



[Kansas Chapter of the American Fisheries Society](#)

North Central Division - Rivers and Streams Technical Committee 2021 Report

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Hello fellow Rivers and Streams enthusiasts,

Below are summaries of many activities related to rivers and streams going on (or just wrapping up) in Kansas. There is a lot of information here, so to save space I have collapsed much of that below each pertinent project. If you have questions about any of projects we have going on, feel free to reach out to me and I can get you in contact with the appropriate project coordinator.

Invasive Carp management

[Kansas River recreationalist survey - Invasive carp communication and outreach in the Missouri River Basin](#)

Chris Steffen, Susan Steffen, and Lucas Kowalewski - Kansas Department of Wildlife and Parks (KDWP)

The Kansas River basin drains approximately the north half of the state of Kansas and flows East to its confluence with the Missouri River at Kansas City, Kansas. Invasive carp are abundant from the Missouri River confluence upstream to the Bowersock Dam at Lawrence, Kansas (rkm 83).

The Kansas River is one of only three rivers in the state of Kansas that is legally a publicly navigable river. The designation allows for public recreation such as kayaking/canoeing, fishing, hunting, wildlife viewing, etc. Additionally, the Kansas River was designated as a National Water Trail in 2012 by the National Park Service. This designation, as well as the recent nationwide surge of participation in kayaking, appears to have led to increasing use of the Kansas River by paddlers. A burgeoning trophy blue catfish population also appears to be increasing angler use of the Kansas River. The Kansas River is a unique and increasingly valuable destination for outdoor recreation in the State of Kansas.

The impacts of invasive carp to recreationalists are not well understood. KDWPT occasionally receives reports of unfavorable interactions between recreationalists and invasive carp, but it is likely that most of these interactions are unreported. Additionally, there is concern that some blue catfish anglers may be tempted to transport invasive carp to other waterbodies based on their belief that the presence of invasive carp lead to the development of the trophy blue catfish fishery. The prevalence of this perception is unknown, and education and outreach are needed to address this issue.

Objectives:

1. Conduct a survey of Kansas River recreationalists to understand user groups and assess invasive carp perceptions and impacts to inform future management decisions.

2. Raise awareness of invasive carp by distributing educational information to Kansas River recreationalists.

3. Conduct a creel survey of Kansas River anglers to obtain estimates of pressure, catch, and harvest.

From March to October 2022, KDWP will conduct in-person (i.e., on-river) surveys of recreationalists in the invasive carp infested portion of the Kansas River basin. The survey will collect information from recreationalists about specific impacts and challenges they have experienced in relation to invasive carp. Data will also be collected to determine if the presence of carp changes type of use or frequency of use of the river by recreationalists. The survey will also ask about how recreationalists perceive invasive carp as well as desires they have for invasive carp management. Finally, conducting the survey will provide opportunities for direct education and outreach about invasive carp.

KDWP has a fisheries-focused human dimensions specialist on staff that will assist in survey design, data collection, and data analysis. Inclusion of this expertise will help improve the overall project and interpretation of results. Grant funding would be used to acquire equipment and hire seasonal staff. By understanding recreationalists and their experiences, perceptions, and desires, KDWP can better manage invasive carp and their impacts in the Kansas River system.

Kansas River Bowersock Dam Invasive Carp Deterrent Feasibility Study

Lead Agency and author: Kansas Department of Wildlife and Parks (KDWP), Chris Steffen
(chris.steffen@ks.gov)

Partners: USFWS, City of Lawrence, Bowersock Mills and Power, Kansas Alliance of Wetlands and Streams, Juniper Environmental

Objective:

1. Conduct a feasibility study to determine the options and approximate costs for an Asian Carp barrier at Bowersock Dam during high flow events.

Statement of Need:

Introduced invasive carps (Bighead Carp, Black Carp, Grass Carp, and Silver Carp) have become established in many portions of the Mississippi River basin since the 1970s. Bighead and Silver Carp were first noted in the Kansas River in 1987 and 1991, respectively. Invasive carp were introduced into waters of the United States as the result of combinations of direct stockings by (or authorized by) various agencies, unauthorized stockings by private individuals, and unintentional escapes from university research facilities, federal and state agency facilities, and private aquaculture operations. The diets of Bighead and Silver Carp overlap with some native species. Bighead and Silver Carp can consume the majority of available plankton where populations become abundant and alter food webs. These (and other) detrimental impacts of Asian Carp have the potential to cause ecological, recreational, and economic harm.

The Kansas River drains approximately the north half of the state of Kansas and a portion of south-central Nebraska and flows east to its confluence with the Missouri River at Kansas City. Only six (6) Bighead Carp have been documented upstream of this barrier (KDWP, unpublished data). These fish are suspected passed over the Bowersock Dam during extreme flooding in 1993. At that time, invasive carp populations in the Kansas River were very low and the numbers of fish that migrated upstream over the dam were insufficient to establish breeding populations in the upper portion of the river basin.

A deterrent to upstream movement of invasive carp at Bowersock Dam during high flow events could prevent invasive carp from establishing breeding populations in the upper Kansas River basin. The upper Kansas River basin represents one of the few large, unimpounded reaches of Midwestern prairie rivers that remains unimpacted by invasive carp and harbors a relatively intact ecosystem of native fishes.

