

KICKAPOO INDIAN RESERVATION

FISHERIES MANAGEMENT PLAN

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INTRODUCTION

The Kickapoo Indian Reservation (Reservation), established in 1862, is located in northeast Kansas near the town of Horton. The Reservation has a land area of 19,200 acres (30 mi²), which is the second largest reservation in Kansas. The terrain is composed of a patchwork of agricultural land (i.e., corn, soybeans, milo, and wheat) and forested creek bottoms. The climate is humid continental with average monthly temperatures that can range from 88 °F in July to 17 °F in January. Record temperatures ranged from -26 to 114 °F. The growing season length averages 130 days and average annual rainfall is 35.6 inches. The 2010 population census reported that approximately 540 people resided on the Reservation (US Census Bureau 2010), while the tribal enrollment office reported an overall membership of 1,628 in 2015 (Kickapoo Tribal Government).

The Reservation has one primary drainage system, the Delaware River, as well as three smaller tributary streams (i.e., Squaw Creek, Plum Creek and Craig Creek). This system does not contain natural lakes, but 30-40 small reservoirs have been constructed. These ponds are generally less than 5 acres in surface area and have maximum depths of 10-15 ft. Of these ponds, 14 (Figure 1) have received fish stocking from USFWS hatcheries and eight have received stocking in multiple years. Most ponds on the Reservation have not been named and are referred to by a number code. Developed boat ramps are not present in any ponds on the reservation.

With the inception of this management plan, the Kickapoo Tribe (Tribe) and the U. S. Fish and Wildlife Service (USFWS) initiated a partnership towards the management of fisheries resources on the Reservation. The USFWS will provide technical assistance, management recommendations, and fish for stocking as available. The Tribe will provide personnel and program direction. As of 2016, the Tribe has not adopted fishing regulations.

The aim of this management plan is to outline goals, strategies, and methods for an effective fisheries management program on the Reservation. The plan recognizes that: (1) through proper management, fisheries resources contribute value to Tribal members; (2) the Tribe has the inherent right and responsibility to make decisions concerning the management of fisheries resources on their lands; (3) Native American culture and customs are compatible with the management of fisheries resources; (4) the primary responsibility for execution of fisheries management lies with the Tribe and the Bureau of Indian Affairs (BIA); and (5) the USFWS's role is to assist the Tribe and the BIA by providing technical advice, assistance, and resources as available.



Figure 1: Map of tribal water bodies on the Kickapoo Indian Reservation, Kansas that have been stocked with from USFWS hatcheries. Exclusive fishing access designation indicates water bodies that are only open to fishing for tribal members.

GOALS AND OBJECTIVES

Goals of the Fisheries Management Plan

1. To maintain sufficient numbers and variety of fish to meet the present and future recreational and aesthetic needs of tribal members.
2. To conserve and enhance all fisheries resources on the Reservation.

Management Objectives and Strategies

- Enhance and maintain fisheries resources to provide the maximum possible opportunities for recreational fishing and fish harvest for tribal members.
 - Determine optimal use (i.e., target goals) for each individual water body based on (a) current fish community, (b) capability of the system to support recreational fisheries, and (c) angler desires. Management decisions should be structured towards these goals. The goal for most lakes will fall into one of the following four categories¹:
 - **Trophy Largemouth Bass Option**
 - *Desired Outcome:* Small number of trophy-sized, fast-growing largemouth bass.
 - *Harvest Restriction:* Release bass larger than 14 or 15 inches, but encourage harvest of smaller bass to reduce competition.
 - *Target Size Distribution:*
 - Largemouth bass: PSD = 50-80, PSD-P = 30-60, PSD-M = 10-25.
 - Bluegill: PSD = 10-50, PSD-P = 0-10.
 - **Large Panfish Option**
 - *Desired Outcome:* Small number of large bluegill. Requires pond with abundant prey resources and abundant number of small largemouth bass that reduce abundance of small bluegill.
 - *Harvest Restriction:* Minimum length limit of 15 inches for harvest of largemouth bass.
 - *Target Size Distribution:*
 - Largemouth Bass: PSD = 20-40, PSD-P = 0-10.
 - Bluegill: PSD = 50-80, PSD-P = 10-30.
 - **Balanced Option**
 - *Desired Outcome:* Harvest of a wide size range of largemouth bass and panfish.
 - *Harvest Restriction:* Protected slot of 12-15 inches for largemouth bass, fish larger or smaller than that range may be harvested.
 - *Target Size Distribution:*
 - Largemouth bass: PSD = 40-70, PSD-P = 10-40, PSD-M = 10-25.
 - Bluegill: PSD = 20-60, PSD-P = 5-20.
 - **Catfish Only Option**
 - *Desired Outcome:* Large number of quality-sized (16 inches) catfish for harvest.
 - *Harvest Restriction:* Unrestricted if maintained as put and take fishery through stocking
 - *Target Size Distribution:* PSD > 50; PSD-P = 0-10.

