

# Biology, Fisheries, and Spawning Aggregations of Snappers and Groupers as Documented by the Proceedings of the Gulf and Caribbean Fisheries Institute

ALEJANDRO ACOSTA<sup>1</sup> and BRIAN E. LUCKHURST<sup>2</sup>

<sup>1</sup>*FWC/FWRI, 2796 Overseas Hwy, Suite 119 Marathon, Florida 33050 USA*

<sup>2</sup>*2-4 Via della Chiesa, 05020 Acqualoreto (TR), Umbria, Italy*

## ABSTRACT

This work is a summary of the 175 (67 snapper, 61 groupers and 47 spawning aggregations) presentations at the GCFI annual meetings which have contributed to advances in the biology, life history and fisheries management of snappers and groupers in the Gulf of Mexico and the Caribbean. During the first three decades of GCFI, snappers and groupers were minimally represented at the annual Institutes (1 grouper–6 snapper papers), probably because the fisheries for snappers and groupers was far less important than the shrimp and other pelagic fisheries in the region. However, the fisheries potential of snappers and groupers was identified in most of the GCFI presentations describing the fisheries resources of several countries throughout the region (Mexico, USA, Venezuela, Martinique, Honduras, Guyana, Colombia, Puerto Rico, Jamaica, and others). The number of publications for these fisheries increased dramatically in the 1990s, especially for groupers, with 40 presentations covering a wide range of research areas from aquaculture to stock assessment and spawning aggregations. The contribution for snappers has been more evenly distributed, with 28 and 29 publications for the 1990s and the 2000s, respectively. In the case of spawning aggregations, there were 19 papers during the 1990s increasing to 27 papers in the period 2000-2006. This reflects an increase in research and management efforts in recent years. This presentation describes the historical trends for snapper and grouper fisheries, as well as spawning aggregations, from the perspective of contributions to the GCFI Proceedings.

KEY WORDS: Snapper, groupers, history, spawning aggregations Caribbean, Gulf of Mexico

## La Biología y Pesquería de Pargos y Meros a Través de las Memorias del Instituto de Pesquerías del Golfo y el Caribe

Este trabajo representa un resumen de las 175 (67 pargos, 61 meros y 19 agregaciones de desove) presentaciones hechas en las reuniones anuales del GCFI, las cuales han contribuido al avance en la biología, la historia de vida y el manejo de las pesquerías de pargo y mero a través del golfo de México y del Caribe. El recurso de pargos y meros estuvo pobremente representado a lo largo de las tres primeras décadas de historia del Instituto de Pesquerías del Golfo y el Caribe (GCFI, por sus siglas en inglés), con apenas 1 presentación de pargo y 6 de meros. Posiblemente esto haya estado vinculado al hecho que las pesquerías de pargo y mero eran mucho menos importantes que las pesquerías de camarón y otras pesquerías de pelágicos en la región. Sin embargo, el potencial de las pesquerías de pargo y mero siempre fue identificado en la mayoría de las presentaciones del GCFI que describían los recursos pesqueros de los países de la región (México, USA, Venezuela, Martinica, Honduras, Guyana, Colombia, Puerto Rico, Jamaica y otros). El número de las publicaciones relacionadas con estas pesquerías aumento en los años noventa, especialmente de meros, con 40 presentaciones que cubrían una amplia gama de áreas de investigación (acuicultura, evaluación de stock y agregaciones de desove). El número de contribuciones para los pargos ha sido más uniforme, con un número de 28 y 29 publicaciones para los años 90 y los 2000, respectivamente. En el caso de las agregaciones de desove el número de publicaciones se incremento de 19 durante los años 90 a 27 durante el periodo de los años 2000 al 2006. El presente trabajo describe las tendencias históricas de las pesquerías de pargo y mero y sus agregaciones de desove desde la perspectiva de las contribuciones a las memorias del GCFI.

