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Diversity and Abundance of the Commercial Fish at Some Coastal Coral Reef Bays in Marsa Alam, Red Sea, Egypt

Mahmoud M. Maaty[1*], Aml Z. Farhat[1], Mohamed A. Abu El-Regal[2,3] and **Ahmad M. Azab[4]**

[1]National Institute of Oceanography and Fisheries, NIOF, Egypt, [2]Marine Biology Department, Faculty of Marine Science, King Abdulaziz University, Jeddah, KSA, [3]Faculty of Science, Port Said University, Port Said, Egypt, and [4]Zoology Department, Faculty of Science, Al-Azhar University, Cairo, Egypt

[*]mahmoudmaaty1@yahoo.com

Abstract. This work aimed to study the diversity and abundance of the common commercial fish communities at six coastal coral reef bays around Marsa Alam city on the southern coast of the Egyptian Red Sea. Fish communities were counted at six sites, Marsa Saifen, Marsa Shoni2, Marsa Shoni4, Marsa Fujiri, Marsa Nakari and Marsa Hamata using underwater visual census technique (UVC). A total of 2458 fish belonging to 16 families and 44 species of commercial fish were identified. Five families (Scaridae, Serranidae, Mullidae, Lutjanidae and Lethrinidae) contained 27 species (61.4% of the total number of species). Four families (Mullidae, Siganidae, Scaridae and Lutjanidae) were the most abundant and they formed about 91.3% of the total number of recorded individuals. Mullidae was the most abundant constituting about 63.5% of the fish community. The most abundant species was *Mulloidichthys flavolineatus*, of the family Mullidae with 1390 individuals forming 56.5%, followed by *Siganus rivulatus* of the family Siganidae (251, 10.2%). The highest fish abundance was recorded in Marsa Saifen (609 individuals) and the lowest abundance was recorded at Hamata (271 individuals). The highest number of species (23 species) was observed in Marsa Fujiri, whereas the lowest number of species (17 species) was recorded in Hamata. The knowledge of the ecology of marine fish communities in the Red Sea is sparse.Hence, the quantitative ecological studies are needed. Action plans and research programs must be developed to reduce early stages bycatch and initiate fisheries management strategies for commercially exploited species.

Keywords: Commercial reef fish, Bays, Red Sea.

1. Introduction

The world food shortage and the shakable situation of Egyptian food security have made development of our food resources an inevitable necessity. Fish is one of the important traditional components of Egyptian citizen's meal, for its comparative cheap fresh protein (Mohamed *et al*., 2010), and over the years, fish have been considered significant, important, and vital source of world food (protein) (Sharaan *et al*., 2017)

In Egypt, fishery sector is considered as one of the important sectors in the economic structure of the country (Seham & Salem, 2004). Fishing might be known well in ancient Egypt. There are paintings in some tombs of pharaoh's which show fish, probably Tilapia, in man-made pools indicating some type of fish culture (Mcvey, 1994). Fish is a basic

* Corrspondance auther.

component of the traditional Egyptian diet and an important source of low-cost animal protein (Soliman & Yacout, 2016). According to the General Authority for Fisheries Resources and Development (GAFRD), fisheries in Egypt are divided into five main areas: the seas, northern lakes, coastal lagoons, inland lakes, and the River Nile (GAFRD 1997–2012).

The Red Sea is a deep semi-enclosed basin connected to the Indian Ocean by a narrow sill in the south (Mandeb Strait) to the Mediterranean Sea by the Suez Canal in the north. The Northern Red Sea is an important sea area, both for fishing and for its unique geography; and often spectacular marine ecology as macro-algae, sea-grass beds, mangroves, and coral reefs (Alkershi & Menon, 2011). The Red Sea has long been recognized as a region of high biodiversity (Samy *et al*., 2011).

The Red Sea coast of Egypt, including the Gulfs of Suez and Aqaba and the intervening Sinai Peninsula, about 1500 km in length (Bird, 2010). The delicate area of the Egyptian Red Sea coast contains about 66% of hard coral reefs species existing within the Red Sea including some endemic species (PERSGA, 2009-2010). Moreover, Coral reefs provide protection and shelter in the natural zone for many different species of fish, and home to over 1000 species, many of them with commercial value. Red Sea is one of the most important fishery resources in Egypt. It has many commercial fish species which are more common in the tropical and subtropical Indo-West Pacific area. On the other hand, these species are absent in the eastern Pacific and Atlantic oceans (Russell, 1990; El-Ganainy, *et al*., 2018). They are consumed as food by some larger fish, which are in turn consumed by humans through the food chain (Altndag & Yigit, 2005 and Abdel Gawad, 2018).