¹ Adapted from Flickenger et al. 1999, Schramm and Willis 2012, and Wright and Craft 2012.

- Conduct fish stocking as necessary to meet management goals
 - Coordinate stocking requests with USFWS Great Plains FWCO to receive fish from the National Fish Hatchery System.
 - When appropriate, trap and transfer fish from over-populated waters to less-populated waters.
 - Identify new waters to introduce fish.
- Establish and maintain fisheries monitoring program.
 - Conduct fisheries surveys every 3-4 years that evaluate fish population characteristics using established gears (e.g., electrofishing, gill nets, and trap nets).
 - Collect data for measures of relative abundance (catch per unit effort), body condition (*Wr*), and size distribution indices (PSD, etc.).
 - Use data to establish regulations that are best suited for the fishery resource (e.g., harvest and possession limits, and maximum, minimum, or slot length limits).
 - Identify waters containing endangered or threatened species. Develop protocol to protect endangered and threatened fish species.
 - Monitor general water quality for fish habitat (i.e., temperature, dissolved oxygen, pH, conductivity, and water clarity).
- Protect aquatic habitat.
 - When possible, exclude livestock from ponds to protect shoreline habitat and stream riparian areas above reservoirs to reduce sediment input.
 - Control overabundant vegetation with approved herbicides in selected areas.
 - Encourage agricultural practices that eliminate or reduce the introduction of sediment and pesticide runoff within reservoir watersheds.
 - Maintain pond aesthetics through litter control and facility maintenance.
 - Maintain access to reservoirs.
 - Maintain roads and parking areas to fishing ponds.
 - Construct and maintain boat ramps.
 - Provide access such as fishing docks for disabled anglers.
 - Construct recreational infrastructure such as picnic areas, shelters, and bathrooms at fishing ponds.
- Prevent, reduce, and control aquatic invasive/nuisance species.
 - Inform and educate tribal members about preventing the spread and introduction of aquatic nuisance species.
- Generate funding for fish and aquatic resource management.
 - Maintain appropriate fishing license fees.
- Facilitate communication with anglers via surveys or public discussion.
 - Understand angler preferences for fish species and harvest options.
 - Identify priority water bodies for management activities.
 - Inform and educate Tribal members of angling opportunities.
 - Provide fishing regulations at all fishing license vendors.
 - Provide fishery assessment reports to public.
 - Encourage school field trips to lakes, reservoirs, and streams.
 - Plan and hold a free fishing weekend annually.
 - Plan and conduct kids fishing tournaments.
 - Plan pond and stream clean up days, including school field trips, to clean litter from around fishing ponds.

SPECIFIC POND OBJECTIVES AND STRATEGIES

Each recreational fishery is different in terms of habitat, watershed size, pond size, and fish community. The habitat available for certain species and the corresponding inter- and intraspecific interactions among fish species must be understood to properly manage each fishery. Currently, fisheries survey data are not available, so bass, panfish, and catfish stocking recommendations have been based solely on pond size.

The priorities and strategies outlined herein will be revised as surveys are conducted. This plan is intended to be flexible and adaptive to new information. As data are collected, the management plan will be updated to reflect new information and provide more specific management strategies.

Based on the limited existing knowledge of fisheries on the Reservation, several ponds were deemed a higher priority for management due to their size, location, and popularity among anglers.

Priority Information Needs to Inform Management

1) Fisheries survey data.

