37.82004	-95.18470	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Big Crk	2019-07-15	37.83455	-95.17405	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Big Crk	2019-07-15	37.84901	-95.16222	1st	0	0	0	0	0	0	0	0	0	0	0
Neosho	Bloody Crk	2019-08-20	38.36195	-96.45496	3rd	0	0	0	0	2	1	0	0	0	0	0
Neosho	Bloody Run	2019-10-15	38.01290	-95.74822	2nd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Brush Crk	2019-08-14	37.14873	-94.81197	3rd	0	0	0	0	1	0	1	0	2	0	0
Neosho	Brush Crk	2019-08-14	37.08422	-94.75900	4th	0	0	0	0	5	0	1	0	2	0	0
Neosho	Brush Crk	2019-08-14	37.07345	-94.74084	4th	0	0	0	0	5	0	0	0	0	0	0
Neosho	Buck Crk	2019-08-20	38.36959	-96.53191	2nd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Buck Crk	2019-08-20	38.37685	-96.50366	2nd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Cherry Crk	2019-10-15	37.87397	-95.61040	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Coal Crk	2019-10-15	37.77241	-95.44322	4th	0	0	0	0	0	0	0	0	0	0	0
Neosho	Coal Crk	2019-10-15	37.78837	-95.43485	4th	0	0	0	0	0	0	0	0	0	0	0
Neosho	Coal Crk	2019-10-15	37.79589	-95.42906	4th	0	0	0	0	0	0	0	0	0	0	0
Neosho	Coal Crk	2019-10-15	37.80026	-95.40257	4th	0	0	0	0	0	0	0	0	0	0	0
Neosho	Coal Crk	2019-10-15	37.81300	-95.40156	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Cottonwood R	2018-08-25	38.38613	-96.18141	6th	0	0	8	45	1	0	3	0	0	0	0
Neosho	Cottonwood R	2018-08-25	38.38613	-96.18141	6th	0	0	8	45	1	0	3	0	0	0	0
Neosho	Cottonwood R	2018-09-15	38.38613	-96.18141	6th	0	0	7	25	2	0	0	0	0	0	0
Neosho	Cottonwood R	2018-09-29	38.38613	-96.18141	6th	0	0	1	3	1	0	0	0	0	0	0
Neosho	Cottonwood R	2018-09-30	38.38613	-96.18141	6th	0	0	8	13	2	0	0	0	0	0	0
Neosho	Cottonwood R	2018-10-20	38.38613	-96.18141	6th	0	0	7	1	1	0	0	0	0	0	0
Neosho	Cottonwood R	2019-08-20	38.37497	-96.54126	6th	0	0	5	31	1	0	0	0	1	0	0
Neosho	Cottonwood R	2019-08-20	38.36972	-96.52615	6th	0	0	4	4	5	0	1	0	2	0	0

Neosho	Cottonwood R	2019-08-20	38.36836	-96.46479	6th	0	0	1	10	1	0	0	0	1	0	0
Neosho	Cottonwood R	2019-08-20	38.38757	-96.39185	6th	0	0	2	1	0	0	0	0	1	0	0
Neosho	Cottonwood R	2019-08-20	38.39775	-96.35667	6th	0	0	2	2	1	0	0	0	0	0	0
Neosho	Cottonwood R	2019-08-20	38.37859	-96.26154	6th	0	0	4	19	6	0	1	0	0	0	0
Neosho	Cottonwood R	2019-08-20	38.38188	-96.20702	6th	0	0	2	16	6	0	0	0	0	0	0
Neosho	Cottonwood R	2019-08-20	38.37555	-96.15265	6th	0	0	0	0	0	0	0	0	0	0	0
Neosho	Cottonwood R	2019-08-20	38.36583	-96.11490	6th	0	0	0	0	0	0	0	0	0	0	0
Neosho	Cottonwood R	2019-08-20	38.37622	-96.06752	6th	0	0	0	0	0	0	0	0	0	0	0
Neosho	Cottonwood R	2019-09-16	38.37619	-96.06757	6th	0	0	1	11	1	0	0	0	0	0	0
Neosho	Cottonwood R	2019-09-16	38.36581	-96.11494	6th	0	0	0	9	0	0	0	0	0	0	0
Neosho	Cottonwood R	2019-09-16	38.37555	-96.15266	6th	0	0	0	10	2	0	0	0	0	0	0
Neosho	Crooked Crk	2019-09-17	38.09692	-95.61169	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Crooked Crk	2019-09-17	38.11116	-95.60915	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Crooked Crk	2019-09-17	38.12579	-95.60455	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Crooked Crk	2019-09-17	38.14037	-95.59196	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Crooked Crk	2019-09-17	38.15481	-95.58925	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Crooked Crk	2019-09-17	38.16942	-95.58569	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Draw Crk	2019-07-15	37.66014	-95.34300	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Draw Crk	2019-07-15	37.67463	-95.34663	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Eagle Crk	2019-09-16	38.26957	-95.95929	4th	0	0	1	0	2	0	0	0	0	0	0
Neosho	Elm Crk	2019-07-11	37.90911	-95.40946	4th	0	0	0	1	6	0	4	0	0	0	0
Neosho	Elm Crk	2019-07-11	37.91058	-95.40540	4th	0	0	0	0	4	0	5	0	0	0	0
Neosho	Fly Crk	2019-10-23	37.03222	-95.01935	4th	0	0	0	0	4	1	6	0	0	0	0
Neosho	Goose Crk	2019-07-15	37.74724	-95.27464	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Jacob Crk	2019-08-20	38.37264	-96.33135	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Labette Crk	2019-10-23	37.07460	-95.10289	5th	0	0	1	2	3	2	0	0	0	0	0
Neosho	Little Crk	2019-07-15	37.81993	-95.19126	2nd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Long Crk	2019-09-06	38.12613	-95.66956	3rd	0	0	0	0	2	0	0	0	0	0	0
Neosho	Long Crk	2019-09-17	37.15823	-97.14438	4th	0	0	0	0	5	0	0	0	1	0	0
Neosho	Long Crk	2019-09-17	38.16971	-95.64443	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Long Crk	2019-09-17	38.15521	-95.65323	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Long Crk	2019-09-17	38.14190	-95.66057	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Long Crk	2019-09-17	38.14068	-95.67030	3rd	0	0	0	0	0	0	0	0	0	0	0

