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FISH CATCH, COMPOSITION, ABUNDANCE, AND SEASONALITY OF A SEMI OXBOW LAKE IN NORTH CENTRAL NIGERIA.

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ABSTRACT
Fish catch composition, abundance and seasonality of Gbedikere Lake were studied between October 2006 and September, 2008. Three sampling stations were used for experimental gill net assessment of the fishery. Twelve fish species representing ten families were recorded. These were Protopteridae, Mormyridae, Claridae, Mochokidae, Cichlidae, Malapteruridae, Osteoglossidae, Gymnarcidae and Citharinidae. The most dominant species were Oreochromis niloticus (17.90%) and Tilapia zilli (13.01%) numerically. In terms of biomass, the Cichlids formed 30.91% of the total catch followed by Heterotis niloticus (15.56%), Clarias gariepinus (13.16%), Gymnarchus niloticus (8.78%), Heterobranchus bidorsalis (7.14%), Synodontis nigrita (6.69%), Mormyrus rume (5.68%), Citharinus citharus (3.91%), Labeo senegalensis (2.93%) and Protopterus annectens (2.74%). In terms of distribution the highest fish catch was from station B, (34.61%) followed by station C, (34.41%) and station A, (30.91%) respectively. There were no significant difference in the distribution of the fish species (P<0.01). Management towards the conservation of the fish resources was suggested.

Key words: Species composition, abundance, seasonality and conservation.

INTRODUCTION
Lakes are invaluable ecological resources that serve many human needs and therefore, enhance our lives by providing a lot of opportunities. This explains why a large proportion of Nigeria's population lives near water bodies such as lakes, reservoirs, rivers, swamps and coastal lagoons. Many depend heavily on the resources of such water bodies as their main source of animal protein and family income (Haruna *et al.*, 2006).

Catch Assessment Surveys (CAS) are conducted to obtain reliable current estimates of the total quantity of the fish harvested by fishers. Species composition and fishing effort involved in the catch are considered as secondary objectives while frame surveys among other things provide reliable estimates of changes in the size and structure of the fishery over time. The basic purposes of fish stock assessment are to provide advice on the optimum exploitation of aquatic living resources (Sparre and Venema, 1992). These living resources are limited but renewable. Consequently, the primary objective of fish stock assessment is to research for the exploitation level which in the long run gives the maximum sustainable yield from a fishery. This fish stock assessment evaluates the effects of fishing on a fishery as a basis for fisheries management decisions. Stock Assessment of fishery resources in the tropics has developed rapidly in the last decade in particular through the works of Pauly (1979, 1980, and 1984) Pauly and David (1981) Saila and Roedel (1980), Munro (1983) etc. Recruitment is the major source of variability in fish population; fish abundance and gill- net selectivity are measures of fish recruitment into a fishery (Ita, 1982; Gulland, 1983). The contribution of each of these species to the artisanal fisheries of the lake was reported upon. This study is intended to elucidate further on the fisheries of the Lake.

MATERIALS AND METHODS

Study Area

Lake Gbedikere (Fig 1) is a natural lake located between Latitudes $7^0 25^N$ and Longitudes $7^0 30^E$ and is about 10km to the East of Oguma the Head quarter of Bassa Local Government Area of Kogi State. Water enters the Lake from tributaries that run from River Benue during rainy or flood season. When the season is over, the Lake separates out. The Lake is about 450m north of Gbedikere village. The water body covers about 400m – 450m with a mean depth of 10 – 14m, depending on the season. The lake water is used for domestic purposes and fishing; consequently most of the settlers around the Lake are fishermen. The Lake contains fish, other aquatic animals and some macrophytes such as wire grass (*Cyperus articulatus*) which are used for weaving mats.

Collection of Water Sample

Water samples were collected with a Van Dorn water sampler, which was lowered, into the water with a graduated rope. Physico-chemical parameters such as temperature and transparency were analyzed at the study site other parameters such as pH and dissolved oxygen were further analyzed in the laboratory and the mean reading recorded.

Collection of Fish Samples

Standard fleets of gill nets were used to collect fish samples for 10 days each monthly for 24 months. This was in conjunction with, the prominent Malian gura trap of the fishers. Fish caught were sorted into species and measurements were taken for the following parameters like total and standard lengths, abundance, weight, sex, gonad stage, maturity (reproduction) and fecundity. These were carried out using standardized methods as in Cailliet *et al* 1986. Frame and catch assessments were carried out according to Bankole *et al.,* (1994) and Bankole and Mbagwu, (2000) for the two major seasons (dry and wet/rainy seasons). The data was analyzed by using a computerized fishery stock assessment program (Fresh and Brackish water fishes) available for fisheries stock assessment (FISAT, 2006) for stock assessment.