Project Status:

KDWP received a grant from USFWS to conduct the feasibility study. KDWP has contracted with Juniper Environmental and Kansas Alliance of Wetlands and Streams to conduct the feasibility study and produce a report which summarizes information on potential deterrent options as well as approximate costs. The feasibility study is nearing completion and will be finalized by the end of January 2022. The study will be used to determine which current deterrent technologies could be most practically integrated into the Bowersock dam to prevent upstream spread of invasive carp during high flow events. Following completion of this study, KDWP will seek funding to install the recommended deterrent.

Distribution and Population Demographics of Bighead Carp in the Neosho River-Grand Lake System to Inform Removal

Lead Agency and author: Kansas Department of Wildlife and Parks, Chris Steffen
(chris.steffen@ks.gov)

Partners: Oklahoma Department of Wildlife Conservation (ODWC), Missouri State University (MSU), United States Fish and Wildlife Service (USFWS)

Objectives:

1. Identify locations of presence and upstream extent of Bighead Carp population within the Neosho River – Grand Lake system.
2. Collect baseline population demographic information including relative abundance, age and growth, and size structure.
3. Determine broadscale movements within the Neosho River system using otolith microchemistry.
4. Identify locations within the Neosho River – Grand Lake system for containment, removal, and/or eradication efforts.

Statement of Need:

Introduced invasive carps (Bighead Carp, Black Carp, Grass Carp, and Silver Carp) have become established in many portions of the Mississippi River Basin. The feeding habits and population

densities of invasive carps cause significant ecological harm where populations become established. The resulting diminished opportunity for fishing (recreational and commercial), boating, and other wildlife-associated recreation causes significant negative economic impact.

Bighead Carp are occasionally captured within the Neosho River/Grand Lake system, but very little targeted sampling has occurred in either Kansas or Oklahoma. Existing bighead carp records are from a combination of public captures (primarily from paddlefish anglers) and incidental capture of bighead carp by ODWC while sampling for other fishes. Due to the limitations of the existing data, the precise distribution and abundance of Bighead Carp in the system is unknown.

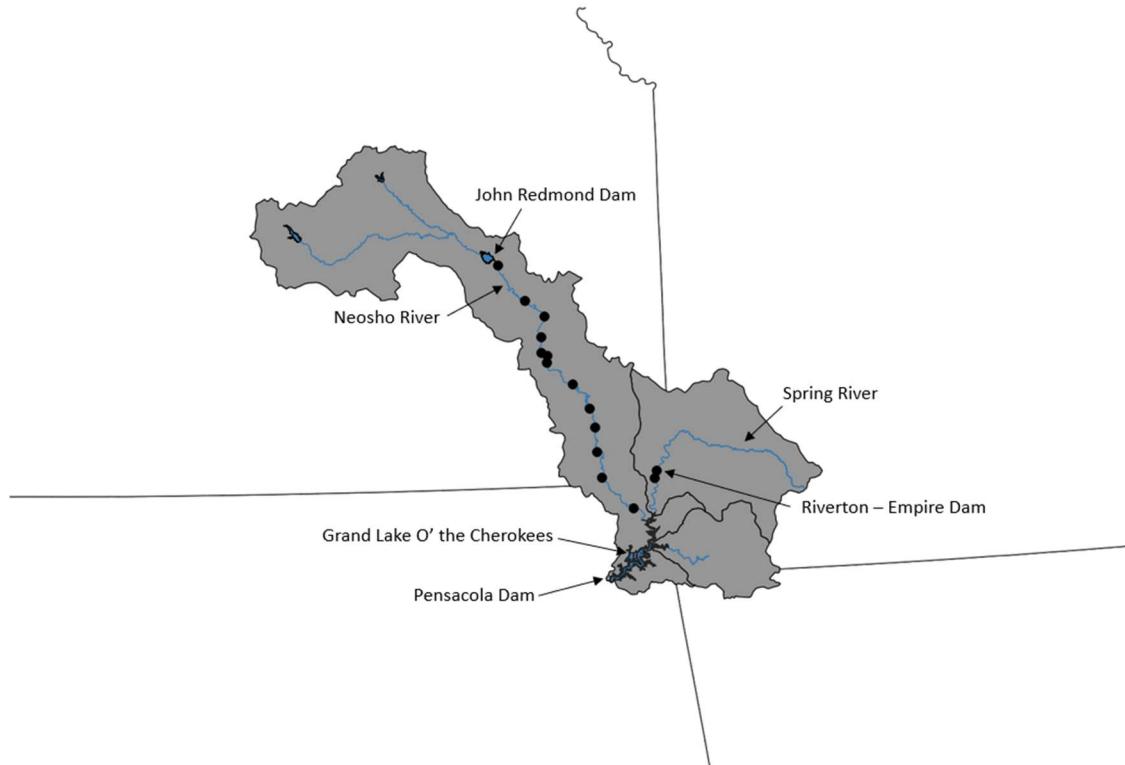
This population of bighead carp also represents the only known population of either species of bigheaded carps in the United States to be potentially reproducing in a reservoir completely isolated from the source populations. This provides a unique opportunity to learn about invasive carp and test ideas for removal or suppression in this type of system. Reservoir systems are incredibly important recreationally and economically in the United States. As invasive carp spread up Mississippi River tributaries and congregate below reservoir dams, the risk of introduction of invasive carp to these reservoirs increases; as does the need to learn more about how to manage invasive carp populations in reservoirs.

