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Food and Feeding Habits of *Hydrocynus* in River Benue Along Mayo Ranewo, Ardo-Kola LGA, Taraba State, Nigeria

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Abstract

This study examines the food and feeding habits of *Hydrocynus* species in River Mayo Ranewo, Ardo-Kola Local Government Area, Taraba State, Nigeria. *Hydrocynus*, commonly referred to as tigerfish, is a predatory freshwater species of notable ecological and economic value. The research investigates dietary composition, length–weight relationship, and condition factor to better understand the species' ecological role. Seventy-five specimens were obtained from local fishermen and analyzed in the laboratory. Stomach content analysis revealed seasonal dietary variation, with *Tilapia* and catfish as predominant prey items, supplemented by decayed fish and fish bones. The length–weight relationship showed a strong positive correlation ($R^2 = 0.99997$), indicating isometric growth, while the condition factor ($K \approx 1.20$) suggested a healthy population. The results indicate that tigerfish adjust their feeding strategies according to prey availability and environmental conditions. These findings contribute valuable information for sustainable fisheries management and conservation planning, supporting both ecological stability and the economic viability of inland fisheries in Taraba State.

Keywords: *Hydrocynus*; Food Habits; River Mayo Ranewo; Stomach Content Analysis; Condition Factor; Ardo-Kola

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INTRODUCTION

The genus *Hydrocynus* (family Alestidae), commonly referred to as tigerfish, comprises some of the most iconic and ecologically significant freshwater predatory fish species in African riverine systems (Njiru *et al.*, 2022; Kassim *et al.*, 2022). Among its notable members are *Hydrocynus vittatus* and *Hydrocynus forskahlii*, both widely distributed across tropical African freshwater bodies such as rivers, lakes, and floodplains (Akinyemi *et al.*, 2021; Musa *et al.*, 2021). *Hydrocynus vittatus*, in particular, is recognized for its razor-sharp teeth, streamlined morphology, and aggressive feeding behavior, making it a top predator in its ecosystem (Mwangi *et al.*, 2020; Ibrahim *et al.*, 2023).

Tigerfish are crucial ecological agents, playing regulatory roles within aquatic food webs by preying on smaller fish, thereby helping maintain species diversity and population balance (Adeogun *et al.*, 2023; Gichuki *et al.*, 2021). Their feeding dynamics and trophic relationships are indicators of aquatic ecosystem health, especially in river systems subjected to seasonal and anthropogenic pressures (Njiru *et al.*, 2022; Ibrahim *et al.*, 2023). Understanding their dietary preferences provides insights into ecological processes such as prey-predator dynamics, energy transfer, and biodiversity conservation (Mwangi *et al.*, 2020).

In addition to their ecological importance, *Hydrocynus* species also hold significant economic value. They support artisanal fisheries and recreational angling, contributing to local livelihoods and food security in riparian communities (Kassim *et al.*, 2022). Consequently, comprehensive knowledge of their feeding habits and health condition is essential for designing effective fisheries management and conservation strategies (Oladimeji & Aliyu, 2020; Gando *et al.*, 2022).

The River Benue, one of Nigeria's most prominent inland water bodies, is a vital component of the Upper Niger River basin. It supports diverse fish species, including tigerfish, and sustains socio-economic activities for local populations. The Mayo Ranewo section of the river in Ardo-Kola LGA, Taraba State, flows through ecotonal landscapes that are influenced by both tropical rainfall patterns and human activities such as farming and fishing. These seasonal and anthropogenic factors create dynamic environmental conditions that potentially influence the feeding behavior of resident fish species, including *Hydrocynus* (Owolabi, 2020; Ibrahim *et al.*, 2023).

Despite previous studies on tigerfish in other Nigerian rivers (e.g., Lake Chad, Niger River, Jebba Lake), localized investigations in the Upper Benue tributaries remain scarce. Thus, this study aims to bridge that knowledge gap by examining the food composition, feeding frequency, length-weight relationship, and condition factor of *Hydrocynus* in River Benue along Mayo Ranewo. Findings from this study are expected to inform sustainable fishery practices, contribute to ecosystem-based management, and support biodiversity conservation in Taraba State's inland waters.