RESULTS

Physico-chemical parameters

The result of the physico-chemical parameter investigated showed that the overall mean temperature was 27.50^0C. It ranged from 26.00^0C to 29.00^0C. The lower temperature of 26.00^0C was recorded in October 2006 and January 2008 while the highest for all the sample points (29.00^0C) was recorded in March 2007 (Fig 2).

The overall mean Secchi disc transparency was 25.6cm ranging from 8.00cm to 68.7cm. The highest transparency was 68.7cm was recorded in October 2006 while the lowest was 8.0cm recorded in July 2008 (Fig 3).

The pH ranged from 5.08 – 8.02. The overall mean pH was 6.55. The highest pH was 8.2 and was recorded in March, 2007 while the lowest was 5.1 recorded in July 2008 (Fig 4).

The overall dissolved oxygen for the Lake was 8.65mg/l. The $D0_2$ ranged from 6.1mg/l to 19.85mg/l the highest $D0_2$ was 19.85mg/l and was recorded in November 2007 and the lowest 6.10mg/l recorded October 2006 (Fig 5).

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Species Composition, Abundance and Distribution

Fish were recorded from 10 fish families in the fishermen's landings. These include *Heterotis niloticus* (Linnaeus, 1762) from family Osteoglossidae; *Oreochromis niloticus* (Linnaeus, 1758) and *Tilapia zilli* (Gervais, 1848) from family Cichlidae; *Heterobranchus bidorsalis* (Geoffrey Saint – Hilaire, 1809) from family Clariidae; *Citharinus citharus* (Geoffrey Saint – Hilaire, 1809) from family Citharnidae; *Gymnarchus niloticus* (Linnaeus, 1758) from family Gymnarchidae; *Protopterus annectens* (Owen, 1883) from family Protopteridae; *Synodontis nigrita* (Valenciennes, 1840) from family Mochokidae**;** *Clarias gariepinus* (Burchell, 1822) was the second member from family Clariidae; *Labeo senegalensis* from family Cyprinidae; *Mormyrus rume* (Valenciennes, 1846) from family Mormyridae; and *Malapterurus electricus* (Gmeiin, 1789) from family Malapteruridae. The highest fish landed was 21,721.5kg recorded in January 2007 followed by 21,655.4kg in February 2007 and 20,216.3kg in December 2006 (Table 1). These form 38.6%, 38.5% and 35.9% respectively. Tilapias dominated the catches constituting 30.91% followed by *Heterotis* (15.56%) and *Clarias* (13.16%) while the rest form 40.37 %. The mean catch per month during the study period was 24.4%.

Abundance by Number and Weight

The most abundant species by number were the Cichlids. This comprises *Oreochromis niloticus* (17.90%) and *Tilapia zilli* (13.01%). They formed 30.91% of the total number of fish caught. They were followed in order of abundance by *Heterotis niloticus* (15.56%), *Clarias gariepinus* (13.16%), *Gymnarchus niloticus* (8.78%) and *Heterobranchus bidorsalis* (7.14%) with other species formed 44.9% of the total catch (Fig 6). Figure 7 shows the abundance of individual species over time.

Yield

Estimated landings for the lake during high and low water periods of 2006, 2007, and 2008 are as shown in Fig 8. For low water periods, 11.913.3 metric tons of fish were recorded in 2006.This declined to 6.449.2mt in 2007 and 2008. For the high water periods the estimated landings were 7.580.3mt in 2007 followed by 6.923.2mt in 2008. In general about the same amount of fish seemed to have been landed for both periods. This is evident in the mean catches for both, 537.4mt for low water and 576.9mt for high water. A closer observation revealed that the trend for low water showed a steady decline. The landing for low water of 2007 was 2165.5mt. That for 2008 was 1000.1mt. These show a decline from 27.3% to 14.8% respectively.

Table 1: Summary of experimental gillnets catches on Gbedikere Lake with estimated catch for whole Lake area.

