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## Considerations about *Ucides cordatus cordatus* Fishing in the Parnaíba River Delta Region, Brazil

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### ABSTRACT

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The Uçá-crab, *Ucides cordatus cordatus*, is distinguished as one of the most explored fishery resources in Brazil. The Parnaíba River Delta region, located between the states of Piauí and Maranhão, has the greatest concentration of crab catcher in the entire country. Evidence of over-exploitation highlights the need of better control over crab fishing activities in this region. The present work has as objective to determine the Uçá-crab Capture per Effort Unit (CPUE) in the Parnaíba River Delta, in order to supply subsidies for the fishery management of this resource. Fishery data collection was carried out during 1999 throughout 2002, between the latitudes 2°40' and 2°45' and the longitudes 41°51' and 42°05'. The CPUE was determined as the number of crabs captured by catcher per day. The total monthly capture was esteemed considering the average between all years and the number of 4.500 operating catchers in the region. The average CPUE values varied between 14.6 and 22.6 crabs per catcher per day. The total monthly capture varied between 1.314.000 and 2.034.000 crabs, in the months of minimum and maximum CPUE, respectively. In the period of one year, about 21 million crabs are captured. The obtained results, added to the over-fishing indications, bring to the conclusion that the collapse of crab fishing is a question of time in the region of the Parnaíba River Delta if the appropriate measures for adequate managing of the resource.

**ADDITIONAL INDEX WORDS:** *Fishing effort, crab fisheries, resource management.*

### INTRODUCTION

The crabs consist of the most conspicuous and abundant components of the benthonic fauna of mangrove environments, playing an important ecological role due to its position in the food chain and to its participation in the biogeochemical cycles of different elements and to sediment oxygenation and draining through hollowing (JONES, 1984). Amongst these crustaceans, the uçá-crab, *Ucides cordatus cordatus*, is distinguished as one of the most explored resources in Brazil, occurring from Amapá to Santa Catarina (SANTOS and COELHO, 2000; CORRÊA JR *et al.*, 2000; DIELE, 2000). In the Northeast region, the uçá-crab is an important fishery resource, with elevated socio-economic value, generating job and income for thousand of families who inhabit littoral zones (NORDI, 1994; IVO and GESTEIRA, 1999).

The Parnaíba River Delta region, located between the states of Piauí and Maranhão, holds the biggest concentration of crab catchers in Brazil. It is esteemed that approximately 4500 catchers depend on the activity for their survival.

In virtue of the socio-economic importance of crab catching and of the increase of fishing effort over this resource, there is increasing interest of some segments of the society in the protection, management and the sustainable exploitation. The reduction in the captures of *U. c. cordatus* in diverse Brazilian states in the last years, has been seen as the first indication of the its collapse as a resource. Currently, the decline of this fishing activity is observed in the states of Rio Grande do Norte, Paraíba, Pernambuco, Alagoas and Sergipe, and in the north of the Bahia. In the states of Piauí and Maranhão, where the capture has been kept constant, over-fishing indications can be found, such as: reduction in the weight and the average size of captured specimens; increase of the fishing effort without capture increase; and increasing difficulty of capture (LEGAT *et al.*, 2002). Traditional fishing of *U. c. cordatus* is made in a disordered manner. There is no control regarding the number of catchers and the amount of crabs removed from the environment. The capture is carried out manually; the catcher

inserts his arm or a metal hook inside of the burrow where the crab inhabits, removing one individual per time.

The crab's productive chain is characterized by elevated rates of wastefulness over the total captures, from capture to the consuming market. The losses generally vary from 40 to 60%, caused by incorrect handling and transportation. Fish stock collapse is common where an adequate resource management is absent. In general, exploration levels exceed maximum sustainable capacity, being common the lack of knowledge about biological aspects of the resources and human actions that modify its habitat. Thus, exploration of supplies becomes unsustainable and impracticable from an ecological and economic point of view. Within this context, the determination of the fishing effort is a basic step to evaluate the pressure to which the fish supplies are submitted, allowing establishing quotas of capture and assisting in the elaboration of management plans for these resources. The present study has as objective to determine the capture per unit of effort (CPUE) of *U. c. cordatus* in the area of the Extraction Reserve of the Parnaíba River Delta of in order to supply subsidies to manage crab exploitation in a more orderly and sustainable fashion.

