DIET OF THE SMOOTH FRESHWATER STINGRAY *FONTITRYGON GAROUAENSIS (*CHONDRICHTHYES: DASYATIDAE) IN RIVER NIGER (NIGERIA).

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ABSTRACT

Food and feeding habit of *Fontitrygon garouaensis* of the Lokoja section of the river Niger was studied. Specimens and water samples was collected over a stretch of about 48km of the River Niger downstream of Lokoja, from the River Niger/Benue confluence to Itobe. Stomach contents were collected from live and fresh died fish to sample all items in the gut. A total of 15 stomachs of *F. garouoaensis* was studied for stomach content. 13 stomachs had food while 2 stomachs were empty. Raptorial forelegs abdominal spiracles and compound eyes suspected to belong to dragon fly larva was found in numerous stomachs of *F. garouaensis.* The total weight of prey in all stomachs studied was recorded as 8.9g. Analysis of stomach contents revealed 3 food items (excluding unidentifiable items) belonging to 3 orders. Insect Larva (Dragonfly and horsefly) from the family *Gomphidae* and *Tabanidae* was the main prey item for *Fontitrygon garouaensis*. Insect larvae of *Gomphidae* (Dragonfly) and *Tabanidae* (Horsefly) together accounted for over 65% (IRI) of the diet of the species. In captive observation studies, the species did not show aggression to the different species added to their tank including small fishes- Alestis (*A. longipinnis*) and Debauwi (*P. debauwi*) confirming a non piscivorous diet.

Keywords: Freshwater Stingrays; Stomach content; Food and feeding habits; Chondrichthyes.

Introduction: The type of food found in an area influences the distribution of fish (Raji *et al.,* 2004). Assessing diet, based on analyzing stomach contents, has become routine practice in the study of the ecology of fish (Cortes, 1997: Cortes, 1999). Detailed information about the feeding habits of elasmobranchs provide a better understanding of their natural history, their role in aquatic ecosystems, and the position of each species in the trophic levels within their particular environments (Cortes, 1999, Wetherbee and Cortés 2004, Shibuya, *et al.*, 2009).

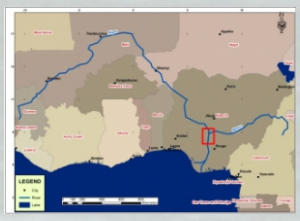


Figure 1: Map showing River Niger, River Benue, the relative location of study area and the Atlantic Ocean.



Plate 1: *Fontitrygon garouaensis* from the Lokoja section of the River Niger



Plate 2: Bagging of *Fontitrygon garouaensis* at the River Niger, Nigeria



Plate 3: Some food items from the stomach of *Fontitrygon garouaensis*

Materials and Methods: Specimens was collected over a stretch of about 48km of the River Niger downstream of Lokoja, from the River Niger/Benue confluence to Itobe. Stomach contents were collected from live and fresh died fish to sample all items in the gut. A total of 15 stomachs of *F. garouoaensis* was studied for stomach content (Lima-Junior and Goitein, 2001). Index of Relative Importance (IRI) was used in interpretation of the dietary data (Lonardoni *et al.* 2006; Shibuya *et al.,* 2009). Twelve well acclimatized specimens of disc width 140mm – 295mm were used for captive observation in three aquariums. Four individuals of *F garouaensis* were stocked per aquarium for captive observations. The fish were fed twice daily with live earthworms and Atiya shrimps (*Atiya gabonensis*) in the first month and gradually introduced to frozen shrimp from a local shop (Shoprite,) and commercial fish food (sinking pellets).

