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**Fish Biodiversity Studies in Some Selected Major Rivers in Oban and Okwangwo Divisions of Cross River National Park, Cross River State, Nigeria.**

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**Abstract:**

The Nigeria National Park Service is expected to have on record all the biodiversity resources in each of its Parks including aquatic resources particularly fisheries, but available literatures showed that no fish biodiversity study had been done inside Cross River National Park but outside its border. This study was conducted to bridge this gap by evaluating species composition, diversity, abundance, distribution of fish species and also evaluate some surface water physico-chemical parameters within the Park. Fish and Surface water samples were collected from 10 sampling stations along with five major rivers each in Oban and Okwangwo Divisions. Data were obtained in July - September and in February, March and April of the year and analyzed using standard methods. A total of 2, 795 fish-catches recorded in Oban (1,684) and Okwangwo (1,111) belonging to 25 families, 48 genera and 114 species. The physico-chemical conditions in the study stations were within the tolerable ranges for temperature (26-31OC), Dissolved Oxygen (6.5-9.0 mg L-1), and pH (6.8-7.5). The abundance index for Bagridae, Characidae, Cyprimidae and Cichlidae were 21.57, 19.59, 19.54 and 15.59% respectively. The dominant species were *Chrysichthys nigrodigitatus*, *Alestes dentex*, *Labeo cubie* and *Oreochromis niloticus*. Shannon Diversity Index test was 4.272 and 4.233, Margalef at 14.81 and 15.54, evenness at 0.65 and 0.63 and Simpson’s Dominance at 0.98 and 0.98 for Oban and Okwangwo respectively. However, diversity of fishes in Oban division is significantly higher (P0.05) than in Okwangwo and the Kolmogorov-Smirnov test revealed significant difference (P0.05) in the diversity of fishes in the two areas. The rich fish diversity confirms that the Cross River National Park is an important site for the conservation of fish species.

**Keywords:** Biodiversity, Aquatic resources, rivers, confluence, Oban, Okwangwo.

**Introduction:**

Freshwater biodiversity is being lost at an alarming rate, even more rapidly than terrestrial biodiversity worldwide and especially in arid and semi-arid regions (Moyle and Yoshiyama, 1994; Cowx and Collares-Pereira, 2002), where demands for water resources are growing. River fisheries in Africa particularly in Nigeria are important because of their contribution of animal protein to human diet (Welcomme, 2003). Fish biodiversity therefore as part of wildlife, needs to be managed with its aquatic relatives and its rational development and management in the context of Nigeria National Park’s Service objectives cannot be over-emphasized. This is more so because there are cases of over-fishing experienced already in capture fisheries in most of the Nigeria’s offshore and inland waters including rivers, natural and artificial lakes, flood plains and paddock waters (Ita, 1982).

Most fisheries scientists in Nigeria have therefore, concluded that the surest place one can get the indigenous unhybridized parent fish stocks (pure strains) is from the wild (Otubusin and Olorunpomi, 1988; Jamu and Ayinla, 2003; and Fapohunda and GodStates, 2007). These natural fish stocks are primarily restricted to the protected areas in Nigeria (Forest and Game Reserves and National Parks). If carefully managed through the effective preservation and protection will go a long way in conserving the fisheries gene pools in Nigeria. The task of this study is to determine the composition and abundance of the natural wild stocks of fish present in the major rivers within the Cross River National Park (Oban and Okwangwo divisions) and essentially putting them under maximum protection (conservation).

**Materials and Methods:**

**Study area**

The study was carried out in the major rivers within the Cross River National Park (Oban and Okwangwo divisions). The Park is geographically located between Latitude 50 05’- 60 29’N and Longitudes 80 15’- 90 30’E. It is situated on the last remains of the Tropical Rainforest in the Southeastern part of Nigeria in Cross River State and covers a total area of 4000km2 and segmented into two non-contiguous divisions, Oban (3000km2) to the south (Fig, 1) and Okwangwo (1000km2) to the North (Fig. 2) respectively.



Source: Olorunpomi, 2010.