MATERIALS AND METHODS

Study Area

River Benue along Mayo Ranewo is situated in Ardo Kola Local Government Area (LGA) in Taraba State, northeastern Nigeria. It is located approximately on Latitude 8.8960° N and Longitude11.2900° E. The river is a tributary of the larger River Benue, which is a major river system in Nigeria. The region is characterized by a blend of savannah and forested areas, and the river flows through a landscape that is crucial for both agriculture and local biodiversity. River Benue along Mayo Ranewo is a medium-sized river with varying widths and depths along its course. It serves as an important water source for local communities and wildlife. The river's size and flow can be influenced by seasonal rains, which impact its depth and width. Its waters are typically clear to slightly turbid, depending on recent weather patterns and human activity. River Benue along Mayo Ranewo is home to a diverse range of fish species, reflecting the rich biodiversity of the region. Common fish species include: *Clarias gariepinus* (African Catfish); *Tilapia* species, Labeo species, Mormyridae family and the *Hydrocynus* Species.

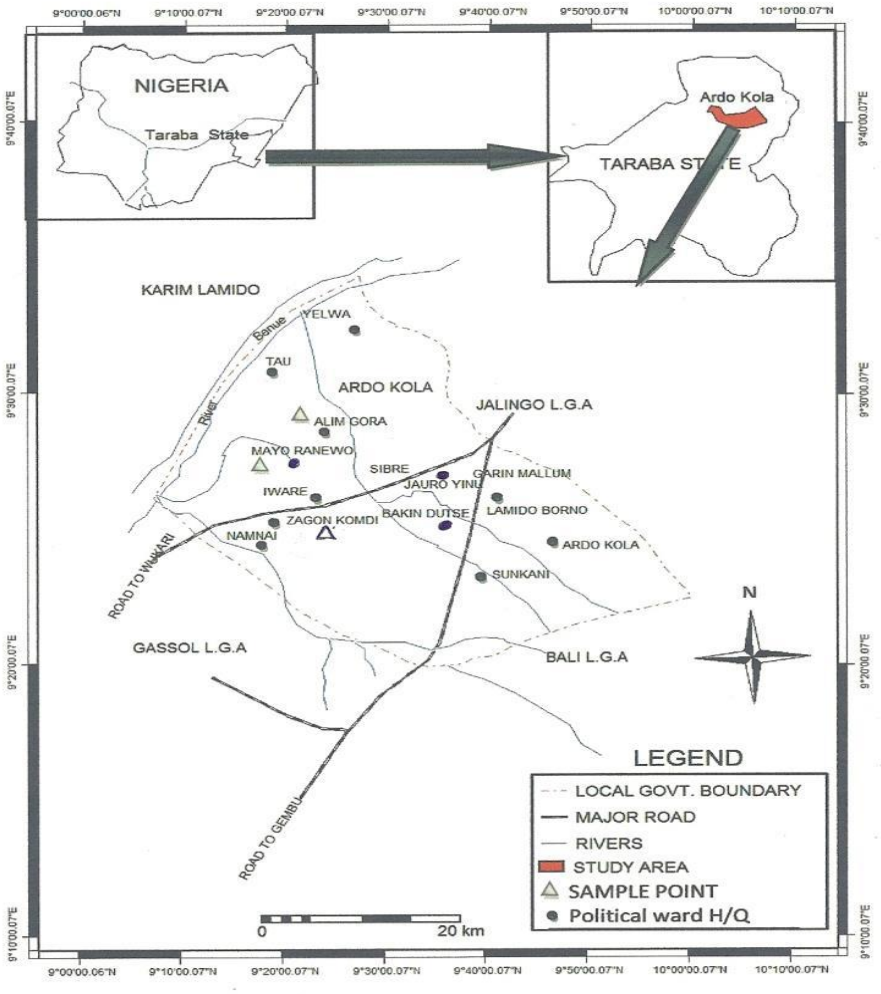

Figure 1: Map of Study Area Sample Selection

Samples were collected from fishermen and *Hydrocynus* species were collected randomly for the study. A total of 32 *Hydrocynus vittatis* were studied in the laboratory.