Month	Catch(kg)	Catch/ 1000sqm(kg)	Catch/ Lake surface Area	Catch/ Lake surface Area 96.75) (metric tons)
Oct-06	30.7	25.6	17281.4	1728.1
Nov-06	35.2	29.3	19807.2	1980.7
Dec-06	35.9	30.0	20216.3	2021.6
Jan-07	38.6	32.2	21721.5	2172.2
Feb-07	38.5	32.0	21655.4	2165.5
Mar-07	32.8	27.3	18452.5	1845.5
Apr-07	22.5	18.8	12669.8	1267.0
May-07	19.3	16.1	10839.8	1084.0
Jun-07	18.1	15.1	10177.7	1017.8
Jul-07	27.4	22.9	15429.2	1542.9
Aug-07	27.6	23.0	15499.4	1549.9
Sep-07	19.9	16.6	11186.8	1118.7
Oct-07	12.8	10.6	7182.7	718.3
Nov-07	20.1	16.8	11319.8	1132.0
Dec-07	17.2	14.4	9696	969.6
Jan-08	18.7	15.5	10490.9	1049.1
Feb-08	17.8	14.8	10001.5	1000.1
Mar-08	28.1	23.4	15801.1	1580.1
Apr-08	19.4	16.1	10885.1	1088.5
May-08	20.9	17.4	11753.8	1175.4
Jun-08	18.3	15.2	10271.5	1027.1
Jul-08	24.7	20.6	13921.2	1392.1
Aug-08	20.8	17.4	117119.4	1171.9
Sep-08	19	15.8	10681.9	1068.2
Total	584.3	486.9	434062.3	32866.3
Mean	**24.35 ± 7.46**	**20.3 ± 6.22**		**1369.4 ± 420.2**

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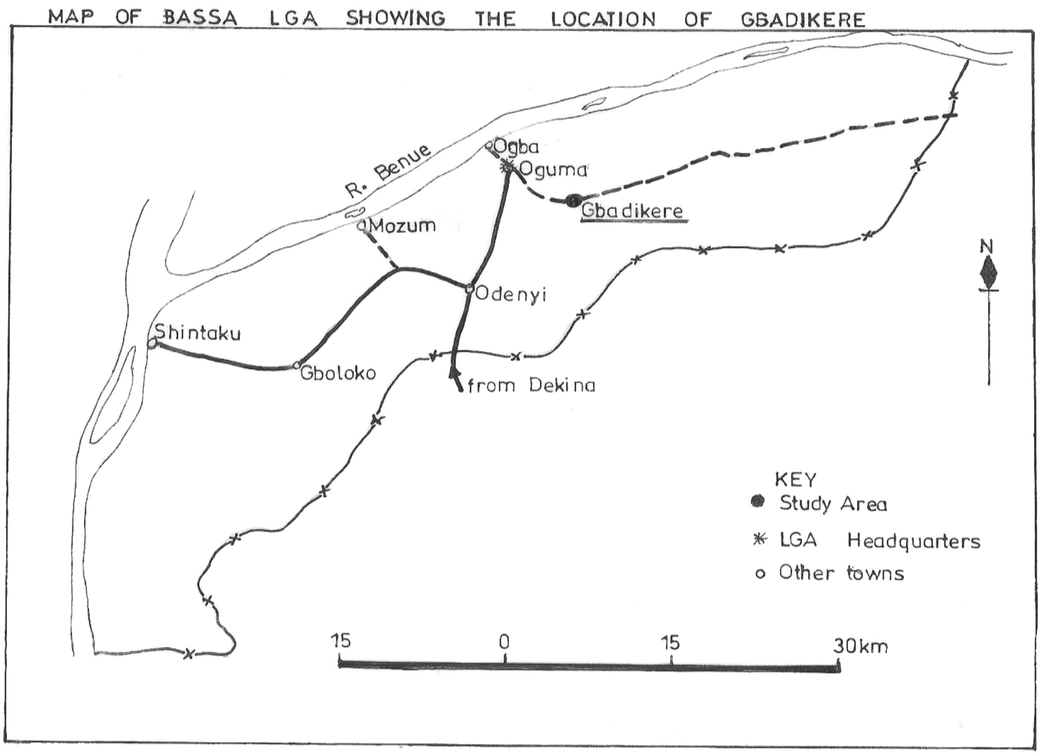

Fig. 1: Map of the Study area.

