Kansas Department of Wildlife and Parks
Fisheries Division
2023 Progress and Management Report
Carbondale City Lake - East

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History

Carbondale City Lake is located two miles east of the city of Carbondale in Osage County. The lake is owned by the city of Carbondale and serves as city water supply. The dam is an earthen embankment. A small spillover channel is located on the east side of the dam. The channel is blocked with a screen to prevent fish escapement. Water treatment facilities are below the dam. Most of the surrounding land is privately owned, and public shoreline access is limited to the dam and parking lot areas. Two or three automatic solar powered fish feeders are maintained by the city. Amenities at the lake include a boat ramp, boat loading dock, parking lot, and bathrooms. Much the infrastructure is deteriorating. The boat and ramp dock are in rough shape. During low water levels, such as in 2023, the trailer will fall off the end of the ramp before the boat is able to float off the bunks. Given its close proximity to Topeka, the lake receives significant fishing pressure. Multiple accounts from anglers have pointed fingers towards overharvest and creel limit violations of Saugeye (LE has been informed).

Regulations

Species	Reach	Length Limit	Creel Limit
Channel Catfish	Statewide		10
Crappie	Statewide		50
Flathead Catfish	Statewide		5
Largemouth Bass	Special	18	2
Saugeye	Special	18	2
Wiper - W x S Bass	Special	18	2

Largemouth Bass, Saugeye, and Wiper are regulated with special harvest regulations. It is important to maintain these populations for predatory control of forage species (bluegill, crappie, shad). Crappie density has greatly increased in recent years, therefore non-restrictive harvest regulations encourage harvest. Catfish species are regulated under statewide regulations.

Limnological Parameters

Parameter	Value
Multipurpose pool (acres)	265.0
Mean depth (ft)	13.0
Watershed area (sq. mi)	5.0
Residence time (days)	412.0
Chlorophyll a (ppb)	12.3
Secchi (cm)	67.0
Shoreline development index	3.3
% Ag	42.6
% Forest	3.9
% Grass	40.8
% Urban	3.6
Trophic state index	62.1

Carbondale is a small to moderate sized impoundment, larger than most state fishing lakes. The lake has three main creek arms extending south and west. Outflow from Carbondale Lake connects to the Wakarusa River, which is the main tributary to Clinton Reservoir which constitutes a significant portion of Clinton Reservoir watershed. The watershed is highly composed agriculture and cattle-grazed grasslands which collects nutrient rich runoff. As a result, productivity is high in comparison to other small lakes in the district and the lake occasionally experiences harmful algae blooms. High retention time further contributes to eutrophication, high sedimentation, and sequestration of nutrients.

Community Fisheries Assistance Program (CFAP) Grants

Project Name	Fiscal Year	KDWP Share	Cooperator Share	Total Project Cost
Dam repair	2022	$20,300.00	$20,300.00	$40,600.00
Fishing brochures	1999	$500.00	$500.00	$1,000.00
Handicap restroom	1999	$6,250.00	$6,250.00	$12,500.00
Courtesy dock, Fish feeder, Pier extension	1998	$2,512.00	$837.00	$3,349.00
Courtesy dock	1997	$5,000.00	$2,517.00	$7,517.00
Informational sign	1995	$800.00	$450.00	$1,250.00
Floating fish feeders	1993	$4,173.00	$480.00	$4,653.00
		$39,535.00	**$31,334.00**	**$70,869.00**

The city of Carbondale was awarded a CFAP grant to repair the dam in FY 2022. The cost was shared equally between KDWP and the city. The dam repairs included addition of new rip rap and grass reseeding. I strongly encourage the city to submit a new grant application in 2024 for a new boat ramp dock. The dock and boat ramp are deteriorating and need repair/replacement. However, the city seems tight on money and may require a substantial cost share from KDWP.

Fish Sampling Summary

Gear	Date Sampled	# of Samples	Units of Effort
Bass Electro	05/02/2023	6	1.00
FRAME NET 1/2 MESH	10/05/2023	4	96.00
GILL NET-CORE PANEL	10/05/2023	6	144.00
Other Electro	09/27/2023	6	1.00

All fisheries sampling outlined in the 2023 FY plan were completed at Carbondale Lake. Night electrofishing survey was conducted to collect supplemental data on Saugeye, aimed at evaluating stocking and recruitment.

Stocking

Stocking Records and Requests from 2018 to 2024

Year	Species	Size	Quantity
2024	Saugeye	FINGERLINGS	6625
2024	Saugeye	FRY	265000
2024	Wiper - W x S Bass	FRY	40000
2023	Wiper - W x S Bass	FRY	39750
2023	Saugeye	FINGERLINGS	6625
2023	Saugeye	FRY	265000
2022	Saugeye	FRY	265000
2022	Wiper - W x S Bass	FINGERLINGS	6625
2021	Wiper - W x S Bass	FINGERLINGS	6625
2021	Saugeye	FRY	265000
2020	Saugeye	FRY	265000
2020	Wiper - W x S Bass	FINGERLINGS	6625
2019	Saugeye	FRY	265000
2018	Saugeye	FRY	265000

Saugeye and Wiper have been the focal point of stocking efforts in recent years. Stocking these predators is imperative to maintaining a balanced ecosystem by controlling excessive forage abundance. Consistent annual stockings have been successful at maintaining these populations. However, Saugeye appear to be in decline. This spurred the addition of Saugeye fingerlings at 25/acre while maintaining the annual fry stocking at 1000/acre. Wiper fingerlings had been stocked annually, until 2023 when fry were supplemented since Wiper fingerlings are no longer available.