Fig. 1: The major rivers of Oban Division. Insets: (a) Map of Nigeria showing Cross River State; (b) Map of Cross River State showing the location of Oban Division of the Cross River National Park.

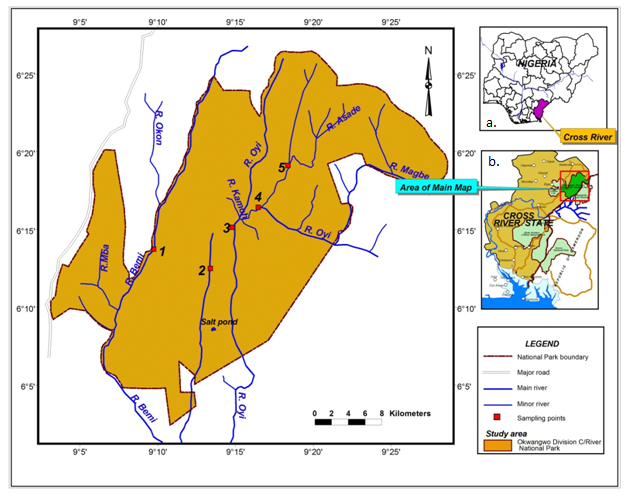


Fig. 2: The major rivers of Okwangwo Division of the Cross River National Park.

Source: Olorunpomi, 2010.

**Data collection**

The rivers sampled in Oban division, were Calabar River, Kwa River, Ibe River, Eku River and Akaram River while in the Okwangwo division: Rivers (Bemin, Anyibtar, Oyi, and Mache/Oyi at the confluence and Mache/Asache at the confluence were sampled. Data were obtained based on records of fish-catches by location (sampling stations) during the rainy season (July-September) and the dry season (February, March April) of the year. The fishing gears used for the study were of three dimensions: cast net; graded gillnet of mesh sizes (50, 75 and 100 mm); and local fish traps. Various types of fishes caught were identified using the basic taxonomic keys (FAO, 1990; 1995a and 1995) as adopted by Olorunpomi (2010). Measurement of sampled fish was taken to aid the identification process. Preservation of fish samples were done in 10 per cent formalin. The physico-chemical parameters (temperature and pH) of the various rivers sampled at each sampling station were monitored using dry mercury bulb thermometer (temperature) and pH meter (pH).

**Data analysis**

The data were subjected to student’s t-test to compare means and Diversity Indices or Species Abundance Relation Test was carried out using PAST statistical package version 3. The fish abundance indices were computed to also show which families were abundant and the dominant species of each family. Descriptive statistical tools such as, frequencies and percentages were used to describe data.

**Results**

Table 1 (a-c) showed total individual fish-catches in Oban and Okwangwo divisions during the study periods. A total of 2, 795 fish-catches was recorded in the study areas at 1,684 and 1,111 individual fish species in Oban and Okwangwo respectively belonging to 25 families, 48 genera and 114 species. The families Bagridae, Characidae, Cyprinidae, and Cichlidae were the most abundant forming 21.57, 19.59, 19.54 and 15.59% respectively of the total families