Results and Discussions: 13 stomachs had food while 2 stomachs were empty. Raptorial forelegs abdominal spiracles and compound eyes suspected to belong to dragon fly larva was found in numerous stomachs of *F. garouaensis.* Analysis of stomach contents revealed 3 food items (excluding unidentifiable items) belonging to 3 orders. In this study, Insect Larva (Dragonfly and horsefly) from the family *Gomphidae* and *Tabanidae* was the main prey item for *Fontitrygon garouaensis*. Dragonfly larvae (*Gomphidae*) was the most representative in all measured indices with 36.4(%N), 46.1(%W), 92.3(%FO), and (48.5) %IRI (table 4.5). Insect larvae of *Gomphidae* (Dragonfly) and *Tabanidae* (Horsefly) together accounted for over 65% (IRI) of the diet of the species. Captive specimens accepted earthworms, shrimp and gradually accepted pellets.

Table 1: **S**tomach content of *Fontitrygon garouaensis* (n=15) expressed in percentages of number (%N), weight (%W) and frequency of occurrence (%F.O.) and Index of Relative Importance (IRI).

Prey Item	$\%N_i$	$\%W_i$	$\%FO_i$	IRI: $(\%N_i + \%W_i)\ \%F_i$	%IRI
Insect Larva					
Odonata (Gomphidae)	36.4	46.1	92.3	7,614.75	48.5
Dragonfly	22.7	21.3	61.5	2,706	17.2
Tabanidae					
Worms					
Oligochaeta (Earthworms)	22.7	15.7	76.9	2,952.96	18.8
Others	18.2	16.9	69.2	2,428.92	15.5

Vacuity Index (VI): Estimation of the voracity of the fish indicated a vacuity index of 13.3

The results of his study that shows 48.5%IRI (Table 1) of the diet of *F. garouaensis* consists of dragonfly larvae, *Gomphidae* making it the most important prey and the most abundantly ingested prey (%N=36.4) is similar to the report of Pantano-Neto (2001); Lonardoni *et al*., 2006 reported that most potamotrygonid rays feed on benthic organisms. Their food generally consists of a variety of bottom-living organisms, including crustaceans, molluscs, worms and small fishes (Quigley, 2006). A diet of 99% (IRI) insect larvae was reported by Pantano-Neto (2001) for *P. motoro* from the Cristalino River, a tributary of the Araguaia River in Brazil. Shibuya *et al.,*(2009) in a study of four freshwater stingrays *Potamotrygon motoro*, *Potamotrygon orbignyi*, *Potamotrygon* sp. "cururu", and *Paratrygon aiereba* reported stomachs of *P. orbignyi* were composed principally by insects (96.4%) predominantly gomphid dragonfly larvae. In this study, earthworms *Oligochaeta* (18.8%), are the second most important prey, while other materials composed 15.5% are the least preferred food for *F. garouoaensis*. Despite being 28.7% N, Tintinnids ranked third in importance at 17.2% (IRI) (Table 1).

Conclusion: Much of the uncertainties regarding food of *Fontitrygon garouaensis* and feeding response in captive environmental conditions have been cleared by the results of this study paving way for further investigation into other aspects of their biology, and *in-situ* or captive study/conservation programmes.

REFERENCES

Abaunza, P., Murta, A.G.; Campbell, N.; Cimmaruta, R.; Comesa~na, S.; Dahle, G.; Gallo, E.; Garca Santamara, M.T.; Gordo, L.; Iversen, S.; MacKenzie, K.; Magoulas, A.; Mattiucci, S.; Molloy, J.; Nascetti, G.; Pinto, A.L.; Quinta, R.; Ramos, P. Ruggi, A.; Sanjuan, A.; Santos, A.T.; Stransky, C. and Zimmermann, C.(2008). Considerations on sampling strategies for an holistic approach to stock identification: the example of the HOMSIR project. *Fish. Res*. 89 (2), 104 -113.

Adaka, G. S.; Udoh, J. P. and Onyeukwu, D. C (2014). Freshwater Fish Diversity of a Tropical Rainforest River in Southeast Nigeria. *Advances in Life Science and Technology*. .23. 16 – 23.

Almeida, M. P.; Lins, P. M. O.; Charvet-Almeida, P. And Barthem, R. B. (2010). Diet of the fresh water stingray *Potamotrygon motoro* Chondrichthyes: Potamotrygonidae) on Marajó Island (Pará, Brazil). *Brazilian Journal of Biology*, v 70, no. 1, p. 155-162.