Historical Stocking Records

The earliest stocking records date back to the 1980's when Channel Catfish and Walleye were regularly stocked. Channel Catfish intermediates were regularly stocked until the late 1990s and have not been stocked since 1998. Channel Catfish recruit naturally and have not required supplemental stocking. Walleye intermediates were stocked until 2005 when percid stocking shifted to Saugeye Triploids. Triploid Saugeye were stocked for three years from 2005 to 2007. Since then, Saugeye fingerlings were stocked annually until 2015 when fry was supplemented. In recent years Saugeye fingerlings and fry have been stocked. Wiper

intermediates have a long stocking history from 1991 to 2022. Largemouth Bass intermediates were stocked 1995 to 1998.

Bluegill

Catch per unit effort (CPUE), proportional stock distribution (PSD), relative weight (Wr), and relative standard error (RSE) estimates for Bluegill by trap nets.

	2019	2020	2022	2023
Total Catch	28	259	219	26
Stock Catch	16	49	55	14
Units of Effort	4	4	4	4
Sub-Stock CPUE (RSE)	3.0 (78)	52.5 (65)	41.0 (90)	3.0 (89)
Stock CPUE (RSE)	4.0 (18)	12.3 (60)	13.8 (25)	3.5 (68)
Quality/Density CPUE (RSE)	0.8 (100)	2.5 (66)	6.5 (47)	0.8 (64)
Preferred CPUE (RSE)	0.0 (.)	0.0 (.)	0.0 (.)	0.0 (.)
Memorable/Lunker CPUE (RSE)	0.0 (.)	0.0 (.)	0.0 (.)	0.0 (.)
Total CPUE (RSE)	7.0 (30)	64.8 (63)	54.8 (67)	6.5 (77)
PSD S-Q	81.25	79.59	52.73	78.57
PSD Q-P	18.75	20.41	47.27	21.43
PSD P-M	.	.	.	.
PSD M-T	.	.	.	.
PSD	18.75	20.41	47.27	21.43
Mean WR S-Q (RSE)	138 (6)	97 (4)	90 (4)	92 (9)
Mean WR Q-P (RSE)	100 (1)	98 (1)	94 (2)	113 (3)
Mean WR P-M (RSE)	. (.)	. (.)	. (.)	. (.)
Mean WR M-T (RSE)	. (.)	. (.)	. (.)	. (.)
Mean WR T+ (RSE)	. (.)	. (.)	. (.)	. (.)

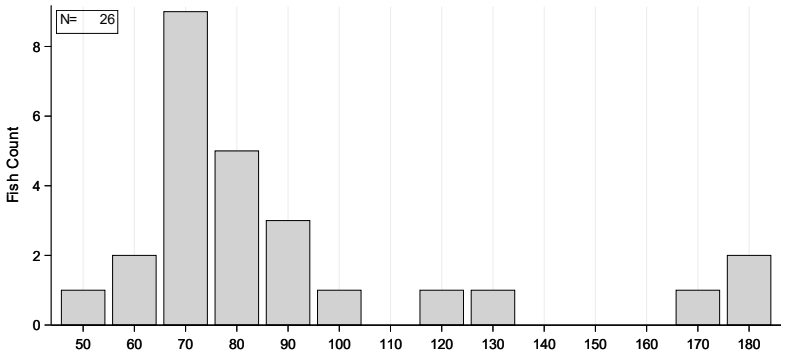


Figure 4. Length-frequency of Bluegill at Carbondale City Lake - East collected using trapnets on 10/05/2023.

The Bluegill population at Carbondale is dominated by small fish. Size structure has been dominated by sub-stock and stock size fish that rarely reach quality size. Small Bluegill are very abundant, and potentially outcompete other species for limited resources. Overall CPUE declined in 2023, but observations during other sampling indicate high abundance. Bluegill likely suffer from density dependent growth and high mortality. The Bluegill population serves as more of a forage source rather than a sport fishery in Carbondale City Lake.

Channel Catfish

Catch per unit effort (CPUE), proportional stock distribution (PSD), relative weight (Wr), and relative standard error (RSE) estimates for Channel Catfish by gillnets.