**Table 1 (a-c): The total individual Fish-Catch, in the Study Area throughout the study period**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **a.** | **Scientific name** | **Family name** | **English names** | **Oban** | **Okwangwo** |
|  | *Chrysichthtys nigrodigitatus* | Bagridae | Bagrid catfish | 75 | 30 |
|  | *Chrysichthtys* auretus longifilis | Golden Nile catfish | 46 | 34 |
|  | *Chrysichthtys* *furcatus* | Aluminum catfish | 25 | 21 |
|  | *Auchenoglanis occidentalis* | Giraffe catfish, | 42 | 30 |
|  | *Auchenoglanis biscutatus* | Black spotted catfish | 26 | 18 |
|  | *Parauchenoglanis fasciatus* | Dotted catfish | 43 | 20 |
|  | *Parauchenoglanis akive* | African Sharptooth catfish | 39 | 19 |
|  | *Clarotes laticeps* | Widehead catfish | 22 | 15 |
|  | *Clarotes macrocephalus* |  | 18 | 13 |
|  | *Bagrus bayad* | Bayad catfish | 22 | 8 |
|  | *Bagrus filamentosus* |  | 12 | 10 |
|  | *Bagrus docmac niger* |  | 12 | 4 |
|  | *Alestes dentex* | Characidae | Characin fish | 108 | 52 |
|  | *Alestes baremose* | Pebbly fish | 42 | 43 |
|  | *Alestes macrocephalus* | Torpedo robber | 39 | 29 |
|  | *Alestes chapteri* | African Characidae | 18 | 11 |
|  | *Alestes imberi* | Pot-tail Robber | 9 | 5 |
|  | *Alestes leuciscus* |  | 6 | 2 |
|  | *Alestes brevis* | Silversides fish | 2 | 4 |
|  | *Brycinus nurse* | Nurse tetra | 60 | 42 |
|  | *Brycinus macrolepidotus* | Robber tetras | 5 | 3 |
|  | *Brycinus longipinis* | African long-finned tetra | 2 | 2 |
|  | *Hydrocynus forskahlis* | Tiger fish | 22 | 5 |
|  | *Hydrocynus brevis* | Sahelian tigerfish | 7 | 3 |
|  | *Micralestes accutidens* | Sharptooth tetra | 10 | 6 |
|  | *Micralestes humilis* |  | 7 | 4 |
|  | *Labeo coubie* | Cyprinidae | Black carp | 33 | 56 |
|  | *Labeo senegalensis* | African carp | 15 | 12 |
|  | *Labeo parvus* | African carp | 16 | 8 |
|  | *Labeo batesii* | bata | 11 | 7 |
|  | *Labeo branchypoma* |  | 8 | 10 |
|  | *Babus chlorotaenia* |  | 40 | 32 |
|  | *Babus nigeriensis* |  | 30 | 25 |
|  | *Babus aboinensis* |  | 31 | 18 |
|  | *Babus callipterus* |  | 22 | 16 |
|  | *Babus batesii* |  | 18 | 18 |
|  | *Babus occidentalis* |  | 18 | 10 |
|  | *Babus sublineatus* |  | 14 | 8 |
|  | *Babus camptacanthus*  *Babus punctitaeniatus*  *Barilius niloticus* |  | 4 | 8 |
| Minnows   Nile minnow | 5  6 | 3  11 |
|  | *Barilius loati* |  | 12 | 4 |
|  | *Barilius senegalensis* |  | 6 | 7 |
|  | *Oreochromis niloticus* | Cichlidae | Nile tilapia | 50 | 28 |
|  | *Coptodon(Tilapia) zillii* | Red-bellied Tilapia | 42 | 24 |
|  | *Tilapia guineensis* |  | 42 | 14 |
|  | *Tilapia mariae* |  | 10 | 10 |
|  | *Tilapia melanopleura* |  | 8 | 8 |
|  | *Sarotherodon galilaeus* | Mango tilapia | 34 | 20 |
|  | *Sarotherodon melanotheron* |  | 20 | 15 |
|  | *Chromidotilapia batesii* |  | 31 | 21 |
|  | *Chromidotilapia guentheri* |  | 26 | 22 |
|  | *Pelmatochromis guentheri* |  | 4 | 5 |
|  | *Hemichromis binaculatus* | Blood-red jewel cichlid, | 8 | 7 |