Neosho	Mud Crk	2019-07-15	37.79102	-95.22288	2nd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Neosho R	2019-04-19	38.42690	-96.17206	5th	0	0	4	8	2	0	0	0	0	0	0
Neosho	Neosho R	2019-04-19	38.42419	-96.17136	5th	0	0	3	11	1	0	0	0	1	0	0
Neosho	Neosho R	2019-09-16	38.30888	-95.94803	6th	0	0	16	50	5	1	1	0	1	0	0
Neosho	Neosho R	2019-09-17	38.08373	-95.65576	6th	0	0	1	8	0	0	0	0	3	0	0
Neosho	Neosho R	2019-09-17	38.08263	-95.68046	4th	0	0	0	0	7	0	0	0	2	0	0
Neosho	Neosho R	2019-09-17	38.36775	-96.00209	6th	0	0	1	23	1	0	0	0	0	0	0
Neosho	Neosho R	2019-09-23	38.61961	-96.44564	5th	0	0	2	0	3	0	0	0	3	0	0
Neosho	Neosho R	2019-09-23	38.59859	-96.41809	5th	0	0	3	3	1	0	0	0	1	0	0
Neosho	Neosho R	2019-09-23	38.57150	-96.38712	5th	0	0	8	2	0	0	0	0	3	0	0
Neosho	Neosho R	2019-09-23	38.55480	-96.37142	5th	0	0	2	0	12	0	0	0	0	0	0
Neosho	Neosho R	2019-09-23	38.55017	-96.33558	5th	0	0	8	0	2	0	0	0	0	0	0
Neosho	Neosho R	2019-09-23	38.50740	-96.31139	5th	0	0	1	0	5	0	0	0	0	0	0
Neosho	Neosho R	2019-09-30	38.59859	-96.41809	5th	0	0	4	2	0	0	0	0	0	0	0
Neosho	Neosho R	2019-09-30	38.47145	-96.25293	5th	0	0	6	11	0	0	0	0	0	0	0
Neosho	Neosho R	2019-09-30	38.43643	-96.20773	5th	0	0	1	3	0	0	0	0	6	0	0
Neosho	Neosho R	2019-09-30	38.42786	-96.18024	5th	0	0	6	7	0	0	0	0	1	0	0
Neosho	Neosho R	2019-09-30	38.42863	-96.15801	5th	0	0	1	6	2	0	0	0	1	0	0
Neosho	Neosho R	2019-09-30	38.41194	-96.11835	5th	0	0	2	7	2	0	0	0	0	0	0
Neosho	Neosho R	2019-09-30	38.40566	-96.09901	5th	0	0	4	9	5	0	0	0	0	0	0
Neosho	Neosho R	2019-10-15	37.79575	-95.42901	4th	0	0	5	0	11	0	2	0	1	0	0
Neosho	Neosho R	2019-10-15	37.80940	-95.44803	6th	0	0	1	2	0	0	0	0	0	0	0
Neosho	Neosho R	2019-10-15	37.91370	-95.41675	6th	0	0	2	2	0	0	0	0	0	0	0
Neosho	Neosho R	2019-10-23	37.04733	-95.08222	6th	0	0	1	0	1	0	0	0	0	0	0
Neosho	Neosho R	2019-10-23	37.12068	-95.08067	6th	0	0	0	1	0	0	0	0	0	0	0
Neosho	Neosho R	2019-10-23	37.17657	-95.10499	6th	0	0	1	4	1	0	2	0	0	0	0
Neosho	N Big Crk	2019-09-06	38.11007	-95.75760	3rd	0	0	0	0	1	0	0	1	0	0	0
Neosho	N Big Crk	2019-09-06	38.14894	-95.86676	3rd	0	0	0	0	3	1	0	0	0	0	0
Neosho	N Big Crk	2019-09-17	38.11383	-95.76676	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	N Big Crk	2019-09-17	38.12979	-95.79443	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	N Big Crk	2019-09-17	38.13596	-95.81186	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	N Big Crk	2019-09-17	38.13724	-95.83041	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	N Big Crk	2019-09-17	38.14147	-95.84471	3rd	0	0	0	0	0	0	0	0	0	0	0