	2019	2020	2022	2023
Total Catch	38	15	21	30
Stock Catch	38	15	21	26
Units of Effort	6	6	5	6
Sub-Stock CPUE (RSE)	0.0 (.)	0.0 (.)	0.0 (.)	0.7 (63)
Stock CPUE (RSE)	6.3 (17)	2.5 (27)	4.2 (24)	4.3 (20)
Quality/Density CPUE (RSE)	5.5 (19)	2.2 (28)	3.6 (29)	3.8 (22)
Preferred CPUE (RSE)	0.3 (63)	0.0 (.)	1.8 (37)	1.7 (30)
Memorable/Lunker CPUE (RSE)	0.2 (100)	0.0 (.)	0.2 (100)	0.3 (63)
Total CPUE (RSE)	6.3 (17)	2.5 (27)	4.2 (24)	5.0 (17)
PSD S-Q	13.16	13.33	14.29	11.54
PSD Q-P	81.58	86.67	42.86	50
PSD P-M	2.63	.	38.1	30.77
PSD M-T	2.63	.	4.76	7.69
PSD	86.84	86.67	85.71	88.46
Mean WR S-Q (RSE)	89 (3)	90 (5)	92 (3)	95 (1)
Mean WR Q-P (RSE)	95 (2)	88 (3)	99 (3)	100 (3)
Mean WR P-M (RSE)	88 (.)	. (.)	93 (6)	102 (5)
Mean WR M-T (RSE)	100 (.)	. (.)	114 (.)	100 (8)
Mean WR T+ (RSE)	. (.)	. (.)	. (.)	. (.)

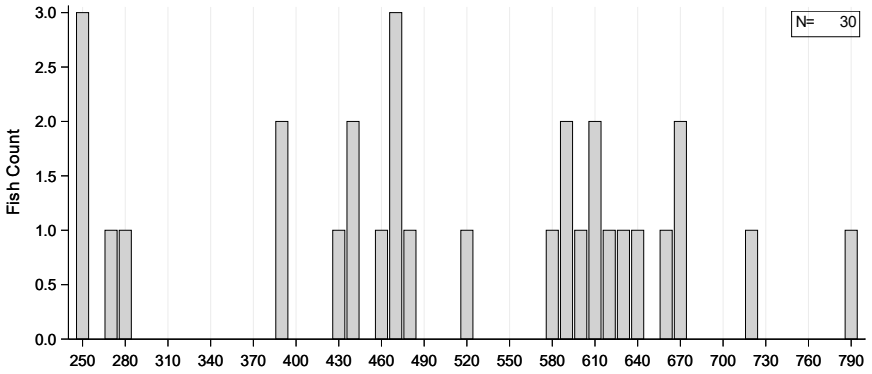


Figure 6. Length-frequency of Channel Catfish at Carbondale City Lake - East collected using gillnets on 10/05/2023.

The Channel Catfish population in Carbondale City Lake is self-sustaining and has not received supplemental stocking since 1998. Typically, natural recruitment of Channel Catfish in minimal in small impoundments due to poor spawning conditions and high predation by Largemouth Bass. However, Carbondale City Lake is an exception to typical Channel Catfish management in small impoundments. Sub-stock individuals are occasionally detected and stock CPUE has remained relatively consistent in recent surveys. Body condition and individual growth rate of Channel Catfish is

good, likely reflective of supplemental fish feeding. The population supports a good abundance of quality and preferred-length fish, with some reaching nearly trophy size. Because this population is self-sustaining, abundance and size structure should be closely monitored to determine if supplemental stocking is necessary. Supplemental sampling with tandem baited hoop nets could increase sample size and help better understand the dynamics of the population.

Management Goal 1: Used of baited hoop nets may help better understand the dynamics of the Channel Catfish population. Since this population is self-sustaining, hoop net data may greatly improve management of the species and provide an excellent comparison to other Channel Catfish populations in small impoundments that are maintained with stocking.

Flathead Catfish

There is little to no data on Flathead Catfish in Carbondale City Lake. Serval accounts from anglers suggest very large Flathead are present. Low frequency electrofishing would provide insight.

Gizzard Shad

Catch per unit effort (CPUE), proportional stock distribution (PSD), relative weight (Wr), and relative standard error (RSE) estimates for Gizzard Shad by gillnets.

	2019	2020	2022	2023
Total Catch	63	55	78	74
Stock Catch	62	53	75	74
Units of Effort	6	6	5	6
Sub-Stock CPUE (RSE)	0.2 (100)	0.3 (100)	0.6 (100)	0.0 (.)
Stock CPUE (RSE)	10.3 (14)	8.8 (9)	15.0 (28)	12.3 (29)
Quality/Density CPUE (RSE)	10.3 (14)	8.8 (9)	5.8 (34)	9.8 (31)
Preferred CPUE (RSE)	1.8 (22)	8.0 (10)	4.0 (35)	3.2 (44)
Memorable/Lunker CPUE (RSE)	0.0 (.)	0.0 (.)	0.0 (.)	0.0 (.)
Total CPUE (RSE)	10.5 (14)	9.2 (7)	15.6 (28)	12.3 (29)
PSD S-Q	.	.	61.33	20.27
PSD Q-P	82.26	9.43	12	54.05
PSD P-M	17.74	90.57	26.67	25.68
PSD M-T	.	.	.	.
PSD	100	100	38.67	79.73
Mean WR S-Q (RSE)	. (.)	. (.)	83 (2)	. (.)
Mean WR Q-P (RSE)	102 (1)	. (.)	81 (2)	. (.)
Mean WR P-M (RSE)	91 (3)	. (.)	86 (4)	. (.)
Mean WR M-T (RSE)	. (.)	. (.)	. (.)	. (.)
Mean WR T+ (RSE)	. (.)	. (.)	. (.)	. (.)

