

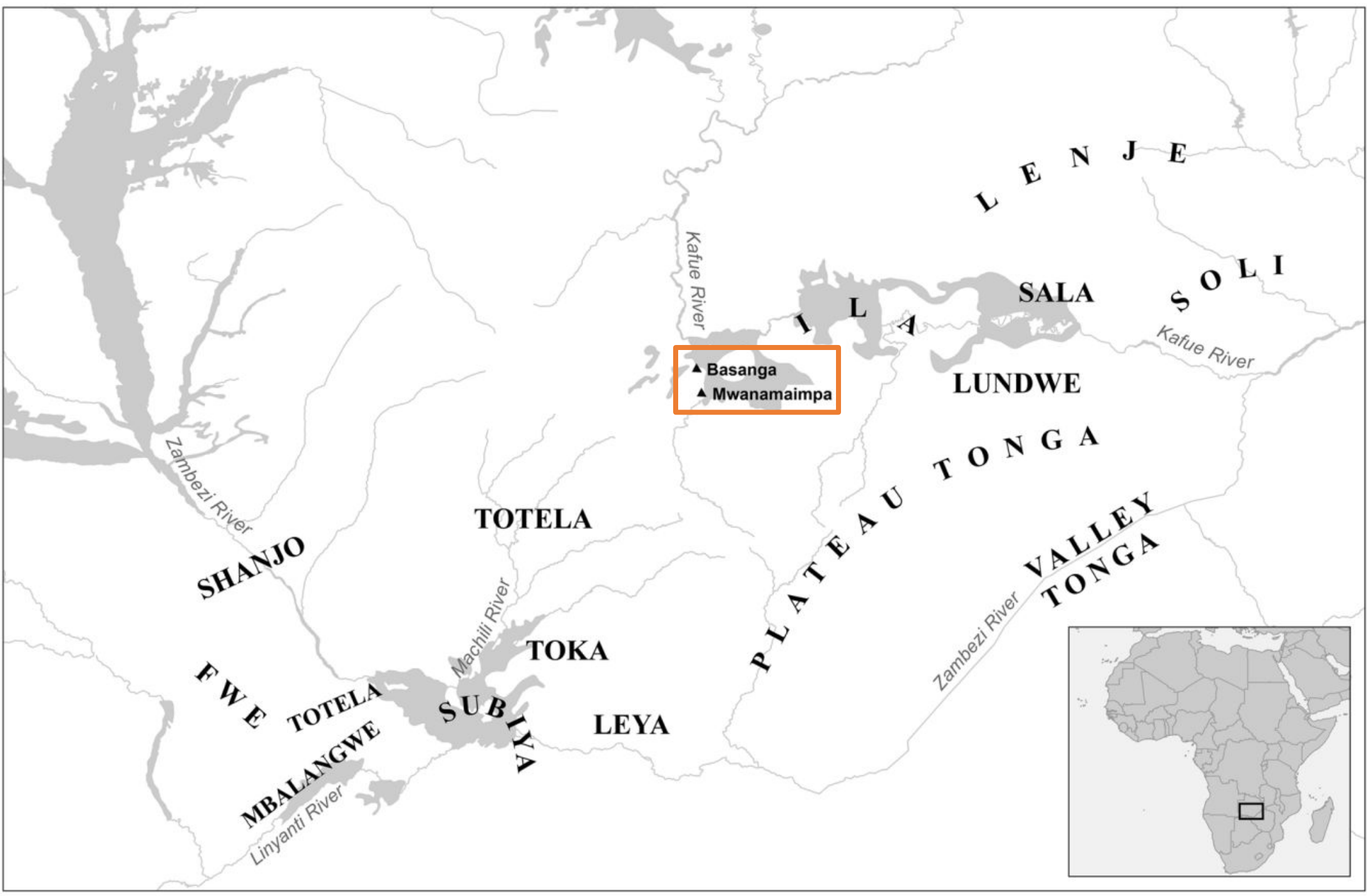
Into the Depths: Examining the Deep-History of Fishing in the Kafue River Floodplain

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Background

The Kafue River Floodplain is a seasonally inundated area in Zambia that extends across 6,500 km² and represents an important resource for local fisheries. Archaeological sites in this region chronicle the settlement and movement of Bantu-speaking people during the 6th-16th centuries. Recently excavated fish remains from mounds in the floodplain provide a long-term record of fishing practices. The goal of this project is to evaluate the socio-ecological impact of sustained fishing in the region. This poster presents a preliminary analysis of the most abundant catfish species (*Clarias gariepinus*) identified in the archaeological assemblage, including size reconstructions estimated from measurements of the catfish pectoral spines.



