

# Patterns of Total Hydrocarbon, Copper and Iron in Some Fish from Cross River Estuary, Nigeria

F. E. Asuquo<sup>1</sup> and J. P. Udoh<sup>2</sup>

<sup>1</sup> *Environmental Pollution & Management Research Unit, Institute of Oceanography, University of Calabar, P.M.B. 1115, Calabar, Nigeria (Corresponding author)*

<sup>2</sup> *Department of Fisheries and Aquaculture, University of Uyo, Nigeria*

## Abstract

Muscle tissue of *Ethmalosa fimbriata* and *Chrysichthys nigrodigitatus* were collected between the period March and August 1999 from the Cross River Estuary, Nigeria, in order to assess possible anthropogenic impacts on these species. Levels of total hydrocarbons (THC > 6.0 p.p.m.) and Cu (> 2.6 p.p.m.) exceeded their WHO permissible limits (0.0001 and 0.02 p.p.m. respectively) in the fish tissues. Fe levels also exceeded the permissible limit (300 p.p.m.) in more than 13.3% of *C. nigrodigitatus* and 22.2% of *E. fimbriata* collected during the period. Lead was not detected in any of the fishes sampled. Inter-locational variation in mean concentrations of THC, Cu and Fe were minimal and insignificant ( $P > 0.05$ ) except for *C. nigrodigitatus* sampled from Anantigha area ( $P < 0.05$ ). Pollution pattern was in the order: Obufa Esuk (upstream) < Henshaw Town (midstream) < Anantigha (downstream), independent of weight and length of fish ( $r < 0.3$ ,  $P > 0.05$ ) but time-dependent ( $P < 0.05$ , ANOVA), especially in the accumulation of THC in *E. fimbriata* and Fe in *C. nigrodigitatus*. Linear relationship was found between Cu and Fe levels in *E. fimbriata* as described by the equation:  $Y = 0.45 - 29.39 X$  ( $r = 0.98$ ,  $n = 18$ ,  $P < 0.05$ ). *E. fimbriata* showed a higher affinity for Cu and Fe than *C. nigrodigitatus*. These results provide the baseline levels of these pollutants in the species investigated and also suggest that long term bioaccumulation of the toxins by these species is potentially hazardous, especially to coastal dwellers who consume them in large quantities yearly.

## Introduction

It is well known that fish and shell fish commonly accumulate water-soluble petroleum products as well as heavy metals through their diet (Davies *et al.*, 1981; Denton & Burdon-Jones, 1986; Blackmore *et al.*, 1998). The Cross River Estuary is the largest estuary along the West African sub-region. It is located between longitude 8° 15' and 8° 30' E and latitude 4° 32' and 5° 12' N (Fig. 1). Sources of pollution include industrial discharges and municipal dumps (Ntekim, 1987; Etim & Akpan, 1991) and oil spills from point and non-point sources (Asuquo, 1998; Asuquo, 1999; Olagbende *et al.*, 1999). Its principal tributaries are the Calabar and Great Kwa Rivers (GKR) which are usually affected by oil spills (Devman Konsult, 1998). Observations in

the Cross River system indicate the presence of enhanced level of pollutants such as lead, mercury, arsenic, total hydrocarbons and copper in the coastal waters and superficial sediments (Ntekim, 1987; Etim & Akpan, 1991; Asuquo, 1998).

*E. fimbriata* and *C. nigrodigitatus* are found spawning in the inshore waters of Nigeria. They were chosen for this study because they are the second and third major components (12.2% and 10.8%, respectively) of fisheries in the Cross River Estuary, after *Pseudotolithus elongatus* (66.5%), (Holzlohner *et al.*, 1998). The paper presents data on the levels of total hydrocarbons, copper, iron and lead in the tissues of resident and migratory *E. fimbriata* and *C. nigrodigitatus* from the Calabar and Great Kwa Rivers of south-