Formal surveys of the fish community have not been conducted on the Reservation. Initial sampling must be completed to identify species composition and abundance to establish baseline population metrics. Relative abundance measures (i.e., catch per unit effort) provide an estimate of the number of fish in a pond. Fish population size-structure provides information about fish growth, size availability for angler harvest, and population balance. Size distribution indices (Guy et al. 2007) provide insight into predator-prey relationships. Fish condition (i.e., relative weight, Wr : Wege and Anderson 1978) provides an indicator of general fish plumpness and prey availability. In combination, this information is used to determine management strategies and subsequent changes in management that could be made. Also, determining if natural reproduction is occurring informs managers of stocking needs, thus surveying for age-0 fish is important.

2) Physical habitat and water quality

Understanding the physical and chemical attributes of each pond is necessary to ensure that conditions are suitable for fish survival and growth. Estimates of surface acreage and the maximum and average depths of each pond provide information about the potential for winter-kill or summer-kill. Measurements of vertical water-column temperature and dissolved oxygen profiles, particularly during the warmer, summer months, inform managers about fish species that are suitable for each pond. In addition, measures of pH, conductivity, and water clarity (e.g., Secchi disk, turbidity) provide information regarding overall water quality.

High Priority Ponds

KT-38

KT-38 (Figure 2, coordinate location: 39.666205, -95.632135) is situated on a main highway (110th St / Kansas State Highway 20) west of Horton, KS. With a surface area of 10.6 acres, it is the largest recreational fishing pond on the Reservation. This pond is very accessible due to its location, open shoreline, and a pathway along the west and south shorelines. From 2009 to 2013, KT-38 was stocked with channel catfish, bluegill, and black crappie.

If a suitable location exists to launch an electrofishing boat from a trailer, electrofishing would be ideal for an initial survey. If not, a smaller boat could possibly be launched from which a crew could deploy trap nets. The goal of an initial survey would be to document species composition, size distribution of targeted species, body condition of targeted species, and relative abundance (*C/f*) of all fish species. In addition, habitat attributes described in number 2 of the Priority Information Needs should be collected. Currently, data are not available for these metrics.



Figure 2: Lake KT-38 on the Kickapoo Reservation. The visible road is Kansas State Highway 20. (Image credit: maps.google.com)

Preacher Lake (KT-27)

Preacher Lake (Figure 3, coordinate location: 39.665889, -95.687333) is located 4.5 km west of Lake KT-38 and is a popular outdoor recreation site on the Reservation due to its scenery. Access to Preacher Lake is obtained by foot or a high-clearance vehicle via a two-track dirt road about 175 m from KS- 20. The pond has a surface area of 3.2 surface acres. Other than a trail along the dam at the northern end, most of the shoreline is heavily vegetated and the lake is surrounded by dense woods. Thick algae is present in the littoral zone throughout most of the pond in the summer. From 2009 to 2013, this pond was stocked with channel catfish, bluegill, and black crappie.

Dense littoral vegetation and algae would make electrofishing difficult. Trap nets, deployed from a small boat, would be the best gear to sample the fish community, document size distribution of fish, body condition of all sport fish, and relative abundance (*C/f*). In addition, habitat attributes described in number 2 of the Priority Information Needs should be collected. Currently, data are not available for these metrics.



Figure 3: Preacher Lake (lake KT-27) on the Kickapoo Reservation. The visible road is Kansas State Highway 20 and the access road is visible connecting Highway 20 to the lake. (Image credit: maps.google.com)

KT-38-1

KT-38-1 (Figure 4, coordinate location: 39.660468, -95.628371) is located about 600m SSE of lake KT-38. Access is possible using a high-clearance vehicle via a short two-track road from Hazelnut Dr. The pond has a surface area of 2.76 acres with a shoreline largely surrounded by cattails and brush. KT-38-1 was stocked with channel catfish, bluegill, and black crappie from 2009 to 2013.

If a suitable location exists to launch an electrofishing boat from a trailer, electrofishing would be ideal for an initial survey. If not, a smaller boat could possibly be launched from which a crew could deploy trap nets. The goal of an initial survey would be to document species composition, size distribution of targeted species, body condition of targeted species, and relative abundance (*C/f*) of all fish species. In addition, habitat attributes described in number 2 of the Priority Information Needs should be collected. Currently, data are not available for these metrics.