|  | *Hemichromis fasciatus* |  | 5 | 2 |
|  | *Chiloglanis batesii* | Mochokidae | Upside-down catfish | 15 | 7 |
|  | *Chiloglanis niger* |  | 11 | 6 |
|  | *Chiloglanis polypogon* |  | 9 | 7 |
| **b** | *Chiloglanis disneyi* |  | 9 | 6 |
|  | *Synodontis schall* |  | 14 | 5 |
|  | *Synodontis. eupterus* |  | 18 | 0 |
|  | *Synodontis membranaceus* |  | 12 | 4 |
|  | *Synodontis sorex* |  | 11 | 2 |
|  | *Synodontis clarias* |  | 12 | 0 |
|  | *Synodontis filamentosus* |  | 9 | 3 |
|  | *Synodontis gambiensis* |  | 7 | 1 |
|  | *Synodontis robbianus* |  | 9 | 0 |
|  | *Synodontis obesus* |  | 7 | 1 |
|  | *Nannaethiops unitaeniatus* | Distichodontidae | One-line tetra | 21 | 15 |
|  | *Nannocharax ansorgeii* |  | 16 | 8 |
|  | *Nannacharax fascatus* |  | 6 | 8 |
|  | *Distichodus rostratus* |  | 8 | 21 |
|  | *Distichodus engycephalus* |  | 11 | 10 |
|  | *Mormyrus rume* | Mormyridae | Trunkfish | 5 | 12 |
|  | *Mormyrus hasselquitic* | Elephant Fish | 5 | 3 |
|  | *Mormyrus tapirus* |  | 4 | 1 |
|  | *Mormyrus oudoti* |  | 2 | 1 |
|  | *Mormyrops deliciosus* |  | 7 | 2 |
|  | *Gnathonemus petersii* |  | 6 | 8 |
|  | *Petrocephalus sinus* |  | 7 | 4 |
|  | *Petrocephalus bovei*  *Petrocephalus ansorgii* |  | 8  0 | 2  6 |
|  | *Petrocephalus bane* |  | 2 | 1 |
|  | *Eutropius niloticus* | Schilbeidae |  | 10 | 15 |
|  | *Schilbe micropogon* |  | 10 | 7 |
|  | *Schilbe mystus* |  | 6 | 8 |
|  | *Schilbe intermedius* |  | 7 | 6 |
|  | *Parailia pelluceda* |  | 4 | 1 |
|  | *Citharinus citharus* | Citharinidae |  | 17 | 8 |
|  | *Citharinus latus* |  | 13 | 4 |
|  | *Clarias gariepinus* | Clariidae | African mud-catfish | 6 | 4 |
|  | *Clarias angullaris* | Mud fish | 4 | 2 |
| **c.** | *Heterobranchus longifilis* |  | 6 | 2 |
|  | *Heterobranchus bidorsalis* |  | 4 | 1 |
|  | *Heterobranchus isopterus* |  | 1 | 2 |
|  | *Pomadasys peroteti* | Polynemidae |  | 2 | 6 |
|  | *Pomadasys jubelini* |  | 4 | 3 |
|  | *Parachanna africana* | Channidae | Lung fish | 5 | 2 |
|  | *Parachanna obscura* | Lung fish | 5 | 1 |
|  | *Epilatys sexfacitus* | Apocheilidae |  | 5 | 6 |
|  | *Doumea thysi* | Amphilidae |  | 3 | 7 |
|  | *Liza falcipinnis* | Mugilidae |  | 5 | 4 |
|  | *Polypterus ansorgeii* | Polypteridae |  | 2 | 3 |
|  | *Polypterus endlicheri endlicheri* |  | 2 | 1 |
|  | *Polypterus senegalus senegalus* | Senegal bichir | 0 | 1 |
|  | *Heterotis niloticus* | Osteoglossidae | African bonytongue | 7 | 1 |
|  | *Pyrocranus afer* | Notopteridae |  | 3 | 2 |
|  | *Lates niloticus* | Centropomidae |  | 5 | 1 |
|  | *Malapterus electricus* | Malapteruridae | Electric fish | 3 | 1 |
|  | *Tetraodon fahaka* | Tetraodontidae | Fahaka pufferfish | 1 | 2 |
|  | *Gymnarcus niloticus* | Gymnarchidae |  | 2 | 1 |
|  | *Hepstus odoe* | Hepsetidae | African pike | 1 | 1 |
|  | *Polynemus quadrifilis* | Polynenidae |  | 2 | 0 |
|  | *Ctenopoma kingsleyae* | Anabantidae | Climbing perch | 0 | 2 |
|  | Grand Total |  |  | 1,684 | 1,111 |

