Montana Department of Fish, Wildlife and Parks
Fisheries Division

Job Progress Report

STATE: Montana **PROJECT: Statewide Fisheries Management**

TITLE: Eastern Region 6 Pond, Stream, and River Sampling

JOB: Northeast Montana Warmwater Ponds and River Investigations

FEDERAL GRANT: F-114-R6

FISCAL YEAR: 2023 (July 1, 2022 through June 30, 2023)

REPORT PERIOD: April 1, 2023 through November 30, 2023

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INTRODUCTION

From the diverse and complex Milk and Missouri Rivers to ponds and small reservoirs less than an acre in size, a wide array of angling opportunities are found in the eastern portion of Fish Wildlife and Parks (FWP) Region 6 fisheries management area. In 2023, fisheries surveys were conducted in Valley, Daniels, Sheridan, and Roosevelt counties and portions of Richland, McCone, Prairie, and Dawson counties. Waterbodies managed by FWP include the Milk River east from Rock Creek to the mouth, the Missouri River from Fort Peck Dam to the North Dakota border, and all ponds, reservoirs, and prairie streams from Rock Creek east to the North Dakota border (Figure 1). FWP has no management authority over waters within the boundary of the Fort Peck Indian Reservation.

High levels of spring runoff stemming from the third snowiest winter on record returned many of northeast Montana's diverse fisheries to near-normal levels in 2023. Overall, the fisheries in many ponds, small reservoirs, and prairie streams within the region positively responded to these much more suitable conditions than those observed during the 2021 and 2022 drought. Additionally, spring runoff resulted in numerous flash flooding events across the region, particularly impacting the Milk River and prairie stream habitats. For example, Milk River discharge peaked at 21,100 cubic feet per second (cfs) in April 2023 (Figure 2). Moreover, Missouri River flows peaked at 22,000 cfs at Wolf Point in late April 2023 and fluctuated between approximately 12,000 and 8,000 cfs through early October, before dropping to below 6,500 cfs for the remainder of the year (Figure 2).

This report summarizes FWP fisheries management work conducted within the eastern region 6 fisheries management district during the 2023 field season.

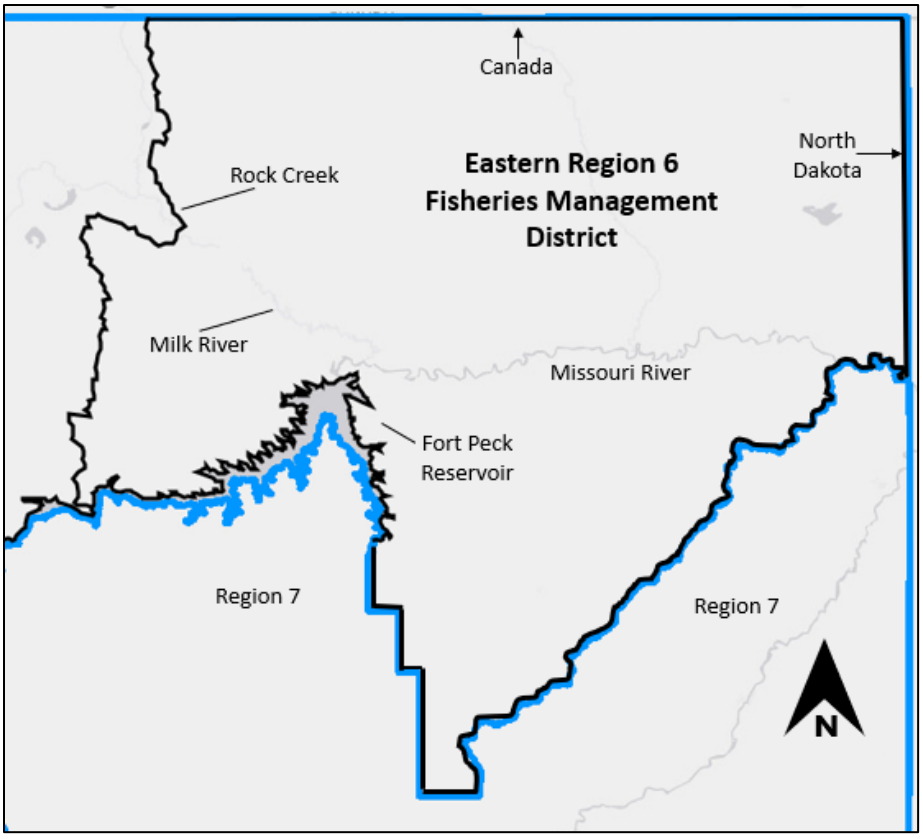

Figure 1. Map depicting the eastern region 6 fisheries management district (black outline).

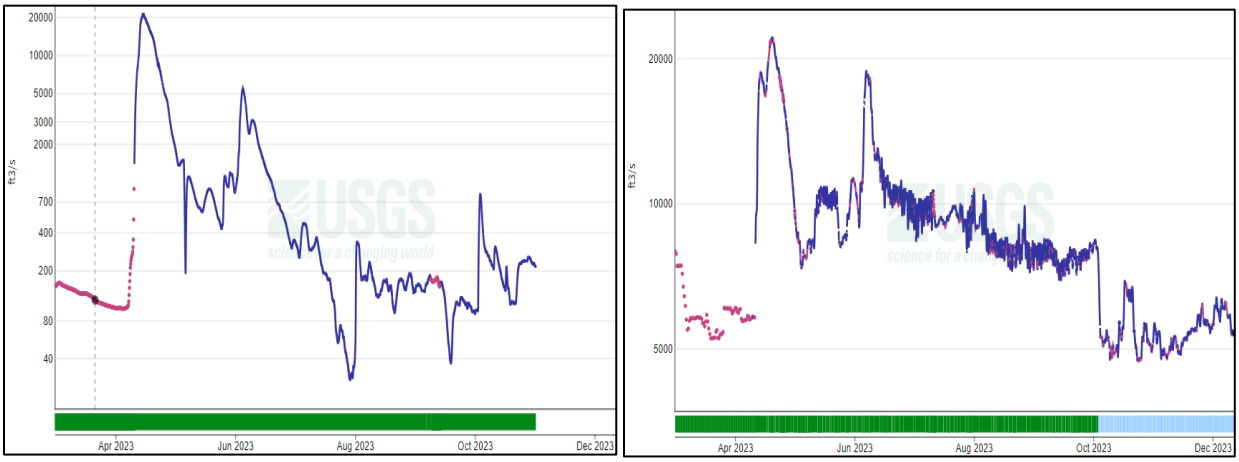

Figure 2. Milk River at Tampico, MT (left; USGS gage 06172310) and Missouri River at Wolf Point, MT (right: USGS gage 06177000) hydrographs, March 2023 through December 2023.

PROCEDURES

POND AND SMALL RESERVIOR SAMPLING

Many ponds and small reservoirs were sampled throughout late spring, summer, and early fall 2023 as part of FWP's long-term monitoring program. Surveys were completed using hook and line sampling, experimental sinking gillnets (125' x 6', 5-25' panels of .75", 1", 1.25", 1.5", 2" bar measure multifilament mesh), fyke nets (3' x 4' hoop, 3' x 50' lead), and mini-fyke (2' x 3' hoop, 2' x 25' lead) nets in combination depending on size of the waterbody being sampled. When using gillnets, fyke nets, or mini-fyke nets gear were deployed, left to soak overnight, and retrieved the following morning. When hook and line sampling was utilized two anglers fished for 1 hour each – resulting in two hours of angling effort. Relative abundance was quantified in terms of fish/net (catch per unit effort; CPUE) for net sampling or fish/hour (catch rate) for hook and line sampling. All fish were measured, weighed, and stomach contents examined when applicable. Age structures (otoliths) were collected opportunistically from Walleye, Sauger, Yellow Perch, and Bluegill to provide information regarding age and growth rates.

In addition to fisheries sampling, limnological measurements were obtained during the field season for most waterbodies. Elevation (+/- full pool), maximum depth (ft), water clarity (ft), and temperature (°F) were recorded during fisheries sampling, and dissolved oxygen levels (mg/L) were recorded from December – February.

BOXELDER RESERVOIR SAMPLING

Boxelder Reservoir in Sheridan County is one of the larger reservoirs (78 ac) in eastern Montana and provides one of few fishing opportunities for residents and non-residents near Montana's northeastern-most corner. Due to concerns with the status of the fishery, primarily the Yellow Perch population, Boxelder Reservoir was sampled twice in 2023. In early June and early September three sinking experimental gillnets (125' x 6', multifilament) and three fyke nets (3' x 4' hoop, 3' x 50' lead) were set, left to soak overnight, and retrieved the next morning. All fish collected were measured and weighed, and stomach contents examined if applicable. Age structures were collected from Yellow Perch and Walleye. Relative abundance (fish/net; CPUE) and condition (W_r) were also quantified.

In addition to net sampling, larval trawling was conducted at Boxelder Reservoir in spring 2023. At three separate locations, a conical ichthyoplankton net (2.5' x 7', 1,000 µm mesh) was towed approximately 50 feet behind the boat at a speed of 3 mph for 5 minutes. All larvae collected were preserved in 95% ethanol and identified.

Additional monitoring of Boxelder Reservoir included a temperature and dissolved oxygen monitoring probe (HOBO®) deployed December 2023 and retrieved January 2024, and winter creel surveys performed monthly from January – March.

FORT PECK DREDGE CUT SAMPLING

The Fort Peck Dredge Cuts were sampled in fall 2023 as part of annual long-term monitoring of the fishery below Fort Peck Dam. Fish collected from experimental sinking gillnets (n=10; 125' x 6', multifilament) and smelt nets (n=4; 100' x 6', monofilament ½" bar mesh) at 14 fixed sites (Figure 3) were used to evaluate fish assemblage, relative abundance (CPUE; fish/net), and condition (relative weight; W_r) of the diverse fishes residing in the Dredge Cuts. Nets were deployed, left to soak overnight, and retrieved the following day. All collected fish were measured, weighed, and stomach contents evaluated if applicable. Genetic material (fin clip) was collected from all captured Sauger and Saugeye. Age structures (otoliths) were also collected from Walleye and Sauger.

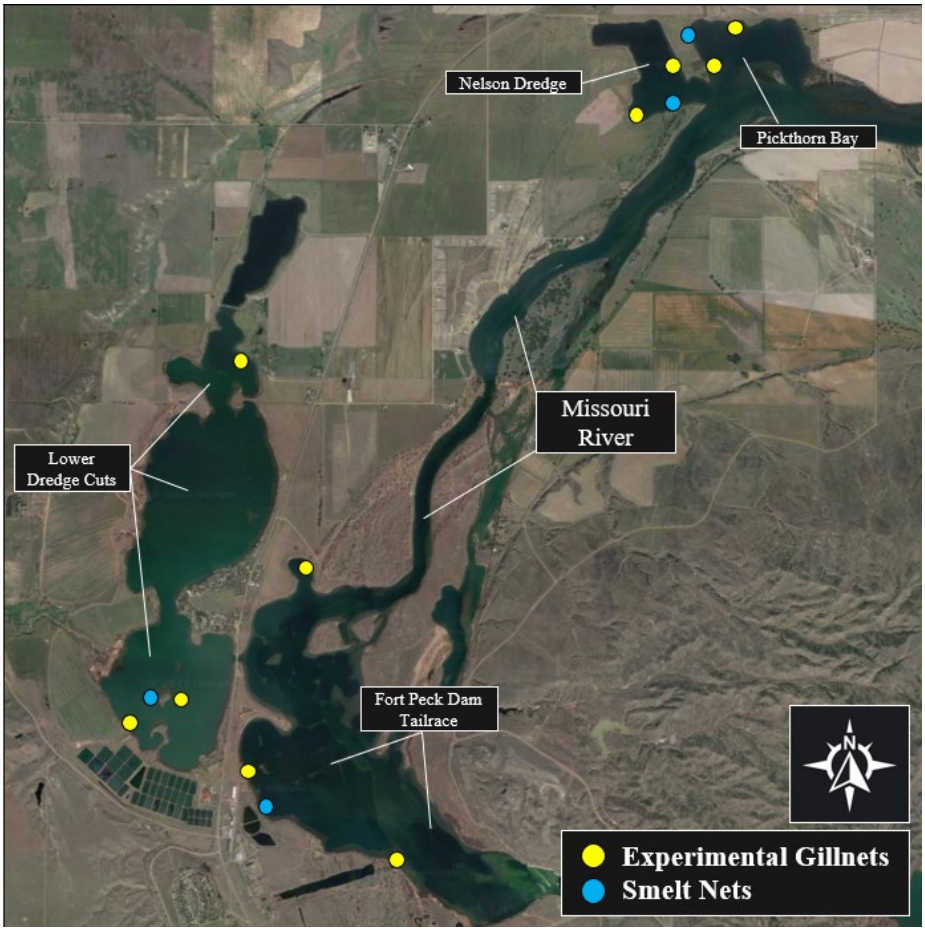

Figure 3. Locations of experimental gillnets (yellow circles) and Smelt nets (blue circles) set in the Missouri River and Fort Peck Dredge Cuts in 2023. Net locations are fixed sites set annually each fall.

BURBOT SAMPLING

Burbot were sampled in two reaches of the Missouri River in late April 2023 (Figure 4). Hoop nets (7 – 2.5' diameter hoops, ½" mesh) baited with fresh cut bait were deployed in slack water areas at least 6 feet deep at locations ranging from Fort Peck Dam (RM 1771.6) downstream to the mouth of the Milk River (RM 1761.5). Access constraints resulting from spring flood events prevented sampling within the Poplar River (RM 1678.0) and Culbertson (RM 1622.0) area reaches. Hoop nets were left to soak overnight and retrieved the following morning. All captured burbot were enumerated, measured, weighed, and kept for removal of age structures (otoliths). Stomach contents, sex, and gonad maturation were also recorded during otolith removal.

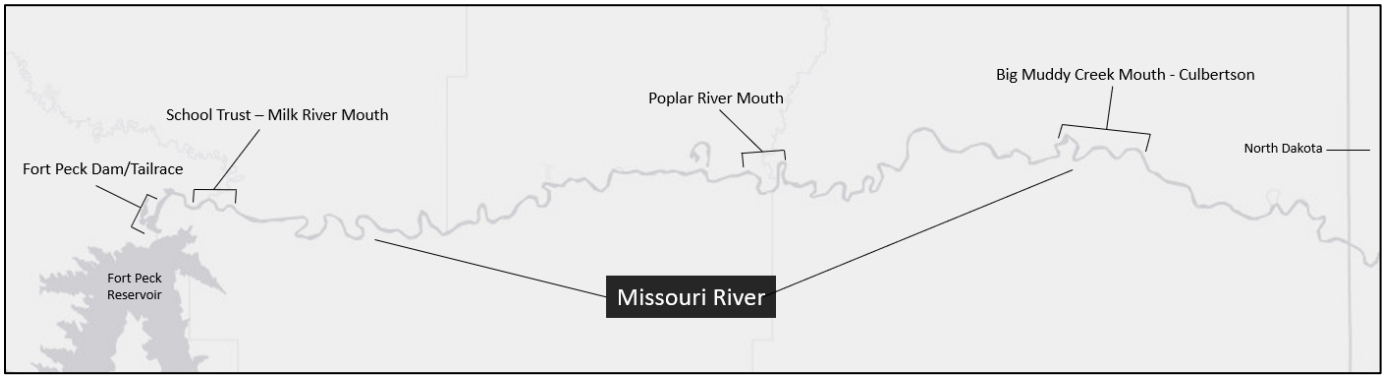

Figure 4. Long-term monitoring reaches for Missouri River Burbot sampling. Four hoop nets were spaced within each individual reach. In 2023, sampling only occurred within the Milk River mouth and Fort Peck Dam reaches.