This project is planned as a stepping-stone to future work. Bighead carp density and reproduction is likely low in the system, which potentially provides an opportunity to suppress the population prior to them reaching problematic levels seen in other systems. This initial work will provide guidance on how, where, and when to capture bighead carp in this system as well as provide insight into the current size of the population.

Project Status:

KDWPT received a grant from USFWS to complete this project. KDWP has contracted with Missouri State University to conduct the project activities. ODWC and KDWP are assisting with project objectives as needed. One field season of sampling has been conducted. Field work will continue March 2023. Following completion of this project, KDWP will seek funding to suppress the population of bighead carp in this system.

Map of Project Area (unlabeled dots indicate lowhead dam location):



Estimated Timetable for activities

| Activity | Time Period (Season, month/year) |
|---|-------------------------------------|
| Water Chemistry Sampling | May 2021 |
| eDNA sampling, traditional sampling | May-July 2021 |
| Water Chemistry Sampling | July-August 2021 |
| Data Analyses (Population Demographics) | August 2021 |
| eDNA sampling, traditional sampling | October 2021 |
| Water Chemistry Sampling | December 2021 |
| eDNA sampling, traditional sampling | January 2022 |
| Data Analyses (Population Demographics) | February 2022 |
| eDNA sampling, traditional sampling | March 2022 |
| Data Analyses (Population Demographics) | April 2022 |
| eDNA sampling, traditional sampling | May-July 2022 |
| Data Analyses (Population Demographics) | August 2022 |
| Otolith Chemistry Sampling | August 2022 |
| eDNA sampling, traditional sampling | October 2022 |
| Data Analyses (Population Demographics) | December 2022 |
| eDNA sampling, traditional sampling | January 2023 |
| Data Analyses (Population Demographics) | February 2023 |
| Otolith Chemistry Sampling | February 2023 |
| eDNA sampling, traditional sampling | March 2023 |
| Summary and Reporting | March-April 2023 |

Stream and River Research and Surveys

[Comparison of Neosho Madtom \(*Noturus placidus*\) population density between the Neosho-Cottonwood and Spring Rivers: does changing water quality and food availability explain density differences?](#)

Grant period: 1 October 2018 – 31 March 2022

Principal Investigator:

James E. Whitney PhD, Assistant Professor
Pittsburg State University – Department of Biology
Pittsburg, KS 66762
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Grant manager:

Jordan Hofmeier, Aquatic Ecologist
Kansas Department of Wildlife, Parks, and Tourism
Pratt, KS 67124
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Study Area

This study will be conducted across 20 sites in the Neosho River basin of Kansas. Specifically, 10 sites will be located in the Neosho–Cottonwood River system, with the other 10 sites in the Spring River subbasin (Figure 2A). Within the Spring River subbasin, five sites will be located upstream of mining contamination, with the other five sites located downstream of pollution inputs from contaminated tributaries (Figure 2B). All sites occur within the Neosho River Ecological Focus Area.

Objectives

1. The first objective of the proposed project is to quantify and compare Neosho Madtom population densities among the Neosho–Cottonwood system, Spring River upstream of pollution, and Spring River downstream of pollution, to see if Neosho Madtom have responded to improving water quality in the Spring River. We predict that Neosho Madtom densities in the Spring River have increased because of improving water quality, such that densities in the Spring River will be more similar to the Neosho-Cottonwood River than in the early 1990s. Addressing this objective will provide an updated look at the status and trends of the Neosho Madtom in Kansas, which can inform future conservation decisions.
2. The second objective of this proposal is to compare macroinvertebrate density and biomass among the Neosho–Cottonwood system, Spring River upstream of pollution, and

Spring River downstream of pollution, to assess whether food availability explains differences in Neosho Madtom population densities. We predict that higher macroinvertebrate density and biomass will result in greater Neosho Madtom population densities. Testing this prediction will provide important information concerning environmental factors that limit the distribution and abundance of the Neosho Madtom in Kansas.

Preliminary results: Total of 129 Neosho Madtoms observed (103 in Neosho-Cottonwood, 26 in Spring River) in 2019. Total of 478 Neosho Madtoms observed (359 in Neosho-Cottonwood, 119 in Spring River) in 2020. Site specific densities have been highly variable, but there seems to be no difference in madtom density in the Spring River compared to the Neosho/Cottonwood system, indicating Spring River populations may have rebounded following water quality improvement. There was also no difference in macroinvertebrate densities between systems.