Neosho	Otter Crk	2019-09-16	38.20482	-95.84809	3rd	0	0	0	0	2	1	0	0	0	0	0
Neosho	Otter Crk	2019-09-16	38.21812	-95.82950	3rd	0	0	7	0	4	0	0	0	0	0	0
Neosho	Owl Crk	2019-10-15	37.80424	-95.47139	5th	0	0	0	0	2	0	1	0	0	0	0
Neosho	Owl Crk	2019-10-15	37.80424	-95.47139	5th	0	0	0	0	0	0	0	0	0	0	0
Neosho	Owl Crk	2019-10-15	37.81154	-95.49205	5th	0	0	0	0	0	0	0	0	0	0	0
Neosho	Owl Crk	2019-10-15	37.82031	-95.51966	5th	0	0	0	0	0	0	0	0	0	0	0
Neosho	Owl Crk	2019-10-15	37.84900	-95.54035	1st	0	0	0	0	0	0	0	0	0	0	0
Neosho	Owl Crk	2019-10-15	37.84879	-95.61065	4th	0	0	0	0	0	0	0	0	0	0	0
Neosho	Phenis Crk	2019-08-20	38.37624	-96.26997	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Scatter Crk	2019-10-15	37.75317	-95.47120	2nd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Scatter Crk	2019-10-15	37.75777	-95.48832	2nd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Scatter Crk	2019-10-15	37.76185	-95.49811	2nd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Scatter Crk	2019-10-15	37.76182	-95.50849	2nd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Shawnee Crk	2019-08-14	37.10438	-94.68412	4th	0	0	3	0	12	0	2	0	0	0	0
Neosho	Shawnee Crk	2019-08-14	37.11923	-94.68483	4th	1	0	0	0	0	0	0	0	0	0	0
Neosho	Shoal Crk	2019-08-14	37.05440	-94.70067	4th	0	0	0	0	2	0	1	0	3	0	0
Neosho	Slack Crk	2019-10-15	37.80813	-95.39672	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Slack Crk	2019-10-15	37.82025	-95.39107	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Slack Crk	2019-10-15	37.82253	-95.33600	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	S Big Crk	2019-07-10	38.07939	-95.76655	4th	0	0	0	0	1	0	0	0	1	0	0
Neosho	S Big Crk	2019-07-10	38.06973	-95.81205	4th	0	0	6	0	4	0	0	0	0	0	0
Neosho	S Big Crk	2019-07-10	38.05878	-95.86707	3rd	0	0	0	0	3	1	0	0	0	0	0
Neosho	S Owl Crk	2019-10-15	37.83506	-95.59685	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Spring Crk	2019-08-20	38.37326	-96.54945	2nd	0	0	0	0	0	0	0	1	0	0	0
Neosho	Spring Crk	2019-08-20	38.36235	-96.56018	2nd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Spring Crk	2019-08-20	38.36204	-96.43070	3rd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Spring R	2019-08-14	37.06759	-94.70470	6th	0	0	0	3	11	0	3	1	3	0	0
Neosho	Spring R	2019-08-14	37.02435	-94.72218	6th	0	0	0	2	2	0	1	0	0	0	0
Neosho	Tauckett Crk	2019-09-17	38.17546	-95.57297	2nd	0	0	0	0	0	0	0	0	0	0	0
Neosho	Willow Crk	2019-08-14	37.03889	-94.75866	3rd	0	0	0	0	1	0	0	0	0	0	0
Spring	Brush Crk	2019-08-14	37.10043	-94.81336	1st	0	0	0	0	0	0	0	0	0	0	0
Spring	Brush Crk	2019-08-14	37.10470	-94.80188	1st	0	0	0	0	0	0	0	0	0	0	0
Spring	Brush Crk	2019-08-14	37.10757	-94.79529	1st	0	0	0	0	0	0	0	0	0	0	0

