



North Central Division- American Fisheries Society

Rivers and Streams Technical Committee Brett Roberg, Nebraska Chapter Representative

Activities related to Rivers and Streams in Nebraska for 2020

NEBRASKA GAME AND PARKS COMMISSION

COOLWATER STREAMS

In 2015/16, the Commission drafted a Coolwater Streams Management Plan. The purpose of the Cool Water Stream Management Plan is to identify goals for stewardship of cool water stream resources in Nebraska, and to develop specific, attainable and measurable action items for Nebraska Game and Parks Commission (NGPC) staff to implement to achieve the vision. A copy of the plan can be found <u>here</u>. Projects completed in 2020 include:

DRY SPOTTED TAIL CREEK

Dry Spotted Tail creek was historically manipulated to improve agricultural drainage and reduce flood potential, and the hydrology of the creek was affected by regional irrigation practices. These anthropogenic manipulations over the past + 70 years caused continued down cutting (+9ft) across the Dry Spotted Tail complex, reduced desirable bedform diversity, and dewatered the surrounding wetlands. The project team recommended a Priority 1 restoration approach that would restore the natural hydrology of Dry Spotted Tail Creek and the North Platte River, return groundwater levels to pre-incised conditions, while installing additional stream sinuosity with in-stream habitat features to sustain healthy aquatic, riparian, and wetland communities (Figure 1).



Figure 1. Aerial images of the Dry Spotted Tail Creek complex illustrating pre-project (left image) and the post-project (right image). Photo credit: Justin Haag, Nebraska Game and Parks Commission.

In total, the project team enhanced 1.50 mi of stream, increased stream sinuosity from 1.0 to 1.43, decreased the bank height ratio from 2.5 to 1.0, reduced Dominant BEHI/NBS from M/L to L/L, increased percent riffle (%) from 35 to 45, increased the pool depth ratio from 1.7 to 3, and increased the riparian width (%) from 20 to 100. This approach allowed for the addition of +6 acres of wetland habitat and expanded upland areas for upland birds (Figure 2).



Figure 2. Estimated water table and land cover changes post-project.

Preliminary fish survey results indicate a change in species richness from four species (n=23) to twentyone species (n=355). Similarly, common species such as White Sucker (*Catostomus commersonii*) and Longnose Dace (*Rhinichthys cataractae*) remained common across nearly all sampling periods (Figure 3). State threatened and endangered species like Johnny Darter (*Etheostoma nigrum*), Common Shiner (*Luxilus cornutus*), Flathead Chub (*Platygobio gracilis*), and Longnose Sucker (*Catostomus catostomus*) saw an increase in abundance as well.



Figure 3. Proportion of total catch by species from fish surveyed conducted on the Dry Spotted Tail Creek complex. The fish survey on June 2019 occurred before our stream project began, and the remaining surveys occurred subsequently following the completion of the new stream channel.

LONG PINE CREEK, PINE GLEN WILDLIFE MANAGEMENT AREA

A stream enhancement project was completed on Long Pine Creek (Brown County) at Pine Glen Wildlife Management Area to improve angler access and habitat for trout. Twenty-three acres of cedar trees were removed along the riparian corridor to improve riparian health by opening up the canopy to promote the growth of grass, forbs and other desirable woody vegetation for greater bank stabilization, promoting greater bank stabilization, and improving water quality along the stream. A series of nineteen habitat structures were constructed along 0.25 mi of stream to provide greater residual pool depths and concentration areas for anglers to fish. Further details about this project can be found here.

LONG PINE CREEK, STATE RECREATIONAL AREA

Habitat structures on Long Pine Creek (Brown County) at the State Recreational Area (SRA) were damaged during the 2019 floods. The Nebraska Game and Parks staff made the necessary FEMA repairs to protect and rebuild the habitat structures back to existing conditions (pre-flood) to prevent further degradation (Figure 4). These improvements are expected to help maintain the high quality trout fishery as well as make the habitat structures more robust to the increasing kayaking and tubing usage.