**Diversity indices of fish species in the study area**

The diversity indices of fish species in the study area are presented in Table 2. The Shannon diversity index for Oban Division was 4.272 while Okwangwo had 4.233; Margalef value was 14.81 in Oban Division and Okwangwo Division had 15.54. The species evenness was higher in Oban (0.6455) than Okwangwo (0.6266) while Simpson’s Dominance of fish species was 0.9803 for both Oban and Okwangwo.

**Table 2: Diversity Indices or Species Abundance Test of fish species in the study area**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Oban** | **Lower** | **Upper** | **Okwangwo** | **Lower** | **Upper** |
| **Taxa\_S** | 111 | 108 | 111 | 110 | 104 | 110 |
| **Individuals** | 1684 | 1684 | 1684 | 1111 | 1111 | 1111 |
| **Simpson\_1-D** | 0.9803 | 0.9782 | 0.9812 | 0.9803 | 0.9777 | 0.9811 |
| **Shannon\_H** | 4.272 | 4.199 | 4.283 | 4.233 | 4.146 | 4.249 |
| **Evenness\_e^H/S** | 0.6455 | 0.6037 | 0.6577 | 0.6266 | 0.5873 | 0.6495 |
| **Margalef** | 14.81 | 14.4 | 14.81 | 15.54 | 14.69 | 15.54 |

The T-test analysis of the diversity of the fish species in Oban and Okwangwo Division of the National Park is shown on Table 3. The result shows that the diversity of fishes in Oban division is significantly higher (t-test = 0.0046) than in Okwangwo division of the Park. However, the Kolmogorov-Smirnov test revealed that there is significant difference (P<0.05) in the diversity of fishes in the two areas

The members of the fish family Bagridae (21.57%) were most abundant in the total catch. The dominant member of the family is *Chrysichthtys nigrodigitatus* (3.75%), followed by *C. auretus longifilis* (2.86%) and *Auchenoglanis occidentalis* (2.57%) in that order respectively. The fish families Characidae and Cyprinidae were next to Bagridae in terms of abundance, each family forming 19.59 per cent and 19.54 per cent respectively of the total catch. *Alestes dentex* (5.72%),*Brycinus nurse* (3.65%) and *Alestes baremose* (3.04%) formed the dominant member of the Characidae, while *Labeo cubie* (3.81%), *Babus chlorotaenia* (2.57%) and *B. nigeriensis* (2.14%) dominated the Cyprinidae. Members of the fish family Cichlidae (15.59%) was next to Cyprinidae in terms of abundance. The dominant member of the family was *Oreochromis niloticus* (2.79%), followed by *Tilapia zillii* (2.36%).

Members of the fish families Mochokidae, Distichodontidae, Mormyridae, Schilbeidae, Citharinidae and Clariidae, follow in that order in terms of abundance. The dominant members of these families were *Chiloglanis batesii* (0.79%), *Nannaethiops unitaeniatus* (1.29%), *Mormyrus rume* (0.61%), *Eutripius niloticus* (1.04%), *Citharinus citharus* (0.89%), and *Clarias gariepinus* (0.36%) respectively.

Other fish families recorded were Polynemidae, Channidae, Apocheilidae, Amphilidae, Mugilidae, Polypteridae, Osteoglossidae Notopteridae, Centhropomidae, Malapteruridae, Tetraodontidae, Gymnarchidae, Hepsetidae, Polynenidae and Anabantidae

**Table 3: T-test Analysis of Fish Diversity in the two areas under study.**

|  |  |  |  |
| --- | --- | --- | --- |
| Tests for equal means |  |  |  |
|  |  |  |  |
|  | Oban |  | Okwangwo |
| N: | 114 | N: | 114 |
| Mean: | 14.772 | Mean: | 9.7456 |
| 95% conf.: | (11.705 17.839) | 95% conf.: | (7.7151 11.776) |
| Variance: | 273.15 | Variance: | 119.75 |
|  |  |  |  |
| Difference between means: | 5.0263 |  |  |
| 95% conf. interval (parametric): | (1.3681 8.6845) |  |  |
| 95% conf. interval (bootstrap): | (1.2544 8.5526) |  |  |
|  |  |  |  |
| t : | 2.7075 | p (same mean): | 0.0072983 |
| Uneq. var. t : | 2.7075 | p (same mean): | 0.0073788 |
| Monte Carlo permutation: | p (same mean): | 0.0046 |  |