Spring	Brush Crk	2019-08-14	37.13399	-94.80017	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Brush Crk	2019-08-14	37.11523	-94.79082	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Brush Crk	2019-08-14	37.11200	-94.77727	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Brush Crk	2019-08-14	37.10469	-94.71695	1st	0	0	0	0	0	0	0	0	0	0	0
Spring	Brush Crk	2019-08-14	37.09023	-94.76495	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.33858	-94.64399	2nd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.37903	-94.70517	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.36742	-94.67681	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.37395	-94.66828	2nd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.38174	-94.66986	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.39635	-94.66909	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.38196	-94.64977	2nd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.36914	-94.64987	1st	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.33838	-94.63802	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.35023	-94.63159	2nd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.35285	-94.62445	2nd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.35076	-94.61763	1st	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.36730	-94.61805	1st	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.36786	-94.61754	1st	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.42564	-94.65006	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.42652	-94.64840	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.45489	-94.64705	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.45517	-94.71179	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.46983	-94.71961	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.48418	-94.68419	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.49873	-94.68986	2nd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cow Crk	2019-09-02	37.50277	-94.68664	1st	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-07-14	37.22206	-94.65273	4th	0	0	7	0	6	0	1	0	0	0	0
Spring	Cox Crk	2019-07-14	37.25137	-94.66938	4th	0	0	3	0	9	0	11	0	1	0	0
Spring	Cox Crk	2019-07-14	37.28067	-94.67434	4th	0	0	1	0	6	1	1	0	0	0	0
Spring	Cox Crk	2019-07-14	37.33853	-94.67323	4th	0	0	2	0	8	0	0	2	1	0	0
Spring	Cox Crk	2019-07-14	37.35477	-94.68688	4th	0	0	0	0	1	0	0	0	1	0	0
Spring	Cox Crk	2019-07-14	37.62949	-94.63374	4th	0	0	0	0	0	0	0	0	0	0	0

Spring	Cox Crk	2019-07-14	37.65326	-94.63009	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-07-14	37.66610	-94.63117	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-07-14	37.67347	-94.63359	4th	0	0	0	0	2	0	0	1	0	0	0
Spring	Cox Crk	2019-07-14	37.32395	-94.64129	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-07-14	37.38074	-94.71062	4th	0	0	0	0	2	0	0	0	1	0	0
Spring	Cox Crk	2019-07-14	37.57208	-94.65503	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-07-14	37.64413	-94.63386	4th	0	0	0	0	1	0	0	0	0	0	0
Spring	Cox Crk	2019-09-02	37.57212	-94.65501	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-09-02	37.58638	-94.64405	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-09-02	37.59251	-94.64166	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-09-02	37.61530	-94.63723	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-09-02	37.62954	-94.63424	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-09-02	37.64415	-94.63434	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-09-02	37.65313	-94.62990	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-09-02	37.66618	-94.63102	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-09-02	37.67243	-94.63651	2nd	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-09-02	37.67350	-94.63268	4th	0	0	0	0	0	0	0	0	0	0	0
Spring	Shawnee Crk	2019-07-14	37.11923	-94.68535	4th	0	0	0	0	2	0	0	0	1	0	0
Spring	Shawnee Crk	2019-07-14	37.14842	-94.67675	4th	0	0	0	0	2	0	1	1	0	0	0
Spring	Shawnee Crk	2019-07-14	37.16292	-94.68771	4th	0	0	0	0	1	0	0	0	0	0	0
Spring	Shawnee Crk	2019-07-14	37.17782	-94.69657	4th	0	0	0	0	4	0	0	0	0	0	0
Spring	Shawnee Crk	2019-07-14	37.18999	-94.72278	4th	0	0	0	0	4	0	0	0	0	0	0
Spring	Shoal Crk	2019-06-13	37.03210	-94.61890	4th	1	0	0	0	0	0	0	0	2	0	0
Spring	Shoal Crk	2019-06-13	37.03896	-94.66719	4th	0	0	0	0	0	0	22	0	0	0	0
Spring	Shoal Crk	2019-06-13	37.04222	-94.64215	4th	3	0	0	0	2	0	13	0	2	0	0
Spring	Shoal Crk	2019-06-13	37.04284	-94.65332	4th	1	0	0	0	3	0	2	0	0	0	0
Spring	Spring R	2019-06-13	37.02088	-94.72153	6th	0	0	3	10	3	0	3	0	4	0	0
Spring	Spring R	2019-06-13	37.02433	-94.72210	6th	0	0	0	5	5	0	6	0	0	0	0
Spring	Spring R	2019-06-13	37.02977	-94.72636	6th	0	0	1	1	2	0	0	0	0	0	0
Spring	Spring R	2019-06-13	37.05423	-94.73051	6th	0	0	1	26	3	0	3	0	0	0	0
Spring	Spring R	2019-06-13	37.05560	-94.70210	6th	0	0	1	3	5	0	16	0	0	0	0
Spring	Spring R	2019-06-13	37.10416	-94.66252	6th	0	0	1	4	1	0	5	0	0	0	0
Spring	Spring R	2019-06-13	37.10767	-94.65505	6th	0	0	2	6	31	1	6	0	0	0	0