Figure 4: Lake KT-38-1 on the Kickapoo Reservation, Kansas. (Image credit: maps.google.com)

KT-24

KT-24 (Figure 5, coordinate location: 39.691003, -95.711722) is located along Coyote Rd, which forms the western boundary of the Kickapoo Reservation. At 3.9 acres, KT-24 has a completely open shoreline and a small peninsula on the south bank, which allows for easy access to shore fishing. However, the clear shorelines may be due to use of the pond by cattle. Cattle and erodible soils in the watershed have likely contributed to the turbid state of this pond. From 2009 to 2011, KT-24 received stockings of channel catfish, bluegill, and black crappie.

If a suitable location exists to launch an electrofishing boat from a trailer, electrofishing would be ideal for an initial survey. If not, a smaller boat could possibly be launched from which a crew could deploy trap nets. The goal of an initial survey would be to document species composition, size distribution of targeted species, body condition of targeted species, and relative abundance (C/f) of all fish species. In addition, habitat attributes described in number 2 of the Priority Information Needs should be collected. Currently, data are not available for these metrics.



Figure 5: Pond KT-24 on the Kickapoo Reservation. (Image credit: maps.google.com)

ADDITIONAL RESOURCES

Book: Fisheries Techniques 3rd Edition, edited by A.V. Zale, D.L. Parris, and T.M. Sutton.

Relevant chapters:

1. Conducting Fisheries Investigations (Zale, Sutton, and Parrish)
6. Passive Fish Captures Methods (Hubert, Pope, and Dettmers)
7. Active Fish Capture Methods (Hayes, Ferreri, and Taylor)
8. Electrofishing (Reynolds and Kolz)
14. Length, Weight, and Associated Indices (Neumann, Guy, and Willis)
19. Recreational Angler Survey Methods: Estimation of Effort, Harvest, and Released Catch (Jones and Pollack).

Book: Small Impoundment Management in North America, edited by J.W. Neal and D.W. Willis.

Relevant Chapters:

4. Biological Productivity of Small Impoundments (Kröger and Tucker)
5. Managing the Pond Environment ((Stone, Morris, and Smith)
6. Stocking Strategies for Recreational Small Impoundments (Wright and Kraft)
7. Assessment and Harvest of Largemouth Bass-Bluegill Ponds (Schramm and Willis)
14. Community Fishing Ponds (Eades and Lang)

Book: Inland Fisheries Management in North America (Hubert and Quist)

Relevant Chapters:

7. Regulating Harvest (Isermann and Paukert)
8. Managing Undesired or Invading Species (Kolar, Courtenay, and Nico)
9. Use of Hatchery Fish for Conservation, Restoration, and Enhancement of Fisheries (Trushenski, Kohler, and Flagg)
16. Farm Ponds and Small Impoundments (Willis, Lusk, and Slipke)

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- Wright, R. A., and C. E. Kraft. 2012. Stocking strategies for recreational small impoundments. Pages 155-180 *in* J. W. Neal and D. W. Willis, editors. Small impoundment management in North America. American Fisheries Society, Bethesda, Maryland.

Appendix 1. Fish stocking history in Kickapoo Indian Reservation ponds.