In all, twenty-five families of fish were sampled in the study area. The dominant members in the major families include Bagridae include *Chrysichthtys nigrodigitatus* (3.75%); Characidae, *Alestes dentex* (5.72%); Cyprinidae, *Labeo cubie* (3.81%) and Cichlidaefamily*, Oreochromis niloticus* (2.79%).

**Table 5 (a-c): Percentage composition of fish families sampled in the major rivers in the study area**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Groups* | *Families* | *English name* | *Species* | *Total* | Percent. |
| a. | Bagridae | Bagrid catfish | *Chrysichthtys nigrodigitatus* | 105 | 3.75 |
|  |  | Golden Nile catfish | *C. auretus longifilis* | 80 | 2.86 |
|  |  | Aluminum catfish | *C. furcatus* | 46 | 1.64 |
|  |  | Giraffe catfish, | *Auchenoglanis occidentalis* | 72 | 2.57 |
|  |  | Black spotted catfish | *A. biscutatus* | 44 | 1.57 |
|  |  | Dotted Catfish | *Parauchenoglanis fasciatus* | 63 | 2.25 |
|  |  | African Sharptooth catfish | *P. alive* | 58 | 2.07 |
|  |  | Widehead catfish | *Clarotes laticeps* | 37 | 1.32 |
|  |  |  | *C. macrocephalus* | 31 | 1.11 |
|  |  | Bayad catfish | *Bagrus bayad* | 30 | 1.07 |
|  |  |  | *B. filamentosus* | 22 | 0.79 |
|  |  |  | *B. docmac niger* | 16 | 0.57 |
|  | Characidae | Characin fish | *Alestes dentex* | 160 | 5.72 |
|  |  | Pebbly fish | *A.baremose* | 85 | 3.04 |
|  |  | Torpedo robber | *A. macrocephalus* | 68 | 2.43 |
|  |  | African Characidae | *A. chaperi* | 29 | 1.04 |
|  |  | Pot-tail robber | *A. imberi* | 14 | 0.5 |
|  |  |  | *A. leuciscus* | 8 | 0.29 |
|  |  | Silversides fish | *A. brevis* | 6 | 0.21 |
|  |  | Nurse tetra | *Brycinus nurse* | 102 | 3.65 |
|  |  | Robber tetras | *B. macrolepidotus* | 8 | 0.29 |
|  |  | African long-finned tetra | *B. longipinis* | 4 | 0.14 |
|  |  | Tiger fish | *Hydrocynus forskahlii* | 27 | 0.96 |
|  |  | Sahelian tigerfish | *H. brevis* | 10 | 0.36 |
|  |  | Sharptooth tetra | *Micralestes accutidens* | 16 | 0.57 |
|  |  |  | *M. humilis* | 11 | 0.39 |
| b | Cyprinidae |  | *Labeo cubie* | 89 | 3.81 |
|  |  |  | *L. senegalensis* | 27 | 0.96 |
|  |  |  | *L. parvus* | 24 | 0.86 |
|  |  |  | *L. batesii* | 18 | 0.64 |
|  |  |  | *L. branchypoma* | 18 | 0.64 |
|  |  |  | *Babus chlorotaenia* | 72 | 2.57 |
|  |  |  | *B. nigeriensis* | 60 | 2.14 |
|  |  |  | *B. aboinensis* | 49 | 1.75 |
|  |  |  | *B. callipterus* | 38 | 1.36 |
|  |  |  | *B. batesii* | 36 | 1.29 |
|  |  |  | *B. occidentalis* | 28 | 1 |
|  |  |  | *B. sublineatus* | 22 | 0.79 |
|  |  |  | *B. camptacanthus* | 12 | 0.43 |
|  |  |  | *B. punctitaeniatus* | 8 | 0.29 |
|  |  |  | *Barilius niloticus* | 17 | 0.61 |
|  |  |  | *B. loati* | 16 | 0.57 |
|  |  |  | *B. senegalensis* | 13 | 0.46 |
|  | Cichlidae |  | *Oreochromis niloticus* | 78 | 2.79 |
|  |  |  | *Tilapia zillii* | 66 | 2.36 |
|  |  |  | *T. guineensis* | 32 | 1.14 |
|  |  |  | *T. mariae* | 24 | 0.86 |
|  |  |  | *T. melanopleura* | 16 | 0.57 |
|  |  |  | *Sarotherodon galilaeus* | 54 | 1.93 |
|  |  |  | *S. melanotheron* | 35 | 1.25 |