Genetic diversity of the Neosho Madtom (*Noturus placidus*)

Duration: 1 October 2020 – 30 September 2022

PI: Marlis Douglas, University of Arkansas; Jeremy Tiemann, Illinois Natural History Survey

Grant Manager: Jordan Hofmeier, KDWP

Background – The Neosho Madtom *Noturus placidus* is a small (<5 in.) catfish that occupies gravel riffles with moderate flows in the Neosho River basin in southeastern Kansas, southwestern Missouri, and northeastern Oklahoma (Wildhaber 2011; Figure 1). The species was listed as federally-threatened in 1990, primarily due to range reduction caused by anthropogenic habitat alterations (USFWS 1991). With 15 lowhead dams and 3 federal reservoirs, impoundments are one of the leading causes of anthropogenic habitat alterations in the Neosho River basin (Tiemann et al. 2004; Wildhaber 2011). Today, *N. placidus* populations exist in three distinct regions separated by reservoirs – 1) the Neosho River basin (including the Cottonwood River) above John Redmond Reservoir in Kansas, 2) the Neosho River basin below John Redmond Reservoir in Kansas and Oklahoma, and 3) the Spring River in Missouri, Kansas, and Oklahoma (USFWS 1991; Wildhaber 2011).

Objectives – The goal of this proposed study is to quantify the spatial genetic structure, connectivity and genetic characteristics of *N. placidus* populations in the Neosho River basin. We will address six objectives to assist with conservation planning.

Specific objectives include:

1. Collect Neosho Madtoms from 15–20 sites in the Neosho River basin, with emphasis on comprehensive spatial (# of sites) and site specific (# of individuals/site) sampling
2. Screen genetic diversity across ~40,000 loci/sample using ddRADseq (double-digest Restriction-Site Associated DNA Sequencing)
3. Determine spatial genetic structure to identify distinct populations, quantify population connectivity (gene flow), and delineate potential conservation units
4. Correlate spatial genetic patterns with riverscape characteristics to identify geographic features that modulate dispersal (e.g., lowhead dams)
5. Derive standard population genetic parameters to determine demographic status and trends (e.g., recent population declines, bottlenecks, low effective population size)
6. Identify loci under selection and re-evaluate population genetic patterns to test for local adaptation

Progress on Project Objectives September 2021 - November 2021

Objective 1: *Collect Neosho Madtoms from 15–20 sites in the Neosho River basin, with emphasis on comprehensive spatial (# of sites) and site specific (# of individuals/site) sampling*

Accomplishments Objective 1: Sampling

- A revised sampling plan was derived during the previous quarter and all necessary collecting permits were obtained and approved.
- Sampling was conducted during the previous quarter from 8-13 August 2021 at 19 sites throughout the Neosho River basin.
- At 14 of these sites, Neosho Madtom was encountered: 3 sites in the Cottonwood River, 9 sites in the Neosho River, and 2 sites in the Spring River.
- From these 14 sites, a total of 192 fin clips representing Neosho Madtom clips were collected.
- One additional site in the Neosho River yielded, samples of Freckled Madtom and Stonecat, but no Neosho Madtom.
- Where present, fin clips of other madtoms (e.g., Freckled Madtom, Slender Madtom, and Stonecats) were also collected (N=57) when encountered to explore potential of hybridization amongst closely related madtom species. Admixture could impact results of genetic analyses.

Objective 2: *Screen genetic diversity across ~40,000 loci/sample using ddRADseq (double-digest Restriction-Site Associated DNA Sequencing)*

Accomplishments Objective 2: Genetic screening

- Fin clip samples gathered in the field during the previous quarter were transferred to the lab at the University of Arkansas.
- A sample database was established for cross-referencing genetic data with meta data (e.g., field data).
- Existing lab protocols were used on a subset of samples to ensure high-quality DNA will be obtained. DNA concentrations suggested sufficient amounts of DNA for robust sequencing/genotyping of individuals.

- Genomic DNA was extracted from all individuals. DNA concentrations indicated good yields from all extractions.
- Genomic DNA will be prepared for next-generation sequencing using existing lab protocols for ddRADseq beginning next quarter.



Developing a Strategic Planning Process for Native Fish Restoration

Grant Period: January 1, 2020 – September 30, 2024

PI: Martha Mather, Kansas State University/USGS Wildlife and Fisheries Coop Unit

Grant Manager: Jordan Hofmeier, KDWP

Summary: We will be developing a planning process for fish restoration that is field-tested, widely applicable, and ultimately designed to adapt to change (habitat conditions, new species listings, etc.). This process will guide selection of release sites and post-release monitoring methods. Information gathered at each stage of restoration will feed back into the process, allowing for adaptive management and incremental improvement of population restoration.

Brief Description of Project / Research Objectives:

1. Identify a process to create and modify a dynamic strategic plan that guides fish restoration
2. Identify high priority candidate species and locations for restoration.
 - a.) For 1-4 species in 1-4 locations, use literature on species life history to identify ecological needs, threats, and potential remedies.
3. Synthesize, integrate, summarize peer-reviewed literature to understand what is known, gaps, and best available practices for success related to
 - a.) Restoration
 - b.) Stocking
4. Use existing databases to guide future restoration plans, decisions, and priorities for
 - a.) Habitat
 - b.) Fish distribution and abundance
5. Conduct field studies that develop and test protocols to evaluate restoration using target and/or surrogate species (density, timing, evaluation).
6. Make recommendations for an adaptive management plan to aid future conservation actions.

Status Update: Students have begun literature review portion of project, “test” fish species have been selected based on life history characteristics and habitat requirements, data exploration has begun on KDWP stream survey database.