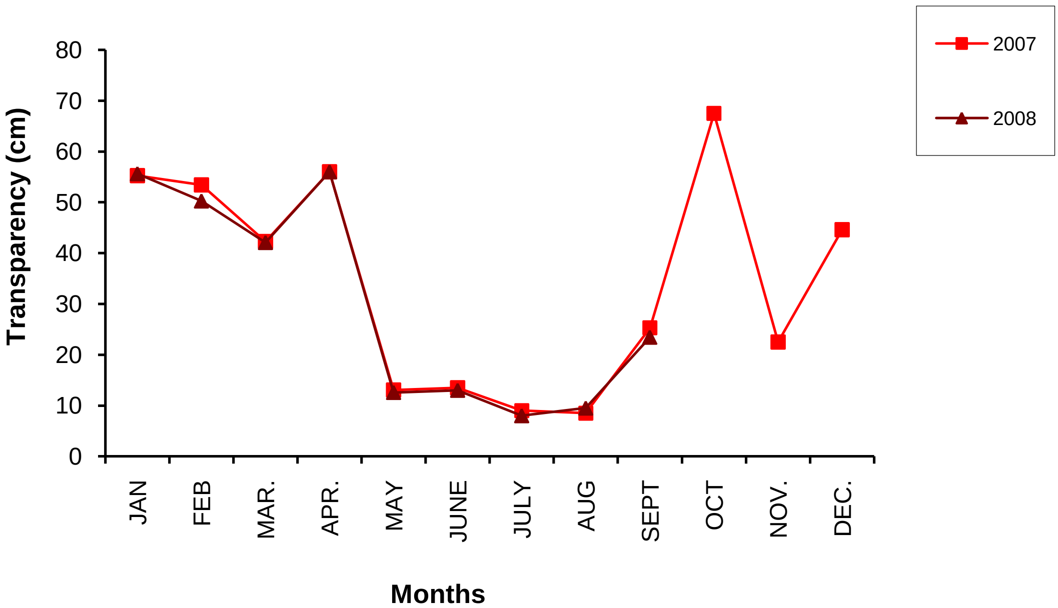

Fig. 3: Transparency for Gbedikere Lake in Kogi State

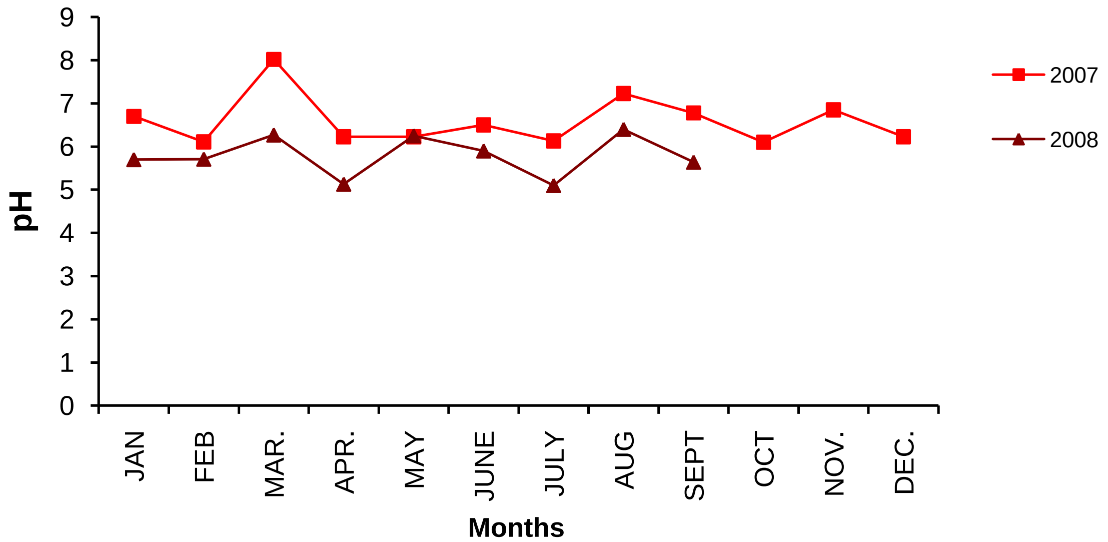

Fig 4 pH for Gbedikere Lake in Kogi State