PALABRAS CLAVES: Pargos, meros, historia, agregaciones de desove, Mar Caribe, Golfo de México

## INTRODUCTION

The purpose of this paper is to review the history of fisheries development and management within the Gulf and Caribbean over the past 60 years, using the Proceedings of the Gulf and Caribbean Fisheries Institute (GCFI) as an historical record. Fisheries in the Gulf of Mexico and Caribbean have undergone substantial changes during this period and, as a consequence, the demand for research on the fisheries resources in the region has increased exponentially. GCFI is one of the oldest scientific meetings for marine scientists and fisheries managers in the region and, due to this longevity, the historical record of the papers

presented at the meeting should provide an excellent means of tracking fisheries developments throughout the region. The objectives of this evaluation are to identify the large-scale trends within the region, and to evaluate the effectiveness of GCFI proceedings in reflecting the developments in resource utilization and management for snapper and grouper fisheries and the associated spawning aggregations.

## METHODS

The Proceedings of the GCFI provide an historical record of the papers presented in both the oral and poster

sessions throughout its 60 years existence. In 2005, all proceedings were digitized and posted on the GCFI website. The digitalization of the proceedings allowed for easy access and the ability to search all papers submitted to the meetings by theme, geographic location, authorship and other fields. The proceedings were searched for snapper, grouper and spawning aggregations and the data was extracted and tabulated based on present-absent values. Study purposes included identifying spatial or temporal patterns, generating species lists, and fisheries and stock assessments. Data was used to develop time lines reflecting changes and trends in the number of publications and subjects throughout the region. These time lines were graphically displayed and compared to FAO landings records for snappers and groupers in the region.

### RESULTS AND DISCUSSION

A review of the snapper and grouper papers in the Gulf of Mexico and Caribbean Sea published in the *Proceedings of the Gulf and Caribbean Fisheries Institute* between 1948 - 2006, revealed an interest in the potential of these fisheries resources from the early years. A total of 139 publications were examined from the GCFI volumes published during this period. The red snapper (*Lutjanus aya*) currently (*L. campechanus*) from the Gulf of Mexico was the first snapper species documented in the GCFI

Proceedings (Camber, 1954). This paper reviewed the landings of *L. aya* from 1880 to 1951. Red grouper (*Epinephelus morio*) from Yucatan, Mexico was the first grouper species documented (Carranza, 1956) as part of a broad review of the marine fisheries of the Yucatan Peninsula. While the cumulative number of publications has grown steadily since the mid-1980s, the sharpest increases occurred in the 1990s. (Table 1).

The snapper species with the greatest number of publications were: red snapper (*L. campechanus*) with 26 publications (42%); followed by deep water snappers. *E. oculatus* with 9 publications (15%), gray snapper (*L. grisesus*) with 7 publications (11%) and Yellowtail snapper (*O. chrysurus*) with 5 publications (8%). The majority of the publications were on four main topics: 1) biology of the species including the estimation of life history parameters and trophic levels - 36 publications (56%); 2) fisheries surveys and management strategies - 22 publications (35%) 3) stock assessment - 8 publications (13%) and 4) habitat - 5 publications (8%). The largest number of publications was in 2002 with 13 publications. Figure 1 presents the changes in the number of publications through the years and a comparison of the number of publications versus the snapper landings reported by FAO.

The grouper species with the greatest number of publications were: red grouper (*E. morio*) - 19 publications

**Table 1.** Total number of contributions in each of the thematic areas using the GCFI proceedings, examined in decadal periods.

Thematic areas	1950	1960	1970	First 30 volumes	1980	1990	2000	Next 27 volumes	Total number
Snapper fishery	2	1	3	7	4	28	29	61	68
Grouper fishery	1	0	0	1	7	40	23	70	71
Total number of contributions	<b>3</b>	<b>1</b>	<b>3</b>	<b>7</b>	<b>11</b>	<b>68</b>	<b>52</b>	<b>117</b>	<b>139</b>
			<b>Related</b>	<b>Topics</b>					
Fisheries management	13	4	31	48	12	45	30	87	135
Coastal and reef fish fisheries	13	6	7	26	9	34	45	88	114
Stock assessment	40	15	21	76	43	50	28	121	197
Sport fisheries	7	5	7	19	34	14	28	76	95
Spawning aggregations	0	0	1	1	0	19	27	46	47