Species	Year	KT-14			KT-20			KT-21		
		Month	N	Size*	Month	N	Size	Month	N	Size
Channel Catfish	2010							9	250	FG
	2009							9	300	FG
Bluegill	2013	8	500	FY	8	1,000	FY	8	900	FY
	2011							8	560	FY
Black Crappie	2013	8	100	FY	8	240	FY	8	100	FY
	2011							8	392	FY
		KT-22			KT-24			KT-25		
		Month	N	Size	Month	N	Size	Month	N	Size
Channel Catfish	2010	9	250	FG	9	450	FG			
	2009	9	300	FG	9	800	FG			
Bluegill	2011				8	1,945	FY	8	1,650	FY
Black Crappie	2011				8	1,362	FY	8	330	FY
		KT-27 (Preacher's Pond)			KT-35			KT-37		
		Month	N	Size	Month	N	Size	Month	N	Size
Channel Catfish	2010	9	450	FG				9	550	FG
	2009	9	1,000	FG				9	500	FG
Bluegill	2013	8	800	FY	8	1,000	FY	8	300	FY
	2011	8	1,330	FY				8	1,810	FY
Black Crappie	2013	8	200	FY	8	250	FY	8	100	FY
	2011	8	931	FY				8	1,267	FY
		KT-38			KT-38-1			KT-40		
		Month	N	Size	Month	N	Size	Month	N	Size
Channel Catfish	2010	9	1,000	FG	9	450	FG			
	2009	9	2,050	FG	9	600	FG			
Bluegill	2013	8	1,295	FY	8	300	FY	8	900	FY
	2011	8	4,060	FY	8	1,380	FY			
Black Crappie	2013	8	650	FY	8	250	FY	8	200	FY
	2011	8	2,842	FY	8	966	FY			
		KT-44			KT-47B					
		Month	N	Size	Month	N	Size			
Channel Catfish	2010	9	350	FG						
	2009	9	400	FG						
Bluegill	2013				8	1,000	FY			
	2011	8	930	FY						
Black Crappie	2013				8	225	FY			
	2011	8	651	FY						

*Stocking size abbreviations are fry (FY; hatch to 1.49 in) and fingerling (FG; 1.5 – 5.49 in).

Appendix 2. List of fishes on the Kickapoo Indian Reservation (Cross and Collins 1995).

Family and species	Abundance*	Location
Lepisosteidae		
Longnose gar <i>Lepisosteus osseus</i>	3	Delaware River
Hiodontidae		
Goldeye <i>Hiodon alosoides</i>		
Clupeidae		
Gizzard shad <i>Dorosoma cepedianum</i>	3	Delaware River
Cyprinidae		
Central stoneroller <i>Campostoma anomalum</i>		
Common carp <i>Cyprinus carpio</i>		
Western silvery minnow <i>Hybognathus argyritis</i>		
Plains minnow <i>Hybognathus placitus</i>		
Bigmouth shiner <i>Hybopsis dorsalis</i>		
Common shiner <i>Luxilus cornutus</i>		
Golden shiner <i>Notemigonus crysoleucas</i>		
Red Shiner <i>Notropis lutrensis</i>		
Sand shiner <i>Notropis stramineus</i>		
Suckermouth minnow <i>Phenacobius mirabilis</i>		
Bluntnose minnow <i>Pimephales notatus</i>		
Fathead minnow <i>Pimephales promelas</i>		
Creek chub <i>Semotilus atromaculatus</i>		
Catostomidae		
River carpsucker <i>Carpionodes carpio</i>		
Quillback <i>Carpionodes cyprinus</i>		
White sucker <i>Catostomus commersonii</i>		
Mountain sucker <i>Catostomus platyrhynchus</i>		
Buffalo sp. <i>Ictiobus sp.</i>		
Shorthead redhorse <i>Moxostoma macrolepidotum</i>		
Ictaluridae		
Black bullhead <i>Ameiurus melas</i>		
Yellow bullhead <i>Ameiurus natalis</i>	3	Ponds
Channel catfish <i>Ictalurus punctatus</i>	2	Ponds and Delaware River
Slender madtom <i>Noturus exilis</i>		
Stonecat <i>Noturus flavus</i>		
Flathead catfish <i>Pylodictis olivaris</i>	2	Delaware River

Appendix 2 continued.

Family and species	Abundance	Location
Centrarchidae		
Green sunfish <i>Lepomis cyanellus</i>		
Orangespotted sunfish <i>Lepomis humilis</i>		
Bluegill <i>Lepomis macrochirus</i>	2	Ponds
Largemouth bass <i>Micropterus salmoides</i>	2	Ponds
White crappie <i>Pomoxis annularis</i>		
Black crappie <i>Pomoxis nigromaculatus</i>		
Percidae		
Orangethroat darter <i>Etheostoma spectabile</i>		
Yellow perch <i>Perca flavescens</i>		
Sciaenidae		
Freshwater drum <i>Aplodinotus grunniens</i>	2	Delaware River

*Species abundance: 1 = dominant, 2 = frequent, 3 = common, 4 = rare, 5 = present but unknown abundance.