Sampling designs for long-term monitoring of lentic and lotic crayfish in Kansas

Principal Investigator(s): Zach Klein, New Mexico State University, Chris Steffen, KDWPT

KDWP Contact: Chris Steffen/Jordan Hofmeier

Start Date – End Date:

Location: Statewide

Objectives:

1. Compare a suite of common sampling techniques for sampling crayfish assemblages in lentic and lotic environments
2. Evaluate habitat-species relationships for crayfish assemblages in lentic and lotic environments
3. Investigate the effort requirements required to sample crayfish with an acceptable level of precision
4. Provide management recommendations to the Kansas Department of Wildlife, Parks, and Tourism regarding long-term monitoring of crayfish in lentic and lotic environments.

Summary: Project will provide valuable distributional data for native and invasive crayfish, one of our most data-deficient taxonomic groups. It will also provide a baseline for methods and levels of effort required for intensive sampling in the future.

Preliminary Results: Approximately 1,450 crayfish were sampled during the first sampling season. A total of 120 crayfish was sampled in lentic systems and 1,330 crayfish were sampled in lotic systems. Three species were sampled during the sampling season. Northern Crayfish *Faxonius virilis* were collected at all sampling locations. White River Crayfish *Procambarus acutus* were detected at McPherson Lake and Battle Creek. Additionally, the first occurrence of Rusty Crayfish *Faxonius rusticus* in Kansas was observed at McPherson Lake.



[Biodiversity Survey and Assessment of Kansas Species of Greatest Conservation Need](#)

Principal Investigator(s): KDWP Ecological Services Section

KDWP Contact: Mark Van Scoyoc

Start Date – End Date: January 1, 2019 – December 31, 2021

Cylindrical Papershell Survey:

Goal: Survey for the Kansas endangered Cylindrical Papershell on the Saline and Smoky Hill Rivers in their modern range to determine the stability of the population after several years of seasonal flow in those rivers.

Objective: Find Cylindrical Papershell populations in the Saline and Smoky Hill Rivers that contained stable enough populations to remove a few female Cylindrical Papershells to use as brood stock at the Kansas Aquatic Biodiversity Center to propagate this endangered species and repatriate into current and historical ranges to create more stable populations affected by drought.

Gained access for permission to survey on 35 private landowners

Tactile surveyed 15 sites on the Saline River consisting of 15.19 miles

Tactile surveyed 12 sites on the Smoky Hill River consisting of 12.23 miles.

Salt Creek, a trib to the Saline River was also surveyed.

TOTAL: 28 sites surveyed consisting of 27.94 miles for the Cylindrical Papershell

Only one Cylindrical Papershell was observed from the Smoky Hill River in Rush Co.

Nine live mussels were observed in the Saline River consisting of two species

829 live mussels were observed in the Smoky Hill River consisting of seven species

Total: 838 live mussels observed consisting of 8 species

| | # SITES | DISTANCE SURVEYED miles |
|------------------|-----------|----------------------------|
| SALINE RIVER | 15 | 15.19 |
| SMOKY HILL RIVER | 12 | 12.23 |
| SALT CREEK | 1 | 0.52 |
| TOTALS | 28 | 27.94 |

LIVE MUSSELS

| | # | # SPECIES |
|------------------|------------|-----------|
| SALINE RIVER | 9 | 2 |
| SMOKY HILL RIVER | 829 | 7 |
| TOTALS | 838 | 8 |

| SPECIES | # |
|------------------------|----------|
| Mapleleaf | 681 |
| Fragile Papershell | 81 |
| Pink Papershell | 52 |
| Giant Floater | 14 |
| Paper Pondshell | 5 |
| Pondhorn | 3 |
| Pimpleback | 1 |
| Cylindrical Papershell | 1 |

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Next Summer:

- Continue to survey stretches of the Saline and Smoky Hill Rivers that didn't get surveyed.
- Focus part of the summer on lower reaches of perennial tributaries to the Saline and Smoky Hill Rivers that didn't go completely dry during the drought.
- spend some time focusing on mussels beds performing quadrat surveys to determine if there is any recruitment occurring of the Cylindrical Papershell.
- collect a sample of Cylindrical Papershell genetic material



CREP: Conservation Reserve Enhancement Program

Completed our 13th year of a 15 year program of biomonitoring for the CREP program of five sites along the Arkansas River in the Upper Arkansas River basin.

We were only able to conduct one survey out of five. Two sites were dry and ironically the other two sites were flooded in early August.

Plains Minnow Repatriation:

486 Plains Minnows were collected from the Salt Fork of the Arkansas River in Barber Co. in early June and late July to be repatriated into their historical range of the Lower Arkansas River basin.

66 of these Plains Minnows went to the Kansas Aquatic Biodiversity Center for propagation work.

We have one more collection of Plains Minnows this fall to be repatriated in one location in the Arkansas River and a sample will be put into the newly renovated aquariums at the Pratt Education Center. Another sample will be sent to Kansas Aquatic Biodiversity Center for more propagation studies.

Miscellaneous river surveys:

Surveyed the Lincoln Street Fish Ladder on the Arkansas River in Wichita only one time this summer. Twelve species were observed consisting of 3,089 individuals. The lower third of the baffles in the passage are either completely filled or partially filled with sand which creates an even greater barrier to move upstream.

Conducted five protocolled stream surveys in and near the Walnut River basin.