|  |  |  | *Chromidotilapia batesii* | 52 | 1.86 |
|  |  |  | *C. guentheri* | 48 | 1.72 |
|  |  |  | *Pelmatochromis guentheri* | 9 | 0.32 |
|  |  |  | *Hemichromis binaculatus* | 15 | 0.54 |
|  |  |  | *H. fasciatus* | 7 | 0.25 |
|  | Mochokidae |  | *Chiloglanis batesii* | 22 | 0.79 |
|  |  |  | *C. niger* | 17 | 0.61 |
|  |  |  | *C. polypogon* | 16 | 0.57 |
|  |  |  | *C. disneyi* | 15 | 0.54 |
|  |  |  | *Synodontis schall* | 19 | 0.68 |
|  |  |  | *S. eupterus* | 18 | 0.64 |
|  |  |  | *S. membranaceus* | 16 | 0.57 |
|  |  |  | *S. sorex* | 13 | 0.46 |
|  |  |  | *S. clarias* | 12 | 0.43 |
|  |  |  | *S. filamentosus* | 12 | 0.43 |
|  |  |  | *S. gambiensis* | 12 | 0.43 |
|  |  |  | *S. robbianus* | 9 | 0.32 |
|  |  |  | *S. obesus* | 8 | 0.29 |
|  | Distichodontidae |  | *Nannaethiops unitaeniatus* | 36 | 1.29 |
|  |  |  | *Nannacharax ansorgeii* | 24 | 0.86 |
|  |  |  | *N. fascatus* | 18 | 0.64 |
|  |  |  | *Distichodus rostratus* | 29 | 1.04 |
|  |  |  | *D. engycephalus* | 21 | 0.75 |
|  | Mormyridae |  | *Mormyrus rume* | 17 | 0.61 |
|  |  |  | *M. hasselquitic* | 8 | 0.29 |
|  |  |  | *M. tapirus* | 5 | 0.18 |
|  |  |  | *M. oudoti* | 3 | 0.11 |
|  |  |  | *Mormyrops deliciosus* | 9 | 0.32 |
|  |  |  | *Gnathonemus petersii* | 14 | 0.5 |
|  |  |  | *Petrocephalus sinus* | 11 | 0.39 |
|  |  |  | *P. bovei* | 10 | 0.36 |
|  |  |  | *P. ansorgii* | 6 | 0.21 |
|  |  |  | *P. bane* | 3 | 0.11 |
|  | Schilbeidae |  | *Eutropius niloticus* | 29 | 1.04 |
|  |  |  | *Schilbe micropogon* | 17 | 0.61 |
|  |  |  | *S. mystus* | 14 | 0.5 |
|  |  |  | *S. intermedius* | 13 | 0.46 |
|  |  |  | *Parailia pelluceda* | 5 | 0.18 |
|  | Citharinidae |  | *Citharinus citarinus* | 17 | 0.16 |
|  |  |  | *Citharinus latus* | 13 | 0.47 |
| c | Clariidae |  | *Clarias gariepinus* | 10 | 0.36 |
|  |  |  | *C. angullaris* | 6 | 0.21 |
|  |  |  | *Heterobranchus longifilis* | 8 | 0.29 |
|  |  |  | *H. bidorsalis* | 5 | 0.18 |
|  |  |  | *H. isopterus* | 5 | 0.11 |
|  | Polynemidae |  | *Pomadasys peroteti* | 8 | 0.29 |
|  |  |  | *P. jubelini* | 7 | 0.25 |
|  | Channidae |  | *Parachanna africana* | 7 | 0.25 |
|  |  |  | *P. obscura* | 6 | 0.21 |
|  | Apocheilidae |  | *Epilatys sexfacitus* | 11 | 0.39 |
|  | Amphilidae |  | *Doumea thysi* | 10 | 0.36 |
|  | Mugilidae |  | *Liza falcipinnis* | 9 | 0.32 |
|  | Polypteridae |  | *Polypterus ansorgeii* | 5 | 0.18 |
|  |  |  | *P. endlicheri endlicheri* | 3 | 0.11 |
|  |  |  | *P. senegalus senegalus* | 1 | 0.04 |
|  | Osteoglossidae |  | *Heterotis niloticus* | 8 | 0.29 |
|  | Notopteridae |  | *Pyrocranus afer* | 8 | 0.29 |
|  | Centropomidae |  | *Lates niloticus* | 6 | 0.21 |
|  | Malapteruridae |  | *Malapterus electricus* | 4 | 0.14 |
|  | Tetraodontidae |  | *Tetraodon fahaka* | 3 | 0.11 |
|  | Gymnarchidae |  | *Gymnarcus niloticus* | 3 | 0.11 |
|  | Hepsetidae |  | *Hepstus odoe* | 2 | 0.07 |
|  | Polynenidae |  | *Polynemus quadrifilis* | 2 | 0.07 |
|  | Anabantidae |  | *Ctenopoma kingsleyae* | 2 | 0.07 |
|  |  |  | Grand Total | 2,795 | 100% |