The study region showing the locations where extant Botatwe languages are spoken around the middle Kafue and Zambezi catchments. Basanga and Mwanamaimpa are shown near the center of the image (in orange box).¹

History of Fishing in the Region

Information gathered from historical linguistic research from the area indicates that the most ancient form of fishing practice is angling with hook and line; however, as the climate shifted into a dryer/cooler season in the beginning to mid first millennium, people developed other techniques to sustain their food sources.² These new techniques included the use of basketry and trapping.

Izubo and *masiko* baskets are most commonly used in tributaries and the slow streams feeding the floodplains and dambos,² similar to the environments of the Middle Iron Age Basanga and Mwanamaimpa settlements of the Kafue Floodplain. Fishing with baskets increases catch sizes and, importantly, predictable success. *Miono* is one of the traps used, known for its conical shape and constructed out of sticks, reeds, or leftover harvest stalks.² They are most frequently used in seasonal or perennial streams, though not at the peak of the floods when barriers cannot be erected.²

The human investment in these practices, based on the linguistic evidence, emphasizes the importance of fishing for the past and present inhabitants of the Kafue Floodplain, and our analysis of the archaeological remains only bolsters this direct connection with the practice.



C. gariepinus close up (top)³ and swimming (bottom)⁴

Meet *Clarias gariepinus*

Known locally as *mubondo*, this species is found in both shallow, swampy areas and fast flowing rivers, which characterize dry and wet seasons in the floodplain. A specialized breathing organ allows them to survive outside of water for long periods of time, even in very dry conditions. Sexual maturity occurs between 40-45 cm in females and 35-40 cm in males, and adults can reach up to 170 cm in total length (TL).³ Mature fish migrate to rivers and temporary streams to spawn during the rainy season and return to larger rivers and lakes soon after, leaving juvenile fish in the flooded delta. Because of the size differences and associated fishing methods linked to their seasonal lifecycle, we can explore *mubondo* fishing patterns in the archaeological record.



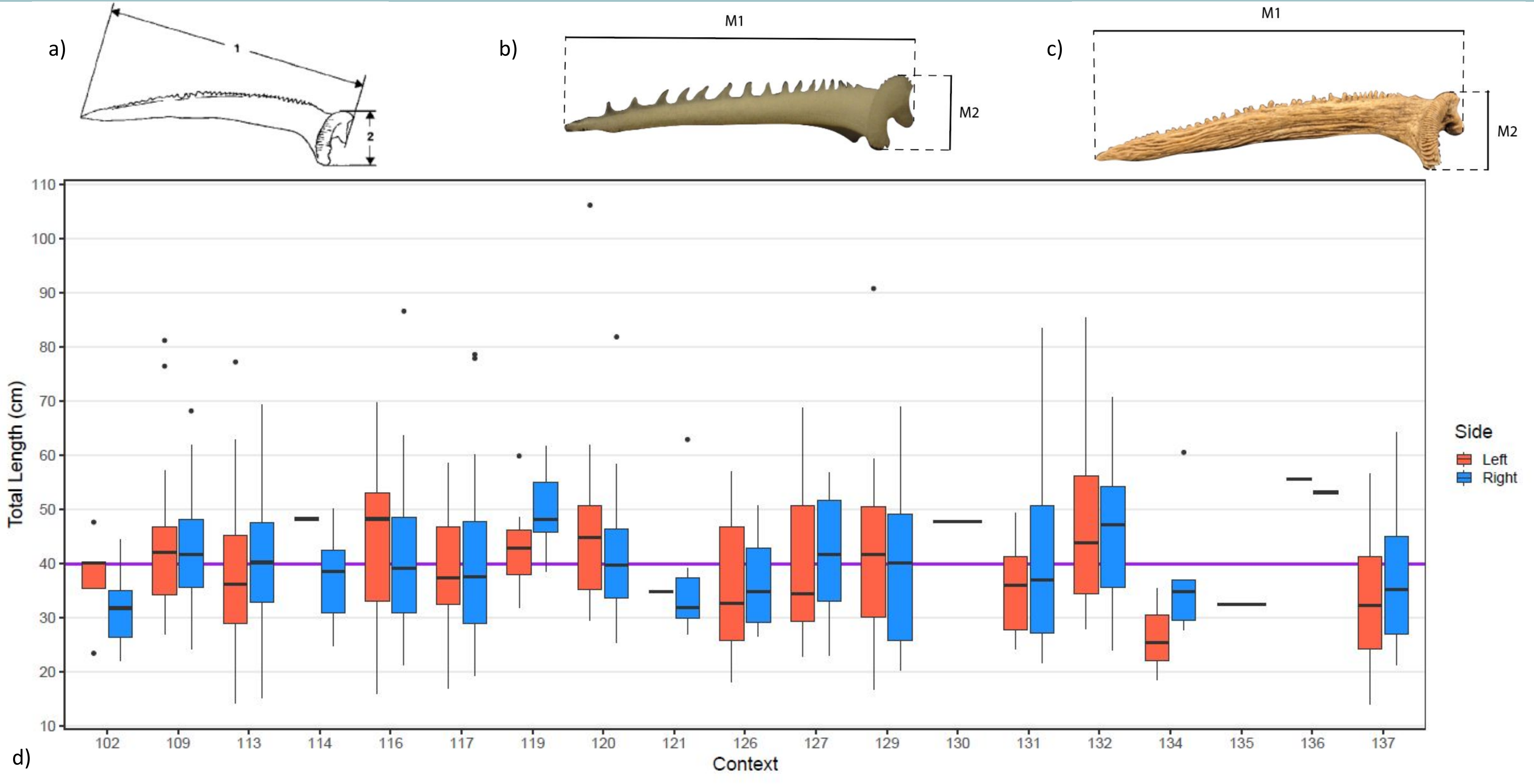
Itumba (pl. *matumba*) is a type of fishing trap used to catch big catfish during the rainy season.