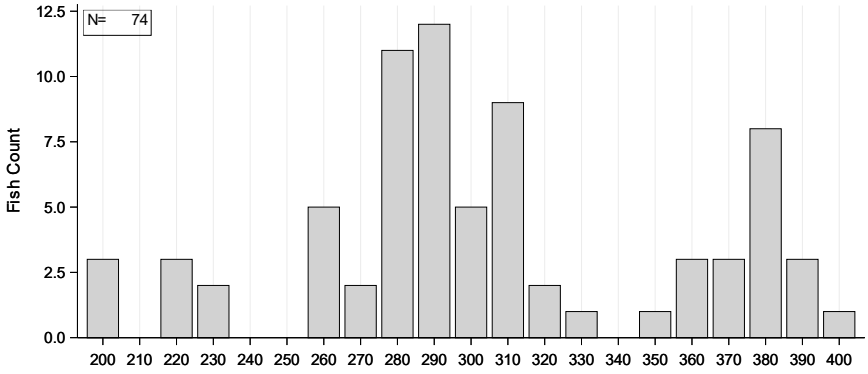


Figure 8. Length-frequency of Gizzard Shad at Carbondale City Lake - East collected using gillnets on 10/05/2023.

Gizzard shad are the primary forage base for sportfish at Carbondale. High productivity of the ecosystem should create ideal conditions for a robust shad population. Shad abundance is moderate to high in comparison to other small impoundments. From 2012 – 2014, size distribution of shad was heavily weighted towards small individuals. Shortly after these consecutive years with small shad, predator populations (White Bass, White Crappie, Saugeye) increased in abundance. More recently, size distribution of the population is heavily weight to larger adult fish and reproduction has been minimal. Shad recruitment appears to be variable, such 1- or 2-year classes may constituent the bulk for the population. For instance, in 2022 stock-quality size fish accounted for a large portion of the population (PSD S-Q = 62). In 2023, this year classes recruited to quality length which shifted size structure to PSD Q-P of 54. Sub-stock individuals are occasionally detected at low abundance, but stock CPUE has remained fairly consistent ranging from 9 – 15 fish/NN in recent surveys. The variable nature of shad recruitment may directly influence sportfish abundance. Predatory control is important for preventing an excess abundance of large adult shad. However, Carbondale is loaded with predators (LMB, SAE, moronids). Is it possible that too many predators are suppressing shad production? Maybe. More than likely age-0 shad production is influenced by large scale environmental (water-level, inflow, temperature) or biological factors (primary productivity, zooplankton abundance).

Management goal 2: Conduct age-0 gizzard shad surveys in August to index recruitment. Given the importance of shad forage, we need to better understand factors influencing recruitment variability and age-0 production. Sportfish abundance appears to fluctuate in direct correlation with age-0 shad production.

Largemouth Bass

Catch per unit effort (CPUE), proportional stock distribution (PSD), relative weight (Wr), and relative standard error (RSE) estimates for Largemouth Bass by electrofishing.

	2018	2019	2020	2021	2022	2023
Total Catch	163	52	88	60	76	58
Stock Catch	141	44	72	43	57	53
Units of Effort	1.02	1.02	1.02	1.02	1.02	1.02
Sub-Stock CPUE (RSE)	21.6 (44)	7.8 (32)	15.7 (41)	16.7 (28)	19 (17)	5 (48)
Stock CPUE (RSE)	138.2 (20)	43.1 (27)	70.6 (21)	42.2 (17)	57 (14)	53 (23)
Quality/Density CPUE (RSE)	112.7 (24)	30.4 (32)	49 (17)	25.5 (26)	30 (14)	33 (28)
Preferred CPUE (RSE)	11.8 (80)	5.9 (26)	9.8 (20)	5.9 (45)	16 (21)	12 (18)
Memorable/Lunker CPUE (RSE)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total CPUE (RSE)	159.8 (20)	51 (26)	86.3 (24)	58.8 (15)	76 (14)	58 (20)
PSD S-Q	18.44	29.55	30.56	39.53	47.37	37.74
PSD Q-P	73.05	56.82	55.56	46.51	24.56	39.62
PSD P-M	8.51	13.64	13.89	13.95	28.07	22.64
PSD M-T	0	0	0	0	0	0
PSD	81.56	70.45	69.44	60.47	52.63	62.26
Mean WR S-Q (RSE)	92 (1)	89 (3)	96 (2)	102 (2)	94 (1)	95 (2)
Mean WR Q-P (RSE)	94 (1)	88 (2)	94 (1)	99 (2)	97 (1)	99 (1)
Mean WR P-M (RSE)	96 (2)	91 (4)	89 (2)	91 (3)	95 (2)	93 (2)
Mean WR M-T (RSE)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Mean WR T+ (RSE)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