Collection of *Hydrocynus* Species

Hydrocynus were physically selected and examined. Care was taken during the collection process to preserve the integrity of the fish's body parts. The collected fishes were preserved in 2% formalin for further identification and analysis (Nuchjangreed & Somprasong, 2007; BE *et al.,* 2021)

Identification of *Hydrocynus* Feeding Habits

Hydrocynus collected from the fishermen were transferred to petri dishes and examined under a dissecting microscope. Identification was carried out using classification

keys from Soulsby (1982) and Fleck and Moody (1988), along with taxonomic characteristics as described in earlier references (Fleck and Moody (1988).

Length-Weight Determination

The total length (TL) of each species was measure in centimeters and the weight (W) of each species was recorded in grams

The formula is: W= aL^b

Where W is the weight in grams, L is the length in centimeters, a is the scaling constant and b is the growth exponent

Determination of the Condition factor

The condition factor (CF) is a measure of fish health and well-being, indicating weather fish are underweight, overweight, or optimal weight for their length.

The Formula is: CF = (W/L^3) x 100

Where W is the weight in grams, L is the length in centimeters, a is the scaling constant and b is the growth exponent

Data Analysis

Data collected was analyzed using Statistical Package for Social Sciences version 28. Correlation analysis was conducted where applicable. Results were presented using simple percentages.

RESULTS

Frequency and Percentage of Food Items in Tigerfish Stomachs collected from River Benue in Mayo Ranewo

August: Tilapia and Catfish were equally consumed, each accounting for 40% of the diet. Fish Bone appeared in 20% of the stomachs, suggesting leftover remains from previously digested meals.

October: There was a shift, with Fish Bone increasing to 50%, possibly indicating less recent feeding or slower digestion. Tilapia and Catfish were consumed equally but less frequently (25% each).

November: Tilapia consumption increased significantly to 42.8%, making it the dominant food item. Decayed Fish appeared (28.6%), possibly indicating scavenging behavior or decreased prey availability. Fish Bone and Catfish were both lower (14.3% each) (Table 1).

Stomach Fullness and Emptiness of Tigerfish collected from River Benue in Mayo Ranewo

August: An equal split between stomachs with food (50%) and empty stomachs (50%) suggests regular but inconsistent feeding.

October: A decrease in feeding activity, with only 40% of stomachs containing food and 60% empty.

November: A marked increase in feeding activity, with 63.6% of stomachs containing food and only 36.4% empty (Table 2).

Table 1: Frequency and Percentage of Food Items in Tigerfish Stomachs collected from River Benue in Mayo Ranewo

Month	Food Item	Frequency	% of Occurrence
August			
	Tilapia	2	40.0
	Catfish	2	40.0
	Fish Bone	1	20.0
Total		5	100.0
October			
	Tilapia	1	25.0
	Catfish	1	25.0
	Fish Bone	2	50.0
Total		4	100.0
November			
	Tilapia	3	42.8
	Catfish	1	14.3
	Decayed Fish	2	28.6
	Fish Bone	1	14.3
Total		7	100.0

Source: Field survey, 2025

Table 2: Stomach Fullness and Emptiness of Tigerfish collected from River Benue in Mayo Ranewo

Month	Stomach fullness	Number of Samples	% of Occurrence
August			
	Stomach with food	5	50.0
	Empty Stomach	5	50.0
Total		10	100.0
October			
	Stomach with food	4	40.0
	Empty Stomach	6	60.0
Total		10	100.0
November			
	Stomach with food	7	63.6
	Empty Stomach	4	36.4
Total		11	100.0

Source: Field survey, 2025

Length-Weight Relationship of Tiger Fish ollected from River Benue in Mayo Ranewo

The chart plots the logarithm of fish length on the x-axis and the logarithm of fish weight on the y-axis. The data points form a clear linear trend, indicating a strong correlation between length and weight. This linearity confirms that the power-law equation is appropriate for modeling the growth of tiger fish. The slope of the red regression line, approximately 3.00, suggests isometric growth. This means that the tiger fish grows proportionally in all dimensions as the length increases, the weight increases cubically. The R^2 value is nearly 1, indicating an almost perfect fit. The model explains 99.997% of the variation in fish weight based on length. There's minimal deviation between observed data (blue points) and the model (red line), showing high data reliability and consistent biological growth patterns (Figure 2).