Appendix 3. Data collection and analysis protocol.

For each species, all fish caught should be weighed to the nearest gram (g) and measured to the nearest millimeter (mm). Fish smaller than 100 mm can be enumerated for inclusion in the length frequency histogram.

Analysis of Data Collected

- 1) Trends in relative abundance are assessed as catch-per-unit-effort (C_f) as number of fish per trap net night, number of fish per gill net night, and (or) number of fish per hour of electrofishing.
- 2) Fish body condition is assessed by calculating relative weight (Wr).
- 3) Proportional size distribution (PSD, PSD-P: Anderson and Neumann 1996, Guy et al. 2007) are calculated for each species in each gear.

Appendix 4. Glossary of fisheries terms.

Catch per unit effort (C/f): an index of abundance used to document relative changes over time (also known as relative abundance), calculated as,

$$C/f = \frac{\text{number of fish (per length group, category, or sample)}}{\text{effort in unit of time (e.g., hour or net night)}}$$

Conductivity: a measure of water's ability to conduct electrical current, which is dependent on the amount of ions in the water. Total dissolved solids (TDS) are equal to ~0.5*conductivity. Conductivity is an approximate measure of a water body's productivity due to a relationship between minerals and productivity.

Effort: the amount of time expended in collecting a sample (e.g., hours, minutes, or net nights). Effort is used to calculate C/f.

Memorable length: the length of a fish (unique to each species) considered as the length that most anglers remember catching, quantified as 59-64% of the world record length for that species.

Net-night: a unit of time (i.e., overnight, <24 hr.) describing the effort expended for a sampling gear, such as a gill net or trap net. For example, if five gill nets were left in the water overnight, five gill net nights of effort were expended.

pH: a measure of how basic or acidic water is. Pure water is considered neutral with a pH of 7. Because pH is on a log10 scale, a change of 1 pH unit equates to a 10-fold increase in H⁺ (hydrogen ions). Values for pH less than 7 indicate acidic water, while pH values greater than 7 indicate basic water.

Preferred length: the length of a fish (unique to each species) that is considered the preferred length that most anglers want to catch, quantified as 45-55% of the world record length for that species.

Proportional size distribution (PSD): the percentage of a sample of stock length fish that are also greater than the number of fish ≥ a fish's length category (i.e., quality, preferred, memorable, trophy), calculated as,

$$\text{PSD} = \frac{\text{number of fish} \geq \text{quality length}}{\text{number of fish} \geq \text{stock length}} \times 100$$

$$\text{PSD} - \text{P} = \frac{\text{number of fish} \geq \text{preferred length}}{\text{number of fish} \geq \text{stock length}} \times 100$$

$$\text{PSD} - \text{M} = \frac{\text{number of fish} \geq \text{memorable length}}{\text{number of fish} \geq \text{stock length}} \times 100$$

$$\text{PSD} - \text{T} = \frac{\text{number of fish} \geq \text{trophy length}}{\text{number of fish} \geq \text{stock length}} \times 100$$

Relative weight (W_r): an index of the condition, or general well-being, of a fish, calculated as,

$$W_r = \frac{\text{weight } (W)}{\text{standard weight } (W_s)} \times 100$$

where W is the weight (g) of an individual fish and W_s is a length specific standard weight developed for each species.

Quality length: the length of a fish (unique to each species) that is considered the minimum length most anglers would keep, quantified as 36-41% of the world record length for that species.

Standard error (SE): the **standard** deviation of the sampling distribution of a statistic, calculated as,

$$\frac{\text{standard deviation}}{\sqrt{n}}$$

or,

$$\sqrt{\frac{\text{variance}}{n}}$$

where n is the sample number.

Standard weight: weight of a fish standardized by regression of weight on length for a particular species, often determined by the 75th percentile weight rather than average weight in a length-class.

Stock length: the length of a fish (unique for each species) considered as the length that a fish reaches sexual maturity, quantified as 20-26% of the world record length for that species.

Trophy length: the length of a fish (unique to each species) considered to be a length worthy of acknowledgement, quantified as 74-80% of the world record length for that species.

Variance: a measure of the dispersion around the average of the sample, calculated as,

$$\sum (\text{observed value} - \text{sample mean})^2$$