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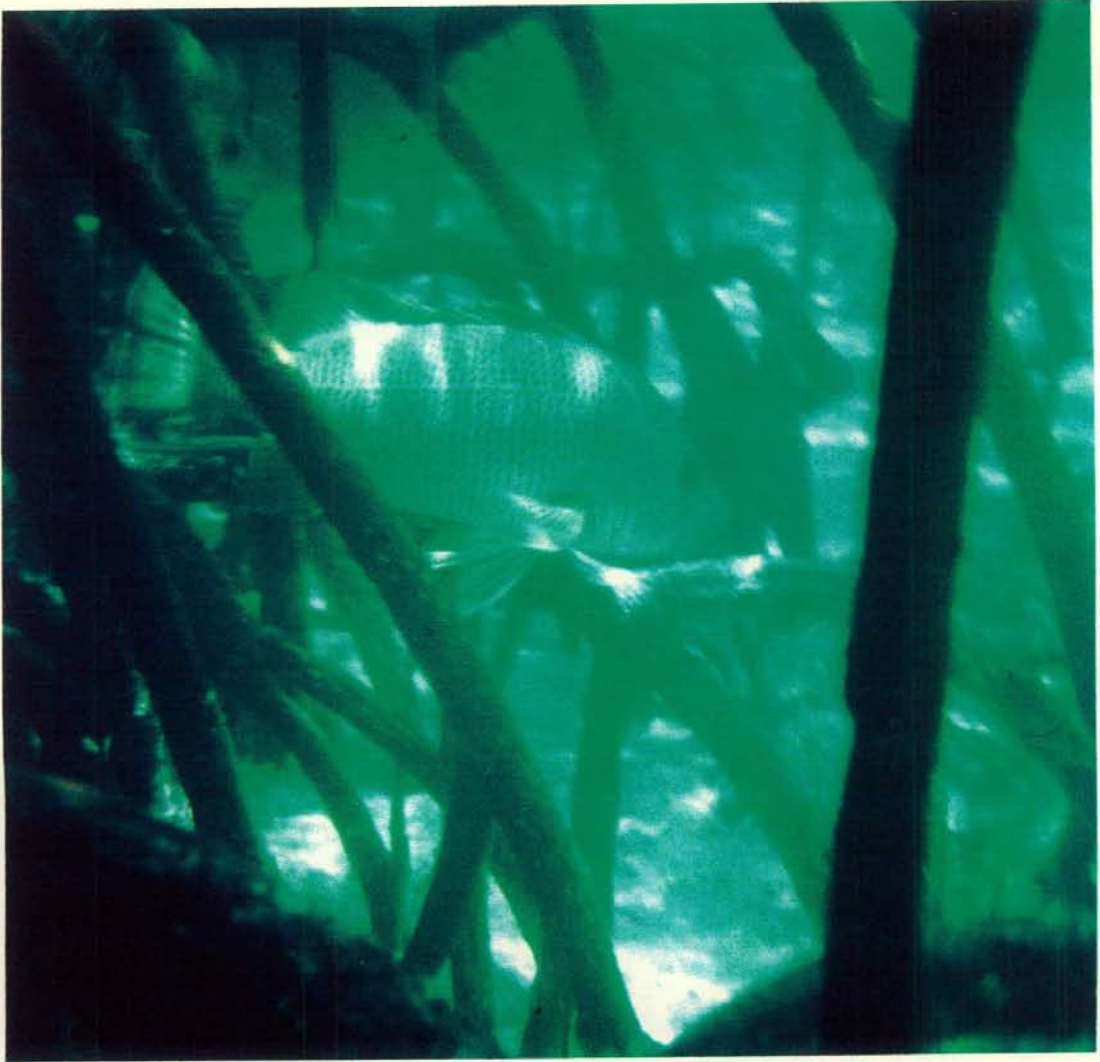
**ESTUARIES AS JUVENILE HABITATS FOR LUTJANID
AND SERRANID FISHES IN TROPICAL NORTHEASTERN
AUSTRALIA.**

Thesis submitted by Marcus John SHEAVES BSc(Hons) (*JCU*) in January 1995

for the degree of Doctor of Philosophy in

the Department of Marine Biology at

James Cook University of North Queensland



Lutjanus argentimaculatus sheltering amongst *Rhizophora stylosa* prop-roots.

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.....15/01/95.....