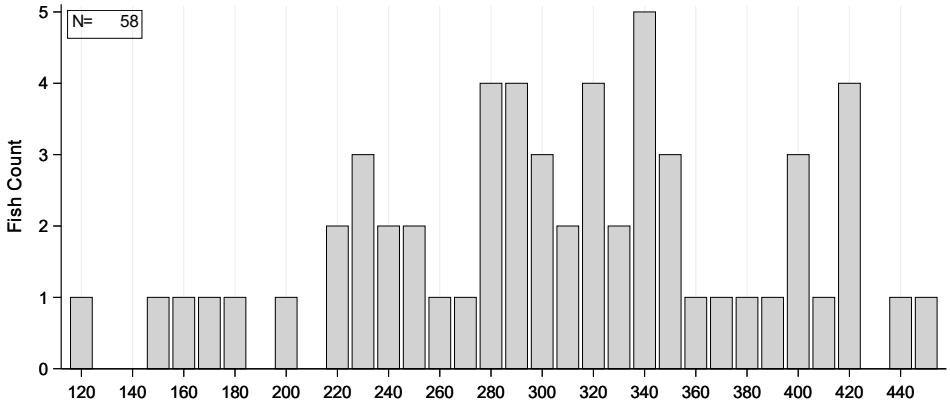


Figure 10. Length-frequency of Largemouth Bass at Carbondale City Lake - East collected using electrofishing on 05/02/2023.

The Largemouth Bass population at Carbondale has experienced drastic fluctuations in abundance in recent years. A near record high CPUE was evident in 2018 of 158 fish/hr., which is extremely high. The following year CPUE declined by nearly 2/3, falling to 51 fish/hr. The cause of this decline is a mystery, but I suspect limited shad forage resources or Largemouth Bass virus resulted in high mortality. Nonetheless, the decline in abundance was beneficial to the population through reduced density-dependent effects on growth. Since 2019, CPUE has remained relatively stable varying between 51 – 87 fish/hr., size structure became more balanced, and preferred abundance has increased. Currently, quality and preferred abundance is high creating a good bass fishery.

Saugeye

Catch per unit effort (CPUE), proportional stock distribution (PSD), relative weight (Wr), and relative standard error (RSE) estimates for Saugeye by gillnets.

	2015	2016	2017	2019	2020	2022	2023
Total Catch	9	34	31	30	35	10	6
Stock Catch	8	33	26	29	35	10	6
Units of Effort	6	6	6	6	6	5	6
Sub-Stock CPUE (RSE)	0.2 (83)	0.2 (83)	0.8 (50)	0.2 (83)	0 (0)	0 (0)	0 (0)
Stock CPUE (RSE)	1.3 (43)	5.5 (28)	4.3 (33)	4.8 (16)	5.8 (20)	2 (57)	1 (37)
Quality/Density CPUE (RSE)	0.5 (45)	3.7 (32)	2.8 (36)	2.7 (38)	5.2 (21)	1 (55)	0.8 (50)
Preferred CPUE (RSE)	0.2 (83)	1.7 (29)	0.2 (83)	0.2 (83)	0 (0)	0 (0)	0.2 (83)
Memorable/Lunker CPUE (RSE)	0.2 (83)	0.3 (70)	0.2 (83)	0 (0)	0 (0)	0 (0)	0 (0)
Total CPUE (RSE)	1.5 (38)	5.7 (29)	5.2 (34)	5 (15)	5.8 (20)	2 (57)	1 (37)
PSD S-Q	62.5	33.33	34.62	44.83	11.43	50	16.67
PSD Q-P	25	36.36	61.54	51.72	88.57	50	66.67
PSD P-M	0	24.24	0	3.45	0	0	16.67
PSD M-T	12.5	6.06	3.85	0	0	0	0
PSD	37.5	66.67	65.38	55.17	88.57	50	83.33
Mean WR S-Q (RSE)	97 (6)	85 (1)	82 (3)	95 (2)	93 (3)	85 (2)	73 (0)
Mean WR Q-P (RSE)	89 (1)	85 (2)	75 (1)	83 (2)	80 (2)	80 (4)	71 (3)
Mean WR P-M (RSE)	0 (0)	86 (2)	0 (0)	71 (0)	0 (0)	0 (0)	78 (0)
Mean WR M-T (RSE)	76 (0)	93 (2)	72 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Mean WR T+ (RSE)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