REDD COUNTS

Hypolimnetic discharge out of Fort Peck creates favorable conditions for salmonid species (Rainbow Trout, Brown Trout) immediately downstream of Fort Peck Dam. In spring 2023, Rainbow Trout spawning was investigated during five separate sampling events within side channel habitat between Duck and Scout Islands along the eastern shore of the Missouri River (Figure 5). During sampling, two FWP staff members in kayaks surveyed active redds as well as spawning adults via visual observation while floating downstream. Quantity of observed redds and number of spawning adults were recorded.

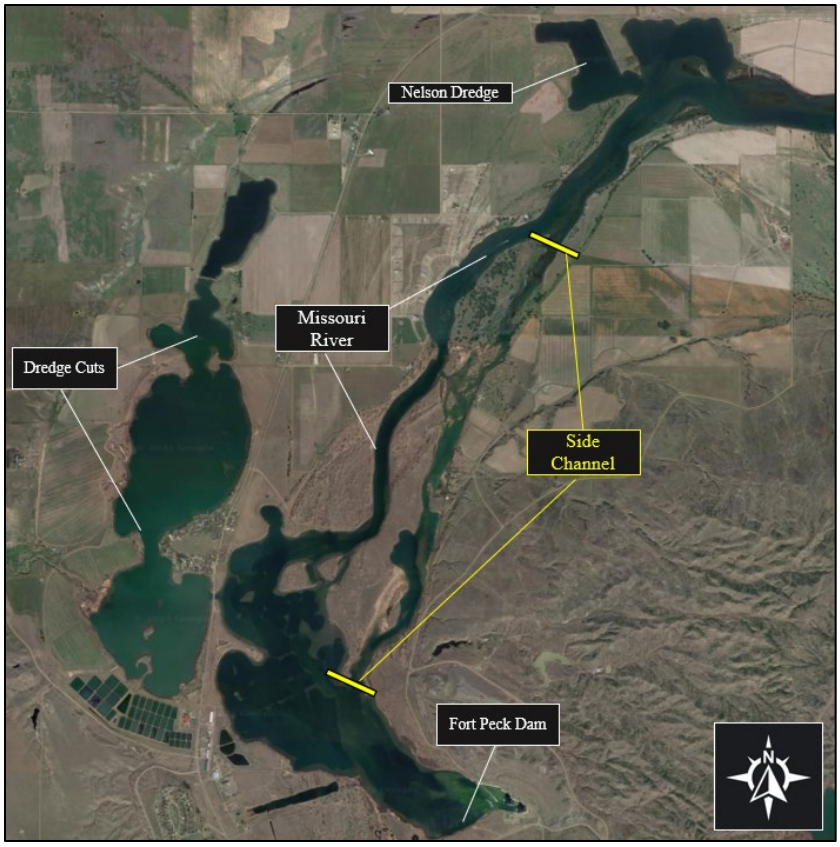

Figure 5. Side channel habitat below Fort Peck Dam within the Missouri River.

MISSOURI RIVER TROUT

Electrofishing for Rainbow Trout and Brown Trout occurred on four separate nights in October 2023. All electrofishing efforts were conducted at night from Boy Scout Park Ramp downstream to just upstream of the Milk River mouth using a jet boat boom mounted system with a Smith Root Apex rectifying unit (Figure 6). Each night consisted of shocking either river left or river right with two netters attempting to net all trout encountered. The opposite bank was shocked the following night. Two consecutive nights of shocking (i.e., both banks shocked) was considered one run.

All captured trout were anesthetized in tricaine methanesulfonate (MS-222), measured, weighed, tagged with a 32 mm passive integrated transponder (PIT) just behind and below the left pectoral fin, and released. As part of a one-time age investigation, twelve Rainbow Trout otoliths were collected for age estimation.

Sporadic sampling of trout below Fort Peck dam has occurred since 2013, during which many collected trout were implanted with PIT tags. Therefore, capture histories were developed for all trout implanted with PIT tags collected between 2013 and 2023, and population estimates were generated for both species using the Schnabel method (Bonar et al. 2009). These initial

presented estimates should be used cautiously, as large gaps in sampling (e.g., 2017-2022) are present in the dataset.

Population estimates generated following 2024 and 2025 sampling are expected to be much more accurate and as a result more useful for management.

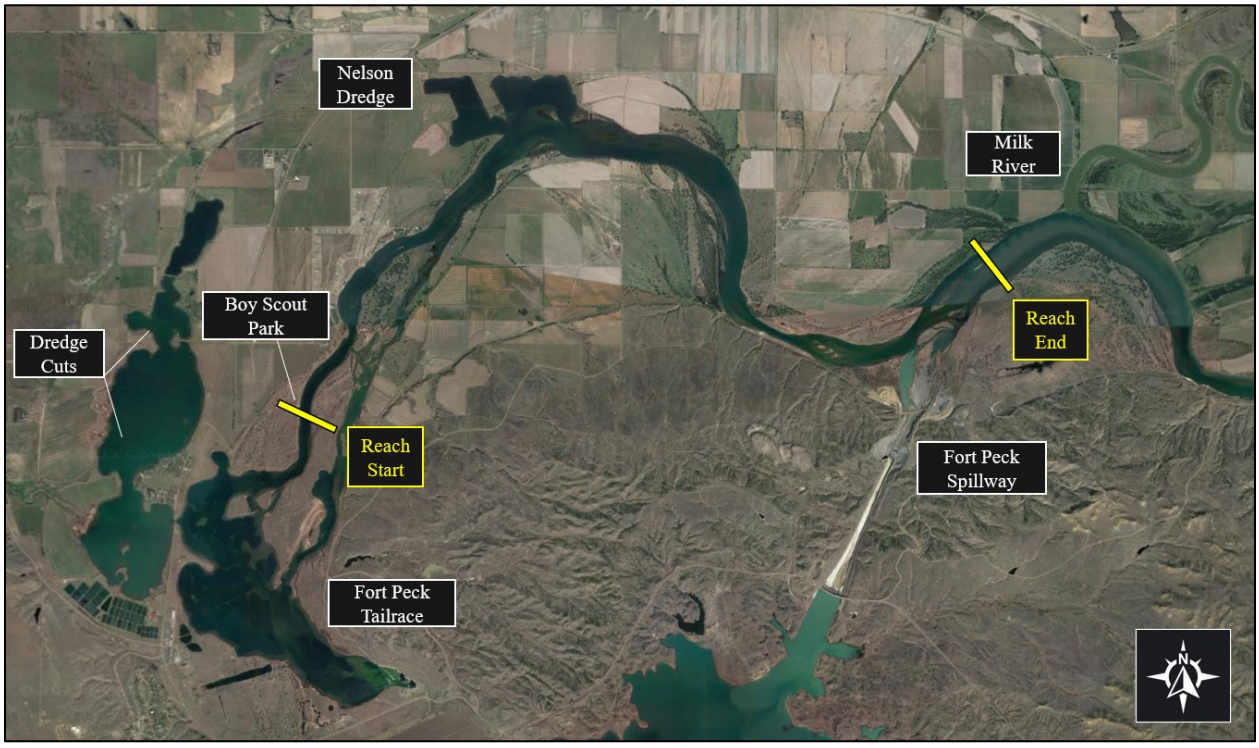

Figure 6. Missouri River salmonid electrofishing reach below Fort Peck Dam. River left and river right banks were shocked on alternating nights and considered one full run.

MISSOURI RIVER FISH ASSEMBLAGE SAMPLING

In 2023, a long-term monitoring program of Missouri River fishes was implemented within four reaches extending from the mouth of the Milk River downstream to Culbertson, MT. Electrofishing was conducted in August and again in September over four, five-mile reaches using a jet boat boom mounted system with a Smith Root Apex rectifying unit (Figure 7). Within each five-mile reach, five one-mile runs were conducted during which one netter netted all fish encountered. Genetic material (fin clip) was collected from all captured Sauger and Saugeye. Further, otoliths from all Burbot, 10 Sauger, and 10 Walleye per reach were collected for age estimation purposes and stomach contents evaluated. Otoliths from Sauger were also collected for insight into natal origin. Blue Sucker were tagged with a 32 mm passive integrated transponder (PIT) just behind and below the left pectoral fin and released. All other species collected were measured, weighed, enumerated, and released.

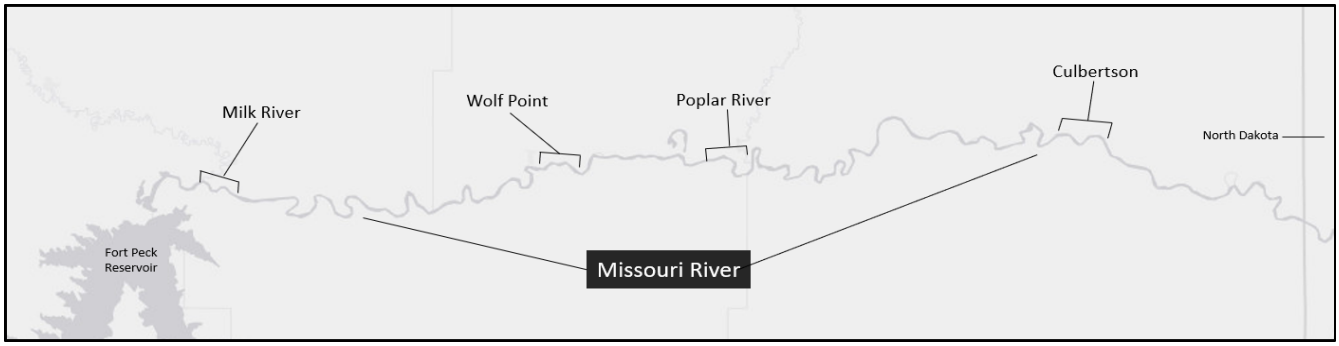

Figure 7. Long-term monitoring reaches for general Missouri River fish assemblage sampling, each reach is five river miles in length.

SELENIUM SAMPLING

As part of a statewide effort to monitor selenium levels within Montana's ecoregions, gravid female Walleye were collected in the Fort Peck Dredge Cuts and Fort Peck Dam Tailrace area in spring 2023. Three experimental sinking gillnets (125' x 6', multifilament) were set during late April in the evening and retrieved the following morning. All captured Walleye were weighed, measured, examined to determine sex and reproductive stage, and collected if deemed a gravid female. All other captured fish were identified and enumerated.

DREDGE CUT PADDLEFISH SAMPLING

To monitor Paddlefish movement and population dynamics, Paddlefish in the Fort Peck Dredge Cuts were sampled during six separate events in May and June 2023. Sampling was conducted using a combination of floating and sinking monofilament gillnets (150' x 14', 5" square). Anywhere between two and four nets were deployed at random locations within the Dredge Cuts and left to soak for approximately 30 minutes before being retrieved and redeployed. Captured Paddlefish were measured eye – fork length, weighed, sex identified visually, and tagged with a metal band jaw tag specific to the Fort Peck Dredge Cuts. Arrow and hooking scars were also noted.

DREDGE CUT ARCHERY PADDLEFISH SEASON

FWP administers an archery-only Paddlefish season in the Fort Peck Dredge Cuts. The season runs from July 1 to August 31 each year and anglers are allowed to harvest one Paddlefish per year using a blue harvest tag. Tags are unlimited and can be purchased over-the-counter at any time.

As of 2016, anglers are required by law to report harvested Paddlefish and have a variety of options to do so. In 2021, self-creel stations were installed at access points near the Dredge Cuts to provide anglers with an additional reporting option, as well as the opportunity to voluntary submit a dentary sample to FWP. Anglers submitting a dentary sample and all required harvest information receive a unique Montana Paddlefish hat as a reward. Following

the season, a phone survey of all blue tag holders is conducted to provide harvest estimates and angler preferences regarding the fishery.

MILK RIVER CATFISH

Long-term monitoring of Channel Catfish within the Milk River continued in 2023. Sampling occurred in late July using set lines (55' long, 10 - 3/0 circle hooks/line on 18" droppers spaced 5' apart) baited with cut sucker or worms, and single hoop nets (7 – 2.5' diameter hoops, ½" mesh) baited with cheese or Zote™ soap among six reaches. Reaches were split evenly around Vandalia Dam (Figure 8), with three reaches above and three reaches below. Six hoop nets (three baited with soap, three baited with cheese) and four set lines (two baited with cut sucker, two baited with worms) were set in each reach, alternating between inside and outside bends. Nets and set lines were deployed, left to soak overnight, and retrieved the following day. Captured Channel Catfish were enumerated, measured, weighed, and released. Additionally, within each reach, a single pectoral spine (five per 2-inch length bin) was collected for age estimation.

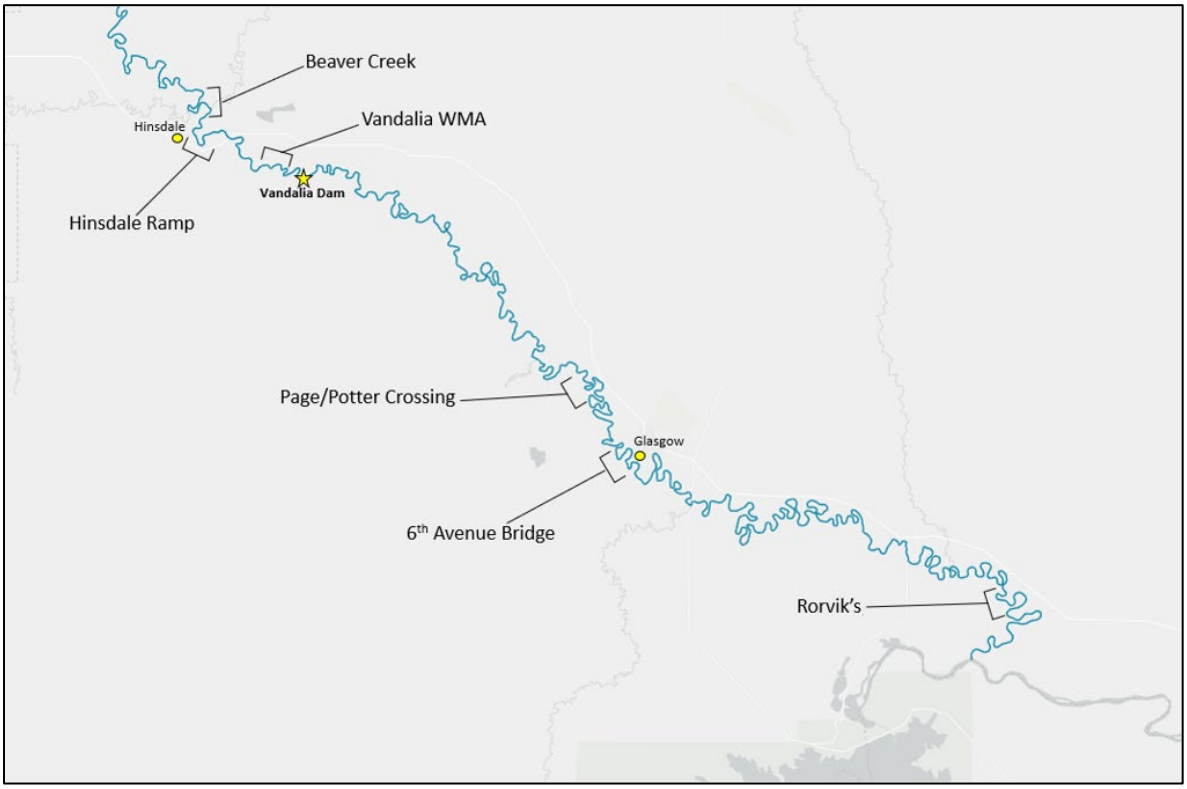

Figure 8. Milk River reaches sampled during long-term Channel Catfish monitoring, 2023.