### METHODS

The present work was carried out at the Extraction Reserve of the Parnaíba River Delta, located between the states of Piauí and Maranhão, Northeast region of Brazil (Figure 1). Captures were carried out by traditional fishers between the latitudes 2°40' and 2°45' and the longitudes 41°51' e 42°05'. Data collection, done on a monthly basis by IBAMA, was done from 1999 to 2002. Data gathered from the fisherman at the moment of landing were: place of capture, number of crabs captured by catcher and number of days of work. Because of the fishing method used in the region, the CPUE was calculated as the number of crabs captured by each fisherman in one day. The importance of the variables "capture area", "total time of capture" and "fisherman" on the total captured fisheries was

Table 1. Monthly average of the total capture of crabs in the Region of the Parnaíba River Delta between the years of 1999 and 2002.

Month	Number of crabs
January	1.765.800
February	1.630.800
March	2.034.000
April	1.827.900
May	1.486.800
June	1.314.000
July	1.661.400
August	1.743.300
September	1.749.600
October	1.980.900
November	1.575.900
December	1.944.900
Total	20.715.300

determined through analysis of variance (ANOVA) and t-test to the level of significance of 99%. Average work time for each catcher and the total monthly capture of crabs was estimated, considering the average between every year of collection and the total number of 4.500 operating catchers in the study area.

## RESULTS

The average CPUE varied between 14.6 and 22.6 crabs captured for each fisherman in the period of one day (Figure 2). A reduction of CPUE was observed between March and June. The values of CPUE gradually increased from July to October, having a fall in the November. From December on, the capture increased until reaching the maximum value in March. No significant differences were observed between the variable tested on the values of CPUE ( $p < 0,01$ ).

The time of work of each fisherman was in average 5 days per week. Considering the number of 4500 catchers, an amount of approximately 2.034.000 crabs have been captured in the month of biggest CPUE and about 1.314.000 in the month of minor CPUE (Table 1).

## DISCUSSIONS

The values of CPUE obtained in the present study can be explained by the biological characteristics of *U. c. cordatus*, the peculiarities of the productive chain and by the crab consuming market trends.

The capture of crab in Parnaíba River Delta supplies, mainly, the consuming market of Ceará and secondarily, the states of Piauí and Maranhão. The highest crab consumption occurs between December and March, when the tourist flow is intense and a search for the product increases. In this period, the values of CPUE have been always above of 18 crabs/catcher/day. From the end of March until June, time of low season in the Northeast region, the reduction of crab consumption incurs in a consequent reduction of the CPUE. Although the market demand in July to November is similar to the demand in April and June, the increase in CPUE values coincides with the time of ecdysis of *U. c. cordatus*. At this time, the crabs little present a soft shell and little resistance to capture methods, causing an addition in the mortality rates that can arrive to 60% of the captured total.

The precarious conditions of transport, from the place of capture until the consuming market, consist in an additional factor for the increase of the mortality rates and capture during the period of ecdysis. The crabs are transported alive and in stacks on open trucks and without refrigeration. This way, the superior layers of animals exert weight on the inferior layers, causing death by crushing. The crabs that arrive dead at the consuming market are discarded due to preference for abate it of the animal at the moment of the preparation for consumption (LEGAT and PUCHNICK, 2003).

No relation was found between the differences in CPUE values of and the capture places ( $p < 0,01$ ), indicating that the distribution of the species is uniform among the capture points. Row data analysis shows that areas of higher capture occur, although these data are not statistically significant. Therefore, despite the present work's usefulness as a subsidy to improve the extraction activity in the Parnaíba River Delta area, it is necessary to continue CPUE studies; and furthermore, initiate an extensive abundance distribution study.