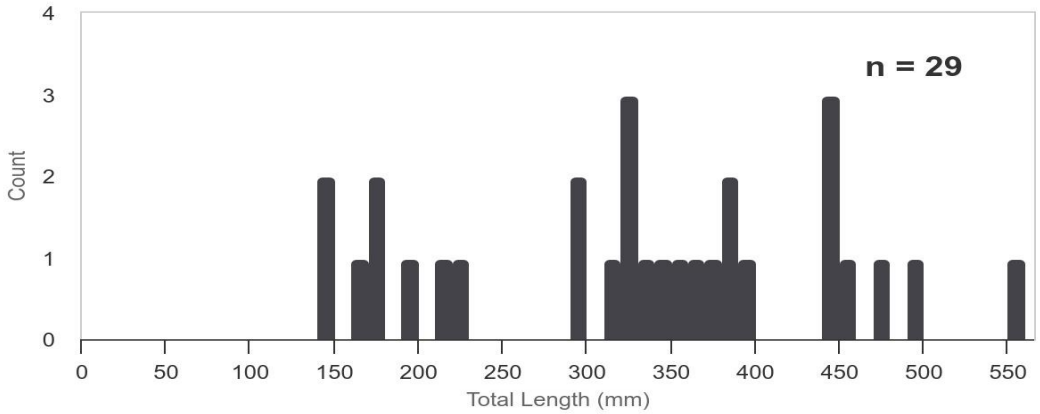


Figure: Length frequecny historgram for Saugeye sampled with night electrofishing

Saugeye support a popular fishery at Carbondale and the lake has experience significant fishing pressure in recent years. In 2005, the last Walleye stocking occurred. Since then, Saugeye have been stocked annually as fry, and fingerlings were occasionally supplemented. Saugeye are important for predatory control of forage species such as shad, crappie, and bluegill. The Saugeye population was slow to develop until abundance greatly increased in 2016, following consecutive years with high abundance of small gizzard shad. From 2016 to 2020, Saugeye abundance was high such that total CPUE was greater than 5 fish/NN. The Saugeye fishery became a popular attraction which drew a crowd of Topeka anglers. Fishing pressure was very high and multiple concerns of overharvest and creel limit violations were voiced. Saugeye are regulated with restrictive regulations (18”

MLL, 2 creel) to prevent overharvest, but regulations are only as good as angler compliance. Gill net surveys in 2022 and 2023 indicated a decline in Saugeye abundance. In an effort to better understand recruitment dynamics of Saugeye, a night electrofishing was conducted in September 2023. Again, Saugeye abundance was low in comparison to that observed at CLTR, MELR, and POMR. Multiple year classes were detected as evidenced by the length frequency histogram. One hour of electrofishing yielded 29 Saugeye, 8 of which were sub-stock individuals (age 0) indicating poor recruitment. Body condition was poor suggesting limited forage resources. I suspect the dynamics of the Saugeye population is closely tied to age-0 gizzard shad production which is highly variable in this particular ecosystem. Efforts to reestablish the Saugeye population will be continued through annual fry and fingerling stockings. Supplemental electrofishing data will be continued to evaluate stockings and better understand factors that may be limiting Saugeye recruitment.

Management Goal 2: Conduct annual night electrofishing surveys to evaluate stockings and better understand factors that may be limiting Saugeye recruitment.

White Bass

Catch per unit effort (CPUE), proportional stock distribution (PSD), relative weight (Wr), and relative standard error (RSE) estimates for White Bass by gillnets.

	2015	2016	2017	2019	2020	2022	2023
Total Catch	8	8	22	53	25	2	0
Stock Catch	8	8	22	52	25	2	0
Units of Effort	6	6	6	6	6	5	6
Sub-Stock CPUE (RSE)	0 (0)	0 (0)	0 (0)	0.2 (83)	0 (0)	0 (0)	0 (0)
Stock CPUE (RSE)	1.3 (47)	1.3 (62)	3.7 (57)	8.7 (49)	4.2 (57)	0.4 (100)	0 (0)
Quality/Density CPUE (RSE)	1 (37)	1.2 (55)	0.7 (95)	3.2 (42)	4.2 (57)	0.4 (100)	0 (0)
Preferred CPUE (RSE)	1 (37)	1.2 (55)	0.5 (100)	2.7 (40)	3.8 (57)	0.2 (100)	0 (0)
Memorable/Lunker CPUE (RSE)	0 (0)	0.2 (83)	0 (0)	0 (0)	0.3 (70)	0 (0)	0 (0)
Total CPUE (RSE)	1.3 (47)	1.3 (62)	3.7 (57)	8.8 (48)	4.2 (57)	0.4 (100)	0 (0)
PSD S-Q	25	12.5	81.82	63.46	0	0	0
PSD Q-P	0	0	4.55	5.77	8	50	0
PSD P-M	75	75	13.64	30.77	84	50	0
PSD M-T	0	12.5	0	0	8	0	0
PSD	75	87.5	18.18	36.54	100	100	0
Mean WR S-Q (RSE)	0 (0)	101 (0)	103 (2)	98 (2)	0 (0)	0 (0)	0 (0)
Mean WR Q-P (RSE)	0 (0)	0 (0)	98 (0)	98 (1)	99 (3)	76 (0)	0 (0)
Mean WR P-M (RSE)	91 (3)	102 (1)	96 (1)	96 (1)	93 (3)	71 (0)	0 (0)
Mean WR M-T (RSE)	0 (0)	85 (0)	0 (0)	0 (0)	89 (18)	0 (0)	0 (0)
Mean WR T+ (RSE)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