MILK RIVER SEINING

Additional long-term monitoring of Milk River fishes occurred via seining. Two seine sizes (200' long x 6' deep x ¼" mesh, 30' long x 5' deep x ¼" mesh) were utilized among six reaches of the Milk River, two above Vandalia Dam and three below Vandalia Dam (Figure 8). Size of seine

used and number of seine hauls within each reach varied with conditions. Captured fish were identified by species, enumerated, and released.

TEMPERATURE LOGGERS

Nineteen temperature loggers were deployed in rivers and streams within eastern region 6 during June 2023. Waters in Valley, Daniels, Phillips, Richland, Roosevelt, McCone, and Sheridan counties received temperature loggers. Loggers were suspended within an aluminum housing before being submerged and staked to the bank with a light cable. Loggers were retrieved in November 2023.

PRAIRIE STREAM SAMPLING

A more standardized approach to long-term monitoring of prairie streams in eastern region 6 was implemented in 2023. Sampling locations were selected from a series of long standing "legacy" sites (more than 3 historical sampling events) and additional random "base" sites (no historical sampling events), with a goal of sampling five legacy sites and 20-25 base sites per year. Each base site to be sampled was selected from a possible 359,900 locations. These locations represented a random stream point corresponding to an individual 300 m reach on any prairie stream (order 2-6) within the management district. This sampling method, or some adaptive version will be used to select sampling locations for the foreseeable future.

Seines (20' long x 4' deep, ¼" mesh) were used to sample fish assemblages within these streams. Seines were moved upstream for an identified 60 m reach before being brought to the bank. The number of reaches seined at each creek varied, but effort was intended to sample ~300 m of stream at each site. With exception to potential voucher specimens for positive identification of Lake Chub/Pearl Dace, all captured fish were identified by species, enumerated, and released.

WILD FISH TRANSFERS

Following numerous winterkills in 2022, many ponds within eastern region 6 were supplemented during 2023 via wild fish transfers. On 14 occasions, wild fish were transferred from disease-free populations into bodies of water elsewhere in region 6 to supplement existing fisheries and bait collection sources. All fish transferred were captured via fyke nets (3' x 4' hoop, 3' x 50' lead) and mini-fyke nets (2' x 3' hoop, 2' x 25' lead). Captured fish were counted and placed in transfer tanks before being driven to the destination waterbody.

AGE ESTIMATION

Age structures were collected from Yellow Perch, Channel Catfish, Burbot, Walleye, Sauger, Rainbow Trout, and Paddlefish in 2023. Otoliths were collected from all aforementioned species with the exception of Paddlefish (dentary samples) and Channel Catfish (pectoral spines). In general, structures were collected from all fish captured in lethal gears (e.g., gillnets) during sampling. In some cases, otoliths were collected from fish captured in nonlethal gears (e.g., fyke

nets) if not enough structures were available from fish captured in lethal gears. Paddlefish dentary samples were collected from anglers who successfully harvested Paddlefish during the archery season.

ANGLER CREEL SURVEYS

Multiple angler creel surveys were undertaken in 2023 in eastern region 6. Boxelder Reservoir (Sheridan County) and Whitetail Reservoir (Daniels County) were surveyed monthly from January – March, Paddlefish anglers participating in the yellow tag snagging fishery were surveyed during May and June on the Missouri River, and Dredge Cut archery Paddlefish anglers were surveyed via phone in September following the July and August season.

RESULTS AND DISCUSSION

POND AND SMALL RESERVIOR SAMPLING

Twenty-five ponds and small reservoirs were sampled in Northeast Montana in 2023. Low water in 2022 coupled with significant ice and snow cover over winter resulted in numerous winterkills between 2022 and 2023 surveys (Appendix A; Appendix B). Most of the ponds and small reservoirs were 4-8 feet higher during 2023 however, aforementioned conditions meant that many were fishless until a stocking event or wild fish transfer occurred.

BOXELDER RESERVOIR SAMPLING

For all species in Boxelder Reservoir, stark contrasts in number of fish captured and relative abundance were observed between spring and fall sampling in 2023 (Tables 1 and 2). Seasonal variation during timing of spring sampling has led to concerns over catchability, as highly variable catch rates have been observed year to year during late May gill and trap net efforts. Therefore, only fall sampling will occur at Boxelder Reservoir going forward.

Yellow Perch relative abundance is still well-below record high levels observed in 2021 (21.0 fish/net) however, fall sampling in 2023 suggests spawning-age adults are still present in the reservoir (Appendix C). This is important, as age information collected from 2021-2023 suggests Yellow Perch in Boxelder are fast growing (Appendix E) and short-lived (< 5 years; Table 19), meaning the Yellow Perch population in Boxelder will rely on consistent recruitment.

In an effort to improve spawning and rearing habitat for Yellow Perch in Boxelder Reservoir, artificial habitat structures (10 – 50’ coated steel cables with 50 individual 4’ ReelWeeds^{TM} spaced 1’ apart) were placed in the reservoir in fall 2023. Use of these artificial structures will be monitored via visual observation in spring 2024.

In 2023, relative abundance of Walleye in Boxelder nearly doubled from observed values in 2021 and 2022 (8.3 fish/net; Appendix C). While Walleye in Boxelder reservoir exhibit poor growth after age 3 (Appendix E), the current population appears to be strong relative to recent years. Further, beginning in 2022 walleye fingerlings stocked at Boxelder have received oxytetracycline marks to differentiate stocked vs. natural recruits. Unfortunately, no walleye

captured in 2023 were age 1 therefore, we were unable to draw conclusions regarding stocked vs. natural contribution to the Boxelder Walleye population.

2023 relative abundance of Black Bullhead, Northern Pike, White Sucker, and Common Carp captured in gillnets was comparatively unchanged from previous years (Appendix C). Fyke nets captured three species during fall 2023 including Black Bullhead (n=24), White Sucker (n=1), and Yellow Perch (n=2). One Northern Pike larvae was captured during spring 2023 larval trawling efforts. No White Crappie or Rainbow Trout were captured during spring or fall sampling in 2023.

Management concerns and actions are summarized in Table 3.

Table 1. Summary of early summer sampling in Boxelder Reservoir, May 30, 2023.

Species	# Sampled	Gillnet CPUE (fish/net)	Avg. TL (in)	Min TL (in)	Max TL (in)	Avg. Wt (lbs)	Avg. Wr
Black Bullhead	1	-	14.5	14.5	14.5	1.36	70.4
Common Carp	4	1.3	26.5	24.8	27.7	7.88	85.6
White Sucker	5	1.3	16.3	9.0	19.5	1.83	85.8
Walleye	5	1.0	13.4	8.6	16.1	0.79	81.0

Table 2. Summary of early fall sampling in Boxelder Reservoir, September 6, 2023.

Species	# Sampled	Gillnet CPUE (fish/net)	Avg. TL (in)	Min TL (in)	Max TL (in)	Avg. Wt (lbs)	Avg. Wr
Black Bullhead	25	0.7	10.0	8.2	11.8	0.68	98.4
Common Carp	5	1.7	9.4	4.3	24.5	0.13	105.4
White Sucker	13	4.0	10.6	8.5	16.0	0.56	89.8
Walleye	25	8.3	13.0	10.3	18.4	0.76	86.2
Yellow Perch	9	3.0	7.8	7.1	9.7	0.26	101.9

Table 3. Recruitment source and management details of fish species sampled from Boxelder Reservoir in 2023. Current and past sampling data as well as stakeholder input were taken into consideration for "Management Direction" details.

Species	Recruitment Source	Management Type	Management Concerns	Management Direction
Black Bullhead	Wild	General	None	-
Common Carp	Wild	Suppression	Overabundance	Investigate population suppression options. Monitor abundance in response to Northern Pike stocking change
Northern Pike	Hatchery/Wild	General	None	Monitor impacts of discontinued stocking
Rainbow Trout	Hatchery	Put - Grow - Take	Survival	Increase stocking of fingerlings, potential prey source for piscivorous species
White Sucker	Wild	General	None	-
Walleye	Hatchery	General	Lack of forage, Habitat availability for reproduction and recruitment	Continue to stock marked fingerlings in an effort to understand hatchery contribution
White Crappie	Wild	General	None	-
Yellow Perch	Wild	General	Population decline, Lack of forage, Habitat availability for reproduction and recruitment	Monitor impacts of artificial habitat implementation - increase reproduction and recruitment

FORT PECK DREDGE CUT SAMPLING

Sixteen species were captured during Missouri River and Fort Peck Dredge Cut sampling in 2023. Channel Catfish were most abundant followed by Walleye, White Sucker, and Cisco (Table 4; Figure 9). Condition of most species surveyed was good with the exception of Sauger, Saugeye, and Common Carp (Table 4). Walleye catch per unit effort (CPUE) was well above the long-term average at 3.6 fish/net, while Sauger CPUE was equal to a previous 10-year high during 2022 at 0.9 fish/net (Figure 10).

Table 4. Summary of Missouri River and Fort Peck Dredge Cut sampling, 2023. *Shovelnose Sturgeon were measured to fork-length (inches) rather than total length.

	# Sampled	Min TL (in)	Max TL (in)	Avg. TL (in)	Avg. Wt (lbs)	Avg. Wr
Bluegill	2	4.6	5.3	5.0	0.10	115.8
Bigmouth Buffalo	1	24.2	24.2	24.2	10.85	-
Channel Catfish	57	14.8	26.0	18.1	2.09	92.1
Common Carp	2	22.2	23.0	22.6	4.62	79.2
Cisco	27	4.9	15.8	12.2	0.73	-
Goldeye	5	14.6	15.4	15.0	1.07	-
Northern Pike	12	19.7	31.1	26.6	4.82	97.3
Rainbow Smelt	2	5.7	5.8	5.8	0.05	-
River Carpsucker	4	17.6	19.0	18.3	2.73	-
Shovelnose Sturgeon*	12	22.6	28.3	26.0	3.00	106.6
Sauger	9	11.7	16.4	14.3	0.81	77.6
Saugeye	1	14.5	14.5	14.5	0.86	79.8
Smallmouth Buffalo	2	19.0	21.2	20.1	4.38	80.9
White Sucker	38	8.9	20.7	16.5	2.23	102.5
Walleye	36	12.0	27.0	17.0	1.84	87.3
Yellow Perch	7	6.1	8.3	7.4	0.18	87.1

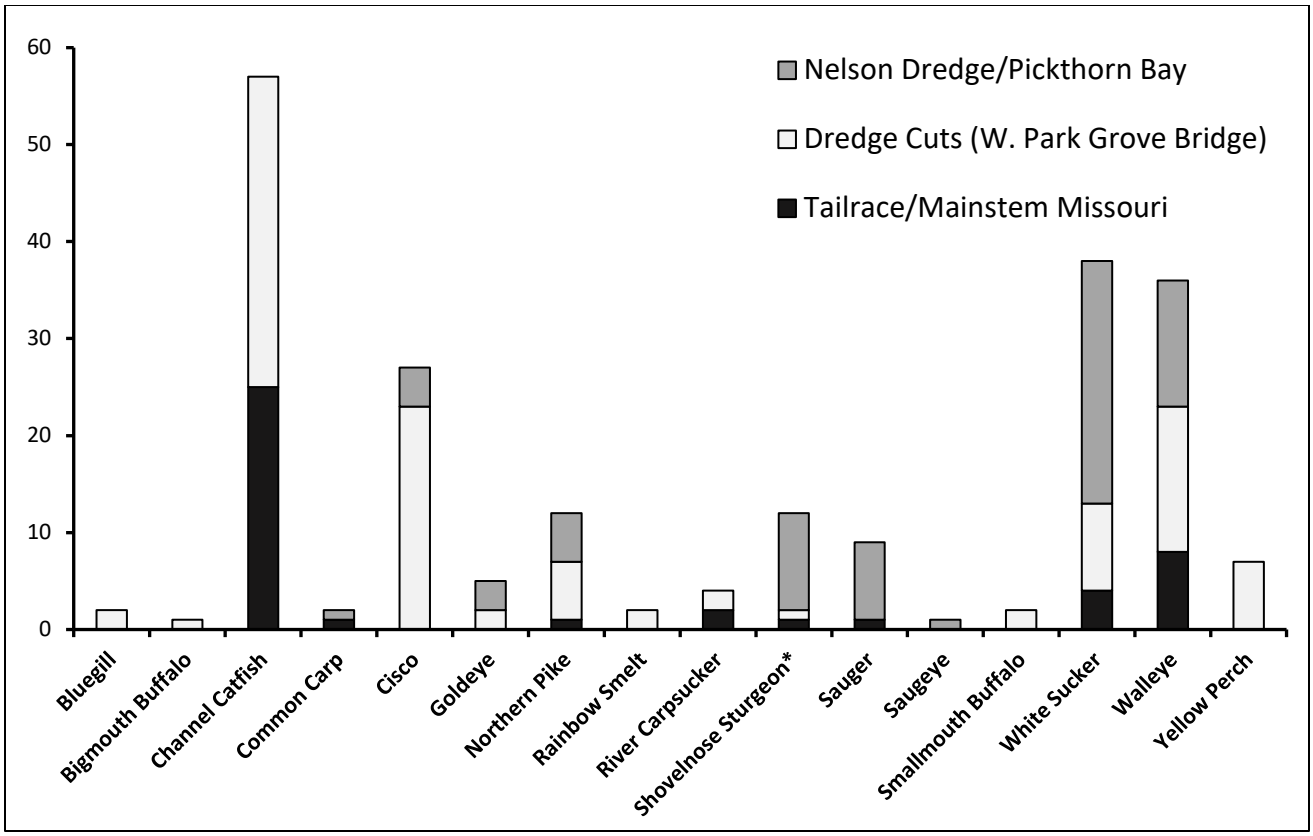

Figure 9. Capture location summary of species sampled during Fort Peck Dredge Cut sampling, 2023.

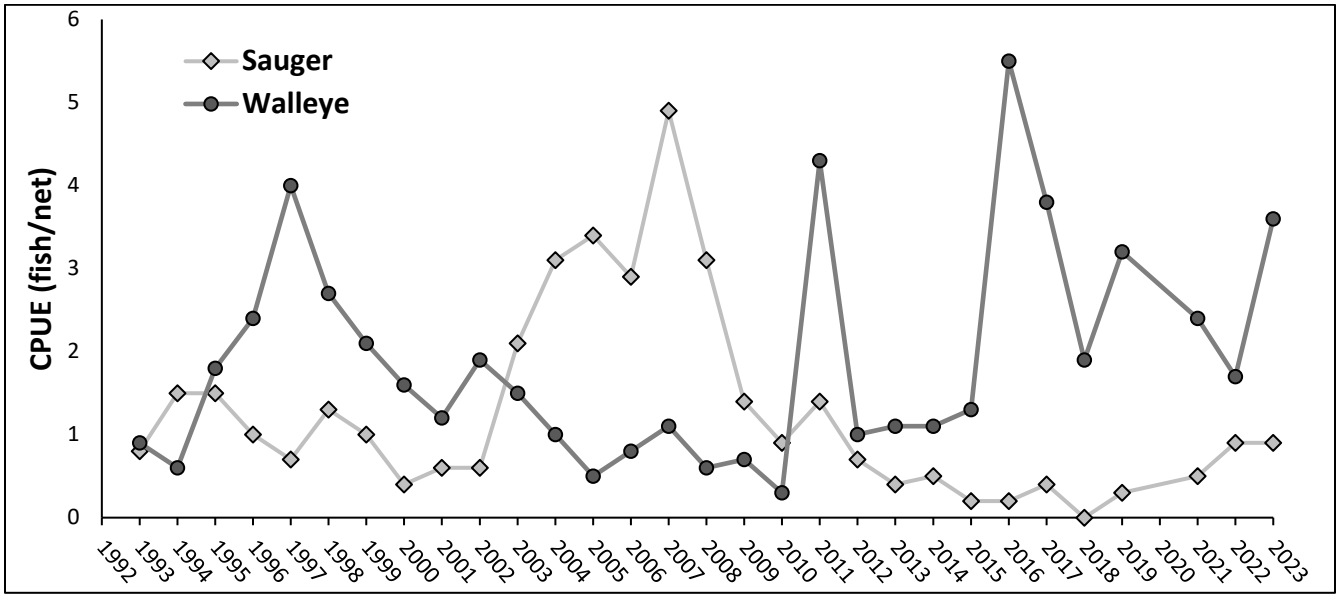

Figure 10. Long-term CPUE data of Walleye and Sauger captured in the Fort Peck Dredge Cuts.

