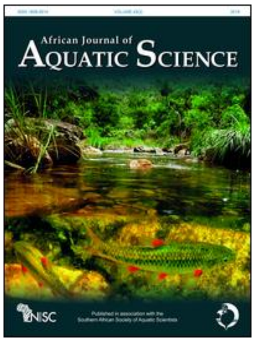

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Artisanal gill-net fishery catches of the catfish, *Schilbe intermedius* (Teleostei: Schilbeidae), in two tributaries of the Ouémé River, Bénin, West Africa

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Artisanal fishery gill-net catches of the catfish *Schilbe intermedius* were studied in the Okpara and Zou tributaries of the Ouémé River, Benin in 1999 and 2000. The largest fish caught at the Toué and Kpassa stations measured 26.2cm and 24.5cm (TL) respectively. The success of artisanal fishing for schilbeids varied during the day, with the highest fish catches being recorded at approximately 22h00 and at 07h00 and the lowest between 13h15 and 16h15. The monthly production at Kpassa varied between 9.0g and 900.0g (average 206.3g) and between 3.3g and 17 320g (average 2 603.4g) at Toué. The monthly production fluctuated considerably. At the two stations, fewer fish were caught each month in the second year than in the same months in the first year. Nets of between 10 and 15mm stretch mesh were the most efficient. Above 15mm, gill-net fishing became less effective. Large fish were often taken with gill-nets of 20–30mm stretch mesh. Beyond these mesh sizes, the gill-net yield and catch decreased.

Keywords: gill-net fisheries, Okpara and Zou tributaries, Ouémé River, *Schilbe intermedius*

Introduction

The silver catfish, *Schilbe intermedius* Rüppell 1832 (De Vos and Skelton 1990), is widely distributed in the Ouémé River and is important in the artisanal gill-net fishery in the Okpara and Zou tributaries. The commercial importance of *S. intermedius* has been documented for a number of other African wetlands, including the Kafue River, Zambia (Carey and Bell-Cross 1965), Lake Kainji, Nigeria (Olatunde 1977), the Pongolo River, South Africa (Merron and Mann 1995), the Chad Basin (Mok 1975) and the Okavango Delta (Merron and Mann 1995). There is, however, little known about the biology and fisheries potential of this species in Bénin in general and the Ouémé River in particular. Although it is a small fish, it is a popular eating fish for the local human population. *Schilbe* contributes to more than 10% by weight of the artisanal fisheries catches in the Zou and Okpara rivers. There are two species of *Schilbe* in the Ouémé River: *S. mystus* and *S. intermedius*. *Schilbe mystus* is rare and *Schilbe intermedius* is typically an open water species frequenting rivers and floodplains (Merron and Mann 1995). This paper is based on gill-net studies that were carried out in the north of the Okpara River at the village of Kpassa and in the south of Zou River at the village of Toué (Figure 1). The objectives of the study were to determine the efficiency of gill-nets for the harvesting of *S. intermedius*, the lengths and weights of fish caught, and the monthly catch and catch per unit of effort (CPUE).

Study area

The Zou (150km length) and Okpara rivers (200km length) are major tributaries of the Ouémé River, which is the largest fluvial basin of Bénin, covering over 50 000km^2. It has an average slope of 0.9m/km, except in the upstream region, where this is 20m/km.

The Okpara River is located between 8°14'–9°45N and 2°35–3°25E, with its source at about 450m asl in the south-west part of Nikki. The Zou River stretches between 7°14–8°34N and 1°30–2°15E and rises in the south-east district of Pira at about 310m asl.

The sampling stations were at Kpassa (09°17.513'N, 02°43.959'E) on the Okpara River and at Toué (07°12.825'N, 02°17.188'E) on the Zou River. Kpassa is a village 12km from Parakou town and is under the influence of a Sudan climate, with one rainy season of about six to seven months' duration from April to October. In addition to this, during the Harmattan season, a dry hot wind — which blows from November to April — also impacts on the area. The effect of these two natural weather cycles accentuates the thermic and hygrometrical amplitudes of this part of the Ouémé basin. The Toué station is a fishing ground located on the Zangnanado plateau. It has a sub-equatorial climate, with two rainy seasons of different lengths. The main rainy season occurs between 1 March and 31 July, and the shorter rainy season occurs between 1 August and 31 October (Adam and Boko 1983).