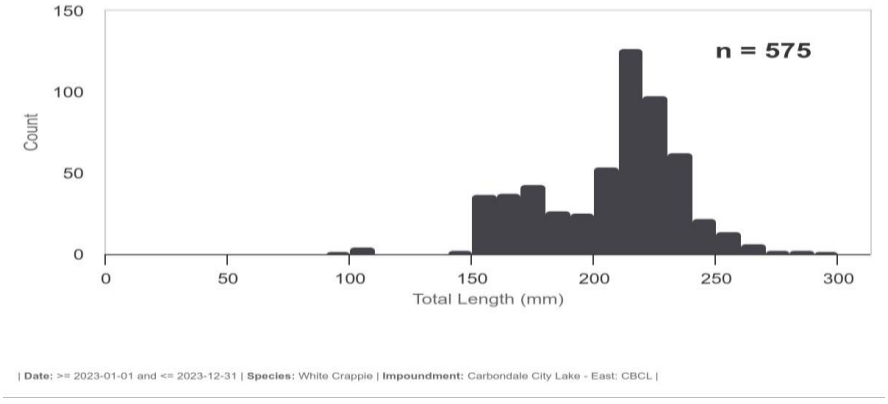
The White Bass population at Carbondale has experienced some drastic fluctuations in recent years. In 2011, White Bass abundance reach a record high of 11.8 fish/NN. In subsequent years 2012 to 2014, zero White Bass were detected in gill nets. Similarly, zero White Bass were detected in 2023, although a few individuals were captured in trap nets. Recruitment dynamics of White Bass are highly variable such that strong year classes are produced periodically. For instance, in 2017, stock CPUE increased, and the vast majority of the population was of stock-quality length (PSD S-Q = 82). Subsequent surveys in 2019 and 2020 indicated this year classes recruited to quality and preferred lengths. In 2020, the vast majority of the population was of preferred length

(PSD P-M = 84). Recently in 2022 and 2023, White Bass all but disappeared from gill net catch. The complete absence of White Bass is a head scratcher, but I suspect fish were tightly schooled in areas where gill nets cannot bet set (shallow > 6ft, or deep < 20ft). At any rate, I suspect the White Bass population experiences a cyclic population cycle revolving around stock-recruit dynamics, environmental factors, and age-0 gizzard shad abundance.

White Crappie

Catch per unit effort (CPUE), proportional stock distribution (PSD), relative weight (Wr), and relative standard error (RSE) estimates for White Crappie by trap nets.

	2015	2016	2017	2019	2020	2022	2023
Total Catch	44	149	229	134	188	385	575
Stock Catch	30	149	220	19	48	384	568
Units of Effort	4	4	4	4	4	4	4
Sub-Stock CPUE (RSE)	3.5 (58)	0 (0)	2.3 (45)	28.8 (26)	35 (94)	0.3 (83)	1.8 (35)
Stock CPUE (RSE)	7.5 (16)	37.3 (28)	55 (48)	4.8 (34)	12 (41)	96 (12)	142 (34)
Quality/Density CPUE (RSE)	7.5 (16)	32 (29)	38.5 (45)	4.8 (34)	9 (45)	77.5 (14)	98.5 (36)
Preferred CPUE (RSE)	3 (30)	9.8 (39)	16 (39)	2.5 (62)	2.5 (38)	21.3 (35)	7.8 (39)
Memorable/Lunker CPUE (RSE)	0 (0)	3 (49)	0.3 (83)	0 (0)	1 (71)	2 (71)	0.5 (58)
Total CPUE (RSE)	11 (23)	37.3 (28)	57.3 (45)	33.5 (24)	47 (77)	96.3 (12)	143.8 (34)
PSD S-Q	0	14.09	30	0	25	19.27	30.63
PSD Q-P	60	59.73	40.91	47.37	54.17	58.59	63.91
PSD P-M	40	18.12	28.64	52.63	12.5	20.05	5.11
PSD M-T	0	8.05	0.45	0	8.33	2.08	0.18
PSD	100	85.91	70	100	75	80.73	69.37
Mean WR S-Q (RSE)	0 (0)	90 (5)	98 (3)	0 (0)	94 (3)	95 (2)	83 (2)
Mean WR Q-P (RSE)	102 (4)	93 (2)	100 (2)	113 (3)	109 (1)	92 (1)	86 (1)
Mean WR P-M (RSE)	98 (3)	99 (1)	97 (1)	107 (2)	106 (2)	90 (1)	84 (2)
Mean WR M-T (RSE)	0 (0)	99 (1)	0 (0)	0 (0)	96 (5)	94 (2)	81 (0)
Mean WR T+ (RSE)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)