Figure 4. Contractor placing additional boulders around the existing habitat structure on Long Pine SRA.

WINTERS CREEK

Heavy summer grazing along private sections of Winters Creek (Scottsbluff County) impacted stream habitat, causing improper sediment transport and suppressed riparian vegetation. To alleviate these concerns, agency staff worked with the private landowner to excavate new pool habitat and removed accumulated sediment for the targeted trout, Orangethroat Darters (*Etheostoma spectabile*) and Longnose Suckers (*Catostomus catostomus* [State Threatened Species]). Cattle were then excluded from the riparian areas and a wildlife friendly fence was installed to allow for revegetation and stabilization of the stream banks, improve overhead cover, and provide proper pool maintenance of deep pool habitats.

RIVERS AND STREAMS PROGRAM

Despite Covid-19 challenges in 2020, the Nebraska Game and Parks Commission (NGPC) Rivers and Streams Program was able to complete a wide variety of work across the state (Figure 5). In the spring and fall, we were able to deploy gear in search of Pallid Sturgeon (*Scaphirhynchus albus*) near the furthermost extent of their range on the Platte and Loup Rivers. Several Shovelnose Sturgeon (*Scaphirhynchus platorynchus*) were collected, however, no Pallid Sturgeon were observed. Also in the spring, we performed a post-habitat assessment on Dry Spotted-Tail Creek, a cool water stream, towards the final phases of construction. Other cool water streams projects with pre-construction surveys conducted were on Sowbelly Creek (Figure 6) and Bordeaux Creek (near Chadron, NE).

In the early summer months, we sampled the Nemaha River watershed for possible occurrences of Asian Carp after a high water year in 2019. We sampled multiple barriers on the Platte and Loup Rivers to assess possible range expansion of Asian Carp. Our results did not indicate any new occurrences outside of our current estimated ranges. A project is underway in collaboration with the University of Nebraska-Lincoln and the United States Geological Survey (USGS) looking at analyzing eDNA samples to detect Asian Carp within Nebraska waters. We assisted in this new collaborative effort by sampling Salt Creek (Lincoln, NE) and the Lower Platte River (Louisville, NE) for Asian Carp. We detected Silver Carp (*Hypophthalmichthys molitrix*) in both the Salt Creek and Lower Platte River, of which were known to have established populations.

In July, we assisted Nebraska Department of Environment and Energy (NDEE) with their Stream Biological Monitoring Program in the Niobrara River Basin. We sampled fifteen sites following NDEE sampling protocols collecting fish, habitat, and macroinvertebrate data (Figure 7).

Additional summer sampling included a unique opportunity to sample the Cedar River near Spalding, NE. High water in 2019 broke the earth-filled Spalding Dam, where previously a fishway was in use. The breach created natural connectivity on the river for over a year. Hoop nets and electrofishing gear were used to sample for Channel Catfish (*Ictalurus punctatus*) and we compared fish abundances both upstream and downstream of the dam. In 2021, the dam is expected to be rebuilt and the fishway will become fully operational once again providing us the opportunity to compare a naturally open system versus an artificially open system.

Multiple privately owned properties were sampled throughout the year including Birdwood Creek and Winters Creek for the purpose of improving cool water fish habitat on private lands. Additionally, we assessed native fish communities along Highway 61 where Nebraska Department of Transportation (NDOT) was working on culvert and bridge repairs. We also conducted a fish salvage on Rock Creek and its tributaries to save native fish prior to the Rock Creek Lake renovation.