Coastal systems provide important ecosystem services with considerable economic and ecological value (Lotze *et al*., 2006; Barbier *et al*. 2011), and play an important role as nursery and fishing grounds for many commercial species (Ahmed & El-Mor, 2006). The Red Sea contains many coastal bays, which act as nursery areas for many commercial and recreationally harvested fish species (Morsy, *et al*., 2010; Mustafa, *et al*., 2014; Peters & Chigbu, 2017). Coastal fish are defined as fish assemblages in shallow near-shore areas (less than 20 m depth). Coastal fish are also of importance for environmental management from several perspectives. They contribute to human well-being both directly via commercial and recreational fisheries, and by supporting the functioning of coastal food webs (Ronnback *et al*., 2007; Seitz *et al*., 2014). For example, coastal fish provide a food source for other species (top predators, piscivorous fish) and act as consumers potentially regulating the abundance of lower trophic level taxa (Ostman *et al*., 2016).

The abundance and species composition of coastal fish assemblages may be locally influenced not only by, for example, the availability of recruitment and foraging areas, prey availability and predation patterns (Harma *et al*., 2008; Vetemaa *et al*., 2010; Ostman *et al*., 2012; Sundblad *et al*., 2014), but also by anthropogenic stressors, such as eutrophication and fishing pressure (Bergstrom *et al.*, 2013; Florin *et al.*, 2013; Mustamaki *et al.*, 2014; Snickars *et al.*, 2015, Bergstrom *et al.*, 2016).

Stock assessments studies over the last 10 years showed that most commercial fish species in the Red Sea and Mediterranean Sea were subject to overfishing (Maiyza *et al*., 2020; Al Solami, 2020 and Shalem *et al*., 2021); Emperor fish, *Lethrinus lentjan* (Younis *et al*., 2020); rabbit fish, *Siganus rivulatus* (Mehanna *et al*., 2018; Gabr *et al*., 2018); bogue, *Boops boops* (Azab *et al*., 2019); Red Sea goatfish, *Parupeneus forsskali* (Sabrah, 2015); lizard fish, *Saurida undosquamis* (El-Etreby *et al*.,

2013) and round sardin, *Sardinella aurita* (Mehanna & Salem, 2012).

There is a shortage of information on fisheries biology and population dynamics in the Red Sea (Sabrah, 2015). Management of fisheries required detailed data on the fleets and exploited resources. Such information should indicate the status of each fishery, their dynamics, characteristics, as well as temporal and spatial distribution of each fleet (Forcada *et al*., 2010; Samy-Kamal *et al*., 2014). The future of fisheries in Egypt also relies in improving the current management strategies and measures. It is important to evaluate the effectiveness of management measures (Samy-Kamal *et al*. 2015a, b & c) to understand if they can achieve their main objectives.

Marsa Alam is a popular and well-known diving destination and renowned seaside resort after being a humble fishing village on the southern border of the Egyptian Red Sea. The city has gained international recognition, welcoming visitors from around the globe to enjoying diving and snorkeling in its fascinating reefs and colorful creatures. The coast of Marsa Alam is characterized by lots of shallow coastal reef bays that harbor hundreds of coral reef fish species of which many are commercial and used as food. The aim of this survey is to spotlight the status of the existing commercial fish in six bays around Marsa Alam City located on the sensitive environmental zone of the Red Sea coast of Egypt.

2. Materials and Methods

3.1 Study Area and Data Collection

The studied area covered the zone around Marsa Alam City, including six bays (Fig.1, Table1). Within this area, commercial fish checklists were obtained and grouped.

The underwater visual census technique (UVC) of the reef fishes is used as a method to record the occurrence and abundance of fish species. Fish were counted visually using transect method where the diver swim slowly along 100 m long, counting fishes at 5 m wide and 1 m high transect. On average about 100 m was covered in 10 minutes -swimming period.