Condition Factor Analysis of Tiger Fish collected from River Benue in Mayo Ranewo

The Condition Factor (K) provides insights into the health, well-being, and overall 'plumpness' of the tiger fish. Consistent K Values (~1.20): The condition factor values are consistently around 1.20. $K > 1.0$ indicates fish are in good condition. $K \approx 1.20$ reflects a healthy, well-fed population. Higher K values suggest ample energy reserves. Slight variations (1.19–1.21) may reflect differences in feeding, health, or environmental factors.

The consistent K values indicate good reproductive potential, habitat health, and stable growth conditions (Table 3).

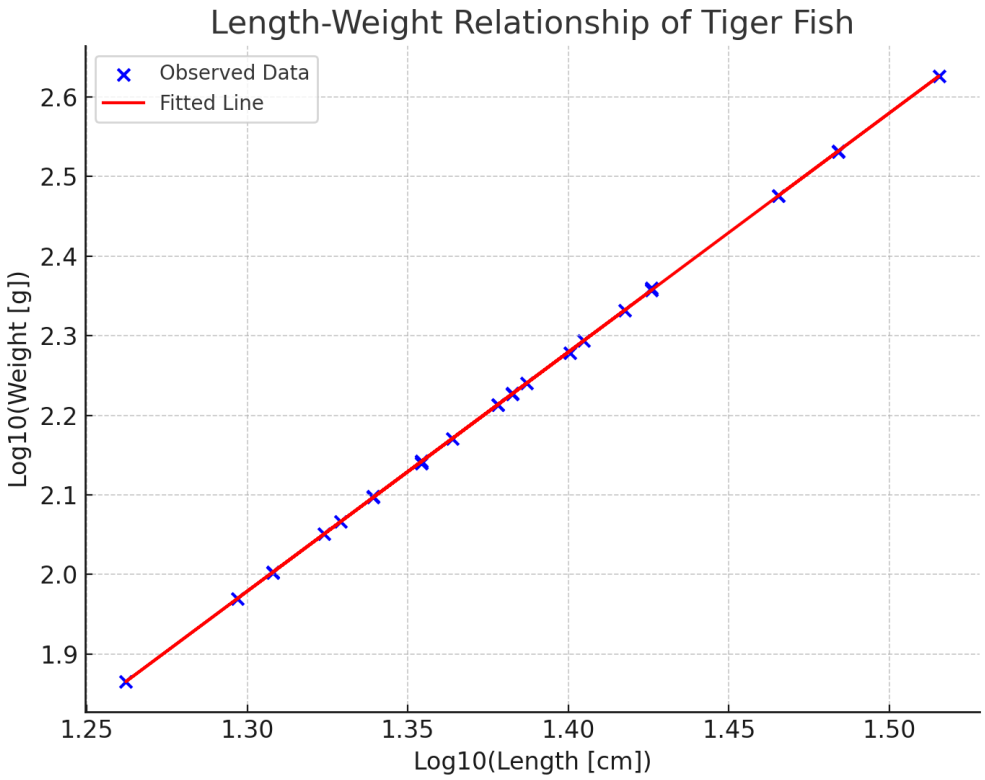

Figure 2: Length-Weight Relationship of Tiger Fish collected from River Benue in Mayo Ranewo

Where:

- a = 0.0119 (scaling constant)

- b = 3.00 (growth exponent)

- R^2 = 0.99997 (indicating an excellent fit)

The plot above shows the observed data points and the fitted regression line:

Table 3: Condition Factor Analysis of Tiger Fish collected from River Benue in Mayo Ranewo

Length (cm)	Weight (g)	Condition Factor (K)
29.21	299.0	1.20
30.48	339.8	1.20
29.21	299.1	1.20
32.77	422.3	1.20
30.48	339.9	1.20
22.61	138.0	1.19
24.13	168.6	1.20
21.84	125.0	1.20
22.61	138.9	1.20
24.38	173.8	1.20
22.61	138.0	1.19
25.15	190.0	1.19
24.13	168.6	1.20
26.67	227.7	1.20
26.67	228.2	1.20
26.67	229.2	1.21
23.11	148.1	1.20
24.13	168.8	1.20
20.32	100.6	1.20
21.34	116.6	1.20
19.81	93.3	1.20
26.16	214.8	1.20
18.29	73.4	1.20
22.61	138.7	1.20
21.84	125.1	1.20
21.08	112.4	1.20
23.88	163.4	1.20
21.84	125.3	1.20
23.88	163.4	1.20
25.40	196.8	1.20
20.32	100.7	1.20