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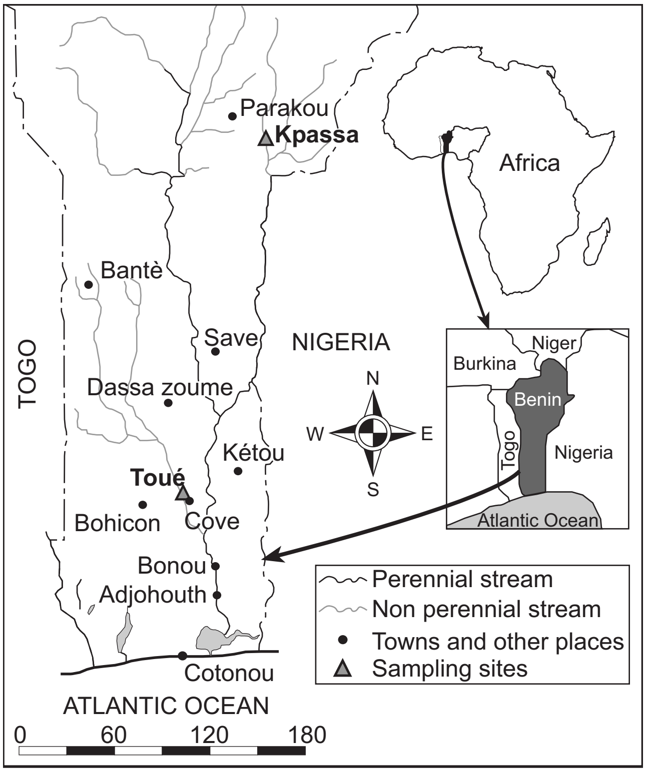

Figure 1: Map of the study area showing the location of some towns, villages and the sampling sites

Methods

Sampling was conducted monthly from May 1999–April 2000, and then every two months from May 2000–March 2001, using 30m x 2m monofilament gill-nets of 10, 12, 15, 20, 25, 30, 35, 40 and 45mm stretch mesh, set for two days and inspected every three hours. Data collected from each individual fish included total length (TL), measured from the tip of the snout to the end of the superior lobe of the caudal fin, wet (ungutted) weight (g), using an electronic Metler PJ400 balance (precision 0.1g), and sex, determined according to Lagler (1968) (i.e. external observation of the fish and macroscopic examination of the gonads). The Catch per Unit Effort (CPUE) was calculated as catch per 100m of gill-net used. Analysis of production variation in terms of space (at each station) and of time (on a monthly basis) was estimated using ANOVA.

Results

The sizes of schilbeids encountered during the study varied between 6.0cm and 245cm TL (average 10.8cm) at Kpassa, with the majority of fish occurring in the 9.0cm and 12.0cm size classes (Figure 2). At Toué, the sizes varied between 7.0cm and 26.2cm TL (average 12.6cm) and the majority of fish here were in the 10 and 15cm size classes.

Figure 3 presents the catch data showing the efficiency of different gill-net mesh sizes with regard to the catching of the schilbeids. Mesh sizes ranging between 10 and 15mm were the most efficient. Mesh sizes above 15mm

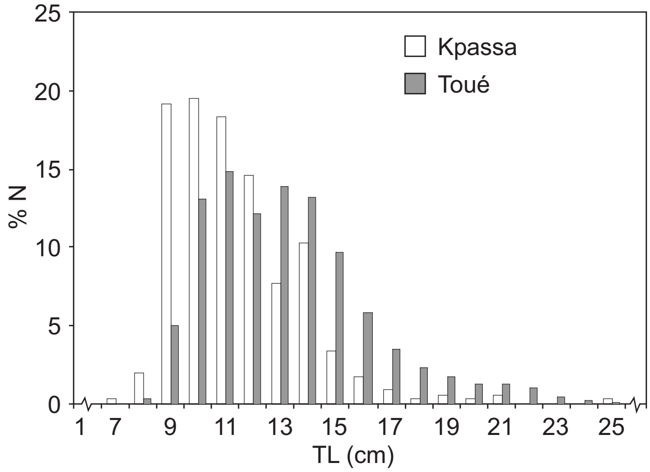

Figure 2: Length-frequency distributions of *Schilbe intermedius* caught in gill-nets at the Kpassa and Toué stations

became less efficient. Large fish were caught with mesh sizes of 20–30mm. Mesh sizes larger than this resulted in decreases in the yield per net.