BURBOT SAMPLING

Only three burbot were captured among the two reaches sampled in 2023 (Table 5). No other species were captured.

Table 5. Summary of Burbot sampled in the Missouri River during 2023.

Reach	Date	# Sampled	CPUE (fish/net)	Avg. TL (in)	Max. TL (in)	Avg. Wt (lb)
Fort Peck Dam/Tailrace	4/24/2023	2	0.5	19.2	20.2	1.48
School Trust - Milk River Mouth	4/25/2023	1	0.33	17.2	17.2	0.97
Poplar River Mouth	-	-	-	-	-	-
Big Muddy Creek Mouth - Culbertson	-	-	-	-	-	-

REDD COUNTS

Conditions were favorable for all but the first redd count conducted in 2023, which occurred April 11th just after ice-off (Table 6; Figure 11). Active redds and number of adults observed in the side channel appeared to positively correlate with flow (water elevation) as spawning habitat became inundated with water as discharge from Fort Peck Dam increased (> ~9,000 cfs). The third and fourth redd counts were the highest number of redds recorded in the side channel, and the most adults observed since spawning investigations began in 2021.

Table 6. Overview of Rainbow Trout spawning investigations in the Scout/Duck Island side channel, 2023.

Date	Redds	Adults	FP Dam Discharge	Temperature	Water Clarity	Conditions
April 11, 2023	0	0	6,897 cfs	38.7-40.5 F	Fair-Poor	Sun, 5-10 mph wind
April 28th, 2023	11	3	4,217 cfs	39.9 - 41.9 F	Good	Mostly cloudy, 5 mph wind
May 16th, 2023	63	34	10,242 cfs	44-46.1 F	Good	Sunny, 10 mph wind
June 6th, 2023	67	34	9,029 cfs	48-51.5 F	Good	Sunny, 5 mph wind
June 23rd, 2023	24	0	9,093 cfs	49.5-50.7 F	Excellent	Overcast, 10 mph wind

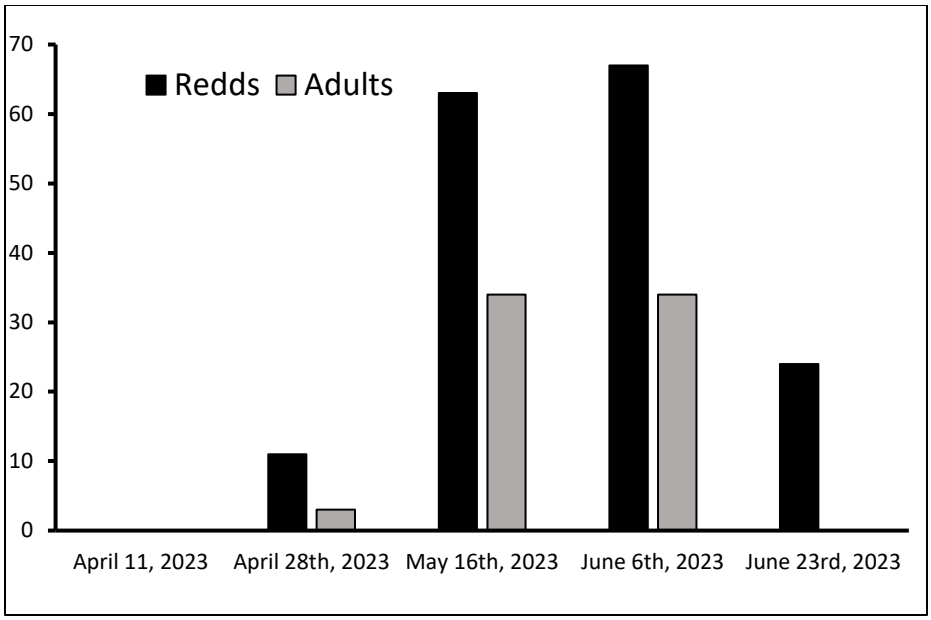

Figure 11. Summary of Rainbow Trout spawning investigations, 2023.

MISSOURI RIVER TROUT

For the first time since 2017, salmonids were surveyed below Fort Peck Dam. A total of 118 Rainbow Trout, 29 Brown Trout, and two Chinook Salmon were captured (Table 7). Of these, one Rainbow Trout and one Brown Trout were tagged during previous sampling efforts in 2013, 97 Rainbow Trout and 28 Brown Trout received new PIT tags, and 12 Rainbow Trout were collected for age estimation.

Rainbow Trout catch per unit effort (CPUE; fish/full run) in 2023 was comparable to the most recent 2017 estimates, while Brown Trout CPUE was slightly lower (Table 7). Population estimates generated using capture histories from 2013, 2014, 2015, and 2023 (most 2017 fish were not PIT tagged) suggest a higher abundance than 2013 and 2017 estimates (Table 8). As mentioned previously, 2023 population estimates should be used cautiously, as these estimates assumed all previously PIT tagged fish were still at large (highly unlikely) and excluded most 2017 fish due to a lack of individual marks (PIT tags), biasing estimates high. Estimates generated after 2024 and 2025 sampling, when 2023 PIT tagged fish are still at large will likely be a much more accurate representation of actual population size.

Overall, the population of salmonids below Fort Peck Dam is dominated by large, long-lived fish (Table 19; Figures 12 and 13) as demonstrated by size structure indices, previous growth data presented by T. Haddix (2017), and the 2023 capture of fish tagged during 2013 sampling. Rainbow Trout collected for age estimation in 2023 ranged from 1-14 years of age.

Table 7. Summary of salmonid sampling below Fort Peck Dam, 2013-2023. Fort Peck Dam discharge during sampling in 2023 ranged from 6,605 cfs to 7,750 cfs.

Species	Year	# Sampled	Avg. TL	Min TL (in)	Max TL (in)	Avg. Wt (lbs)	Avg. Wr	CPUE (fish/full run)
Rainbow Trout	2023	118	22.5	6.8	27.8	5.4	109.3	59.0
	2017	150	20.4	2.8	27.8	3.6	81.2	50.0
	2015	82	21.5	8.5	27.8	3.9	89.2	82.0
	2014	176	21.6	8.7	27.6	4.0	92.9	88.0
	2013	261	21.1	7.2	27.7	4.1	100.1	65.3
Brown Trout	2023	29	25.0	18.5	31.1	6.3	104.2	14.5
	2017	29	22.7	16.0	30.7	5.2	104.1	9.7
	2015	11	23.2	16.1	30.6	4.9	100.2	11.0
	2014	19	22.6	10.6	30.1	4.8	102.7	9.5
	2013	24	23.7	17.3	31.1	6.3	113.7	6.0
Chinook Salmon	2023	2	28.1	27.9	28.3	8.0	87.8	1.0
	2017	2	24.4	23.6	25.1	5.7	92.8	0.7
	2015	1	26.3	26.3	26.3	7.7	102.5	1.0
	2014	0	-	-	-	-	-	-
	2013	0	-	-	-	-	-	-

Table 8. Summary of population estimates (Schnabel) for salmonids > 14 inches below Fort Peck Dam (RM 1771 – 1761). N = abundance, LCI = lower 95% confidence interval, UCI = upper 95% confidence interval.

Species	Year	N	LCI	UCI
Rainbow Trout	2023	2496	2391	4560
	2017	785	445	1489
	2013	638	460	909
Brown Trout	2023	138	134	394
	2017	46	26	87
	2013	72	36	158

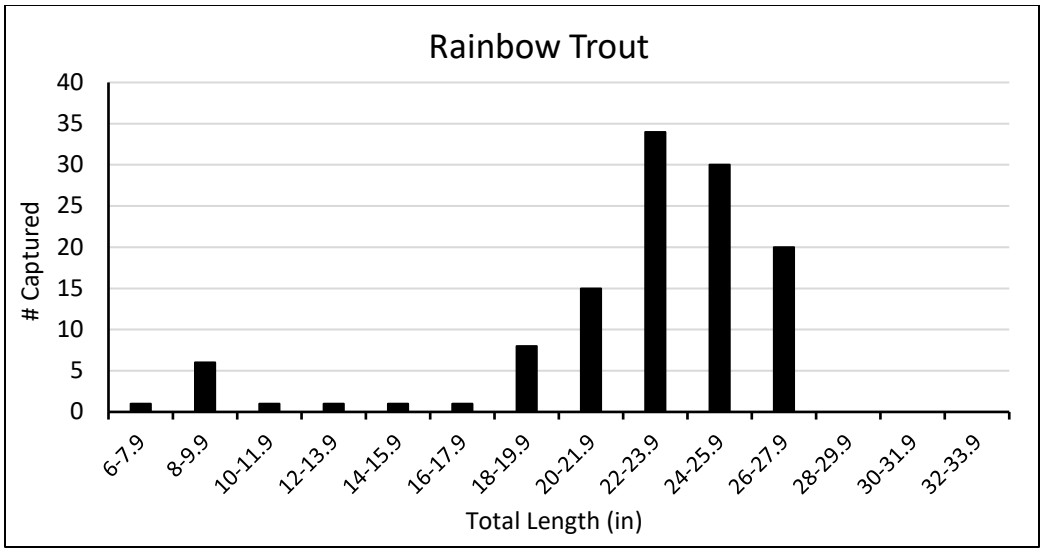

Figure 12. Length-frequency of Rainbow Trout captured below Fort Peck Dam, 2023.

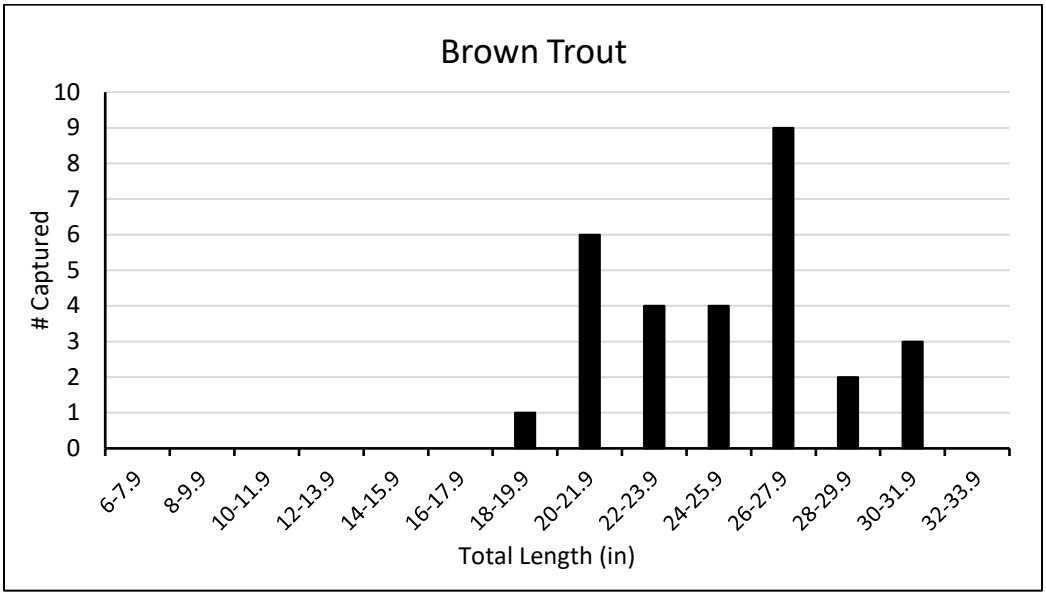

Figure 13. Length-frequency of Brown Trout captured below Fort Peck Dam, 2023.

MISSOURI RIVER FISH ASSEMBLAGE SAMPLING

In total, 478 fish comprised of 21 species were captured during August electrofishing efforts, and 973 fish comprised of 23 species were captured during September electrofishing efforts on the Missouri River (Tables 9 and 10). Goldeye, emerald shiner, and shorthead redhorse were most abundant during both months of effort (Figures 14 and 15). Genetic information was collected from 76 Sauger and two fish assumed to be Saugeye. Otoliths were collected from three Burbot, nine Walleye, 66 Sauger and two Saugeye. All twelve Blue Sucker captured were implanted with PIT tags and released. Other notable captures include a Chinook Salmon in September in the Poplar River reach, a White Bass captured in September in the Culbertson

reach, and 16 Smallmouth Bass captured throughout both months of sampling in the Poplar River and Culbertson reaches.

Table 9. Summary of Missouri River electrofishing efforts in all reaches, August 2023. *Shovelnose Sturgeon were measured to fork-length (inches) rather than total length. Discharge during August sampling was approximately 180 cfs at Nashua, MT (USGS gage 06174500), approximately 7,640 cfs (USGS gage 06177000) at Wolf Point, MT and approximately 7,880 cfs (USGS gage 06185500) at Culbertson, MT.

AUGUST	# Sampled	Min TL (in)	Max TL (in)	Avg. TL (in)	Avg. Wt (lbs)	Avg. Wr
Blue Sucker	10	23.3	29.2	27.75	6.38	-
Bigmouth Buffalo	5	17.0	28.4	23.68	9.96	-
Channel Catfish	20	15.5	24.5	18.25	2.21	97.9
Common Carp	28	13.9	29.4	20.92	4.32	88.23
Freshwater Drum	2	16.4	18.6	17.5	2.47	95.92
Emerald Shiner	105	2.7	3.6	3.24	-	-
Flathead Chub	1	8.8	8.8	8.8	0.19	-
Goldeye	125	4.0	14.9	12.15	0.66	-
Lake Whitefish	1	19.3	19.3	19.3	3.47	-
Longnose Sucker	3	16.5	18	17.27	2.11	-
Northern Pike	5	23.7	34.1	27.9	4.85	84.68
Plains Minnow	2	4.4	4.7	4.6	-	-
River Carpsucker	34	14.3	22.9	18.64	3.09	-
Shovelnose Sturgeon*	1	23.9	23.9	23.9	1.89	89.53
Sauger	40	8.5	19.5	12.84	0.59	73.11
Saugeye	2	14.2	18.8	16.5	1.38	77.28
Shorthead Redhorse	59	5.7	19.7	13.35	1.07	-
Smallmouth Bass	2	5.5	12.8	9.15	0.55	97.57
Smallmouth Buffalo	12	17.5	26.6	22.78	5.96	71.92
White Sucker	16	6.2	18.8	14.84	1.71	114.83
Walleye	5	14.0	19.6	16.62	1.46	77.96

Table 10. Summary of Missouri River electrofishing efforts in all reaches, September 2023. *Shovelnose Sturgeon were measured to fork-length (inches) rather than total length. Discharge during August sampling was approximately 150 cfs at Nashua, MT (USGS gage 06174500), approximately 7,150 cfs (USGS gage 06177000) at Wolf Point, MT and approximately 7,700 cfs (USGS gage 06185500) at Culbertson, MT.