Spring	Spring R	2019-06-13	37.13219	-94.62402	6th	0	0	1	7	13	0	8	1	2	0	0
Spring	Spring R	2019-06-13	37.17845	-94.64307	6th	0	0	4	2	5	0	3	0	2	0	0
Spring	Spring R	2019-06-13	37.05477	-94.69997	6th	0	0	0	0	0	0	1	0	1	0	0
Spring	Spring R	2019-08-14	37.05363	-94.72814	6th	0	0	0	0	0	0	0	0	0	0	0
Spring	Spring R	2019-08-14	37.10825	-94.65592	6th	0	0	0	0	0	0	0	0	0	0	0
Spring	Spring R	2019-08-14	37.13283	-94.62499	6th	0	0	0	0	0	0	0	0	0	0	0
Spring	Spring R	2019-08-14	37.17898	-94.64194	6th	0	0	0	0	0	0	0	0	0	0	0
Spring	Turkey Crk	2019-08-14	37.12809	-94.62506	2nd	0	0	0	0	0	0	0	0	0	0	0
Spring	Willow Crk	2019-08-14	37.04022	-94.74053	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Willow Crk	2019-08-14	37.03756	-94.77684	3rd	0	0	0	0	0	0	0	0	0	0	0
Spring	Willow Crk	2019-08-14	37.03703	-94.79512	2nd	0	0	0	0	0	0	0	0	0	0	0
Spring	Willow Crk	2019-08-14	37.04573	-94.79517	1st	0	0	0	0	0	0	0	0	0	0	0
Spring	Willow Crk	2019-08-14	37.04604	-94.80891	2nd	0	0	0	0	0	0	0	0	0	0	0
Spring	Willow Crk	2019-08-14	37.05525	-94.81330	2nd	0	0	0	0	0	0	0	0	0	0	0
Spring	Willow Crk	2019-08-14	37.06066	-94.80371	1st	0	0	0	0	0	0	0	0	0	0	0
Spring	Willow Crk	2019-08-14	37.06874	-94.81334	1st	0	0	0	0	0	0	0	0	0	0	0
Spring	Cox Crk	2019-07-14	37.30965	-94.67976	4th	0	0	0	0	1	0	0	0	0	0	0
Spring	Shawnee Crk	2019-06-13	37.10428	-94.68268	4th	0	0	4	0	9	0	6	0	0	0	0
Verdigris	Big Caney	2019-06-17	37.04125	-96.42152	5th	0	0	6	6	2	0	0	0	1	0	0
Verdigris	Big Caney	2019-06-17	37.04106	-96.43380	5th	0	0	2	0	0	0	0	0	0	0	0
Verdigris	Big Cedar Crk	2019-08-06	37.51012	-95.65192	4th	0	0	0	0	5	0	0	0	0	0	0
Verdigris	Big Cedar Crk	2019-08-06	37.52788	-95.63378	4th	0	0	0	0	13	0	0	0	0	0	0
Verdigris	Big Cedar Crk	2019-08-06	37.55885	-95.60302	3rd	0	0	0	0	4	0	0	0	0	0	0
Verdigris	Big Cedar Crk	2019-08-06	37.58773	-95.57220	3rd	0	0	0	0	0	0	0	1	0	0	0
Verdigris	Big Cedar Crk	2019-08-06	37.53984	-95.61556	4th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Big Cedar Crk	2019-08-06	37.57329	-95.59775	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Big Cedar Crk	2019-08-06	37.57518	-95.59691	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Big Cedar Crk	2019-08-06	37.58773	-95.57220	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Buffalo Crk	2018-09-30	37.73351	-95.68729	3rd	0	0	1	0	9	0	0	0	0	0	0
Verdigris	Buffalo Crk	2018-09-30	37.66105	-95.73585	4th	0	0	0	0	4	0	0	0	0	0	0
Verdigris	Buffalo Crk	2018-09-30	37.69559	-95.74244	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Buffalo Crk	2018-09-30	37.69745	-95.72455	3rd	0	0	0	0	13	1	0	0	0	0	0
Verdigris	Buffalo Crk	2018-09-30	37.69754	-95.74532	3rd	0	0	0	0	3	0	0	0	0	0	0