Relating catch to inspection time, the highest fish catches were recorded at 22h15 and 07h15, and the lowest at between 13h15 and 16h15 (Figure 4). The monthly production (CPUE) of schilbeids varied between 9.0g and 900.0g (average 206.3g) at Kpassa and between 3.3g and 17 320g (average 2 603.4g) at Toué. Catches at the two stations were significantly different (F = 34, 23.1158; $P < 0.01$), with Toué being more productive than Kpassa. The monthly CPUE fluctuated considerably (Figure 5), with two main trends during the year. The first one (September–December) was characterised by a progressive increase of CPUE. The highest values were obtained in November at Kpassa and in December at Toué. The second trend (December–May) was characterised by a progressive decline in CPUE. The lowest values occurred during February–April at Kpassa and during May–July at Toué.

Discussion

Gill-nets have been shown to be efficient in catching *Schilbe intermedius* in the Zou and Okpara tributaries. Gillnets catch fish at different stages in their life cycle, depending on their size. The modal length was 11.0–13.0cm TL and the observed fish maximum length was about 26.2cm TL. This is less than the maximum recorded length of 50.0cm SL known for this species in the West African inland waters (Lévêque *et al*. 1990, 1992), but greater than that of 19.6cm SL and almost 24.0cm TL recorded by Olatunde (1977) in Lake Kainji, Nigeria.

As expected, the sizes of the fish captured were related to the different mesh sizes, as was reported by Olatunde (1977) for *Schilbe* in Lake Kainji, Nigeria. According to the results of the present study, this relationship only existed in the stretch mesh sizes between 10 and 30mm. There was no clear relationship between other mesh sizes and fish sizes captured.

The success of schilbeid fishing varies during the day. The highest catches were made in the night at about 22h00 and early in the morning at about 07h00, and the lowest

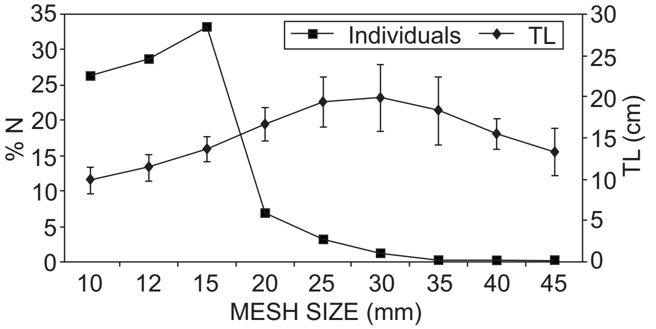

Figure 3: Comparison of abundances (% N) and length (cm TL) of *Schilbe intermedius* caught per gill-net mesh size

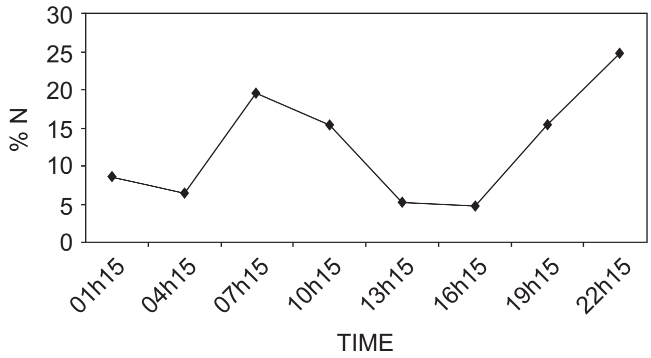

Figure 4: Changes in abundances (% N) of *Schilbe intermedius* caught in gill-nets, according to time of day

