FAO Fisheries and Aquaculture Circular No. 1056 SLC/C1056 (En)
ISSN 2070-6065

BIOLOGY AND FISHERY MANAGEMENT OF THE WHITE SEA URCHIN, *TRIPNEUSTES VENTRICOSUS,* IN THE EASTERN CARIBBEAN

Cover photographs:
Left to right from top: white sea urchins on reef (courtesy of BARNUFO); pre-season population abundance survey being conducted in Barbados (courtesy of BARNUFO); consultative meeting with white sea urchin harvesters, Barbados (courtesy of Sharon Almerigi); harvester preparing white sea urchins for sale, Barbados (courtesy of Christopher Parker).

Copies of FAO publications can be requested from:
Sales and Marketing Group
Office of Knowledge Exchange, Research and Extension
Food and Agriculture Organization
of the United Nations
Viale delle Terme di Caracalla
00153 Rome, Italy
E-mail: publications-sales@fao.org
Fax: +39 06 57053360
Web site: www.fao.org/icatalog/inter-e.htm

BIOLOGY AND FISHERY MANAGEMENT OF THE WHITE SEA URCHIN, *TRIPNEUSTES VENTRICOSUS*, IN THE EASTERN CARIBBEAN

by
Maria Pena
Project Officer
CERMES, The University of the West Indies
Barbados

Hazel A. Oxenford
Professor of Marine Ecology and Fisheries
CERMES, The University of the West Indies
Barbados

Christopher Parker
Fisheries Biologist
Fisheries Division
Ministry of Agriculture
Barbados

Antoinette Johnson
Laboratory Manager
Department of Environmental Health
Cayman Islands (United Kingdom)

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 2010

ISBN 978-92-5-106648-5

PREPARATION OF THIS DOCUMENT

This publication was prepared for the Food and Agriculture Organization of the United Nations (FAO) Subregional Office for the Caribbean (FAO/SLC) as a direct output of a Special Workshop on the White Sea Urchin Fisheries in the Eastern Caribbean at the 61st Annual Gulf and Caribbean Fisheries Institute in Le Gosier, Guadeloupe, on 10–14 November 2008. In view of the importance of the collated information obtained from published and unpublished documents on the white sea urchin fisheries in the eastern Caribbean and the request by some countries to address the white sea urchin fishery from a regional perspective, it was considered that a separate document presenting this material would have a greater scientific impact and would be more accessible for information sharing than if simply incorporated into the report of the workshop.

Pena, M. H.; Oxenford, H.A.; Parker, C.; Johnson, A.
Biology and fishery management of the white sea urchin, *Tripneustes ventricosus*, in the eastern Caribbean.
FAO Fisheries and Aquaculture Circular. No. 1056. Rome, FAO. 2010. 43p.

ABSTRACT

The white sea urchin, *Tripneustes ventricosus*, is common in shallow coastal waters of the tropical Atlantic Ocean, and is widely distributed in the Caribbean Sea. The species supports small-scale, commercially important, seasonal fisheries in several islands in the eastern Caribbean including Barbados, Martinique (France) and Saint Lucia, and minor subsistence fisheries in Grenada and Saint Vincent and the Grenadines. However, despite significant management and conservation efforts by some countries, white sea urchin population abundance has declined locally. Understanding the large fluctuations in local population size and implementing sound management practices in the white sea urchin fisheries is critical to the sustainable use of this resource in the future, and would benefit considerably from a sharing of information and management experiences. To this end, this circular has attempted to collate both published and unpublished information on the white sea urchin and its fisheries in the eastern Caribbean and perspectives on past and current management of these fisheries.

CONTENTS

	Page
Preparation of this document	iii
Abstract	iv
Abbreviations and acronyms	vii
Executive summary	viii
1. IDENTITY: NOMENCLATURE AND TAXONOMY	**1**
2. MORPHOLOGY	**1**
3. DISTRIBUTION	**3**
3.1 Species range	3
3.2 Habitat and distribution	3
4. ECOLOGY AND LIFE HISTORY	**4**
4.1 Reproduction: sexuality, maturity, fertilization and spawning	4
4.2 Life-history stages	5
4.3 Nutrition and growth	6
4.4 Behaviour: migration and response to stimuli	7
4.5 Diseases, polluants and environmental sensitivity	7
5. AQUACULTURE POTENTIAL	**8**
6. POPULATION STRUCTURE	**9**
6.1 Stock structure	9
6.2 Abundance and density	9
7. EXPLOITATION	**11**
7.1 Fishing methods, vessel types and gear	11
7.2 Fishing areas: national fishing locations and landing sites	14
7.3 Fishing seasons	15
7.4 Fishing operations	15
8. SOCIO-ECONOMIC PROFILES OF WHITE SEA URCHIN FISHERIES	**20**
8.1 Barbados	20
8.2 Saint Lucia	22
8.3 Carriacou and Grenada	22
8.4 Saint Vincent and the Grenadines	23
8.5 Martinique	23
9. SEA URCHIN FISHERIES MANAGEMENT	**23**
9.1 Barbados: closed seasons and moratoria	24
9.2 Saint Lucia: closed seasons and comanagement	32
9.3 Carriacou and Grenada	34
9.4 Saint Vincent and the Grenadines	34
9.5 Martinique: closed seasons and moratoria	34
9.6 Commonalities in white sea urchin fishery management	36
10. CURRENT AND FUTURE RESEARCH	**36**
10.1 Country-specific research needs	36
10.2 Current research	38