ACKNOWLEDGMENTS

I would like to thank the many people and organisations without whos' help and encouragement this work would not have been possible. This extends especially to the staff and students of James Cook University Department of Marine Biology. Particular thanks go to Prof. Howard Choat, Dr. Garry Russ and Dr. Dave Williams for their financial support and encouragement. Financial support from Merit Research Grants and Great Barrier Reef Marine Park Authority Augmentative Grants is also gratefully acknowledged. Special thanks to all the anglers who supplied fish, and particularly to the research staff from the Australian Institute of Marine Science Fish Biology Unit for their donations of samples of *Lutjanus russelli* from offshore waters. The careful reading, critical comments and encouragement of Dr. Brett Molony and Dr. Garry Russ is greatly appreciated also. The advise of Glenn De'ath on statistical matters was particularly valuable and is greatly appreciated. Finally, I thank my wife, who's perseverance, encouragement and support made the course of this project immeasurably smoother.

ABSTRACT

A number of lutjanid and serranid fishes are thought to utilise tropical estuaries as juvenile habitats. However, little detailed biological or life-history information exists for any species, and the species compositions of these families inhabiting tropical estuaries, are poorly known. During this study, the species compositions and life-histories of lutjanid and serranid fishes inhabiting estuaries along the north-eastern coast of tropical Australia were investigated. Using fish-traps, estuary faunas were compared to those inhabiting near-shore reefs. Additional samples were donated by anglers and collected from estuaries by angling. The reproductive statuses, and size and age structures of two serranids (*Epinephelus coioides* and *E. malabaricus*) and two lutjanids (*Lutjanus russelli* and *L. argentimaculatus*), in estuaries were compared to those of the same species from offshore. Fish-traps were also used to obtain data on the distribution and abundance by size of *L. russelli*, *E. coioides* and *E. malabaricus* from three estuaries - Cattle, Barramundi and Alligator Creeks - over a two year period.

Far fewer species of lutjanids and serranids were trapped from estuaries than from nearshore reefs. While fish-trap and angling collections from estuaries produced 9 species of serranids and 5 species of lutjanids, most were collected in low numbers. Only two serranids (*Epinephelus coioides* and *E. malabaricus*) and two lutjanids (*Lutjanus russelli* and *L. argentimaculatus*) were common in either trap or angling catches. All fish of each of these species from estuaries were found to be much smaller and younger than the largest and oldest fishes of these species from offshore waters. Furthermore, all fish of each species from estuaries were found to be in pre-reproductive condition. This implies that the estuarine populations of these species consist of juveniles, and that they undergo migrations to offshore adult habitats. Thus they possess three distinct life-history stages (pelagic larvae, estuarine juveniles, offshore adults) that correspond to major habitat shifts .

L. russelli were common in all estuaries and distributed throughout the three estuaries studied in detail. The probability of capturing *L. russelli* was similar in seaward areas of Cattle, Barramundi and Alligator Creeks, remained similar upstream areas of Barramundi Creek, but fell markedly in upstream parts of Cattle Creek. Spatial differences in the size of *L. russelli* (both within and between estuaries) were small, however, there was a strong pattern of seasonal change in the size of *L. russelli* in all estuaries. This seasonal pattern was apparently a product of the interaction between recruitment, mortality and migration. Studies in Alligator Creek showed that *L. russelli* demonstrated a strong preference for structurally complex habitats provided by fallen timbers and mangrove roots.

The numbers of both species of *Epinephelus* in trap catches declined in upstream areas of the three estuaries considered in detail. However, this reduction was much more marked for *E. coioides* than *E. malabaricus*, and while in downstream areas, the numbers of *E. coioides* were similar to or greater than those of *E. malabaricus*, in upstream areas *E. malabaricus* dominated. This suggests that the two species differ in their abilities to access or remain in upstream areas of estuaries. There was a strong negative correlation between the maximum deviation of salinity from 'normal' seawater levels and catches of both species of *Epinephelus*, suggesting that long-term salinity variation may be important in determining the distribution and abundance of *Epinephelus* spp. within estuaries.

The occupation of specific habitats during particular periods of development must be considered in the development of management strategies for these fishes. The use of estuaries as juvenile nursery grounds underlines the importance of maintaining the quality of estuarine habitats. More data from localities further afield (both within Australia and overseas) are needed to determine if the reproductive patterns found here apply to these species in other areas or to related species.

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DECLARATION

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

M. J. Sheaves

15 January 1995