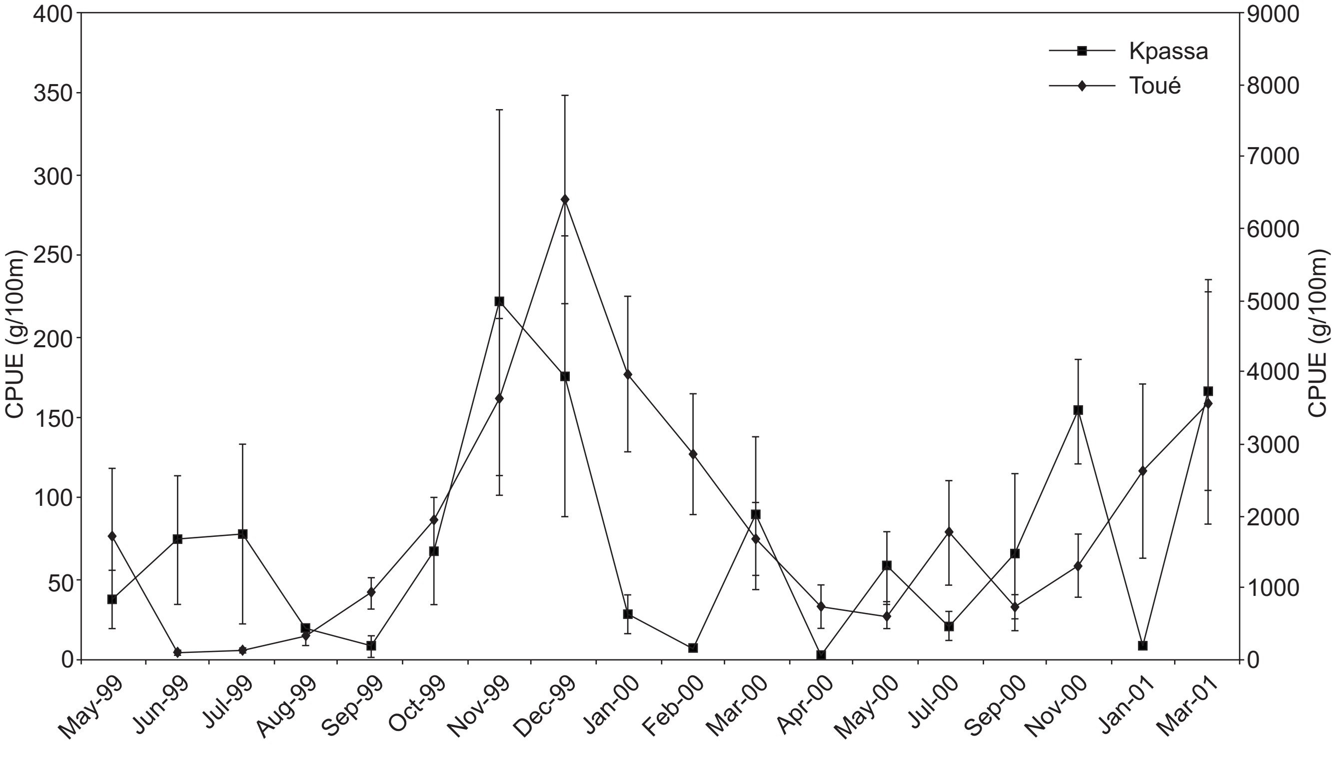

Figure 5: Monthly CPUE of *Schilbe intermedius* caught in gill-nets at the Kpassa and Toué stations

catches at between 13h00 and 16h00. This differential catch efficiency can be linked to the fish's trophic activity rhythm, starting at twilight around 19h00 and intensifying to a maximum at about 22h00, after which time the trophic activity decreased until 04h00. The high catch registered at 07h00 indicated that there was a second period of daily feeding activity. *Schilbe intermedius* possibly rests between 13h00 and 16h00. Several researchers have shown that catfishes are generally more active at night (Ali 1992, Beaute *et al*. 1993, Lalèyè *et al*. 1999). According to Boujard and Luquet (1996), siluroids are said to have a mainly nocturnal trophic activity.

With regard to the exploitation of *Schilbe intermedius* within their natural area, fishing would only be effective at 07h00 and between 19h00 and 22h00. No other periods would produce significant catches. If this species was being farmed, it would be more efficient to feed *Schilbe intermedius* twice a day, at 07h00 and 19h00. In theory, the fish would not feed at any other time and any food supplied would be wasted. However, it should be noted that captive culture conditions can be manipulated, changing the natural behaviour patterns of captive fish (Wooton 1994).

Fishing for schilbeids improved during the flood season and at the beginning of the dry season. The first period resulted in the capture of shoals of fish migrating to their breeding habitats, which can easily be caught using gill-nets. The second peak resulted from the capture of the recruitment milieu of young fish.