Fish were identified up to species level using the underwater identification guide of Randall (1992). Individuals of each species were separately counted, and their abundances were recorded on the underwater data sheets (Zekeria *et al*., 2002). Checklists of reef fish were extracted from the literature (Bellwood & Hughes, 2001 and Mora *et al*., 2012) and from FISHBASE (Froese & Pauly, 2003). These lists were completed with recent reviews of fish families or genera.

2.2 Data Analysis

The univariate statistics were done in SPSS 22, using ANOVA to determine differences in number of individuals and number of species among different months and bays. All data were tested for homogeneity of variance. If samples were not homogeneous, data were either transformed or the non-parametric Kruskal-Wallis test was used (Zar, 1996; Dytham, 2003).

The multivariate cluster analysis was used to determine similarities between sites and months, and diversity indices (species richness, the evenness, Shannon-Wiener and Simpson's index) were calculated using PRIMER (Plymouth Routines in Multivariate Ecological Research) version 6.

3. Results

3.1 General Abundance of Commercial Reef Fish

The visual censuses recorded 14353 fish belonging to 133 fish species of which 2458 individuals representing 16 families and 44 species are commercially important and used as food. Commercial fish formed about 17% of the whole fish community in the area (Fig. 2). The highest number of fish individuals was recorded at Marsa Saifen, where 609 fish were counted; followed by Marsa Fujiri (496 fish) and Marsa Shoni2 (463 fish). The lowest number of fish individuals was found at Marsa Hamata, where only 271 fish were recorded (Table, 3 and Fig. 3).

The results showed that Marsa Fujiri recorded the highest diversity with 23 species (52.3% of the total number of collected commercial reef fish species), followed by both the bays of Shoni2 and Shoni4 with 21 species (47.7%). On the other hand, Hamata had only 38.6% (17 species) of the collected commercial fish species (Table, 2).

3.2 *Species Composition of Commercial Fish Community*

A total of 16 families and 44 species of commercial fish were recorded in the six surveyed bays. The family Scaridae was the most diverse family with eight species followed by Serranidae and Mullidae which included six and five species, respectively. Each of Lutjanidae and Letherinidae had four species. On the other hand, six fish families (Hemiramphidae, Nemipteridae, Kyphosidae, Priacanthidae, Scombridae and Platycephallidae) were represented by only one species (Table, 2).

Four families (Mullidae, Siganidae, Scaridae and Lutjanidae) were the most abundant and they formed about 91.3% of the total number of recorded individuals. The most abundant family was Mullidae, which contained 1561 individuals (63.5% of the total number of individuals). The lowest abundant five families were Kyphosidae, Synodontidae. Priacanthidae, Heamulidae and Platycephalidae; they contributed less than 1% of the total number of individuals (Table, 2 and Fig. 4).

Six species formed about 83.8% of all counted fishes. Where the most abundant species was *Mulloidichthys flavolineatus* (Family: Mullidae), with 1390 fish recorded (constituting 56.55 % of all fish community). The second most abundant species was *Siganus rivulatus* (Family: Siganidae) with 251 individuals forming 10.21% of all fish number. The third most abundant species, *Lutjanus monostigma* (Family: Lutjanidae), formed 6.79% of all fish (167 fish). The fourth abundant species was *Mulloidichthys vanicolensis* (Family: Mullidae) with 122 fish (represented 4.96% of all fish number followed by *Scarus niger* and *Chlorurus sordidus* (Family: Scaridae) with 68 and 62 fish forming 2.77% and 2.52% of all fish number, respectively (Table, 3 and Fig. 5).

Results showed that 7 commercial fish species (*Hipposcarus harid, Calotomus viridescens, Parupeneus forsskali, Lutjanus kasmira, Gerres longirostris, Hemiramphus far* and *Rastrelliger kanagurta*) had a moderate level of abundance. These species formed about 8.7 % of the total number of fish. On the other hand, 31 commercial fish species were rare and collectively constituted only 7.5 % of the total number of specimens (Table, 3 and Fig. 5,6).