In conclusion, we were able to complete a variety of tasks in 2020. In total, we visited 65 sites across Nebraska, traveled 38,246 miles, and collected 9,373 fish. The most notable species observed in 2020 was the Blacknose Shiner (*Notropis heterolepis* [Fig. 8; State Endangered Species]) collected in Holt Creek (Keya Paha County, NE) and Sandy Richards Creek (Cherry County, NE). Plans in 2021 are to continue with cool water streams habitat projects, NDEE Stream Biological Monitoring Program (Nemaha River Basin), and expanding investigation into Asian Carp distribution.



Figure 5. Sample sites across the state for the Nebraska Game and Parks Commission Rivers and Streams Program in 2020.



Figure 6. Flow data collection at Sowbelly Creek.



Figure 7. Nebraska Department of Environment and Energy (NDEE) stream biomonitoring assessment at Coon Creek.



Figure 8. Blacknose Shiner (Notropis heterolepis) sampled in Holt Creek

University of Nebraska at Kearney

Fall sampling on the Kearney Canal below Kearney Lake occurred for the third year. In 2020, the canal ceased operation earlier than in previous years (September versus late October/early November) due to necessary repairs. Overall, fewer fish were collected across the three standardized locations as compared to 2019. Species richness in 2020 was similar to 2018, but both years were lower than 2019. We will be planning for continued sampling in fall 2021, with a possibility of adding some locations in the canal above Kearney Lake.

In summer 2020, we initiated sampling in the North Platte River above Lake McConaughy. The goal of this sampling was to identify where age-0 White Bass (*Morone chrysops*) are naturally produced, following up on previous research involving otolith microchemistry and natal origins of this species. We sampled three habitat types (main channel, backwater, and side channel) within five sections of the river between Oshkosh, Nebraska, and the top end of Lake McConaughy. One randomly selected habitat type was selected in each reach every two weeks between June and August 2020. Fish were collected via seining. All fish were identified and enumerated, and the first 20 individuals of each species in each habitat type for each reach were measured (total length; mm) during each sampling event. While we did not collect any age-0 white bass, we did capture approximately 32 species from 10 different families. No species of conservation concern were collected; only one > age-0 white bass was collected. Species identifications are currently being verified. Once verification is completed, community analyses will be initiated, including assessments of species richness and diversity and associations of fish communities and habitat types. All analyses of this data are expected to be completed by March 2021. This work will be useful in understanding the dynamics of the river-reservoir interface.

Nebraska Department of Environment and Energy (NDEE)

The Surface Water Unit of NDEE collects physical, chemical, and biological water quality samples from streams and lakes, implements surface water improvement projects, and prepare surface water quality reports. Several monitoring programs collect stream and lake samples throughout the state; however, most monitoring is focused in one to three river basins each year in conjunction with a rotating basin monitoring strategy. Targeting resources in this manner improves NDEE's ability to identify and remediate water quality problems and allows resources to be focused where they can produce the greatest environmental results. During a six-year cycle, all 13 river basins in the state are intensively monitored. Monitoring data are used to document existing water quality conditions, assess the support of beneficial uses (such as aquatic life, recreation, and public drinking water supply), and prioritize water quality problems. The current six-year basin rotation monitoring cycle is:

- 2020 Niobrara Basin
- 2021—Missouri River tributaries and Nemaha River

In addition to the Stream Biological Monitoring Program which assesses the health of streams by evaluating the composition and numbers of resident aquatic macroinvertebrate and fish communities, NDEQ also conducts the following monitoring programs: Ambient Stream Monitoring, Basin Rotation Monitoring, Fish Tissue Monitoring, Public Beach Monitoring and Ambient Lake Monitoring. Reports and summaries of these activities can be found on NDEQ's website address: www.deq.ne.gov

Wyoming Game and Fish Department, Upper Niobrara River Research

Sampling efforts in the upper Niobrara River drainage in 2020 aimed to identify locations containing Northern Pearl Dace (*Margariscus nachtriebi* [NPD]) and translocate individuals farther from the known Northern Pike (Esox Lucius [NOP]) distribution. NPD only occur in the Niobrara River drainage in Wyoming, and have recently only been found in locations near the known distribution of NOP in the drainage (WGFD 2020). Surveys completed by a University of Wyoming graduate student in 2019 found several NPD in a large pool beneath a railroad crossing at (yellow circle Figure 9). Two trap nets were set in this pool on 11 June 2020 and fished overnight. The two traps had a combined catch of over 3,000 smallbodied native fish. Approximately the first 500 fish were sorted by species, and the rest were sorted to only retain NPD (Table 1).