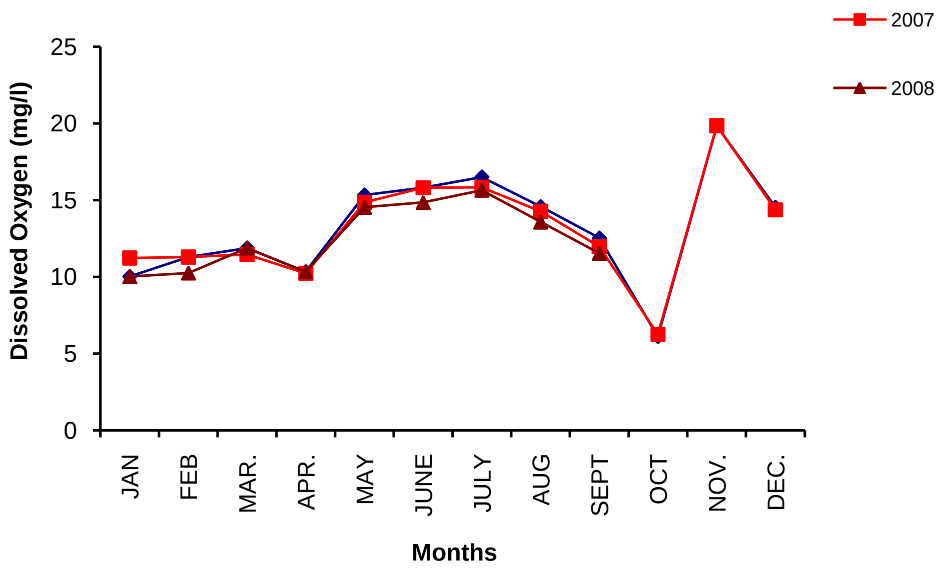

Fig. 5: Dissolved Oxygen for Gbedikere Lake in Kogi State

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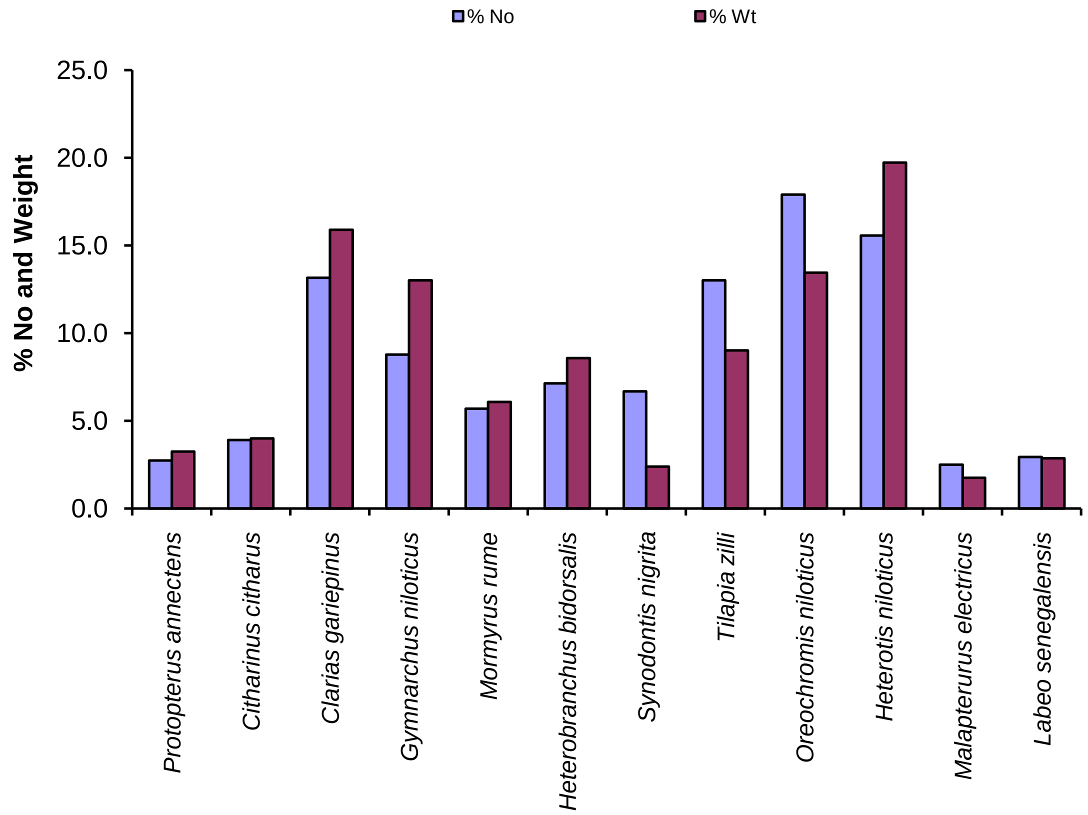