Alum-Udensi, O and Nlewadim, A. A (2016). Initial Observation of the Smooth Freshwater Stingray Dasyatis garouaensis from the River Niger in Freshwater Aquariums. Proceedings of world Aquaculture Society 2016. Las Vegas, Nevada. February 22 - 26.

Baker, R; Buckland, A. and Sheaves, M. (2014). Fish Gut Content Analysis: Robust Measures of Diet Composition. *Fish and Fisheries*, 15, 170–177.

Compagno, L. J. V. and Roberts, T. R. (1984). Marine and Freshwater Stingrays (Dasyatidae) of West Africa, With Description of a New Species. *Proceedings of the Californian Academy of Sciences Series*, 43(18). 283-300.

Cortes, E. (1997). A Critical Review of Methods of Studying Fish Feeding Based on Analysis of Stomach Contents: Application to Elasmobranch Fishes. Canadian *Journal of Fisheries and Aquatic Sciences,* 54: 726- 738.

Cortes, E. (1999). Standardized diet compositions and trophic levels of sharks. *Journal of Marine Sciences*, 56: 707-717.

Jacobsen, and Bennett. (2013). A Comparative Analysis of Feeding and Trophic Level Ecology in Stingrays (Rajiformes; Myliobatoidei) and Electric Rays (Rajiformes: Torpedinoidei). *PLoS ONE* 8(8).

Kolmann, M. A; Welch, Jr K. C; Summers, A. P.; Lovejoy, N. R.. (2016). Always Chew Your Food: Freshwater Stingrays use Mastication to Process Tough Insect Prey. *Proceedings of Research Society*. B 283: 2016.1392.

Lima-Junior S. E. and Goitein, R. (2001). A new Method for the Analysis of Fish Stomach Contents. *Acta Scientiarum, Maringa.* 23(2): 421-424.

Olaosebikan, B. D. and Raji, A. (2013). Field Guide to Nigerian Freshwater Fishes. FCFFT Publications. New Bussa, Nigeria. p170.

Paugy, D.; Leveque, C. and Teugels, G. G. (2003a).The Fresh and Brackish Water Fishes of West Africa: Volume 1. Paris: Publications Scientific du Museum. P 457.

Reed, W.; Burchard, J.; Hopson, A. J.; Jennes, J. and Yaro, I. (1967). Fish and Fisheries of Northern Nigeria: 1st Edition. Zaria, Nigeria: Ministry of Agriculture, Northern Nigeria.

Shibuya, A.; Araujo, M. L. G and Zuanon, J. A. S. (2009). Analysis of stomach contents of freshwater stingrays (Elasmobranchii, Potamotrygonidae) from the middle Negro River, Amazonas, Brazil. *Pan-American Journal of Aquatic Sciences*. 4(4). 466-475.

Silva, T. B. and Uieda V. S., (2007). Preliminary data on the feeding habits of the freshwater stingrays *Potamotrygon falkneri* and *Potamotrygon motoro* (Potamotrygonidae) from the Upper Paraná River basin, Brazil. *Biota Neotropica*. 7: 221-226.

Solomon S. G.; Okomoda V. T. and Aladi. S. L. (2012). Fish fauna in lower River Niger at Idah in Kogi State. Journal of Agriculture and Veterinary Science. 4: 34-37.

Wilga, C. A.; Stoehr, A. A.; Duquette, D. C. and Allen, R. M. (2012). Functional ecology of feeding in elasmobranchs. *Environ. Biol. Fishes* 95: 155–167.

Zacharia, P. U. and Abdurahiman, K. P. (2004). Methods of Stomach Content Analysis of Fishes. In: Mohamed, K.S. (Ed). Towards Ecosystem Based Management of Marine Fisheries – Building Mass Balance Trophic and Simulation Models. CMFRI – Winter School on Ecosystem Based Management of Marine Fisheries. P 200.

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