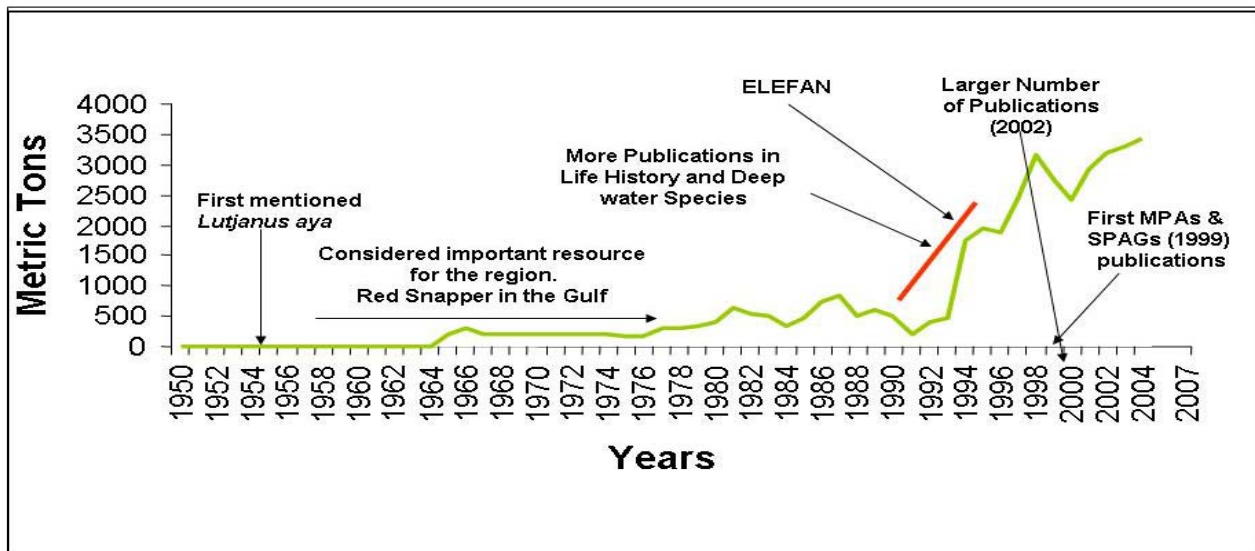
(31%), red hind (*E. guttatus*) - 11 publications (18%), Nassau grouper (*E. striatus*) - 10 publications (16%) and gag grouper (*M. microlepis*) - 9 publications (15%). The majority of the publications have been on four main topics: 1) biology of the species including the estimation of life history parameters and trophic levels - 28 publications (46%) 2) fisheries surveys and management strategies - 25 publications (41%) 3) stock assessment - 5 publications and 4) aquaculture - 3 publications. Figure 2 presents the changes in the number of publications through the years

and a comparison of the number of publications versus the grouper landings reported by FAO. The largest number of publications was in 1990 during the Grouper Symposium of the 43rd Annual meeting.

A chronological overview of publications based on spawning aggregations indicates that the first paper was published in 1979 on Nassau grouper (Olsen and Laplace, 1979). Surprisingly, there were no papers published during the 1980s on spawning aggregations but during the 1990s there were a total of 19 papers. From 2000-2006 there

**Table 2.** Total number of contributions by geographic areas for snappers and groupers using the history of the GCFI proceedings

Geographic Area	Number of Publications Snappers	Percentage	Number of Publications Groupers	Percentage
U.S.. Atlantic	10	15		
U.S. Gulf of Mexico	23	34	15	21
Mexico	8	12	38	54
Caribbean Sea	20	29	8	11
Latin America	4	6		
Puerto Rico	3	4	10	14
Total	68		71	



Data Source FAO

Figure 1. Comparison between FAO Snapper landings and publication of the GCFI.

were a total of 27 papers published as interest in, and studies on, spawning aggregations expanded rapidly. The majority of the grouper papers were based on studies of Nassau grouper and red hind.