3.3 Diversity and Abundance in Different Coastal Bays of Marsa Alam

Out of 44 species recorded, three species representing 64.27 % of the total commercial fish abundance (*Mulloidichthys flavolineatus, Parupeneus forsskali* from family Mullidae and *Scarus niger* from family Scaridae) were recorded from all sites, and three species (14.24 % of commercial fish abundance) (*Chlorurus sordidus*, *Hipposcarus harid* from family Scaridae and *Siganus rivulatus* from family Siganidae) were occurred at five ones. Whereas 14 species (7.97 %) were recorded from only one site (Table, 3).

3.4 Diversity and Abundance in Different Coastal Bays of Marsa Alam

Diversity indices varied considerably among bays. Richness varied from the minimum value of 2.81 in Saifen to the maximum of 3.54 in Fujiri. The Evenness value ranged from the lowest of 0.37 in Saifen to the highest of 0.72 in Shoni4. The highest value of diversity index (Shannon-Wiener) was recorded also in Shoni4; and the lowest value was found in Saifen. The highest value of Simpson's index was recorded in Shoni4, and the lowest value was recorded in Saifen (Fig. 7).

The analysis of variance (ANOVA) showed that abundance of fish in different bays were not significantly different (F= 2.72, P>0.05). Whereas there was a significant difference in number of species among bays (F= 6.102, P<0.05). Fujiri was significantly varied from other bays in the survey.

Depending on the number of individuals at different bays, the similarity index showed that they could be divided into two main clusters with similarity of 60% (Fig. 8,9). The first cluster contained three bays (Shoni4, Hamata, and Nakari). With a maximum similarity between stations Shoni4 and Hamata (99.18), the similarity between them and Nakari was 95.22. The second cluster included the rest of bays (Fujiri, Shoni2, and Saifen). With a maximum similarity between stations Fujiri and Shoni2 (98.28), the similarity between them and Saifen was 94.87. Also, the similarity between the two clusters was high (92.22).

Depending on the number of individuals at different bays, it could be divided into two clusters. The first cluster contains two bays (Fujiri and Nakari), with maximum similarity between them (Fig. 8). The second cluster also includes two bays (Shoni2, and Shoni4), with a maximum similarity (68.44), the similarity between the two clusters was 63.73. The similarity between the two clusters and Saifen was slightly low (55.91). The similarity between the previous bays and Hamata was (50.53) (Fig. 8).

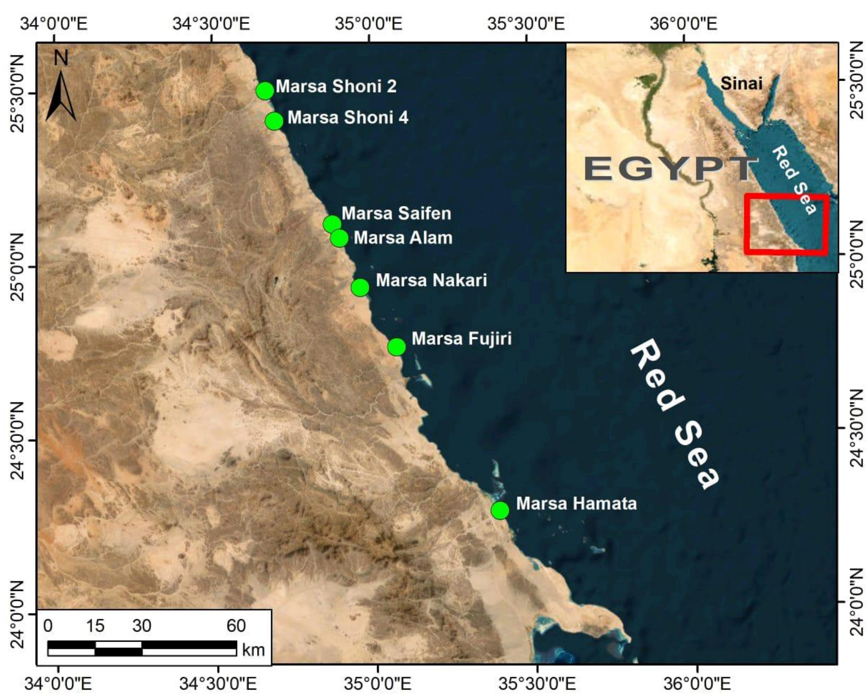

Fig. 1. Map of the study area and survey sites.