SEPTEMBER	# Sampled	Min TL (in)	Max TL (in)	Avg. TL (in)	Avg. Wt (lbs)	Avg. Wr
Blue Sucker	2	29.5	30.1	29.8	8.28	-
Bigmouth Buffalo	10	16.6	31.6	22.0	6.65	-
Channel Catfish	12	15.1	23.2	18.7	2.26	89.86
Common Carp	34	17.1	27.2	22.1	5.15	92.20
Chinook Salmon	1	27.8	27.8	27.8	8.15	92.09
Freshwater Drum	1	16.5	16.5	16.5	2.04	96.25
Emerald Shiner	479	3.0	3.0	3.0	-	-
Flathead Chub	4	6.0	7.8	7.1	0.10	-
Goldeye	123	3.6	15.5	11.9	0.59	-
Lake Whitefish	1	21.9	21.9	21.9	3.68	-
Ling	3	14.6	22.0	17.5	1.04	66.54
Longnose Sucker	3	9.2	18.3	14.8	1.70	-
Northern Pike	6	8.0	22.4	13.9	0.66	85.94
Plains Minnow	59	3.4	4.2	3.7	0.02	-
River Carpsucker	57	10.7	23.2	18.1	2.94	-
Shovelnose Sturgeon*	2	23.6	32.5	28.1	4.39	105.58
Sauger	36	8.5	19.6	11.6	0.42	70.16
Shorthead Redhorse	97	5.4	20.2	13.4	1.13	-
Smallmouth Bass	4	5.6	9.8	7.1	0.22	104.89
Smallmouth Buffalo	14	16.2	24.3	20.9	5.09	81.37
White Bass	1	14.5	14.5	14.5	1.27	83.18
White Sucker	21	9.7	19.3	15.8	1.91	103.96
Walleye	3	15.4	18.1	17.1	1.70	87.32

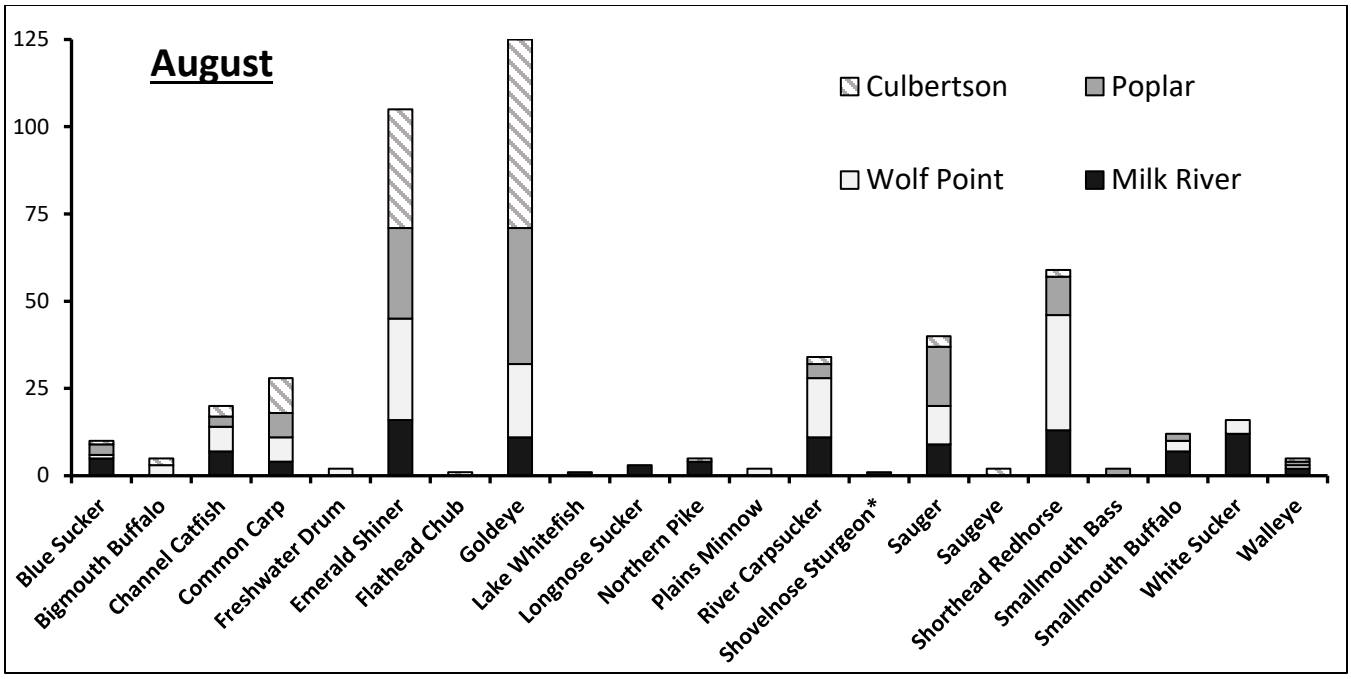

Figure 14. Summary of Missouri River electrofishing captures by reach, August 2023.

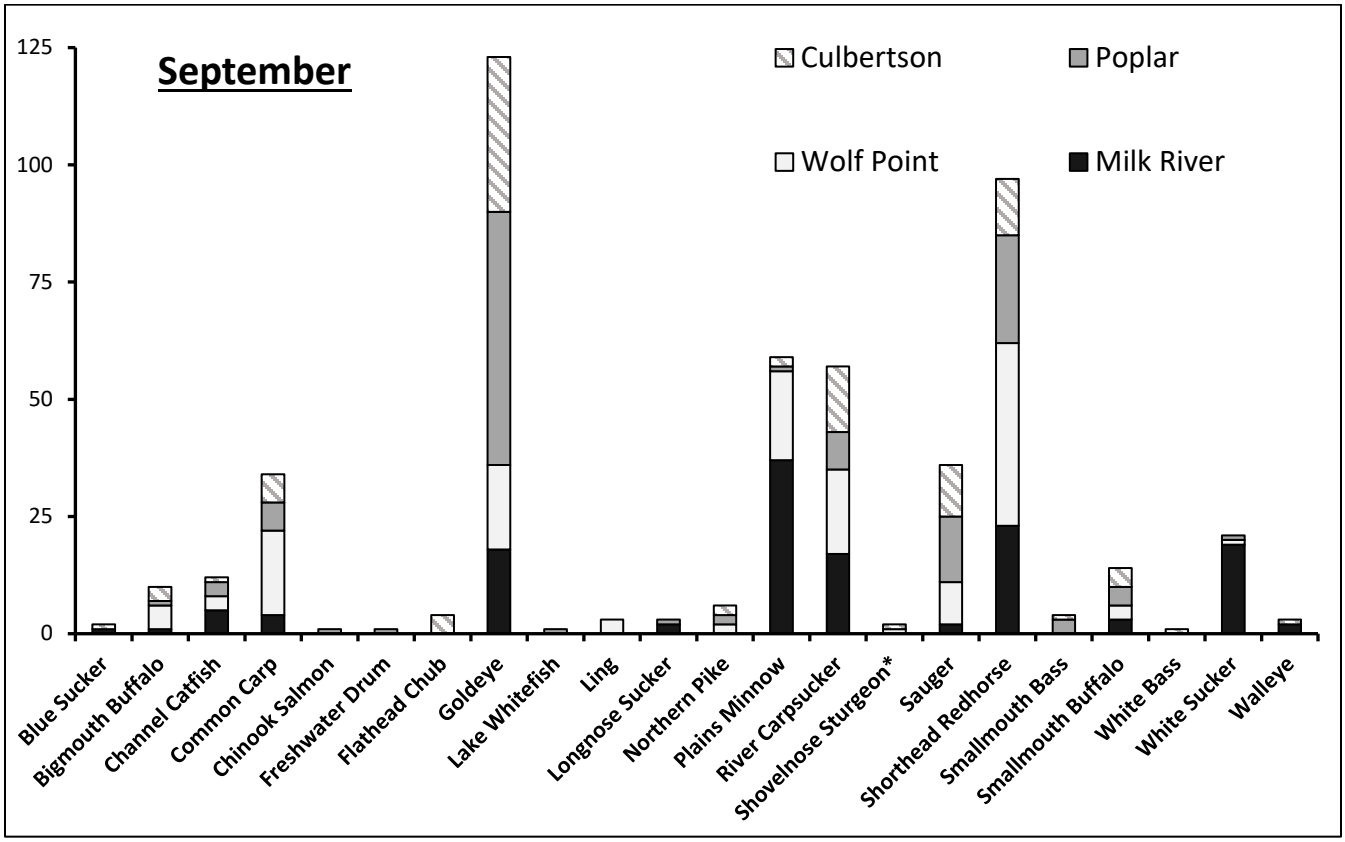

Figure 15. Summary of Missouri River electrofishing captures by reach, September 2023. Emerald shiner (N=479) were removed for display purposes.

SELENIUM SAMPLING

A total of 159 fish were captured during efforts to collect gravid female walleye for selenium sampling. Of 16 walleyes captured, five gravid females were collected for selenium sampling (Table 11). Other species collected include Bigmouth Buffalo (n=1), Channel Catfish (n=121), Cisco (n=5), Northern Pike (n=3), River Carpsucker (n=6), Shovelnose Sturgeon (n=1), Shorthead Redhorse (n=2), Smallmouth Buffalo (n=2), and White Sucker (n=2).

Table 11. Summary of gravid female Walleye collected for selenium sampling, April 2023.

Species	TL (in)	WT (lbs)	Sex
Walleye	28.5	8.97	F
Walleye	19.3	2.56	F
Walleye	18.1	2.14	F
Walleye	19.1	2.33	F
Walleye	26.6	7.78	F

DREDGE CUT PADDLEFISH SAMPLING

Thirteen Paddlefish were captured during 52 individual gillnet sets in the Fort Peck Dredge Cuts during 2023 (Table 12). Seven were captured in 3rd Dredge, 3 were captured in 2nd Dredge, and one was captured in 1st Dredge, Nelson Dredge, and Pickthorn Bay, respectfully. The lone Paddlefish captured in 1st Dredge was previously tagged however, identifiers on the existing tag were not completely legible therefore origin of the fish was not determined. The remaining 12 Paddlefish were tagged with new metal band jaw tags specific to the Fort Peck Dredge Cuts (Table 12). One of the Paddlefish tagged in the Dredge Cuts in 2023 (MT DC 0003) was harvested in 2nd Dredge during the 2023 archery paddlefish season.

Table 12. Summary of Paddlefish captured during tagging efforts in the Dredge Cuts, 2023. *Previous jaw tag identifiers were not completely legible.

Date	Tag	Eye-FL	Weight	Sex	Location	Comments
5/15/2023	MT DC 0001	37.5	38.5	F	3rd Dredge	
5/15/2023	MT DC 0002	36.5	39.5	F	3rd Dredge	
5/15/2023	MT DC 0003	39.0	56.5	F	3rd Dredge	Arrow scar behind head, harvested 8/26/2023
5/15/2023	MT DC 0004	39.0	34.3	M	3rd Dredge	
5/15/2023	MT DC 0005	40.5	36.4	F	3rd Dredge	
5/19/2023	MT DC 0006	36.0	34.4	M	2nd Dredge	
5/19/2023	MT DC 0007	37.0	33.1	M	2nd Dredge	
5/22/2023	MT DC 0008	33.5	24.1	M	Nelson Dredge	
5/22/2023	MT DC 0009	35.5	26.3	M	Pickthorn Bay	
5/23/2023	111*	33.5	26.0	F	1st Dredge	Recapture
5/25/2023	MT DC 0010	41.0	45.0	M	3rd Dredge	
5/25/2023	MT DC 0011	37.0	37.8	F	3rd Dredge	
5/25/2023	MT DC 0012	37.5	36.0	F	2nd Dredge	

DREDGE CUT ARCHERY PADDLEFISH SEASON

The 2023 Dredge Cut archery Paddlefish season saw harvest, angler days, catch rate, and nonresident tag sales all increase from 2022 however, none of these metrics greatly exceeded 10-year averages (Table 13).

Overall harvest, tag returns, conversations with anglers, and additional anecdotal evidence suggested more Paddlefish were in and around the Dredge Cuts during the 2023 season compared to previous years. Possibly, this is due to high flows out of the Milk River in spring and early summer (> 20,000 cfs), as warm water input out of the Milk River is thought to draw fish up the Missouri River system towards Fort Peck Dam.

Similar to 2021 and 2022, anglers continue to utilize self-creel stations and the reward hat program, as dentary samples were submitted for all 36 reported Paddlefish (Table 13). Additionally, 5/36 (13.9%) of harvested Paddlefish were previously jaw tagged, continuing to suggest mixing of Dredge Cut and Lower Missouri River-Sakakawea Paddlefish stocks (Table 14).

Table 13. Summary of angler dynamics and participation in the Dredge Cut archery Paddlefish fishery. Number of fish harvested is based on FWP implemented phone survey data, and mandatory reporting did not begin until 2016.

Year	Total Tags Sold	NR tags	Percent Bow Hunted	Total Angler Days	catch rate (PF/day)	# fish harvested	# fish reported	# dentary samples
2011	108	4	65.8	204	0.034	7		
2012	171	12	70.0	390	0.066	26		
2013	162	20	86.7	401	0.146	59		
2014	213	46	89.4	718	0.078	56		
2015	261	57	83.0	742	0.074	56		
2016	253	56	90.0	729	0.066	48	28	
2017	300	73	80.5	859	0.080	69	27	
2018	210	43	86.0	575	0.090	52	26	
2019	182	32	82.0	493	0.034	17	1	
2020	235	61	83.9	790	0.566	45	14	
2021	217	54	80.9	633	0.066	41	36	33
2022	204	37	85.3	675	0.029	20	20	16
2023	213	50	88.8	740	0.061	45	36	36

Table 14. Summary of previously tagged Paddlefish harvested during the 2023 Dredge Cut archery season. *Angler likely measured total length rather than fork length.

Harvest Date	FL (in)	Wt (lbs)	Sex	Jaw Tag	Tagging Date	Location	FL (in)	Wt (lbs)
7/22/2023	41	39	M	Silver ND50438	4/24/2013	RM 1574.0 - ND	40	33
7/22/2023	39	N/A	M	Silver ND3223	10/2/1996	Pipeline, ND	37	36
7/31/2023	41	48	F	Silver MT15177	6/9/2015	Intake, MT	41	N/A
8/5/2023	39.5	37	M	Silver ND6069	4/30/2001	RM 1555.0 - ND	37	28
8/28/2023	43*	52	F	Silver MTDC0003	5/15/2023	Dredge Cuts, MT	39	56.5

MILK RIVER CATFISH

A total of 211 Channel Catfish were captured during 2023 long-term monitoring efforts. Sixty-five (30.8%) were captured above Vandalia Dam and 146 (69.2%) were captured below Vandalia Dam (Figure 8). Moving from tandem hoop nets to single hoop nets inhibits comparisons of CPUE from 2022 to 2023 in nets however, significantly more fish were captured overall in 2023. Perhaps this is due to higher flows in the Milk River during 2023 sampling than in 2022. Interestingly, condition (W_r) of Milk River Channel Catfish in 2023 was much better than condition observed in 2022 (2022 Avg. W_r = 81.3; Table 15).

Other species captured above Vandalia Dam include Black Crappie (n=2), Common Carp (n=2), Goldeye (n=1), River Carpsucker (n=3), Shorthead Redhorse (n=4), White Sucker (n=1), Walleye (n=5), and White Crappie (n=3). Other species captured below Vandalia Dam include Black

Bullhead (n=2), Common Carp (N=1), Goldeye (n=1), Stonecat (n=1), Sauger (n=2), Shorthead Redhorse (n=6), Smallmouth Buffalo (n=1), and Walleye (n=3).