Kansas River and Arkansas River continued to be surveyed. More Spotted Gar (verified photographically with Dr. Solomon David, Nicholls State University Thibodaux, LA) were surveyed and DNA samples collected on the Ark River. No Sicklefin or Sturgeon Chub were encountered on the Kansas River, but

adult Shoal Chub were surveyed consistently along the Kansas above Bowersock Dam. Young-of-year Shoal Chub were also surveyed along Republican River above Milford Reservoir.

Helped sample Alligator Snapping Turtles for a week, with good numbers of turtles collected in northern Oklahoma.



Verdigris River Mussel Survey

KDWP Contact: Ed Miller

In 1991, eight sites on the Verdigris River were selected to assess freshwater mussel (Family Unionidae) diversity, density and size structure. Each site measured 100 x 10m and was sampled by hand-digging mussels from 40 randomly placed 1-m² quadrats (4% sample). Mussels were identified and measured then returned to the river. This same sampling effort was repeated in 1997, 2003, 2009, 2015 and 2021. Over the six sampling periods, 24,839 specimens were identified and measured, representing 22 species. Mussel density significantly increased in the early 2000s and has been relatively stable over the last 18 years. Most species have shown significant population increases, but a few decreased. The five most common species made up 77% of the total count and use either catfish or minnows as their primary fish hosts. Positive freshwater mussel trends on this reach of river bode well for the health of the watershed and river ecosystem.

| Year | Mean Mussels per quadrat across all 8 sites |
|---------|---|
| 1991 | 5.93 |
| 1997 | 8.49 |
| 2003 | 16.13 |
| 2009-10 | 14.27 |
| 2015 | 17.05 |
| 2021 | 15.72 |



Distribution, Abundance, and Conservation Status of Mudpuppies and Common Map Turtles in Kansas

Principal Investigator(s): David Edds, Emporia State University
Alexis Powell, Emporia State University
Greg Seivert, Emporia State University

KDWP Contact: Daren Riedle

Start Date – End Date: January 9, 2018 – May 31, 2020

Brief Description of Project / Research Objectives:

Objectives:

1. Sample a minimum of 150 sites across 5 Aquatic Ecological Focus Areas (EFAs) in eastern Kansas:
 - a. Lower Arkansas River EFA
 - b. Walnut River EFA
 - c. Verdigris River EFA
 - d. Neosho River EFA
 - e. Marais des Cygnes River EFA
2. Determine presence/absence of three target species at these sites
3. Use the results of the trapping and eDNA surveys to develop distributional and habitat models for all three species
4. Use results of the surveys to identify issues affecting population persistence in the three target species
5. Develop a recovery plan for the Common Map Turtle, a State Threatened species

Status: Last spring Alexis Powell and his students finished their survey efforts for Common Map Turtles in eastern Kansas. Common Map Turtles were last surveyed in the state in 1990 by David Edds using baited hoop traps, and they only captured 10 individuals. This time around survey crews combined hoop trapping with scanning for basking turtles using spotting scopes. A total of 111 individuals were observed, and of those 111 only 6 were captured in turtle traps. As far as optimal survey methods for this species goes, this is pretty telling. Notable records during the survey include the first captures of the species in Kansas River drainage, as well as the Missouri River drainage in Kansas. Common Map Turtles were not observed in the Spring River drainage during the 1990 survey, but they were observed during this survey. Jenn Rader observes them quite frequently on Shoal Creek.

Little is known about the distribution of Mudpuppies in Kansas. One hundred and forty-four sites were sampled for a total of 2141 net nights. Thirteen Mudpuppies were captured at 12 sites. While few Mudpuppies were captured, individuals were captured at new sites on the Marais Des Cygne, Neosho, and Verdigris rivers. Additionally, a specimen was captured in the Elk River, a River where the species was previously unknown. I also trapped Mudpuppies in two reservoirs—Pomona Lake and Melvern Lake—to study seasonal activity patterns, bait preference, and local population sizes and 251 individuals in the two reservoirs, with a catch per unit effort of 0.006 and 0.027 per trap night, respectively. Mudpuppy activity was highest between early November and late April and exhibited a bimodal distribution at Melvern Lake, with peaks at the beginning and end of that period. Study areas at Pomona Lake and Melvern Lake had populations estimated to be 818.5 ± 537.0 and 967.9 ± 507.9 individuals respectively.



Post Release Monitoring of Alligator Snapping Turtles

Principal Investigator(s): Day Ligon – Missouri State University

KDWP Contact: Daren Riedle

Start Date – End Date: January 1, 2020 – May 31, 2022

Objectives:

1. Post release monitoring of Alligator Snapping Turtles in the Verdigris and Neosho rivers
2. Continued monitoring for immigration from release sites.
3. Development of a success criteria via Population Viability Analyses for conservation efforts within the Arkansas River drainage in Kansas and Oklahoma

Status Update:

We trapped a total of 176 net nights on the Caney River and its tributary Pond Creek 03 June–13 June 2020 and captured 307 turtles—289 unique individual turtles—for an average capture rate of 1.74 turtles per net night. Seven species were detected; *Trachemys scripta* were caught most frequently, followed by *Apalone spinifera*. Average morphometric measurements were calculated for each species. We caught 28 *Macrochelys temminckii* ranging from 176.9 mm to 396.0 mm in carapace length (1.35–17.4 kg).