Verdigris	Buffalo Crk	2018-09-30	37.70804	-95.71909	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Buffalo Crk	2018-09-30	37.71174	-95.74664	3rd	0	0	0	0	1	0	0	0	0	0	0
Verdigris	Buffalo Crk	2018-09-30	37.71200	-95.74929	3rd	0	0	0	0	5	0	0	0	0	0	0
Verdigris	Buffalo Crk	2018-09-30	37.72253	-95.69748	3rd	0	0	0	0	1	0	0	0	0	0	0
Verdigris	Buffalo Crk	2018-09-30	37.72260	-95.70590	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.66105	-95.73585	4th	0	0	0	0	1	0	1	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.69737	-95.72487	3rd	0	0	0	0	6	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.70804	-95.71909	3rd	0	0	0	0	2	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.72907	-95.69156	3rd	0	0	0	0	2	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.73351	-95.68729	3rd	0	0	3	0	7	0	2	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.74778	-95.65446	3rd	0	0	0	0	5	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.75004	-95.65241	3rd	0	0	0	0	3	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.64376	-95.73468	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.69559	-95.74244	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.69754	-95.74532	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.72253	-95.69748	3rd	0	0	0	0	1	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.72260	-95.70590	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.74022	-95.67030	3rd	0	0	0	0	0	0	0	1	0	0	0
Verdigris	Buffalo Crk	2019-07-18	37.76214	-95.63670	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-08-06	37.64460	-95.73730	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Buffalo Crk	2019-08-06	37.64295	-95.72388	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Buzzard Crk	2019-06-17	37.00384	-96.31623	5th	0	0	0	4	1	0	1	0	0	0	0
Verdigris	Caney R	2019-06-17	37.09537	-96.47557	5th	0	0	3	0	0	0	0	0	0	0	0
Verdigris	Caney R	2019-06-17	37.01704	-96.34587	5th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Caney R	2019-06-17	37.05598	-96.44389	5th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Cedar Crk	2019-06-17	37.00954	-96.25568	4th	0	0	1	0	0	0	0	0	0	0	0
Verdigris	Cedar Crk	2019-06-17	37.01741	-96.26304	4th	0	0	0	0	2	0	1	0	0	0	0
Verdigris	Cedar Crk	2019-06-17	37.08796	-96.48954	3rd	0	0	0	0	2	0	1	0	1	0	0
Verdigris	Cedar Crk	2019-06-17	37.01741	-96.26304	4th	0	0	0	1	1	0	1	0	0	0	0
Verdigris	Chetopa Crk	2019-08-06	37.47703	-95.59721	3rd	0	0	0	0	5	0	0	1	0	0	0
Verdigris	Chetopa Crk	2019-08-06	37.47194	-95.63559	3rd	0	0	0	0	3	0	0	0	0	0	0
Verdigris	Chetopa Crk	2019-08-06	37.51432	-95.55423	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Chetopa Crk	2019-08-06	37.50579	-95.56138	2nd	0	0	0	0	0	0	0	0	0	0	0