Table 15. Summary of 2023 long-term monitoring for Channel Catfish in the Milk River. Reaches are listed from upstream to downstream, with a complete fish barrier (Vandalia Dam) occurring between Vandalia WMA and Page/Potter Crossing.

Reach	Date	Gear Type (#)	CPUE - fish/hoop	CPUE - fish/set line	Avg. TL (in)	Avg. Wt (lb)	Avg. Wr
Beaver Creek	7/17/2023	Hoop (6) Set Line (4)	0.8	2.3	13.8	1.20	103.2
Hinsdale Ramp	7/18/2023	Hoop (6) Set Line (4)	5.5	0.5	8.0	0.21	106.5
Vandalia WMA	7/19/2023	Hoop (6) Set Line (4)	2.0	1.0	11.6	1.13	100.7
Page/Potter Crossing	7/24/2023	Hoop (6) Set Line (4)	8.3	2.0	15.6	1.48	100.6
6th Avenue Bridge	7/25/2023	Hoop (6) Set Line (4)	8.5	2.5	12.1	0.95	98.2
Rorvik's	7/26/2023	Hoop (6) Set Line (4)	2.3	3.3	12.1	0.91	95.0

MILK RIVER SEINING

Fourteen species were captured during 2023 seining efforts within the Milk River. A total of 381 individuals were captured among 6 reaches sampled. Boat access prevented the larger (200’ x 6’) seine from being used in reaches below Vandalia Dam (6th Ave. Bridge, Page/Potter Crossing, Rorvik’s), therefore comparisons of catch rates between sampling locations above and below Vandalia Dam cannot be compared. A summary of results can be found in Appendix D.

TEMPERATURE LOGGERS

Of the 19 temperature loggers deployed in 2023, 18/19 (95%) were retrieved. One logger malfunctioned while deployed preventing data from being downloaded. The sole logger not retrieved was washed into the creek during high water and could not be located.

Of the 18 loggers collected, temperatures varied greatly throughout the year (Table 16) however, maximum temperatures were less extreme than those observed in 2022.

Table 16. Summary of temperature loggers deployed in eastern region 6 during 2023. Observed temperatures with an asterisk (*) refer to loggers that likely were not fully submerged during all months of deployment.

Location	# of Loggers	Months Deployed	Range of observed temperatures (F)
Milk River	3	June-October	50.2 - 82.1
Poplar River	2	June-October	42.5 - 84.6
Redwater River	2	June-October	47.8 - 87.5
West Fork Poplar	1	June-October	43.6 - 80.9
Prairie Elk Creek	1	Logger Malfunction	-
Plentywood Creek	1	June-October	45.8 - 81.0*
Frenchman Creek	1	June-October	38.0 - 82.2*
Rock Creek	1	June-November	41.6 - 76.9
Larb Creek	1	Not Retrieved	-
Willow Creek	1	June-November	41.4 - 89.7*
Brazil Creek	1	June-November	39.4 - 82.9
Cherry Creek	1	June-September	46.0 - 77.2*
Timber Creek	1	June-November	39.2 - 75.1*
Porcupine Creek	1	June-November	31.8 - 87.0*
Big Muddy Creek	1	June-November	39.2 - 84.1

PRAIRIE STREAM SAMPLING

Six prairie streams were sampled in 2023 including Plentywood Creek (Sheridan County), Rock Creek (Valley County), South Fork of Rock Creek (McCone County), Big Muddy Creek (Roosevelt County), Beaver Creek (Sheridan County), and Sheep Creek (Roosevelt County). Another 18 predetermined sampling locations were either dry or lacked enough water to sample.

A total of 4,533 individuals of 11 different species were captured during prairie stream surveys in 2023 (Table 17). No Northern Pearl Dace were captured in 2023.

Table 17. Summary of 2023 prairie stream long term monitoring surveys.

System (County)	Lat/Long	Date	Effort (60 m reaches)	Species	# Captured
Big Muddy Creek (Roosevelt)	48.34245, -104.58417	10/4/2023	4	Common Carp	23
				Fathead Minnow	1533
				Lake Chub	5
				White Sucker	1
Plentywood Creek (Sheridan)	48.82551, -104.68534	8/30/2023	1	Black Bullhead	10
				Fathead Minnow	93
				Northern Pike	2
Sheep Creek (Roosevelt)	48.33113, -104.49669	10/4/2023	1	Brook Stickleback	72
				Fathead Minnow	1094
				Iowa Darter	1
Rock Creek (Valley)	48.94108, -106.8552	8/18/2023	3	Black Bullhead	1
				Fathead Minnow	502
				Lake Chub	647
				Longnose Dace	3
				Stonecat	2
				Shorthead Redhorse	1
				White Sucker	216
				Western Silvery	46
S. Fork Rock Creek (McCone)	47.71446, -106.22192	8/16/2023	4	Common Carp	6
				Fathead Minnow	74
				Western Silvery	1
Beaver Creek (Sheridan)	48.94363, -104.97412	8/30/2023	4	Black Bullhead	37
				Fathead Minnow	153
				Lake Chub	6
				Northern Pike	3
				White Sucker	1

WILD FISH TRANSFERS

Fourteen waterbodies were supplemented via wild fish transfers in 2023 (Table 18).

Table 18. Summary of wild fish transfers performed in eastern region 6 during 2023.

Date	Source	Destination	Species	Avg. Size	~Number
5/1/2023	Winter Harbor Pond	Raymond Dam	BG	4"	155
5/3/2023	Carpenter Creek Reservoir	Troika Reservoir	YP	5"	500
5/3/2023	Carpenter Creek Reservoir	Glasgow Base Pond	YP	5"	200
5/8/2023	Carpenter Creek Reservoir	Kuester Reservoir	YP	5"	200
5/8/2023	Carpenter Creek Reservoir	Wold's Dam	YP	5"	270
7/6/2023	Carpenter Creek Reservoir	Ike's Fishing Pond	YP	3"	1350
7/13/2023	Killenbeck Reservoir	VR009 Reservoir	FH MN	2"	3 gallons
7/13/2023	Killenbeck Reservoir	Glasgow Base Pond	FH MN	2"	3 gallons
7/13/2023	Killenbeck Reservoir	Base Pond East	FH MN	2"	3 gallons
7/13/2023	Killenbeck Reservoir	Shoot Reservoir	FH MN	2"	7 gallons
7/13/2023	Killenbeck Reservoir	Bentonite Pond 1	FH MN	2"	1 gallon
7/13/2023	Killenbeck Reservoir	Bentonite Pond 2	FH MN	2"	1 gallon
7/13/2023	Killenbeck Reservoir	Jensen Trail Pond	FH MN	2"	2 gallons
7/13/2023	Killenbeck Reservoir	Gun Range Pond	FH MN	2"	7 gallons

GENETICS

Genetic material was collected from 92 Sauger and four fish assumed to be Saugeye in the Missouri River and Fort Peck Dredge Cuts in 2023. All four assumed Saugeye were identified as Walleye-Sauger hybrids, and five of the 92 Sauger were identified as having Walleye alleles. In total, 9/96 (9.4%) Sauger and Saugeye collected in the Missouri River below Fort Peck Dam were identified as Walleye-Sauger hybrids, a much higher percentage than observed previously (~1%; Bingham 2011). A more comprehensive genetic collection approach is planned in 2024, as genetic material will be collected from all Walleye, Sauger and Saugeye captured in the Missouri River.

No Pearl Dace were captured during 2023.

AGE ESTIMATION

A total of 415 age structures were collected from seven different species in 2023. A summary of collected structures and associated age data can be found in Table 19. Additional age and growth information can be found in Appendix E.

Table 19. Summary of age data collected during 2023. Hyphens (-) represent a given age that no known-age fish were collected or mean total lengths (μ TL) could not be estimated.

Species	Location	Structure	# Collected	Min Age	Max Age	μ TL A1	μ TL A3	μ TL A5	μ TL A10
Paddlefish	Dredge Cuts	Dentary	36	10	55	-	-	-	36.0
Channel Catfish	Milk R. Above Vandalia	Spine	32	1	12	5.5	10.5	14.4	20.7
	Milk R. Below Vandalia	Spine	95	1	17	6.8	9.3	11.8	17.4
Ling	Missouri River	Otolith	6	4	9	-	-	20.2	-
Rainbow Trout	Missouri River	Otolith	13	1	15	10.7	-	24.3	27.0
Sauger	Missouri River	Otolith	71	1	12	8.8	12.8	14.5	15.8
	Dredge Cuts	Otolith	9	2	6	-	14.7	-	
Walleye	Boxelder Reservoir	Otolith	25	2	8	9.9	11.5	14.6	16.6
	Missouri River	Otolith	9	2	8	-	15.6	16.2	-
	Dredge Cuts	Otolith	29	3	12	-	15.1	16.5	22.6
Yellow Perch	Fort Peck Trout Pond	Otolith	6	3	3	-	5.9	-	-
	Whitetail Reservoir	Otolith	12	1	3	5.9	10.2	-	-
	Bainville Ponds	Otolith	9	1	3	3.6	6.2	-	-
	Carpenter Creek Res.	Otolith	24	4	5	-	-	7.2	-
	Buer Pond	Otolith	22	2	7	-	7.7	8.9	-
	Kuester Lake	Otolith	3	5	5	-	-	9.6	-
	Dredge Cuts	Otolith	7	1	3	6.1	8.3	-	-
	Boxelder Reservoir	Otolith	7	1	2	7.2	-	-	-

ANGLER CREEL SURVEYS

A total of 189 anglers were surveyed during 2023 creel surveys. Eleven were surveyed on-site at Boxelder Reservoir, 17 were surveyed on-site at Whitetail Reservoir, 161 were surveyed via phone call after the archery Paddlefish season, and no anglers were surveyed regarding the Missouri River Paddlefish fishery. Catch rates for Walleye, Yellow Perch, and Northern Pike in Boxleder Reservoir were 0.13, 0.0, and 0.04 fish/hour, respectively. Catch rates for Yellow Perch and Northern Pike in Whitetail Reservoir were 1.29 and 0.11 fish/hour, respectively. Phone creel results for the Fort Peck Dredge Cut archery Paddlefish fishery are summarized in Table 13.

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Bingham, D. 2011. Conservation Genetics of Sauger in the Missouri River. Graduate Student Thesis. University of Montana. Missoula, MT.

Bonar, S. A., W. A. Hubert, and D. W. Willis, editors. 2009. Standard methods for sampling North American freshwater fishes. American Fisheries Society, Bethesda, Maryland.

Haddix, T. 2018. Eastern Region 6 Pond, Stream, and River Sampling. Montana Fish, Wildlife & Parks.

APPENDIX

Appendix A. 1. Summary of all ponds and small reservoirs sampled in Valley County in 2022.

Waterbody	Sampling Effort	Date	Purpose	Species Captured	Gillnet CPUE	Fyke Net CPUE	Avg. TL (in)	Range TL (in)	Management Recommendations/Comments
Fort Peck Trout Pond	Gillnet - 3 Fyke Net - 1 Mini Fyke - 1	6/27/2023	Long Term Monitoring	BG, NP, S STRG, W SU, WE, YP	NP - 0.67/net S STRG - 0.33/net W SU - 0.33/net WE - 0.33/net YP - 1.67/net	BG - 23/net W SU - 0.5/net YP - 1.5/net	BG - 4.7 NP - 32.5 S STRG - 25.1 W SU - 18.2 WE - 23.9 YP - 5.4	BG 3.5 - 5.8 NP 30.4 - 34.6 S STRG - 25.1 W SU 17.7 - 18.6 WE - 23.9 YP 3.9 - 6.3	Artificial habitat project underway to increase near-shore spawning and rearing habitat, effort to complete bathymetry mapping and zooplankton investigations in 2024
Glasgow Base Pond	Gillnet - 1 Mini Fyke - 1	5/22/2023	Long Term Monitoring	NP, YP	NP - 3/net YP - 1/net	-	NP - 23.3 YP - 5.4	NP 16.0 - 32.0 YP - 5.4	Winterkill in 2022, restocked with RB in spring 2023 and WFT of 500 5" YP in 2023
VR 009 Reservoir	Gillnet - 1 Mini Fyke - 1	5/22/2023	Long Term Monitoring	NO FISH	-	-	-	-	Winterkill in 2022, restocked with RB in spring 2023
Home Run Pond	Hook and Line	5/24/2023	Long Term Monitoring	RB	-	-	RB - 6.2	RB 6.2	Sampled during Glasgow kids fishing day (~45 angler hours), one RB captured. Drawn down fall 2023 to induce winterkill, will refill spring 2024
McNab Reservoir	Gillnet - 1 Fyke Net - 1 Mini Fyke - 1	6/29/2023	Long Term Monitoring	BL CR, FH MN	-	BL CR - 1.33/net FH MN - 1.33/net	BL CR - 2.0 FH MN - 3.0	BL CR 1.1 - 3.8 FH MN 3.0	Continued reduction in relative abundance of BL CR and FH MN from 2021, will continue to monitor
O'Juel Reservoir	Hook and Line	6/27/2023	Long Term Monitoring	RB	-	-	RB - 14.6	RB 12.5 - 17.9	Angler reports suggested high abundances and multiple year classes of RB, therefore H/L sampling was preferred in 2023, 3.0 fish/hour
Paulo Reservoir	Gillnet - 1 Mini Fyke - 1	5/23/2023	Long Term Monitoring	CARP, BG	NO FISH	CARP - 1/net BG - 3/net	CARP - 12.5 BG - 4.5	CARP 12.5 BG 4.3 - 4.8	Partial winterkill in 2022. Funding approved to rehabilitate reservoir by raising freeboard of dam to allow for 3-4' more vertical ft of storage
Shoot Reservoir	Did not sample		-						Did not sample in 2023. Known winterkill in winter 2022. Restocked with RB and FH MN in 2023
Troika Reservoir	Did not sample		-						Winterkill in 2022, restocked with 500 adult YP in 2023
Winter Harbor Pond	Fyke Net - 2 Mini Fyke - 2	5/1/2023	Wild Fish Transfer	BG, LMB, W SU, YP	-	BG - 38.5/net LMB - 0.25/net W SU - 0.5/net YP - 39.3/net	-	-	Did not measure fish as WFT of BG was priority, anecdotal data and angler reports suggest moderate abundance of adult (> 14") LMB
Cory's Pond	Hook and Line	8/8/2023	Long Term Monitoring	YP	-	-	-	-	5 YP/ hour. Avg TL = 6.8". Will continue to serve as a donor pond for wild transfer of YP through 2026
Big Reservoir	Did not sample		-						Known winterkill in 2022, stocked with RB annually
Hose Reservoir	Gillnet - 1 Fyke Net - 1	6/29/2023	Long Term Monitoring	RB, FH MN	RB - 2/net	FH MN - 2/net	RB - 7.2	RB 7.1 - 7.2	Surprisingly low catches of RB, will continue to stock annually
Carpenter Creek Reservoir	Fyke Net - 2 Mini Fyke - 2	5/3/2023	Wild Fish Transfer	YP, FH MN	-	FH MN - 0.3/net YP - 175.3/net	YP - 5.0	YP 3.0 - 9.5	Will continue to serve as donor source for wild transfers of YP through 2024

Atlas Reservoir	Hook and Line	6/28/2023	Long Term Monitoring	NO FISH					Probable winterkill in 2022, no fish observed despite many observed in fall 2022

Appendix A. 2. Summary of all ponds and reservoirs sampled in Daniels County in 2023.