Materials and Methods

We developed a reference collection of modern fish species common in the Kafue Floodplains to facilitate later archaeological identification. The collection includes 16 specimens, including various specimens of *C. gariepinus* and other common catfish species. Each specimen was photographed, weighed, measured, and identified before processing.

This poster focuses on archaeological fish remains excavated in 2022 from 19 contexts, each representing stratigraphic layers, in Mwanamaimpa. The analysis we have conducted so far includes sorting and identifying all catfish remains present in these layers, which represent approximately half of the depth of the mound.

Our analysis focuses on the catfish pectoral spine for determining the size of individual catfish found in the archaeological record. Using the reference collection we identified three different types of spines found archaeologically: Type A (*C. gariepinus*), Type B (cf. *Synodontis macrostigma*), and Type C (cf. *Schilbe intermedius*). For each context, the pectoral spines were separated into these types and into left and right sides. We used published length and height measurements (M1 and M2, respectively) for the *C. gariepinus* catfish pectoral spines.⁵ To calculate the estimated size of archaeological specimens of *C. gariepinus*, we used the regression equations for M1 ($y = 15.112x^{0.9408}$) and M2 ($y = 54.673x^{1.0020}$) of the pectoral spines.⁵



Measurements (M1 and M2) recorded for *C. gariepinus* pectoral spines shown on a) published reference,⁵ b) reference specimen, and c) archaeological specimen. d) Box-plot of Mwanamaimpa *C. gariepinus* fish sizes estimated from measurement 2 (M2) of archaeological spines (Total=609), according to side and context. The line inside the box is the median; lower and upper box boundaries represent the 25th and 75th percentiles, respectively; lower and upper error lines represent the 10th and 90th percentiles, respectively; circles represent data falling outside 10th and 90th percentiles. The purple horizontal line indicates the mean size at maturity for *C. gariepinus*.

Preliminary Results

We based the chronology of the Mwanamaimpa mound on the context layers excavated to date because dates for the Mwanamaimpa Mound are not yet available. These context layers represent a relative timeline of the excavated occupation layers, and we plan to extend our analysis as excavations continue. We recorded 609 pectoral spines of *C. gariepinus* (291 Left, 318 Right), 15 pectoral spines of cf. *Synodontis macrostigma*, and 14 pectoral spines of cf. *Schilbe intermedius*. Overall, the estimated total length of *C. gariepinus* fish from Mwanamaimpa range from 14 to 106 cm in total length (TL). Archaeological fish sizes primarily fall around the typical maturity size range for this species between 35-45 cm. Although there are some outliers representing large-sized fish, the size ranges remain relatively consistent throughout the contexts currently represented in the assemblage, suggesting consistent and sustainable fishing practices.



A fisher checks for catfish hooked along his fishing line set across a small stream near Mwanamaimpa.

Discussion and Future Questions

The pattern of consistent *C. gariepinus* size ranges across time provides evidence for the continuous knowledge transfer and sustainable fishing practices in the Kafue Floodplain. The data indicate that past fishing practices targeted individuals around the age of sexual maturity (35-45 cm). As we continue analysis of materials from the ongoing excavations at Mwanamaimpa, we will continue to explore the following questions:

- Where were catfish caught? From rivers or inundated plains?
- How does fish size vary according to season, habitat, and fishing technology?
- How did fishing practices change between seasons and across time?
- What other species are present in the assemblage and what were their patterns of exploitation?

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