Table 1. Catch of first 500 fish sorted from two trap nets set overnight in the Niobrara River, along with all 76 NPD captured in the nets. Shaded species codes indicate Wyoming's SGCN in the 2017 SWAP (FSD=Finescale Dace, PTM= Plains Topminnow, NPD=Northern Peal Dace, FHM=Fathead Minnow, BMN=Brassy Minnow).

FSD	PTM	NPD	FHM	BMN
276	4	76	48	170

The 76 NPD captured included juveniles and adults ranging from approximately 2 in to 6 in. All NPD were transported to the upper pond at the M Lazy Heart ranch (red circle Figure 9.)



Figure 9. Locations of NPD source (yellow circle) and translocation site (red circle) in the Niobrara River. The Nebraska state line is at the right edge of the map.

The second objective of surveys in 2020 was to continue suppressing NOP in the lower Niobrara River and Van Tassell Creek, and to determine whether suppression efforts are having an effect on the population. Intensive suppression began in 2019 with the removal of 107 NOP from the lowest 2.4 stream mi of the Niobrara River and lowest 0.8 stream mi of Van Tassell Creek (WGFD 2020). The 107 NOP captured in 2019 were captured with an assortment of gears, but trammel nets were overall the most effective, accounting for 93 captured NOP. All removals in 2020 were done with trammel nets (TM); therefore, comparisons in size and age structure between years are limited to individuals captured with TM only.

NOP removals were done with stationary TM on six days between April and September 2020. In all, 96 NOP were removed. The size distribution of captured NOP differed significantly between the past two years (Kolmogorov-Smirnov p < 0.01; Figure 10). This difference amounts to a 2.5 in reduction in the mean TL of NOP captured in 2020 (Table 2).



Figure 10. Length-frequency distribution of NOP captured with TM in the Niobrara River drainage in 2019 and 2020.

Similar to size distribution, the age distribution of captured NOP differed from 2019 (K-S p = 0.03; Figure 11). The average NOP removed in 2020 was about 1 year younger than in 2019 (Table 2).



Figure 11. Age-frequency of NOP captured with TM in the Niobrara River drainage in 2019 and 2020.

Table 2. Mean and median size and age of NOP captured with TM in the Niobrara River drainage in 2019 and 2020.

	Mean	Median
2019 TL	20.4	19.9
2020 TL	17.5	17.0
2019 Age	3.2	3
2020 Age	2.7	2

Finally, age-frequency data were used to compare mortality rates between the two years, and NOP were considered recruited to the TM at age-2. The catch curve analysis showed higher instantaneous mortality in 2020 (0.74) than in 2019 (0.59); however, an ANCOVA suggests this difference is not significant (p = 0.21; Figure 12).



Figure 12. Catch curve analysis of age-2 to age-8 NOP captured with TM in the Niobrara River drainage in 2019 and 2020.

The decreased size and age structure, coupled with a potentially increased mortality rate, suggest that intensive removals may have a population level effect due to small population size or limited movement. A radio telemetry project will be initiated in 2020/21 to better understand seasonal movement and colonization potential for NOP during stochastic water conditions across the Upper Niobrara River in Wyoming and Nebraska.

Management Recommendations

- Translocate additional NPD to location(s) with perennial water and no predators farther upstream in the drainage
- Continue removing ~100 NOP per year and evaluate changes in size and age structure
- Initiate NOP telemetry project to quantify interstate exchange and upstream colonization potential