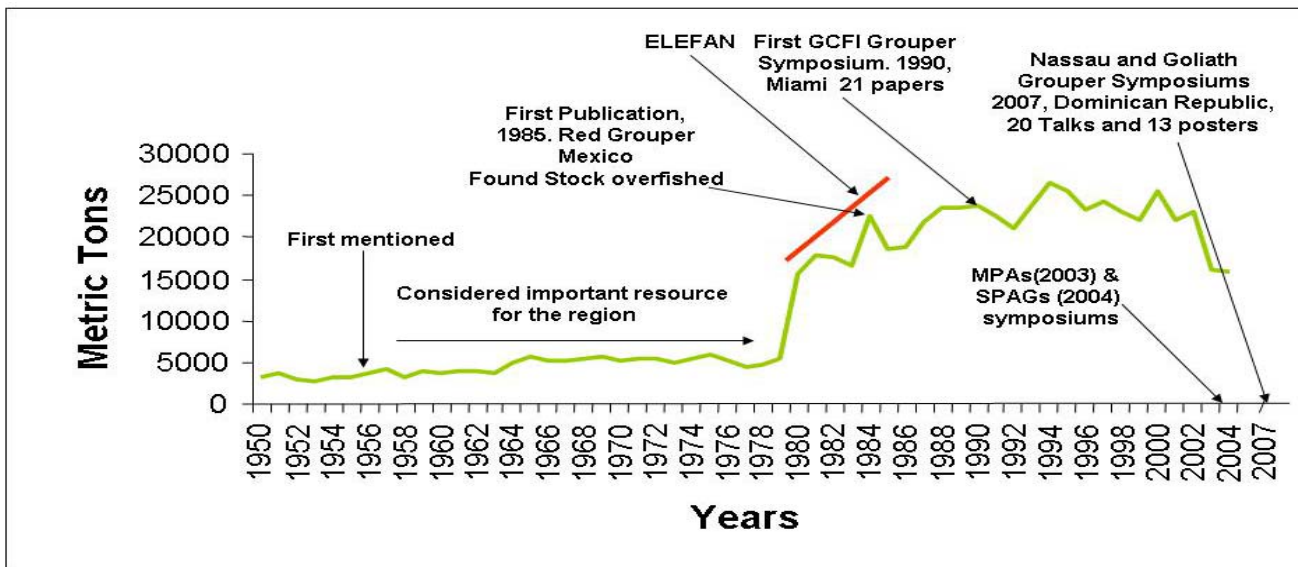
Presentations from the Caribbean began in the late 1950's and have held fairly steady until the late 1980s. Starting in the late 1980s, a notable increase in the number publications from the Caribbean islands was observed. Although disproportionate, the spatial distribution of studies examined covers much of the known distribution of snappers and groupers. Specific areas that have received the most thorough study include Florida (USA) and the Gulf of Mexico (Table 2).

**CONCLUDING REMARKS**

This work represents the first attempt to assemble and examine the trends of the snapper and grouper fisheries in the Caribbean and Gulf of Mexico based on the participation of scientists, industry and government at the annual

meetings of GCFI. The demand for fisheries resources in the region together with the many developments in gear and practices are likely to result in increased fishing power and capture of snappers and groupers in the region. As the landings increased, the demand for scientific and management information also increased and this is reflected in an increase in the number of presentations and the diversity of research topics at the GCFI meetings. The development of computer-based stock assessment techniques using length-frequency data such as ELEFAN and FISAT permitted the increase of life history papers especially in the late 1980s and early 1990s. The increase in multi-disciplinary sessions and presentations at the GCFI annual meeting indicated that studies that examine habitat features at multiple temporal and spatial scales are more predominant in the last 10 years than those that only look at one scale of the spectrum. In addition, there is a new research area looking at habitat connectivity and home range for these species together with research on MPAs and spawning aggregations.

Figure 2. Comparison between FAO Grouper landings and publication of the GCFI.



Data Source FAO