Fig 6: Overall relative fish species abundance on Gbedikere Lake in Kogi State

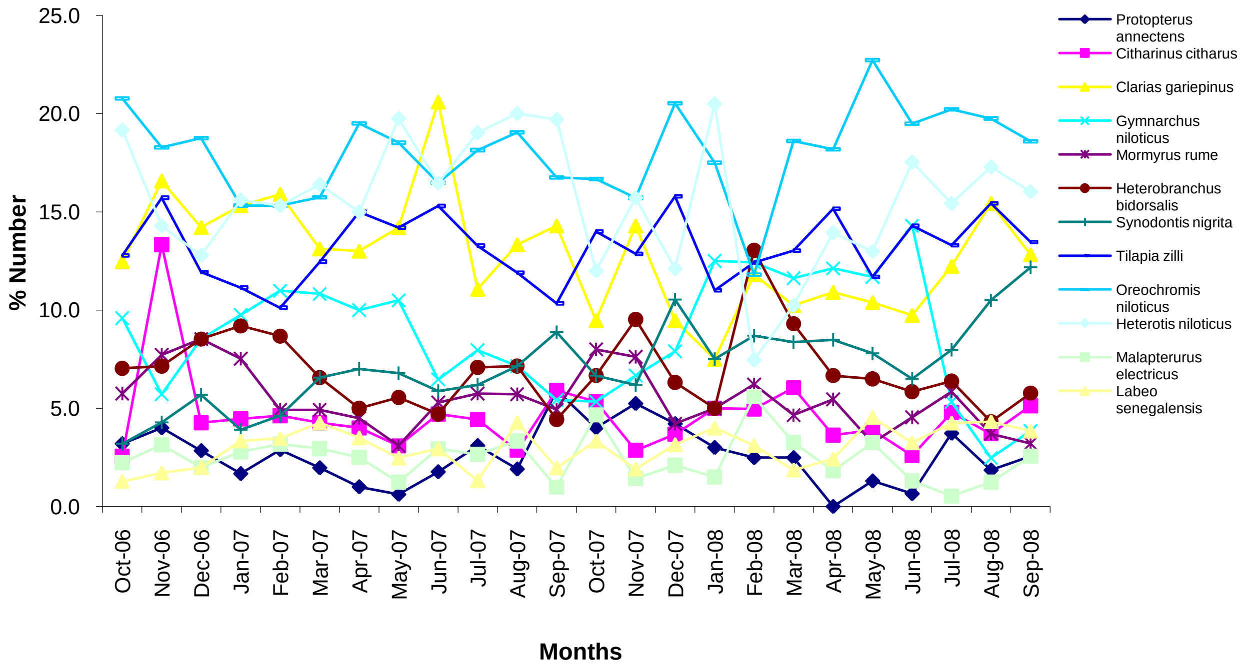

Fig 7:Relative Monthly species abundance by percentage number on Gbedikere Lake Kogi State

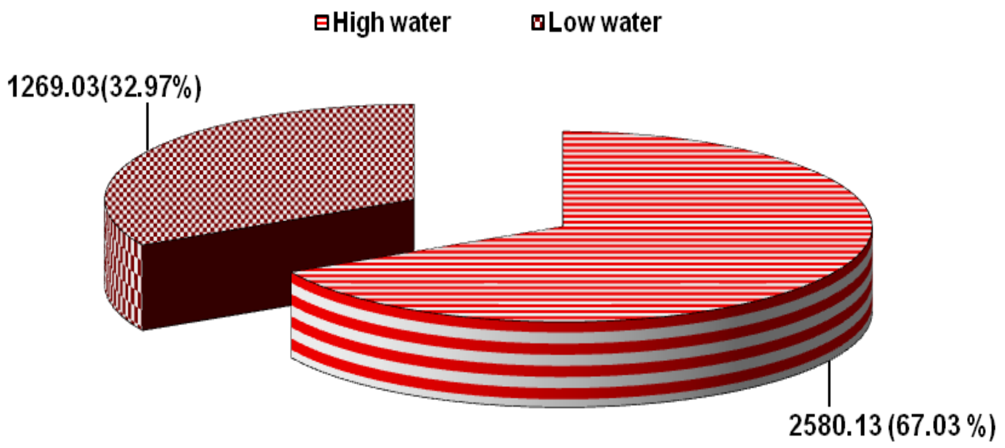

Fig. 8 Summary of fish landings for Biroko landing site at Gbedikere Lake for wet and dry seasons of 2006-2008