Verdigris	Chetopa Crk	2019-08-06	37.50021	-95.56169	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Chetopa Crk	2019-08-06	37.49324	-95.57459	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Chetopa Crk	2019-08-06	37.48613	-95.58154	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Chetopa Crk	2019-08-06	37.49314	-95.67605	1st	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Clear Crk	2019-06-17	37.51078	-95.81955	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Crooked Crk	2019-08-06	37.61722	-95.70665	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Crooked Crk	2019-08-06	37.60265	-95.71248	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Crooked Crk	2019-08-06	37.59010	-95.71437	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Deer Crk	2019-06-17	37.12353	-96.19192	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Elk R	2019-09-15	37.35854	-96.12399	5th	0	0	6	3	5	0	1	0	0	0	0
Verdigris	Elk R	2019-09-15	37.37448	-96.18409	5th	0	0	4	7	0	0	0	0	2	0	0
Verdigris	Elk R	2019-09-15	37.37516	-96.18695	5th	0	0	1	0	4	0	1	0	0	0	0
Verdigris	Elk R	2019-09-15	37.42230	-96.21009	5th	0	0	2	0	1	0	0	0	1	0	0
Verdigris	Elk R	2019-09-15	37.44877	-96.28965	4th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Elk R	2019-09-15	37.45520	-96.25519	4th	0	0	4	0	2	0	0	0	2	0	0
Verdigris	Elk R	2019-09-15	37.46005	-96.31699	4th	0	0	1	0	0	0	0	0	0	0	0
Verdigris	Elk R	2019-09-15	37.46155	-96.32978	4th	0	0	2	0	2	0	0	0	0	0	0
Verdigris	Elk R	2019-09-15	37.46888	-96.33942	4th	0	0	1	0	1	0	0	0	1	0	0
Verdigris	Elk R	2019-09-15	37.46987	-96.34113	4th	0	0	0	0	6	0	4	0	0	0	0
Verdigris	Elk R	2019-09-15	37.47095	-96.34117	4th	0	0	1	1	2	0	1	0	0	0	0
Verdigris	Elk R	2019-09-15	37.47220	-96.34155	4th	0	0	2	0	2	0	1	1	1	0	0
Verdigris	Elk R	2019-09-15	37.47283	-96.34290	4th	0	0	2	0	1	0	1	0	0	0	0
Verdigris	Elk R	2019-09-15	37.47354	-96.34299	4th	0	0	0	0	0	0	1	0	1	0	0
Verdigris	Elk R	2019-09-15	37.47576	-96.34326	4th	0	0	8	0	5	0	0	0	3	0	0
Verdigris	Elk R	2019-09-15	37.50892	-96.39841	4th	0	0	0	0	1	0	0	0	0	0	0
Verdigris	Elk R	2019-09-15	37.51589	-96.40694	4th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Elk R	2019-09-15	37.52435	-96.41652	4th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Elk R	2019-09-15	37.53419	-96.42342	4th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Elk R	2019-09-15	37.45291	-96.28962	4th	0	0	0	0	1	0	0	0	0	0	0
Verdigris	Elk R	2019-09-15	37.55194	-96.45260	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Elk R	2019-09-15	37.56349	-96.46175	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Fall R	2019-06-18	37.41770	-95.69372	5th	0	0	0	1	1	0	0	0	0	0	0
Verdigris	Fall R	2019-06-18	37.43221	-95.72312	5th	0	0	0	4	0	0	0	0	0	0	0

Verdigris	Fall R	2019-06-18	37.45739	-95.72877	5th	0	0	3	2	1	0	0	0	0	0	0
Verdigris	Fall R	2019-06-18	37.50828	-95.83360	5th	0	0	0	4	0	0	0	0	0	0	0
Verdigris	Fall R	2019-06-18	37.50139	-95.85842	5th	0	0	0	0	1	0	0	0	0	0	0
Verdigris	Fall R	2019-06-18	37.52404	-95.90685	5th	0	0	0	2	1	0	0	0	0	0	0
Verdigris	Fall R	2019-06-18	37.53138	-95.92461	5th	0	0	0	1	0	0	0	0	0	0	0
Verdigris	Fall R	2019-06-18	37.56220	-95.94306	5th	0	0	0	0	2	0	0	0	0	0	0
Verdigris	Fall R	2019-06-18	37.58231	-95.95614	5th	0	0	0	1	0	0	0	0	0	0	0
Verdigris	Fall R	2019-06-18	37.61574	-96.04075	5th	0	0	0	0	1	0	0	0	0	0	0
Verdigris	Fall R	2019-09-15	37.78573	-96.23454	5th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Little Cedar Crk	2019-08-06	37.52271	-95.65696	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Little Cedar Crk	2019-08-06	37.54453	-95.64568	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Little Cedar Crk	2019-08-06	37.55889	-95.63797	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Little Cedar Crk	2019-08-06	37.56295	-95.63370	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	N Branch Verdigris R	2018-09-30	38.14010	-96.20190	4th	0	0	1	0	0	0	0	0	0	0	0
Verdigris	N Branch Verdigris R	2018-09-30	38.16745	-96.23949	4th	0	0	1	0	2	0	0	0	0	0	0
Verdigris	N Branch Verdigris R	2018-09-30	38.16919	-96.19390	4th	0	0	1	0	0	0	0	0	0	0	0
Verdigris	N Branch Verdigris R	2018-09-30	38.17283	-96.25807	4th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	N Branch Verdigris R	2019-10-08	38.16907	-96.19347	4th	0	0	1	3	0	0	0	0	0	0	0
Verdigris	Possom Trot Crk	2019-06-17	37.02436	-96.40680	5th	0	0	0	0	1	0	0	0	3	0	0
Verdigris	Rock Crk	2019-06-17	37.04493	-96.48952	4th	0	0	1	4	2	0	0	0	0	0	0
Verdigris	Rock Crk	2019-06-17	37.02752	-96.49130	1st	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Rock Crk	2019-06-17	37.02752	-96.57706	3rd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Ross Crk	2019-07-18	37.69215	-95.89800	2nd	0	0	0	0	1	0	0	0	0	0	0
Verdigris	S Branch Verdigris R	2018-09-30	38.13228	-96.21213	4th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Verdigris R	2018-09-30	37.66915	-95.83274	5th	0	0	2	17	9	0	0	0	1	0	0
Verdigris	Verdigris R	2018-09-30	37.70602	-95.90627	5th	0	0	1	0	0	0	0	0	0	0	0
Verdigris	Verdigris R	2018-09-30	37.83619	-95.96365	5th	0	0	12	12	4	0	0	0	0	0	0
Verdigris	Verdigris R	2018-09-30	38.13475	-96.10301	5th	0	0	0	0	1	0	0	0	1	0	0
Verdigris	Verdigris R	2018-09-30	37.62967	-95.75330	5th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Verdigris R	2019-06-18	37.41844	-95.67163	5th	0	0	2	8	0	0	0	0	2	0	0
Verdigris	Verdigris R	2019-07-18	37.62967	-95.75330	5th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Verdigris R	2019-07-18	37.66915	-95.83274	5th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Verdigris R	2019-07-18	37.70602	-95.90627	5th	0	0	0	0	0	0	0	0	0	0	0