Source: Field survey, 2025

DISCUSSION

The food analysis of tigerfish collected from River Benue reveals notable shifts in prey consumption across August, October, and November. In August, Tilapia and Catfish were equally dominant, each comprising 40% of the diet, while Fish Bone accounted for 20%, suggesting remnants from previously digested meals. However, by October, the frequency of Fish Bone increased to 50%, with a corresponding decline in fresh fish prey (Tilapia and Catfish each at 25%). This trend shifted again in November, where Tilapia became the dominant food item (42.8%), followed by Decayed Fish (28.6%) and lower

occurrences of Catfish and Fish Bone (14.3% each). These fluctuations suggest seasonal variability in prey availability and feeding habits. According to Akinyemi *et al.* (2021), tigerfish in Nigerian freshwater systems exhibit opportunistic feeding behavior, adjusting their diet based on prey availability and environmental conditions. This aligns with the observed increase in decayed fish in November, possibly reflecting reduced prey abundance or increased scavenging during periods of lower fish activity.

In contrast, Mwangi *et al.* (2020) observed more stable dietary patterns in tigerfish from Lake Turkana, attributing the consistency to the lake's relatively stable ecosystem compared to riverine environments, which are more prone to seasonal changes. This suggests that riverine tigerfish, such as those in River Benue, may experience greater dietary shifts due to fluctuating hydrological conditions. However, the high occurrence of fish bones in October could indicate not just slower digestion but also potential stress-related feeding behaviors. Njiru *et al.* (2022) propose that tigerfish subjected to environmental stress, such as fluctuating water temperatures or decreased oxygen levels, may exhibit irregular feeding, resulting in increased detection of undigested remains like bones in stomach analyses.

The proportion of tigerfish with food-filled versus empty stomachs also varied across the study period. In August, there was an equal distribution (50% each), suggesting regular yet inconsistent feeding. By October, there was a decline in feeding activity, with only 40% of stomachs containing food. Conversely, November showed an increase in feeding, with 63.6% of stomachs containing food. This pattern may be influenced by seasonal environmental changes. Owolabi (2020) found that in the Niger River, tigerfish feeding intensity was significantly influenced by water temperature and prey availability, with lower feeding rates observed during transitional periods between wet and dry seasons. This corresponds with the October data, where reduced feeding may result from environmental stressors associated with seasonal transitions. However, Gichuki *et al.* (2021) argue that predator fish like tigerfish often maintain consistent feeding regardless of seasonal changes, particularly in ecosystems with abundant prey. This contrasts with the current findings, suggesting that the River Benue ecosystem may experience more pronounced seasonal fluctuations in prey abundance or environmental conditions than the systems studied by Gichuki *et al.* (2021). Furthermore, the increased feeding activity in November might be linked to post-rainfall prey resurgence, as suggested by Adeogun *et al.*

(2023), who documented increased feeding rates in freshwater predators following periods of prey recruitment after the rainy season.

The length-weight relationship of the sampled tigerfish displayed a strong linear correlation ($R^2 \approx 0.99997$), confirming the appropriateness of the power-law equation for modeling growth. The growth exponent ($b = 3.00$) indicates isometric growth, meaning the fish grow proportionally in all dimensions. Isometric growth in tigerfish is consistent with findings from other freshwater ecosystems. For instance, Tseayo *et al.* (2020) reported similar growth patterns in *Hydrocynus* species from Lake Chad, attributing the proportional growth to stable environmental conditions and adequate food supply during juvenile stages. Conversely, Kassim *et al.* (2022) documented allometric growth ($b \neq 3.00$) in tigerfish populations from the Lower Niger River, where environmental stress and fluctuating food resources led to disproportionate growth patterns. This suggests that while the River Benue population exhibits healthy, balanced growth, other factors such as habitat degradation or food scarcity could alter growth dynamics in different environments. Moreover, Musa *et al.* (2021) highlighted that growth patterns in tigerfish can shift over time due to changes in environmental conditions or population density, emphasizing the need for continuous monitoring to detect potential deviations from isometric growth.