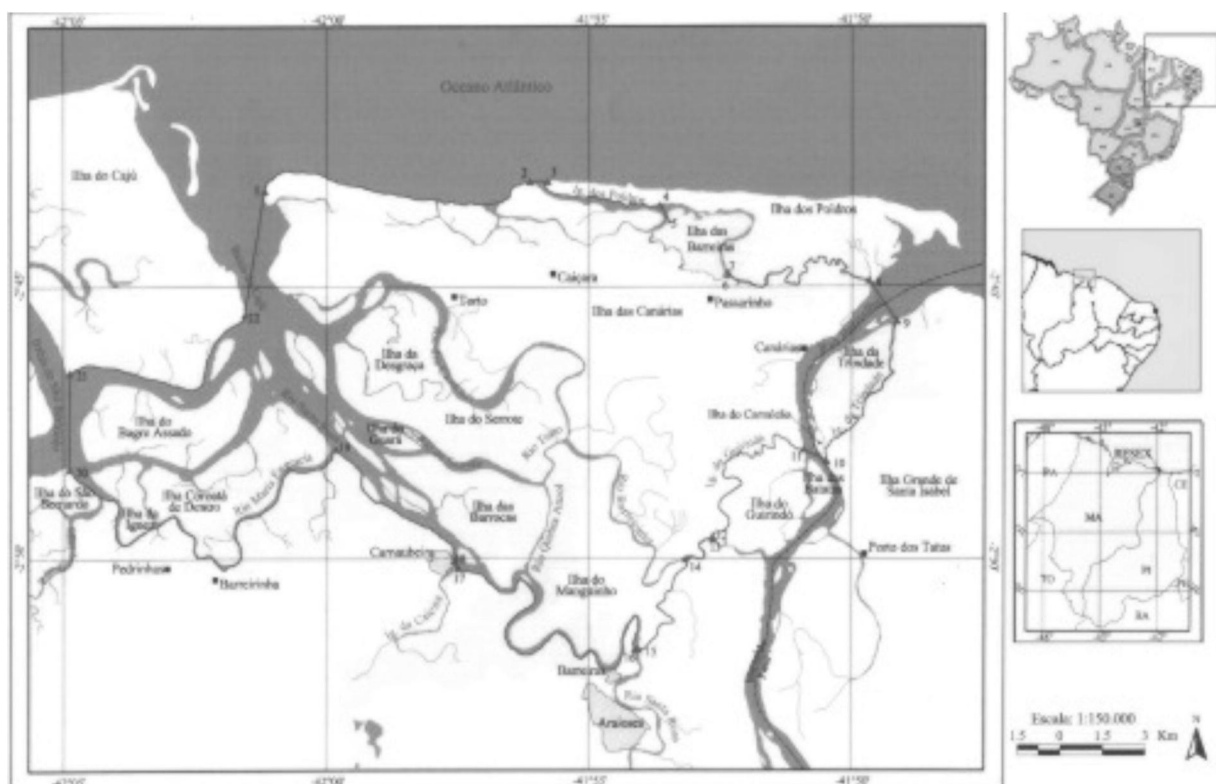


Figure 1. Extraction Reserve of the Parnaíba River Delta, located between the states of Piauí and Maranhão, Northeast region of Brazil

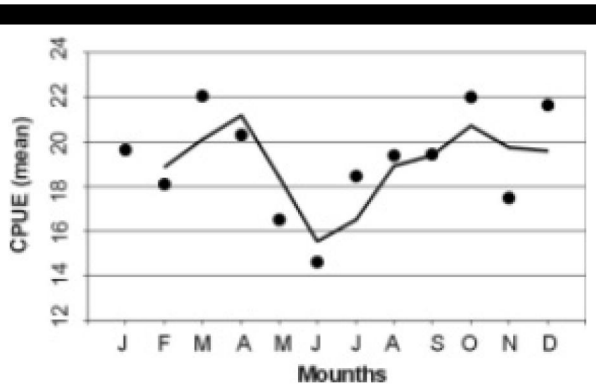


Figure 2. Mean of *Ucides cordatus cordatus* CPUE at Parnaíba River between 1999 e 2002.

According with the obtained results, about 21 million crabs are captured annually in the region. The raised taxes of capture, the socio-economic and environmental importance of *U. c. cordatus* and the description of the collapse of the resource in other regions of Brazil, evidence the necessity to develop actions that can modify this picture. Taking in account these issues, EMBRAPA, IBAMA and other partner institutions have elaborated projects and gathered resources to start a fishery management plan. This plan will, from 2004 on, directly involve the catcher communities, first-hand users of this resource. Amongst the planned actions are: the accomplishment of a socio-economic and environmental diagnosis; a study for a wastefulness reduction and improvement of the crab productive chain; the implementation of aquiculture systems and familiar agriculture in the communities; and the establishment of a socio-environmental education program. The development of these activities aims at to reach the sustainable capture of *U. c. cordatus* in the States of Piauí and Maranhão.

### CONCLUSION

The annual capture of approximately 21 million crabs in the Parnaíba River Delta, associated with the already observed indications of over fishing, brings to the conclusion that the collapse of the activity is a question of time, in case the appropriate measures are not taken to organize the productive chain and for an adequate resource management.

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