Verdigris	Verdigris R	2019-07-18	37.83619	-95.96365	5th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Verdigris R	2019-08-06	37.55435	-95.69733	5th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Verdigris R	2019-08-06	37.55277	-95.67026	2nd	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Verdigris R	2019-09-15	38.14777	-96.15742	5th	0	0	1	0	0	0	0	0	0	0	0
Verdigris	Verdigris R	2019-10-08	38.14881	-96.15751	5th	0	0	3	0	3	0	0	0	0	0	0
Verdigris	Verdigris R	2019-10-08	38.14623	-96.13877	5th	0	0	8	0	0	0	0	0	0	0	0
Verdigris	Verdigris R	2019-10-08	38.13475	-96.10283	5th	0	0	9	0	4	0	0	0	0	0	0
Verdigris	Verdigris R	2019-10-08	38.11912	-96.08460	5th	0	0	3	0	0	0	0	0	0	0	0
Verdigris	Verdigris R	2019-10-08	38.08450	-96.05086	5th	0	0	3	0	3	0	0	0	0	0	0
Verdigris	Verdigris R	2019-10-08	38.05593	-96.05049	5th	0	0	2	0	1	0	0	0	0	0	0
Verdigris	Verdigris R	2019-10-08	37.99664	-96.02389	5th	0	0	4	5	4	0	1	0	0	0	0
Verdigris	Verdigris R	2019-10-08	37.98249	-96.02359	5th	0	0	2	6	5	0	2	0	3	0	0
Verdigris	Verdigris R	2019-10-08	37.94201	-96.01366	5th	0	0	8	2	2	0	0	0	0	0	0
Verdigris	West Crk	2019-07-18	37.89014	-96.03123	4th	0	0	1	2	0	0	2	0	0	0	0
Verdigris	West Crk	2019-07-18	37.89546	-96.04625	4th	0	0	2	0	1	0	1	0	0	0	0
Verdigris	West Crk	2019-07-18	37.91063	-96.05825	4th	0	0	4	0	0	0	0	0	0	0	0
Verdigris	West Crk	2019-07-18	37.91462	-96.06770	4th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	West Crk	2019-07-18	37.92669	-96.08587	4th	0	0	4	0	3	0	0	0	0	0	0
Verdigris	West Crk	2019-07-18	37.93947	-96.08962	4th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	West Crk	2019-07-18	37.96867	-96.09650	4th	0	0	0	0	0	0	0	0	0	0	0
Verdigris	Willow Crk	2019-07-18	37.98691	-96.13988	3rd	0	0	0	0	0	0	0	0	2	0	0
Verdigris	Willow Crk	2019-07-18	38.01554	-96.14564	3rd	0	0	0	0	0	0	0	0	0	0	0

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Michael Stephen Mahr

Typed Signature of Author

XX October 2020

Date

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