A decrease in production can be observed after some months of intensive fishing activity. The low catches observed in the second year of this study may, however, have been the result of poor recruitment due to adverse environmental conditions. This has to be considered when managing natural fish stocks. The second year was characterised by low rainfall and therefore low flood intensity. Merron and Bruton (1995) found that, in the Okavango Delta, the annual flood cycle played an important role in determining the nature of the fish taxocene. Krushlan (1976) found that the seasonal fluctuation in water level in the Everglades Swamp, USA, was the most critical environmental factor affecting the demography of the fish taxocene. Welcomme (1979) showed that the greater the magnitude of the annual flood, the longer its duration on the floodplain and the greater the resulting overall production of fish.

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References

Adam KS and Boko M (1983) *Le Bénin Ministère des Enseignements maternels et de base*. EDICEF (ed) Paris, 98pp.

Ali MA (ed) (1992) *Rhythms in Fishes*. Proceedings of a NATO Advance Study Institute on Rhythms in Fishes, August 4–17 1991, Montreal, Canada, 348pp.

Beaute P, Poncin P and Muzigwa K (1993) Etude préliminaire du comportement de *Distichodus sexfasciatus* Boulenger 1897 en aquarium: ethogramme, structure sociale et rythmes nycthéméraux d'activité alimentaire. *Cahiers d'Ethologie* **12**(4): 509–518.

Boujard T and Luquet P (1994) *Rythmes alimentaires et alimentation chez les siluriformes.* 70, abstract Atelier International sur les Bases Biologiques de l'Aquaculture des Siluriformes, CEMAGREF de Montpellier, Montpellier, 24–27 May 1994.

Carey TG and Bell-Cross G (1965) Breeding seasons and quantitative data on gonads and ova for certain fish species. *Fisheries Research Bulletin, Zambia* **3**: 12–22.

De Vos L and Skelton PH (1990) Nature changes for two common African catfishes. Rehabilitation of *Schilbe intermedius* (Siluriformes, Schilbeidae). *Cybium* **14**: 323–326.

Krushlan JA (1976) Environmental stability and fish community diversity. *Ecology* **57**: 821–825.

Lagler KF (1968) Capture, sampling and examination of fishes. In: Ricker WE (ed) *Methods for Assessment of Fish Production in Freshwaters.* IBP Handbook, No. 3, pp 7–44.

Lalèyè AP, Poncin P and Philippart JC (1999) *Etude préliminaire des rythmes nycthéméraux d'activité chez Chrysichthys nigrodigitatus (Pisisces, Siluriformes, Claroteidae): influence de l'augmentation de la salinité*. Annales des Sciences Agronomiques de l'Université Nationale du Bénin, Bénin **2**: 139–148.

Lévêque C, Paugy D and Teugels GG (eds) (1990) *Faune des poissons d'eaux douces et saumâtres de l'Afrique de l'Ouest, I.* ORSTOM, 910pp.

Lévêque C, Paugy D and Teugels GG (eds) (1992) *Faune des poissons d'eaux douces et saumâtres de l'Afrique de l'Ouest, II.* ORSTOM, 910pp.

Merron GS and Bruton MN (1995) Community ecology and conservation of the fishes of the Okavango Delta, Botswana. *Environmental Biology of Fishes* **43**: 109–119.

Merron GS and Mann BQ (1995) The reproductive and feeding biology of *Schilbe intermedius* in the Okavango Delta, Botswana. *Hydrobiologia* **308**: 121–129.

Mok M (1975) Biométrie et biologie des *Schilbe* (Pisces: Siluriformes) du bassin Tchadien. 2ème partie. Biologie comparée des deux espèces. Cahiers ORSTOM, sér. *Hydrobiologie* Vol. IX, **1**: 33–60.

Olatunde AA (1977) The distribution, abundance and trends in the establishment of the family Schilbeidae (Osteichthyes) in Lake Kainji, Nigeria. *Hydrobiologia* **56**: 69–80.

Welcomme RL (1979) Fisheries Ecology of Floodplain Rivers. Longmans, London, 317pp.

Wooton JR (1994) *Ecology of Teleost Fishes*. Fish and Fisheries Series I (4th ed.). Chapman & Hall, London, 404pp.