We trapped a total of 191 net nights on the Verdigris River and its tributary Big Creek 02 August–07 August 2020 and captured 704 turtles—650 unique individual turtles—for an average capture rate of 3.68 turtles per net night. Seven species were detected; *Trachemys scripta* were again the most common species captured, followed by *Graptemys ouachitensis*. Average morphometric measurements were calculated for each species. We caught 35 *Macrochelys temminckii* ranging from 191.1 mm to 393.8 mm in carapace length (1490–7250 g). *Macrochelys temminckii* captured in the Verdigris River were on average smaller than the individuals captured on the Caney River. Release of head-started *M. temminckii* into the Verdigris River first occurred in 2012 and the oldest individuals released were members of the 2007 age class. Releases occurred on the Caney River as early as 2009, and oldest released individuals were from the 2003 age class. As such, *M. temminckii* inhabiting the Verdigris River are expected to be generally smaller than at the more established population inhabiting the Caney River site.

In 2020, 28 individual Alligator Snapping Turtles were caught on the Caney River. Eight individuals met the minimum threshold for reproductive maturity and were taken to the Tulsa Zoo to be examined. Of the three turtles identified as male, none of them had active spermatogenesis; all three had teste

melanization and biopsied tissue samples were composed of seminiferous tubules, sertoli and interstitial cells. Five individuals were females in various stages of reproductive maturity. Dr. Kay Backues, DVM, at the Tulsa Zoo diagnosed likelihood of nesting based upon size and other characteristics of the oviduct. Two females likely laid eggs in 2020 (5B79 and 5B14) and two will most likely nest next season (5719 and 0C64). The smallest female (1C05) appeared to be at an earlier stage of maturity and will probably not lay for another two seasons or more.

We sampled two sites in Kansas the summer of 2020. We first sampled a segment of the Neosho River near the Harmon Wildlife Area (37.0465, -95.0825). We also trapped on the Walnut River—a tributary of the Arkansas River (37.0568, -97.0254). We used the same trapping methods as used during sampling on the Verdigris and Caney rivers. Species, sex, carapace length, plastron length, and mass of each individual were recorded, and a shallow notch was applied to a posterior marginal scute to signify it was captured previously.

Neosho River—Harmon

Trapping took place on 18 and 19 July 2020 and resulted in 142 captures of 124 individual turtles. We trapped a total of 30 net nights for a capture rate of 4.7 turtles per net night. The section of the Neosho River that was on public land was small, so we set nets in the same locations both nights. Average morphometric measurements were calculated for each of three species captured. While we were on the river, we observed high levels of public use. On each day of sampling, we documented at least six boats and several fishermen on the riverbanks.

Walnut River

We sampled the Walnut River for 56 net nights on 21 July through 24 July 2020. We totaled 339 captures of 289 individual turtles representing six species. The capture rate at this site was 6.1 turtles per net night. Most notable were the captures of *Apolone mutica* and *Chrysemys picta*—two species that are less commonly detected during our past sampling efforts in Kansas. Average morphometric measurements were calculated for each species detected.

Conservation Genomics of the Neosho Mucket (*Lampsilis rafinesqueana*)

Principal Investigator(s): David Berg, Miami University

KDWP Contact: Edwin Miller

Objectives:

1. Collect DNA swabs from individuals from each of the eight rivers with extant populations.
2. Modify current restriction site-associated sequencing (RADseq) methods to quantify genomic variation in this species, and then refine our current analytical pipeline to analyze genotype data from ~10,000 loci per individual.
3. Use these methods to calculate common descriptors of within-population genetic variation (sequence similarity, average heterozygosity, genetically effective population size), conduct hierarchical analyses of among population variation, and estimate historical and contemporary gene flow among populations.

Conclusions and Recommendations: We found that within the occupied rivers, there are two genetic populations of *Lampsilis rafinesqueana*. The more diverse of the two populations is comprised of the rivers in the Illinois and Neosho basins. However, we are unable to determine the status of the Neosho River itself, as no samples were available for this study. The second major population includes the two

occupied rivers of the Verdigris River basin. Between pairs of rivers, we are able to distinguish fine-scale structure, except between the Spring River and its North Fork. Migration rates among rivers within each of the populations was historically moderate-to-high, with no significant directionality. We, therefore, recommend that the two populations be considered separate management units. We are unable to identify from this study any particular river that should be afforded higher conservation priority than the others. The presence of reservoirs and dams means that *L. rafinesqueana* locations in the Illinois, Neosho, and Verdigris basins are isolated from each other (assuming that their host fishes cannot transit these habitats). Within the Neosho basin, Lake O' The Cherokees serves to isolate the Elk River, the Spring River drainage, and the Neosho River from each other. Within the Spring River drainage, Shoal Creek is isolated from the Spring River by Lowell Reservoir. Thus, not only are the two populations isolated from one another, but Population One is highly fragmented. Reintroduction, translocation and population augmentation would be viable conservation strategies within each population. Movement of individuals between populations should only occur if one of these is at great risk of extirpation

Evaluation of the Delta Hydrobe (*Probythinella emarginata*) in Kansas

Principal Investigator(s): Allison Hullinger

KDWP Contact: Daren Riedle

Start Date – End Date: March 16, 2020 – March 31, 2021

Objectives:

1. Quantitatively re-evaluate the Delta Hydrobe populations in Cedar Creek, Chase County and the Elk River, Montgomery County
2. Qualitatively search for additional populations in perennial streams throughout the lower Verdigris River Basin
3. Enumerate all species of prosobranch snails encountered.