REFERENCES **40**

TABLES

1. Nomenclature and taxonomy of the white sea urchin 1
2. Common and vernacular names of the white sea urchin used in the eastern Caribbean 1
3. Types of white sea urchin fishers in Barbados 20
4. Traditional management practices in the Barbados white sea urchin fishery 25
5. Recent projects aimed at developing comanagement approaches to the white sea urchin fishery 27
6. Fisheries comanagement annual work planning project summary 28
7. By-laws regulating the white sea urchin fishery in Martinique, 1988–2008 35

FIGURES

1. Basic body plan of a sea urchin test 2
2. Life cycle of the white sea urchin 5
3. Nei's genetic distance dendrograms 10
4. Main white sea urchin fishing areas in the eastern Caribbean 14
5. Estimates of income of regular divers in the two-month 2002 season in Barbados 22
6. Twenty-five year summarized management history for the Barbados white sea urchin fishery 24
7. Degrees and labels of comanagement 27
8. Phases of comanagement 31
9. Twenty-five year summarized management history for the Saint Lucia white sea urchin fishery 33

BOXES

1. Comanagement demonstration project summary 29
2. Comanagement of the white sea urchin fishery – CCA pilot project summary 29
3. Coastal Resources Comanagement Project (CORECOMP) summary 30
4. Research needs and existing information gaps in white sea urchin fisheries in the eastern Caribbean 37
5. Current research being undertaken by the CERMES on the white sea urchin and its fisheries 38

PLATES

1. Species of *Tripneustes* 1
2. Removing the Aristotle's lantern from a white sea urchin 2
3. Morphology of the white sea urchin 3
4. Partially de-spined, running-ripe white sea urchins 4
5. Diseased urchins showing symptomatic loss of spines 8
6. Traditional harvesting method for white sea urchins in Barbados 11
7. Types of boats used in the harvest of white sea urchins in the eastern Caribbean 12
8. Traditional harvesting method for white sea urchins using the dory in Saint Lucia 13
9. Processing and marketing of white sea urchins for sale 18

ABBREVIATIONS AND ACRONYMS

BARNUFO	Barbados National Union of Fisherfolk Organisations
CANARI	Caribbean Natural Resources Institute
CERMES	Centre for Resource Management and Environmental Studies
DOF	Department of Fisheries
FAC	Barbados Fisheries Advisory Committee
FMP	fisheries management plan
IFREMER	Institut français de recherche pour l'exploitation de la mer
IRPM	Institut régional de pêche et de marine
MarGov	Marine Resource Governance in the eastern Caribbean
RAPD	Randomly Amplified Polymorphic DNA
SEFMAC	Sea Egg Fishery Management Advisory Council

EXECUTIVE SUMMARY

Stocks of the white sea urchin, commonly known as the sea egg in the eastern Caribbean, have virtually collapsed in recent years, despite serious efforts aimed at conservation and protection by some countries harvesting the resource. Some of the main fishery management measures implemented over the years include annual closed seasons; closed areas; prohibition of harvest with the assistance of scuba gear; multiyear fishing moratoria; minimum size at capture and total individual or area catch quotas.

Despite these efforts, empirical evidence indicates overall declines in white sea urchin stocks, with occasional instances of recovery not being sustained. Given these observations, FAO was requested by some eastern Caribbean countries to address the white sea urchin fishery from a regional perspective.

In response to this request, the FAO Subregional Office for the Caribbean (FAO/SLC), the Centre for Resource Management and Environmental Studies (CERMES) of the University of the West Indies (UWI) in Barbados, the Institut français de recherche pour l'exploitation de la mer (IFREMER) in Martinique (France) and the Institut régional de pêche et de marine (IRPM) in Guadeloupe (France) collaborated in hosting a Special Workshop on the White Sea Urchin Fisheries in the Eastern Caribbean at the 61st session of the Gulf and Caribbean Fisheries held in Gossier, Guadeloupe on 10-14 November 2008. The main objective of the workshop was to determine the national and/or subregional actions that could be taken for recovery of white sea urchin fisheries in the eastern Caribbean.

Prior to this workshop, the partners collaborated in collating existing information on the biology and management of the white sea urchin fisheries in the eastern Caribbean with specific responsibilities being divided as follows:

- UWI/CERMES – collation and review of published and unpublished information on the white sea urchin and its fishery in the English-speaking eastern Caribbean;
- IFREMER – collation of published and unpublished information on the white sea urchin and its fishery in Martinique and Guadeloupe;
- FAO/SLC – solicitation of national reports on the white sea urchin and its fishery from participating countries.

This synthesis incorporates published and unpublished information on the white sea urchin in the eastern Caribbean – Barbados, Carriacou (Grenada), Grenada, Martinique, Saint Lucia, and Saint Vincent and the Grenadines. The Circular consists of ten chapters. Chapters 1–6 synthesize information on the biology, ecology, population structure and aquaculture potential of the resource. Chapter 7 addresses the exploitation of the resource including the types of fishing equipment used, fishing areas and seasons. Chapter 8 examines the socio-economic importance of the white sea urchin fisheries in the eastern Caribbean. Chapter 9 focuses on the past and current management of the white sea urchin fisheries by country, and Chapter 10 identifies knowledge gaps for the sustainable management of white sea urchin fisheries and provides an overview of current research being conducted on white sea urchin fisheries in the region.

A second output of the collaboration is an annotated bibliography related to the white sea urchin and its fisheries in the eastern Caribbean. It is hoped this bibliography will be used as a reference guide for future research and will be updated regularly as literature is both produced in the future and discovered from previous studies.

Bisessar Chakalall †
Senior Fishery Officer
FAO Subregional Office for the Caribbean