The physico-chemical conditions at the various study stations were within the tolerable ranges, 26-31oC for temperature, 6.5-9.0 mg L-1. for Dissolved Oxygen, and 6.8-7.5 for Hydrogen ion concentration (pH).

**Discussion:**

Even though Teugels *et a*l, (1992); King, (1996); WWF,(1996-98) and Schelly *et al*, (2005) carried out fish biodiversity studies and recorded various fish compositions, the works were outside around the border of the Cross River National Park. This present work, therefore, delved specifically on fish biodiversity obtained in the major rivers within the Cross River National Park. The percentage composition by number of the fish families obtained in this study demonstrated the abundance index of the individual family in the catch assessment survey.

The dominance of the fish families Bagridae, Characide, Cyprinidae and Cichlidae in the catch assessment survey can be attributed to all the various water columns within the ecosystem were co-inhabited and exploited by these fish families. These families exhibited primary bottom-feeding behaviour in nature. Bagridae, Cyprinidae, and Cichlidae are detritus and plantktonic feeder, while Characidae are noted to be pelagic and surface water dwellers and feeders. Some of the various observations made in this study are similar to those established by Teugels *et al*, (1992); Mdaihli and Ayeni, (2001); and Fapohunda and Godstates, (2007).

The significantly higher diversity of fishes in the Oban division is because all the rivers sampled are perennial in nature and do not break into pools during the dry season such that the upward and downward movements of the fish species are not hindered. This differs from the rivers sampled in Okwango which are seasonal and break into pools during the dry season. This explained more fish-catches in the Oban division than in the Okwangwo division. The rich fish diversity confirms the Cross River National Park as an important site for the conservation of the fish species in this ecological region.

**Conclusion:**

Although this study centered on major rivers within the Cross River National Park, an additional fish species composition undoubtedly remains to be discovered in the adjoining streams, swamps and flood plains in the Park. Further studies are therefore required in these areas to update the present level of information revealed by this study.

The pisci-fauna so far recorded, clearly demonstrates that the Oban and Okwangwo divisions of the Cross River National Park, have rich fish diversity and that it is one of important sites for fisheries conservation in the rainforest ecosystem in Nigeria.

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