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DISCUSSION

The fish species diversity of Gbedikere Lake revealed a low species diversity of 12 species from experimental gill-nets. *Oreochromis niloticus* was dominant every month for the duration of the sampling. It was followed by *Heterotis* in ranking (Fig.4.2). The dominance of the cichlids could be attributed to their prolific breeding habit. A closer look at three of the economically important species revealed that *O. niloticus* was the most abundant among all the species. The highest number and biomass for it was recorded in December 2006 and January 2006 for *Heterotis niloticus.* The peak biomass for *Clarias gariepinus* was recorded in November 2006.This was followed by January and February 2007. The least biomass for *C. gariepinus* which was less than 5% was recorded in October 2007; this could be attributed to the flooding of the vegetated shoreline which afforded a hiding place for the fish thereby, making it difficult for the species to be recorded in the catches (Bankole *et al.*, 1994). For *O. niloticus* the lowest record was in March, 2008. This could be attributed to the effect of the draw-down which made the fish to go into the deeper waters, coupled with the intensive pressure of catch which had reduce the populations Bankole *et al.,* (1994). The populations start to pick up again from May upwards due to the replenishment of the stock through breeding activities.

The mean annual yield obtained through Catch Assessment Surveys during the study was 240.2 metric tons as compared with 869.8mt in 1994 (Bankole *et al.,* 1994). Standing stocks for the period was 20.3kg / Ha as compared with 155 kg / Ha obtained in 1994 (Bankole *et al* op. sit.). Catch per unit of effort was 24.4 kg / Ha^{-1} for the experimental gillnets. Estimated total catches from the experimental gillnets was 326.6mt.

REFERENCES

Bankole, N.O., Sule, O.D., Okwundu E.C., Umoru. I and Balogun. I. (1994). Preliminary investigation on the frame and Catches Assessment survey of Alau Lake, Maiduguri, Borno State. N.I.F.F.R. Annual Report (1994) p134 -147.

Bankole, N.O. and Mbagwu, I.G. 2000. Aspects of the fisheries of Lake Alau in North Eastern Nigeria. *Afri. J. Trop. Hydrobiol. Fish. Vol 9 (1 & 2)*: 49 – 61.

Bankole, N.O and Mbagwu, I.G. (2002). The current status of the Limnology and fishery of Dadinkowa Reservoir in Northeast Nigeria. *Annals of Borno*, University of Maiduguri Press. Vol 17/18: (2002) 186-201.

Cailliet, G.M., Love, M.S. and Eberling, A.W. (1986). Fishes: A field and laboratory manual on their structure, identification and natural history.Wadsworth Publi. Comp. Behmont, California. 194pp.

Ekwemalor, A. I. (1977). Catch Assessment Survey of Kainji Lake, Nigeria.M.Sc Thesis. University of New South Wales, Sydney Australia 49p.

Ita, E. O. (1978). An analysis of fish distribution in Kainji Lake, Nigeria**.** *Hydrobiologia*, 59 (3): 233 – 244.

Ita, E.O., Bankole, N.O. Mohammed, A., Omorinkoba, W.S. Awojoodu, S. (1985). A preliminary report on the immediate post impoundment fishery survey of Shiroro Reservoir, Niger State, Nigeria. Kainji Lake Research_ Institute Annual report, p25-29.

Odunze, F.C., Awojebi, R and Ntakil, N. (1995) Preliminary fisheries resources survey of lake Alau, Maiduguri. Paper presented at the workshop on sustenance, management and conservation of fisheries and other Aquatic Resources of Lake Chad and the arid zone of Nigeria. Held on the 16th - 17th of January, 1995 at Lake Chad Research Institute, Maiduguri.

Omotosho J. S. (1998) Ichthyofauna diversity of Asa Reservoir, Ilorin, Nigeria. *Bioscience Research Communications Vol. 10 No. 1*, March, 1998, 75-81

Marshall, B. E. (1984). Towards predicting ecology and fish yields in African reservoirs from preimpondment physico-chemical data. CIFA Tech. Pap./Doc. Tech. CPCA, (12); 36 p.