Waterbody	Sampling Effort	Date	Purpose	Species Captured	Gillnet CPUE	Fyke Net CPUE	Avg. TL (in)	Range TL (in)	Management Recommendations/Comments
Buer Pond	Gillnet - 1 Fyke Net - 1	8/2/2023	Long Term Monitoring	YP	YP - 60/net	YP - 619/net	YP - 3.8	YP 3.0 - 11.2	Donor source for YP through 2027, good recruitment of YP
Hatfield Reservoir	Gillnet - 1 Fyke Net - 1	8/2/2023	Long Term Monitoring	RB	RB - 28/net	-	RB - 6.2	RB 5.3 - 7.0	Probable winterkill, captured RB likely stocked in spring 2023
Killenbeck Reservoir	Fyke Net - 3 Mini Fyke - 2	7/13/2023	Long Term Monitoring	FH MN	-	FH MN - 8,300 net	-	-	Transferred ~40,000 to various waters, donor source for FH MN through 2027
Whitetail Reservoir	Gillnet - 1 Fyke Net - 1	8/2/2023	Long Term Monitoring	NP, YP	NP - 20/net YP - 26/net	NP - 2/net YP - 3/net	NP - 16.2 YP - 5.1	NP 7.2 - 25.2 YP 2.4 - 10.2	Seemingly adequate natural recruitment of both NP and YP
Carney Reservoir	Did not sample		-						Donor source for FH MN through 2027

Appendix A. 3. Summary of all ponds and reservoirs sampled in Sheridan County in 2023, with the exception of Boxelder Reservoir.

Waterbody	Sampling Effort	Date	Purpose	Species Captured	Gillnet CPUE	Fyke Net CPUE	Avg. TL (in)	Range TL (in)	Management Recommendations/Comments
Carlson Pond	Hook and Line	8/1/2023	Long Term Monitoring	NO FISH	-	-	-	-	No fish observed
Christensen Dam	Hook and Line	8/1/2023	Long Term Monitoring	NO FISH	-	-	-	-	Better water conditions, some fish observed surfacing
Holtan Reservoir	Gillnet - 1 Mini Fyke - 1	8/2/2023	Long Term Monitoring	NO FISH	-	-	-	-	Poor Rainbow Trout survival, potential WFT of YP in 2023
Raymond Dam	Gillnet - 1 Mini Fyke - 1	8/1/2023	Long Term Monitoring	RB	RB - 14/net	-	RB - 8.2	RB 5.8 - 10.1	No BG or age 2 RB captured, possible winterkill
Wagner Reservoir	Did not sample		-						Dry

Appendix A. 4. Summary of all ponds and reservoirs sampled in Richland County in 2023.

Waterbody	Sampling Effort	Date	Purpose	Species Captured	Gillnet CPUE	Fyke Net CPUE	Avg. TL (in)	Range TL (in)	Management Recommendations/Comments
Candee Pond	Hook and Line	8/10/2023	Long Term Monitoring	NO FISH	-	-	-	-	Probable winterkill, newly stocked RB (4-5") observed surfacing
Wold's Dam	Did not sample		-						YP transfer in 2023, probable BG transfer in 2024
Kuester Reservoir	Did not sample	8/9/2023	Long Term Monitoring	FH MN, W SU, YP	YP - 2/net	FH MN - 212/net W SU - 0.5/net YP - 4/net	W SU - 13.8 YP - 10.3	W SU 13.8 YP 7.8 - 12.9	Transferred 500 YP in spring 2023, will receive WE transfer in 2024
Verschoot Reservoir	Did not sample		-						Low water (< 2') prevented sampling
Johnson Reservoir	Did not sample		-						Low water (< 4') prevented sampling

Appendix A. 5. Summary of all ponds and reservoirs sampled in Roosevelt County in 2023.

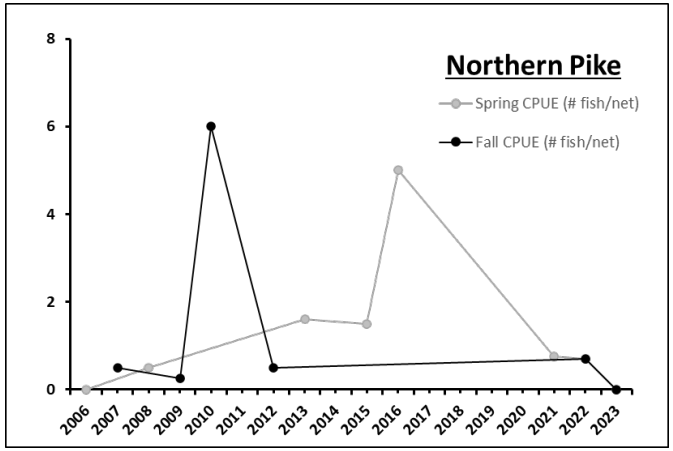
Waterbody	Sampling Effort	Date	Purpose	Species Captured	Gillnet CPUE	Fyke Net CPUE	Avg. TL (in)	Range TL (in)	Management Recommendations/Comments
Bainville East	Gillnet - 1 Fyke Net - 1	8/8/2023	Long Term Monitoring	CARP, FH MN, YP	YP - 4/net	CARP - 1/net FH MN - 1000/net YP - 268/net	CARP - 5.9 YP - 4.3	CARP 5.9 YP 3.3 - 7.4	Lack of Northern Pike seems to have improved Yellow Perch recruitment
Bainville West	Gillnet - 1 Fyke Net - 1	8/8/2023	Long Term Monitoring	CARP, NP, YP	CARP - 1/net NP - 5/net YP - 2/net	YP - 27/net	CARP - 10.9 NP - 23.5 YP - 3.9	CARP 10.9 NP 21.8 - 25.9 YP 3.1 - 6.7	Concerns with littoral habitat availability
Hofman Reservoir	Gillnet - 1 Mini Fyke - 1	8/8/2023	Long Term Monitoring	FH MN, LK CH, RB	RB - 1/net	FH MN - 600/net LK CH - 26/net	RB - 10.8	RB 10.8	Survival of RB limited, good bait source for local collectors
Knudsen Bros. Reservoir	Gillnet - 1 Mini Fyke - 1	8/8/2023	Long Term Monitoring	NO FISH	-	-	-	-	Winterkill in 2022, limited survival of stocked RB
Ike's Fishing Pond	Did not sample		-						Angler reports suggest high abundances of multiple RB year classes, WFT of YP in summer 2023
Big Muddy Reservoir	Did not sample		-						Access prevented sampling
Crusch Reservoir	Did not sample		-						Access prevented sampling

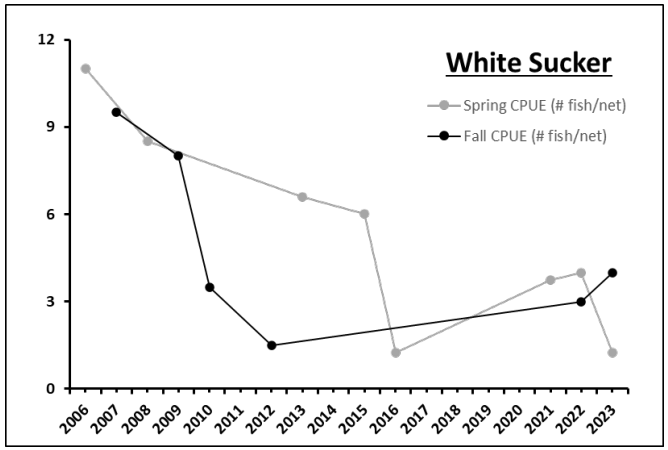
Appendix B. 1. Summary of limnological characteristics of ponds and reservoirs within the eastern region 6 fisheries management district.

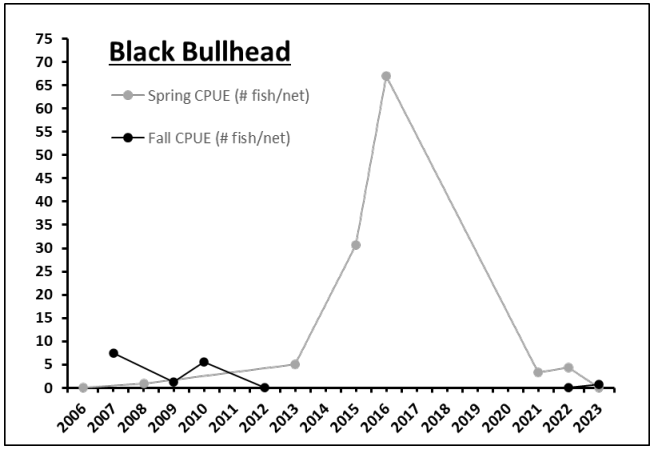
Waterbody	Surface Acres (full pool)	Sampling Date	Elevation (+/- full pool)	Max Depth (ft)	Secchi (ft)	Winter D.O. level (mg/L; avg)	Aerator Present	Comments
Atlas Reservoir	6.7	6/28/2023	2.0	-	-	-	N	Probable winterkill prior to 2023 sampling
Bainville East	5.6	8/8/2023	-1.0	9.2	2.5	-	N	
Bainville West	4.3	8/8/2023	-1.0	8.9	2.5	-	N	
Big Muddy Reservoir	3.5	-	-	-	-	-	N	Did not sample, access issues
Big Reservoir	3.5	-	-	-	-	-	N	Did not sample
Boxelder Reservoir	77.9	9/6/2023	-4.5	19.1	2.5	2.80	N	Turbidity likely due to carp presence
Buer Pond	4.5	8/2/2023	0.5	14.2	8.0	-	N	Spring influence
Candee Pond	3.1	8/10/2023	-2.5	-	-	-	N	Winterkill prior to 2023 sampling
Carlson Pond	0.9	8/1/2023	-1.0	-	-	-	Y	
Carney Reservoir	27.3	-	-	-	-	-	N	Did not sample
Carpenter Creek Reservoir	24.8	5/8/2023	0	21.2	6.5	-	N	
Christensen Dam	4.0	8/1/2023	0.0	-	-	-	Y	
Cory's Pond	1.7	8/8/2023	0.0	-	-	-	N	Spring influence
Crusch Reservoir	7.4	-	-	-	-	-	N	Did not sample, access issues
Danelson Reservoir	10.1	-	-	-	-	-	N	Did not sample, no longer viable fishery
Fort Peck Trout Pond	52.9	6/27/2023	0.0	24.4	15.0	-	N	Missouri River influence
Glasgow Base Pond	7.8	5/22/2023	1.0	15.1	7.0	2.17	N	Probable winterkill prior to 2023 sampling
Hatfield Reservoir	4.6	8/2/2023	0.5	11.1	4.0	-	N	Probable winterkill
Hofman Reservoir	7.8	8/8/2023	0.0	11.9	9.0	-	N	Winterkill prior to 2023 sampling
Holtan Reservoir	4.2	8/2/2023	0.0	17.8	3.5	-	N	
Home Run Pond	0.7	5/24/2023	0.0	-	-	-	N	Drawdown fall 2023
Hose Reservoir	12.4	6/29/2023	1.0	25.2	5.5	1.36	N	
Ike's Fishing Pond	1.9	-	-	-	-	-	N	Well maintains water level
Johnson Reservoir	3.4	-	-	-	-	-	N	Did not sample, water levels < 4'
Killenbeck Reservoir	36.9	7/13/2023	0.0	11.8	1.5	-	N	Probable winterkill of RB
Knudsen Bros. Reservoir	14.8	8/8/2023	0.0	14.7	7.5	-	N	Probable winterkill
Kuester Reservoir	66.4	8/9/2023	-3.0	16.3	1.5	8.98	N	
McNab Reservoir	9.1	6/29/2023	1.0	25.2	1.0	2.51	Y	Windmill installed August 2021
O'Juel Reservoir	9.5	6/27/2023	0.0	-	-	-	N	Spring influence
Paulo Reservoir	7.3	5/25/2023	0.0	12.8	1.5	-	Y	Windmill installed 2021, restoration planned
Raymond Dam	21.1	8/1/2023	0.0	11.3	4.5	1.65	N	Probable winterkill prior to 2023 sampling
Shoot Reservoir	7.3	-	-	-	-	-	N	Confirmed winterkill
Troika Reservoir	3.9	-	-	-	-	9.38	N	Confirmed winterkill 2023, WFT in spring 2023
Valley Reservoir	5.7	-	-	-	-	-	N	Did not sample, likely fishless

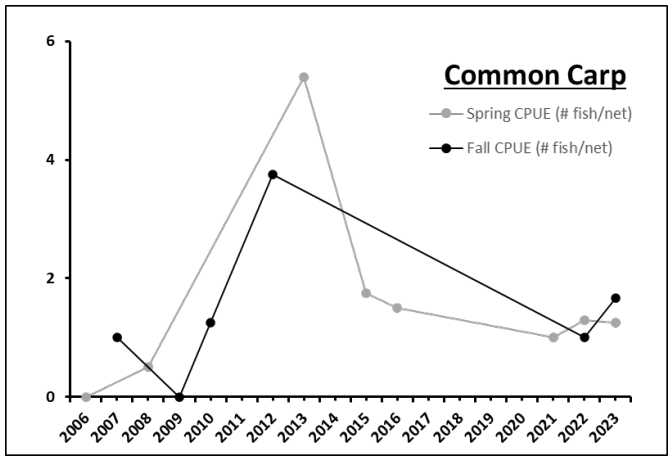
Verschoot Reservoir	2.9	-	-	-	-	-	N	Did not sample, dry
VR 009 Reservoir	7.6	5/22/2023	1.0	13.8	9.0	-	N	Confirmed winterkill
Wagner Reservoir	1.9	-	-	-	-	-	N	Did not sample, water levels < 4'
Whitetail Reservoir	24.5	8/2/2023	0.0	18.3	5.0	-	N	Spring influence
Winter Harbor Pond	1.3	5/1/2023	1.0	10.1	6.0	4.79	N	Missouri River influence
Wold's Reservoir	30.8	-	-	-	-	6.39	N	Did not sample, WFT in 2023

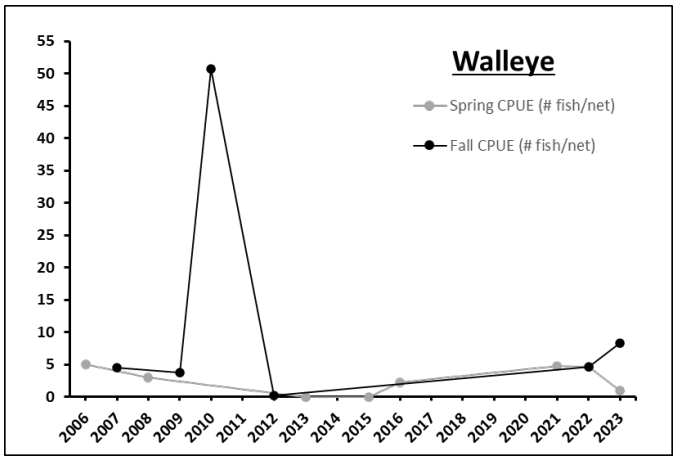
Appendix C. 1. Long-term gillnet trends of fish species captured in Boxelder Reservoir. Spring relative abundance is denoted in gray and fall relative abundance is denoted in black.

