

**Fishery and reproductive biology of *Amblygaster sirm*  
(spotted sardinella) distributed in the Eastern coastal  
waters of Sri Lanka**

By

Udaya Prasad Wickramasinghe Hettiarachchi

Thesis Submitted to the University of Sri Jayewardenepura For the  
award of the

M. Sc. Degree of Fisheries and Aquatic Resources Management

## Table of Contents

Table of Contents.....	I
List of Figures .....	IV
List of Plates.....	V
List of Tables.....	VI
Acknowledgements.....	VII
Abstract.....	VIII

## Table of contents

<b>CHAPTER ONE-Introduction.....</b>	<b>1</b>
1.1 Introduction to fishery in Sri Lanka .....	1
<b>CHAPTER TWO-Literature Review.....</b>	<b>3</b>
2.1 Introduction to Spotted sardinella .....	3
2.2 Distribution of spotted sardinella.....	4
2.3 Biology of spotted sardinella.....	5
2.3.1 Life cycle.....	6
2.3.2 Feeding Ecology .....	6
2.3.3 Reproductive biology . .....	7
2.4 Spotted Sardinella Fishery.....	9
2.4.1 Global status.....	9

2.4.2	Local status.....	10
2.5	<i>A.sirm</i> prices in local market in Sri Lanka.....	11
2.5.1	Annual average wholesale prices of fresh <i>A.sirm</i> at main fish market Colombo in Sri Lanka.....	11
<b>CHAPTER THREE- Materials and Methods.....</b>		<b>12</b>
3.1	Site selection.....	12
3.2	Data collection .....	14
3.2.1	Catch and effort data collection .....	14
3.2.2	Biological sample analysis .....	14
3.2.3	Reproductive biology.....	15
3.3	Data Analysis .....	16
3.3.1	Catch and effort data analysis.....	16
3.3.2	Reproduction biology .....	17
3.3.2.1	Sex ratio.....	17
3.3.2.2	Gonado-somatic Index (GSI).....	17
3.3.2.3	Size at first sexual maturity ( $L_{50}$ ).....	18
3.3.2.4	Fecundity.....	18
3.4	Statistical analysis.....	19
<b>CHAPTER FOUR-Results.....</b>		<b>20</b>
4.1	Spotted Sardinella fishery.....	20
4.1.1	Fishing method.....	20
4.2	Relative annual fisheries contribution of different species in total catch.....	22

4.3	Fishing effort.....	22
4.3.1	Variation in fishing effort.....	22
4.4	Monthly variation of <i>A.sirm</i> CPUE .....	25
4.5	Variation of <i>A.sirm</i> total production .....	26
4.6	Reproductive biology.....	28
4.6.1	Sex ratio.....	28
4.6.2	Macroscopic and gonad staging.....	29
4.6.2.1	Stages of male gonads.....	29
4.6.2.2	Stages of female gonads.....	30
4.6.3	Reproductive cycle of <i>A.sirm</i> .....	31
4.6.4	Gonad somatic Index.....	31
4.6.5	Size at first sexual maturity ( $L_{50}$ ).....	33
4.6.6	Fecundity.....	34
<b>CHAPTER FIVE-Discussion.....</b>		<b>35</b>
<b>CHAPTER SIX- Conclusions.....</b>		<b>40</b>
<b>References</b>		
<b>Appendices</b>		



**Fishery and reproductive biology of *Amblygaster sirm* (spotted sardinella)  
distributed in the Eastern coastal waters of Sri Lanka.**

**Udaya Prasad Wickramasinghe Hettiarachchi**

**ABSTRACT**

The fishery and reproductive biology of *Amblygaster sirm* (spotted sardinella) were studied in Kalmunai and Batticaloa fisheries districts in the Eastern Coastal Waters of Sri Lanka from October in 2018 to September in 2019, in order to provide some recommendations for sustainable utilization of this species. Field visits were conducted on monthly basis. During the field visits, total catch of *A. sirm* were taken randomly from selected boats and fishing effort were recorded. On each sampling day, 60-70% of Out boat engine Fiberglass Reinforced Plastic (OFRP) boats that operated for the gill net fishery were sampled randomly; total length, standard length, body depth, head length, total weight, gonad weight and somatic weight of the fish were recorded. Gonadal development of each fish was examined after dissecting the fish and then sex and maturity stages of *A. sirm* were determined. The lowest Catch Per Unit Effort (CPUE) of *A. sirm* in terms of catch in kg / gillnet boat /day was recorded in the month of May where as the highest was recorded in July. The observed CPUE was significantly different between fishing months ( $p < 0.05$ ). However, the CPUE was not significantly different between fish landing sites ( $p > 0.05$ ). Reproductive activity was assessed by using macroscopic and microscopic observations of gonadal characteristics, trends of gonad indices, size at first sexual maturity and differences in the monthly sex ratio. According to the results, the estimated mean standard body length of *A. sirm* males (16.1cm) were higher than females (15.9cm). Gravid females were observed throughout the year, confirming that they are continuous spawners. However, the peak spawning season observed during the present study

was from June to July. The estimated mean Gonado Somatic Index (GSI) was 0.08 and 0.09 for males and females respectively. Females were dominant in fish catches observed for all months. Sex ratio of *A. sirm* population fluctuated seasonally as well as significantly, the higher sex ratio between males and females was observed in December 2018 and April in 2019. The size at first sexual maturity ( $L_{50}$ ) was estimated at 13.8 and 14.0 cm (standard length, SL) for males and females respectively. Five stages of internal egg masses; stage I, II, III, IV and V were identified based on colour and size of the eggs. The average fecundity of *A. sirm* varied from  $1.4 \times 10^4$  to  $1.2 \times 10^4$ . Present study revealed that spawning season of the *A.sirm* spawns in the eastern coastal of Sri Lanka occurred from June to July and also the estimated length at first maturity was lower than the previous studies carried out in Sri Lankan waters. The period from January to July could be considered as the lean fishing season in gillnet fishery and the remaining time period of the year could be considered as the main fishing season in the eastern coastal waters. Females with developed stage were found throughout the study period confirming that *Amblygaster sirm* spawns throughout the year. Further, this study showed that *Amblygaster sirm* caught in the Eastern Coastal waters were early matured than in the Western Coastal waters of Sri Lanka. Therefore, findings of this study provide baseline information to manage and sustainable utilization of the *Amblygaster sirm* resources in the Eastern Coastal Waters of Sri Lanka.