Status Update:

We quantitatively surveyed 3 stream sites and qualitatively surveyed 12 streams in the summer and fall of 2020. Live Delta Hydrobes were not observed at any of the surveyed locations. Dead valves were observed at the historical Cedar Creek location in Chase County, where Sowards (2012) had recorded live specimens. We collected no evidence of Delta Hydrobes, live or dead valves, in the two Elk River historical sites. Weathered valves were observed at the following sites: Fall River, Greenwood County, Sycamore and Pumpkin creeks, Montgomery County. Only one valve was observed at each of these sites. Other invertebrate species were observed during our surveys such as the Neosho Mucket and Midland Siltsnail.

Status and Trends of the Blackside Darter (*Percina maculata*) in Kansas

Principal Investigator(s): James E. Whitney – Pittsburg State University

KDWP Contact: Daren Riedle

Start Date – End Date: February 13, 2019 – February 1, 2020

Location: Mill Creek and its tributaries in Wabaunsee County, Vermillion Creek in Pottawatomie County, Rock Creek in Douglas County, and Wildcat Creek in Riley County

Brief Description of Project / Research Objectives:

1. Sample streams in Kansas where the Blackside Darter historically occurred
2. Measure local physicochemical variables and upstream watershed characteristics of sample sites to evaluate Blackside Darter habitat preferences
3. Compile collection records to assess temporal trends in distribution and abundance.

Status Update:

Occupancy of the Blackside Darter in the Kansas River basin was 2.5% (8/318 sites). Occupancy increased to 4.6% (8/174 sites) when the Middle Kansas River subbasin was analyzed separately (Figure 3). Within the Vermillion Creek, West Branch Mill Creek, and Mill Creek watersheds, occupancy was 7.4% (2/27 sites), 10.3% (3/29 sites), and 12.5% (3/24 sites), respectively. Finally, occupancy combined between the Mill Creek and West Branch Mill Creek watersheds was 11.3% (6/53 sites).

Conservation Efforts and Habitat Improvements

Development of a Safe Harbor Agreement/Candidate Conservation Agreement with Assurances.

Principal Investigator(s): David Zippin/Rebecca Sloan - KDWP

KDWP Contact: Daren Riedle

Start Date – End Date: June 5, 2020– December 31, 2021 Amended through June 30, 2022

Brief Description of Project / Research Objectives:

The KDWP Ecological Services Section and Aquatic Biodiversity Center will be working towards future species reintroductions in Kansas rivers and streams. As most waterways in Kansas are considered private land, KDWP is looking to develop a multi-species programmatic Safe Harbor Agreement (SHA) and/or Candidate Conservation Agreement with Assurances (CCAA) or similar tool that will provide protections and assurances to private landowners while allowing for progressive conservation actions. The successful awardee will work with KDWP and the USFWS to develop a programmatic SHA/CCAA or similar agreement that will allow KDWP to enter into partnerships with landowners to move forward on the conservation of aquatic organisms in the state.

The purpose of a SHA/CCAA is to promote the conservation, enhancement of survival, and recovery of federal and state aquatic Threatened or Endangered species and provide assurances to landowners that no restrictions will be imposed on their land as a result of conservation actions on their part, and that they are essentially relieved of liability under the Endangered Species Act if conservation practices on their land attract and/or perpetuate federally listed species.

The multi-species plan will cover federal Threatened, Endangered, Candidate, and petitioned aquatic species, as well as state listed aquatic species.

Cottonwood Falls Fish Passage Construction on Cottonwood River

Principal Investigator(s): Buddy Sisson, Mayor of Cottonwood Falls

KDWP Contact: Jordan Hofmeier

Start Date – End Date: 9/9/2016 – September 1, 2024

Objectives:

1. Construct 1 nature-like rock-ramp fishway at Cottonwood Falls dam replacement to restore aquatic organism passage to 69 kilometers for the Cottonwood River by September 1, 2024.

Status Update: City is seeking potential funding opportunities from USDA for water infrastructure.

Hydrologic study indicated that the head provided by the dam was necessary for maintaining

groundwater levels for water supply wells. Project on hold until additional partner funding is available.



Topeka Weir Fish Passage Construction on Kansas River

Principal Investigator(s): Brent Trout, City of Topeka Manager

KDWP Contact: Jordan Hofmeier

Start Date – End Date: September 1, 2017 – September 1, 2022

Brief Description of Project / Research Objectives:

Objectives:

1. Construct 1 passage structure at the Topeka Weir to restore aquatic organism passage and reconnect two fragments of the Kansas River by September 1, 2022.

Status Update: Construction of fish passage structure is complete.



Other Notes

The first record of Alligator Gar in Kansas came from a setline angler in the Neosho River in September 2021. The fish weighed 39.5 lbs.



After observing increased presence of Blue Catfish in several rivers of southern Kansas, KDWP increased the daily creel limit from 5 to 10.