Similar to other sportfish populations at Carbondale, White Crappie have experienced drastic fluctuations in abundance and size structure. Variation in abundance appears to follow a cyclic pattern revolving around the formation of strong year classes, a phenomenon common for White Crappie in small impoundments. For instance, in 2011 a large year class was produced such that sub-stock CPUE reached 98 fish/NN. By 2014, the 2011-year class recruited to preferred length and CPUE-P peaked at 7.5 fish/NN. The following years 2015 – 2017, size strucute was mostly composed of quality and preferred length fish (PSD > 70) and age-0 production was minimal. In 2019 and 2020, large sub-stock year classes were detected. By 2022, preferred abundance reached a near record high (CPUE-P = 21.3 fish/NN). Most recently in 2023, White Crappie abundance was very high (total CPUE = 143 fish/NN) and harvestable size fish are abundant. The cyclic nature of the White Crappie population is driven by spawning stock abundance, environmental, and biological factors that promote age-0 survival. Many of sport fish populations at Carbondale follow a similar cyclic pattern.

Wiper - W X S Bass

Catch per unit effort (CPUE), proportional stock distribution (PSD), relative weight (Wr), and relative standard error (RSE) estimates for Wiper - W X S Bass by gillnets.

	2015	2016	2017	2019	2020	2022	2023
Total Catch	43	11	0	3	3	11	5
Stock Catch	43	11	0	3	3	11	5
Units of Effort	6	6	6	6	6	5	6
Sub-Stock CPUE (RSE)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Stock CPUE (RSE)	7.2 (35)	1.8 (36)	0 (0)	0.5 (100)	0.5 (45)	2.2 (89)	0.8 (82)
Quality/Density CPUE (RSE)	5.3 (42)	1.8 (36)	0 (0)	0.5 (100)	0.5 (45)	0.6 (100)	0 (0)
Preferred CPUE (RSE)	0.2 (83)	0.5 (45)	0 (0)	0 (0)	0.2 (83)	0.6 (100)	0 (0)
Memorable/Lunker CPUE (RSE)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total CPUE (RSE)	7.2 (35)	1.8 (36)	0 (0)	0.5 (100)	0.5 (45)	2.2 (89)	0.8 (82)
PSD S-Q	25.58	0	0	0	0	72.73	100
PSD Q-P	72.09	72.73	0	100	66.67	0	0
PSD P-M	2.33	27.27	0	0	33.33	27.27	0
PSD M-T	0	0	0	0	0	0	0
PSD	74.42	100	0	100	100	27.27	0
Mean WR S-Q (RSE)	86 (2)	0 (0)	0 (0)	0 (0)	0 (0)	74 (2)	78 (4)
Mean WR Q-P (RSE)	84 (1)	79 (1)	0 (0)	75 (4)	78 (1)	0 (0)	0 (0)
Mean WR P-M (RSE)	75 (0)	79 (4)	0 (0)	0 (0)	93 (0)	74 (4)	0 (0)
Mean WR M-T (RSE)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Mean WR T+ (RSE)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Like other sportfish populations at Carbondale, Wiper abundance as fluctuated in a similar pattern. Wiper abundance peaked in 2015, following several years of high shad production (2011 – 2014). When shad production declined from 2015 -2017, Wiper abundance greatly declined in the following years (2016-2020). Wiper abundance in recent years has remained low. Historically, the Wiper population has been maintained through intermediate stocking. Now wiper are only available as fry. A robust Wiper population is unlikely considering limited stocking options and the cyclic nature of sport fish and forage. Given their relatively low

abundance and poor recruitment success, perhaps Wiper stocking should be abandoned to free up forage resources for Saugeye and naturally sustained LMB, CCF, and WHC. Nonetheless Wiper fry stocking will be continued in 2024 until variability of the ecosystem can be better explained.

Management Goals

Management Goal 1: Used of baited hoop nets may help better understand the dynamics of the Channel Catfish population. Since this population is self-sustaining, hoop net data may greatly improve management of the species and provide an excellent comparison to other Channel Catfish populations in small impoundments that are maintained with stocking.

Management Goal 2: Conduct age-0 gizzard shad surveys in August to index recruitment and age-0 abundance. Given the importance of shad forage, we need to better understand factors influencing recruitment variability. Sportfish abundance appears to fluctuate in direct correlation with shad reproduction.

Management Goal 3: Conduct annual night electrofishing surveys to evaluate stockings and better understand factors that may be limiting Saugeye recruitment.

Management Goal 4: The highly cyclic nature of multiple sportfish species occurring simultaneously at Carbondale is unusual. Clearly there are some environmental (water-level, inflow, temperature) and biological (forage abundance, zooplankton abundance) factors that have an overarching influence on sportfish populations in this dynamic ecosystem. Larval fish sampling would be incredibly useful for identifying recruitment bottlenecks. However, larval fish sampling is very labor intensive and time consuming. Exploratory analysis and modeling should attempt to correlate exogenous factors to sportfish abundance. Such information would greatly improve sportfish management and may help guide stocking efforts when conditions are most favorable.