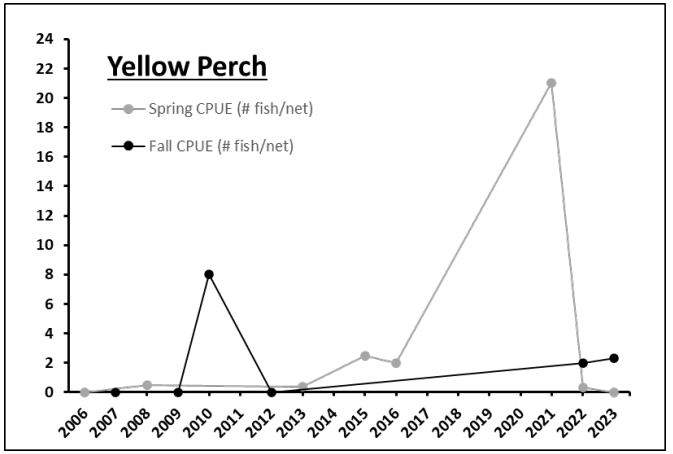








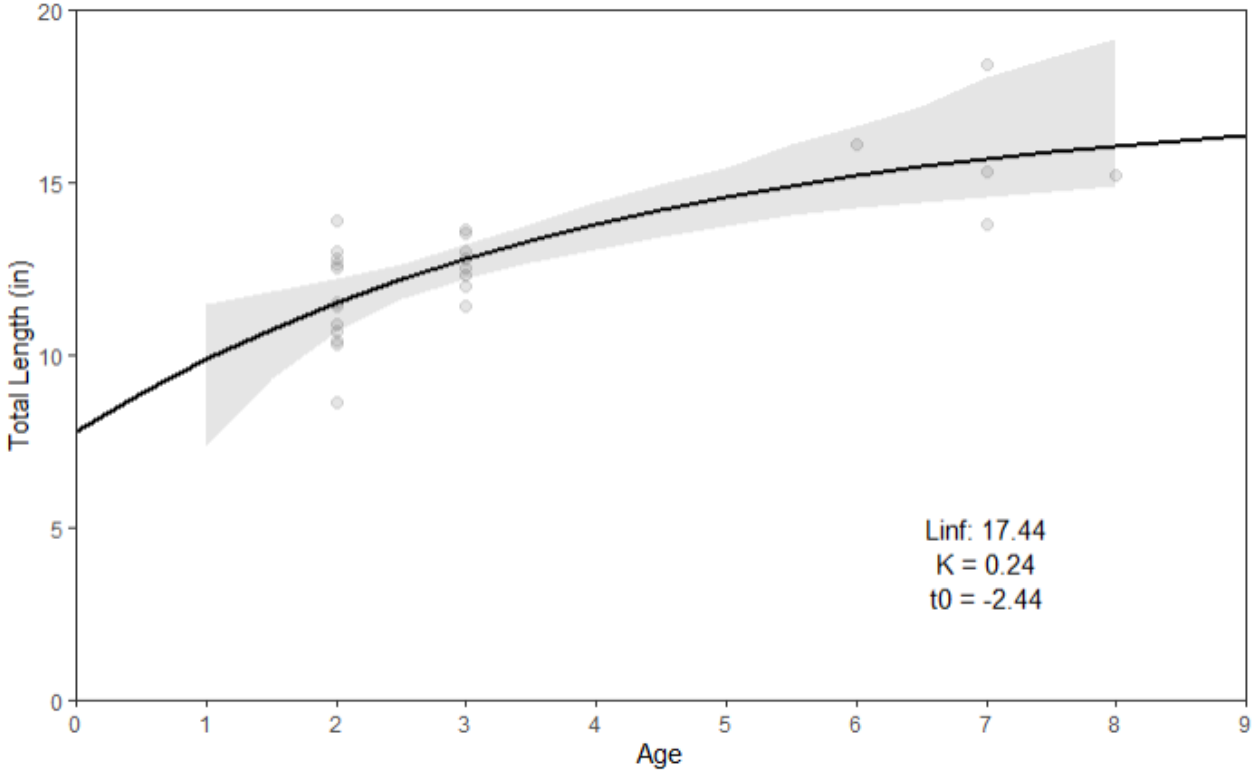




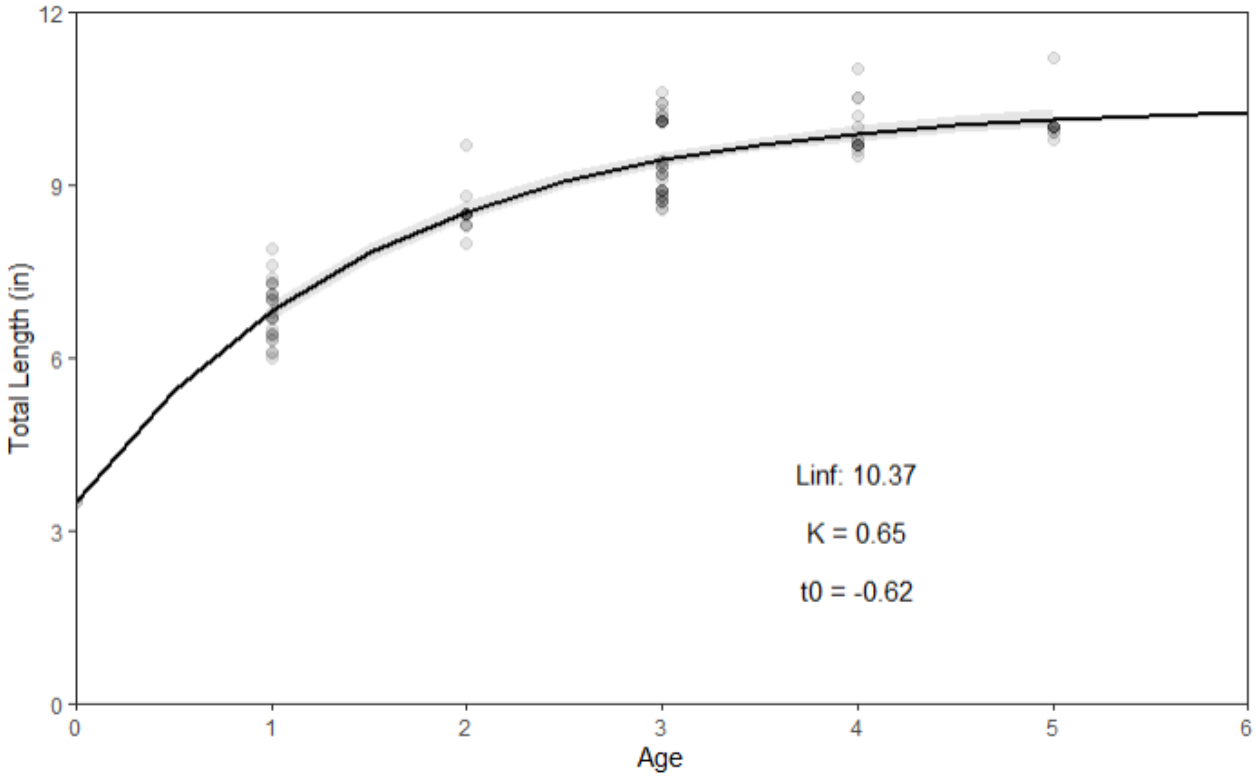
Appendix D. 1. Summary of 2023 Milk River seining efforts.

Reach	Location	Date	Seine Hauls	Species	# Captured
Beaver Creek	48.41574, -107.08217	7/28/2023	2	Channel Catfish	2
				Emerald Shiner	118
				Goldeye	1
				Yellow Perch	3
Hinsdale Ramp	48.39.86, -107.08108	7/28/2023	2	Crappie	5
				Channel Catfish	2
				Common Carp	1
				Emerald Shiner	91
				Goldeye	1
				Smallmouth Bass	2
				Yellow Perch	2
Vandalia WMA	48.38521, -107.03212	7/28/2023	2	Crappie	2
				Channel Catfish	3
				Common Carp	14
				Freshwater Drum	3
				Emerald Shiner	68
				Goldeye	3
				Smallmouth Bass	7
				Spottail Shiner	5
				Walleye	3
				Yellow Perch	2
6th Avenue Bridge	48.19059, -106.65402	7/27/2023	1	Fathead Minnow	1
Page/Potter Crossing	48.30246, -106.78073	7/27/2023	3	Channel Catfish	2
				Emerald Shiner	23
				Fathead Minnow	2
				Smallmouth Bass	1
Rorvik's	48.09841, -106.29430	7/27/2022	3	Channel Catfish	1
				Common Carp	1
				Emerald Shiner	5
				Flathead Chub	1
				Fathead Minnow	3
				Sauger	1
				Spottail Shiner	2
				White Sucker	1

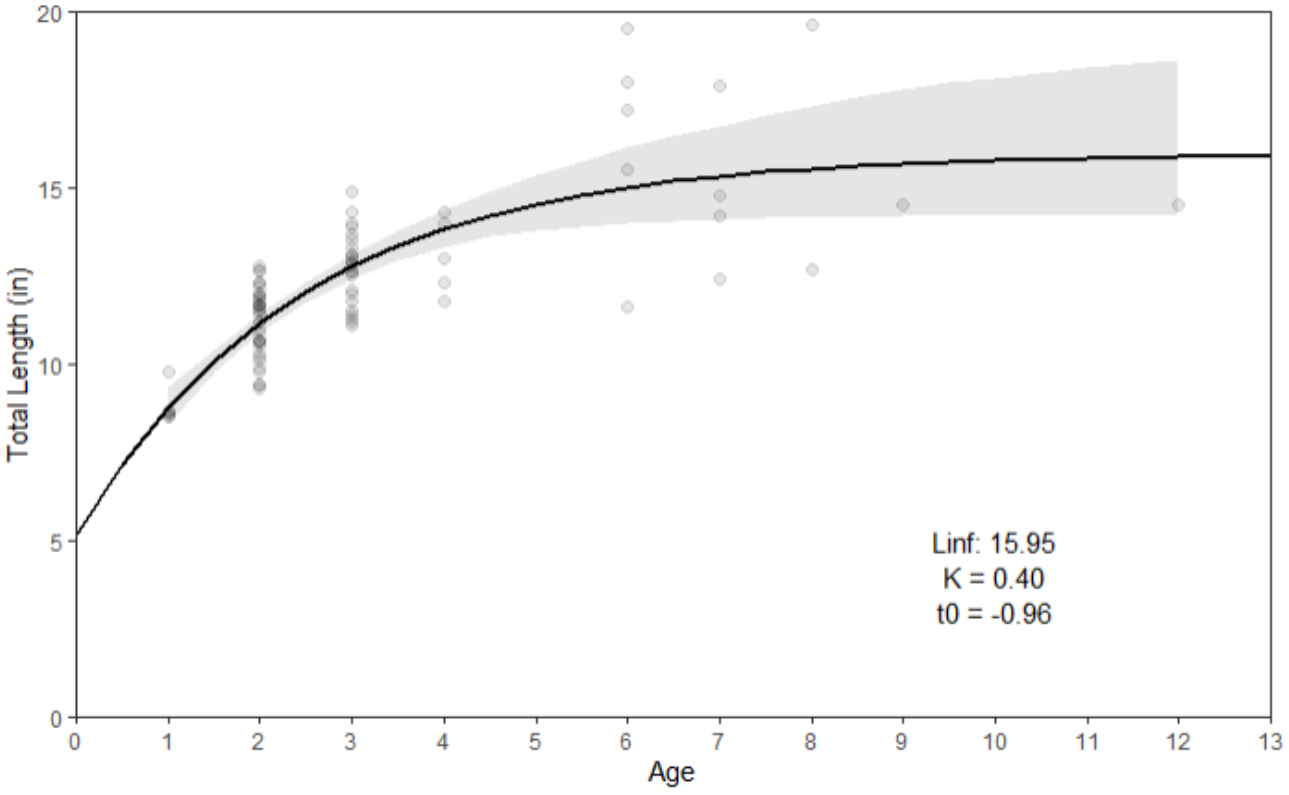
Appendix E. 1. Von Bertalanffy growth model for Walleye in Boxelder Reservoir collected in 2023. Dots represent known-age fish, the black line represents predicted total length at age, and gray shading represents 95% confidence intervals.



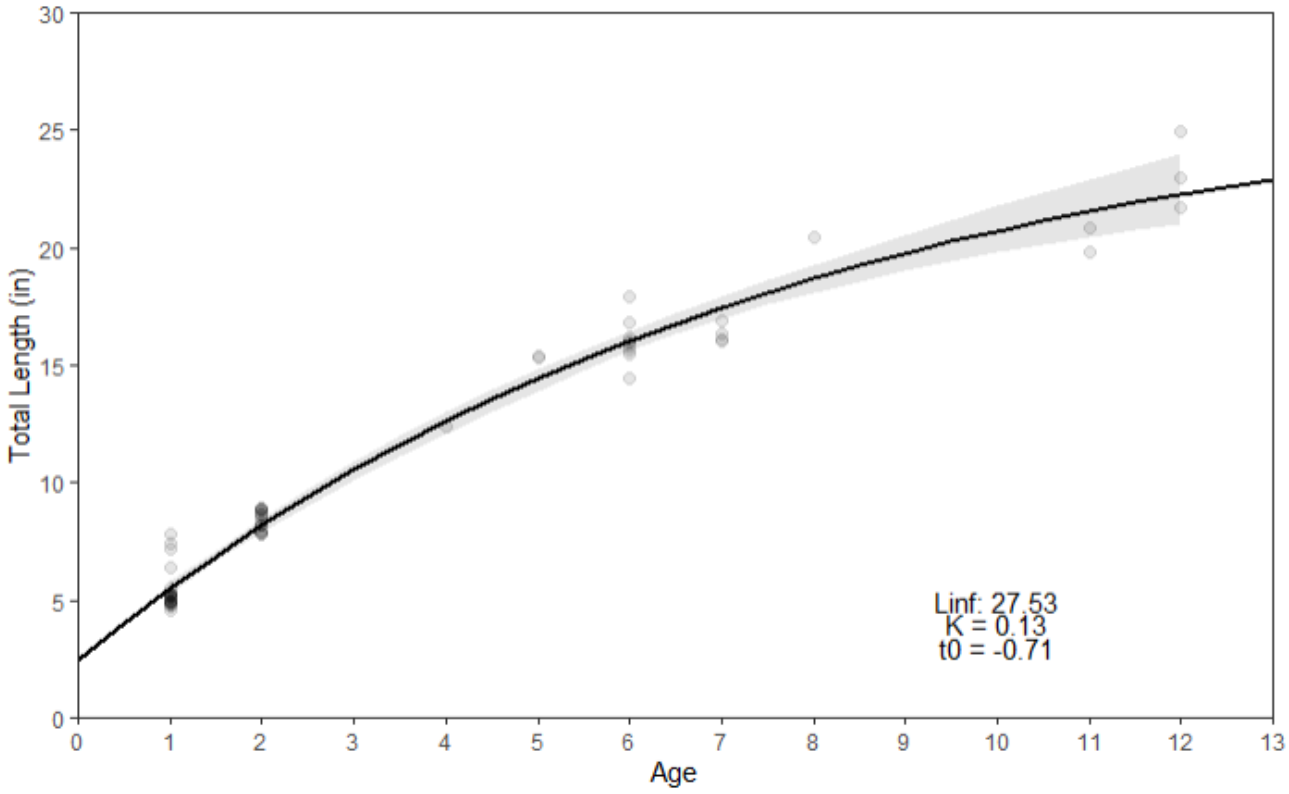
Appendix E. 2. Von Bertalanffy growth model for Yellow Perch in Boxelder Reservoir collected from 2021-2023. Dots represent known-age fish, the black line represents predicted total length at age, and gray shading represents 95% confidence intervals.



Appendix E. 3. Von Bertalanffy growth model for Sauger in the Missouri River collected in 2023. Dots represent known-age fish, the black line represents predicted total length at age, and gray shading represents 95% confidence intervals.



Appendix E. 4. Von Bertalanffy growth model for Channel Catfish collected above Vandalia Dam in 2023. Dots represent known-age fish, the black line represents predicted total length at age, and gray shading represents 95% confidence intervals.



Appendix E. 5. Von Bertalanffy growth model for Channel Catfish collected below Vandalia Dam in 2023. Dots represent known-age fish, the black line represents predicted total length at age, and gray shading represents 95% confidence intervals. Note the lack of asymptotic growth and subsequent impacts to L_{inf} estimates.