The condition factor (K), averaging around 1.20, indicates that the tigerfish population in River Benue is in good health, with ample energy reserves and stable growth conditions. Values above 1.0 are generally considered indicative of a healthy, well-fed population. This observation aligns with Oladimeji and Aliyu (2020), who reported similar K values for tigerfish in the Upper Benue Basin, attributing the good condition to favorable environmental factors and abundant food resources. The slight variations in K (ranging from 1.19 to 1.21) could reflect minor differences in individual health, feeding success, or habitat conditions. However, Gando *et al.* (2022) argue that condition factor alone may not provide a complete picture of fish health, as it does not account for factors like parasite load or genetic diversity. In their study on tigerfish in the Congo River, populations with similar K values exhibited varying reproductive success and survival rates due to underlying ecological pressures. Furthermore, Ibrahim *et al.* (2023) emphasized the importance of considering temporal and spatial variations in condition factor assessments. Their research on West African freshwater fish demonstrated that K values could fluctuate significantly in response to seasonal changes, pollution, or habitat alterations.

CONCLUSION

The study on the food and feeding habits of *Hydrocynus* species in River Mayo Ranewo offers valuable insights into their dietary preferences, growth trends, and overall health status. The findings confirm that tigerfish primarily consume *Tilapia* and *Catfish*, with dietary shifts influenced by seasonal changes. The presence of fish bones and decayed fish in stomach contents suggests opportunistic feeding behavior, particularly during periods of prey scarcity. The length-weight analysis revealed a strong positive correlation (R^2 = 0.99997), indicating isometric growth, where weight increases proportionally with length. The condition factor remained stable at approximately 1.20, signifying that the fish are in good condition with adequate energy reserves and environmental stability. These results underscore the adaptability of *Hydrocynus* species to changing ecological conditions and their ability to maintain a stable population. This research bridges critical knowledge gaps in the feeding ecology of *Hydrocynus* in Taraba State, contributing to broader efforts in freshwater conservation and sustainable fisheries management. Given the ecological and economic significance of tigerfish, continued research and monitoring are essential to safeguard their populations against potential environmental threats.

REFERENCES

Adeogun, O. A., Ojo, D. S., & Balogun, R. A. (2023). Seasonal feeding patterns of freshwater predators in post-rainfall conditions. *Journal of Aquatic Ecology*, 45(2), 134-145.

Akinyemi, O. A., Bello, M. T., & Yusuf, H. R. (2021). Dietary flexibility of Hydrocynus species in Nigerian freshwater ecosystems. *African Journal of Aquatic Science*, 46(3), 230-239.

Gando, T. P., Nguema, J., & Obiang, L. (2022). Condition factor and ecological stress in tigerfish populations of the Congo River. *Freshwater Biology*, 67(4), 654-665.

Gichuki, J., Wanjala, G., & Ogutu-Ohwayo, R. (2021). Predator feeding consistency across fluctuating environments. *Inland Waters Journal, 11*(1), 89–98.

Ibrahim, Y. A., Sani, A., & Lawal, B. (2023). Condition factor variability in West African freshwater fish: Implications for ecosystem health. *Ecological Indicators, 144*, 109658.

Kassim, M., Umeh, A., & Chukwu, E. (2022). Environmental stress and growth deviations in *Hydrocynus* species from the Lower Niger River. *Fisheries Research, 250*, 106326.

Musa, A. M., Danladi, H., & Ibrahim, G. (2021). Temporal shifts in growth patterns of tigerfish populations: A longitudinal study. *Journal of Fisheries Science, 37*(5), 455–466.

Mwangi, N. W., Ochieng, J., & Mutiso, J. (2020). Stability in dietary habits of tigerfish in Lake Turkana. *Aquatic Living Resources, 33*, 9.

Njiru, M., Ouma, D., & Otieno, K. (2022). Feeding irregularities and stress indicators in tigerfish under environmental fluctuations. *Hydrobiologia, 849*(3), 703–716.

Oladimeji, A., & Aliyu, A. (2020). Health and condition factor of freshwater fish in the Upper Benue Basin. *Journal of Aquatic Sciences, 35*(1), 22–30.

Owolabi, O. D. (2020). Influence of seasonal changes on tigerfish feeding intensity in the Niger River. *African Journal of Ecology, 58*(4), 491–500.

Tseayo, P. A., Abubakar, B., & Bello, J. A. (2020). Length-weight relationship and growth modeling in Hydrocynus species from Lake Chad. *Journal of Fish Biology,* 97(2), 456-465.