Table 1. Coordinates of the surveyed bays along Marsa Alam coast, Red Sea.

Sites	Latitude	Longitude
Marsa Shoni2	25°30'2.38"N	34°40'8.44"E
Marsa Shoni4	25°25'4.01"N	34°41'40.46"E
Marsa Saifen	25° 6'18.05"N	34°52'52.19"E
Marsa Nakari	24°55'34.90"N	34°57'45.61"E
Marsa Fujiri	24°45'21.39"N	35° 4'4.24"E
Marsa Hamata	24°17'15.18"N	35°22'49.93"E

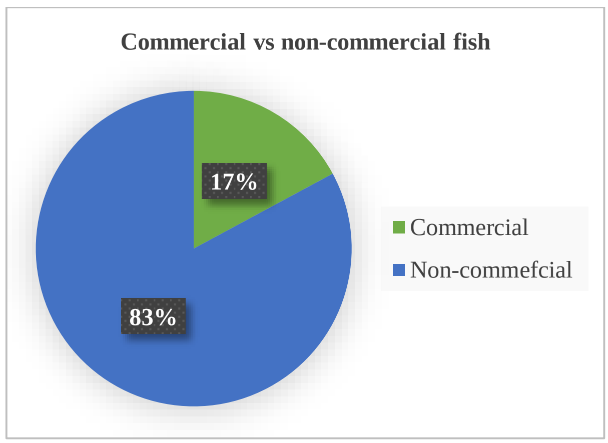

Fig. 2. The percentage contribution of commercial vs non-commercial fish species along Marsa Alam, Red Sea.

Table 2. Diversity and abundance of commercial fish families in the study area.

Families	No. of species	Abundance	
		No.	%
Mullidae	5	1561	63.5
Siganidae	3	259	10.5
Scaridae	8	221	9.0
Lutjanidae	4	203	8.3
Scombridae	1	45	1.8
Gerridae	2	42	1.7
Lethrinidae	4	28	1.1
Serranidae	6	24	1.0
Hemiramphidae	1	20	0.8
Carangidae	2	17	0.7
Nemipteridae	1	15	0.6
Kyphosidae	1	10	0.4
Synodontidae	2	5	0.2
Priacanthidae	1	4	0.2
Heamulidae	2	3	0.1
Platycephallidae	1	1	0.0
Total	**44**	**2458**	**100.0**

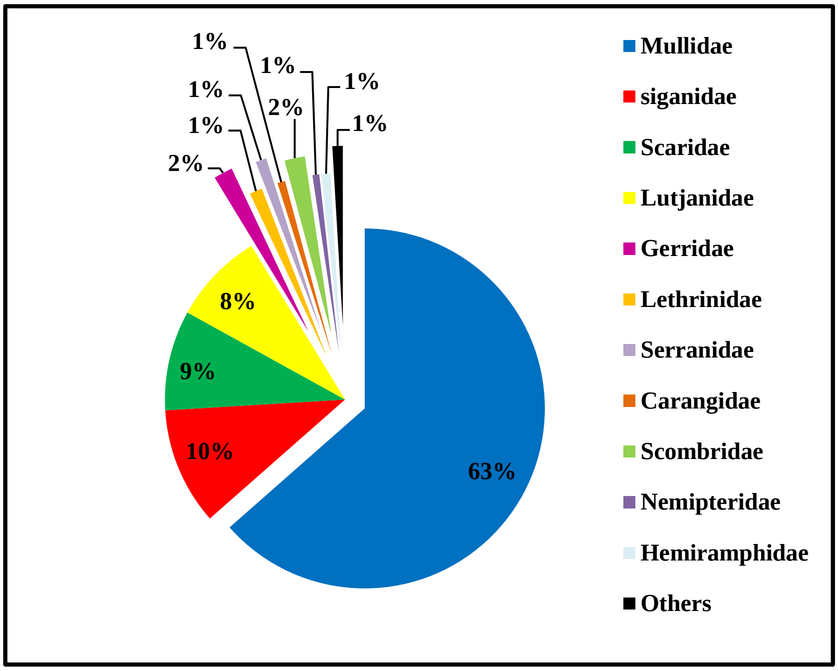

Fig. 3. Abundance of commercial reef fish families in coastal bays along Marsa Alam, coast, Red Sea.

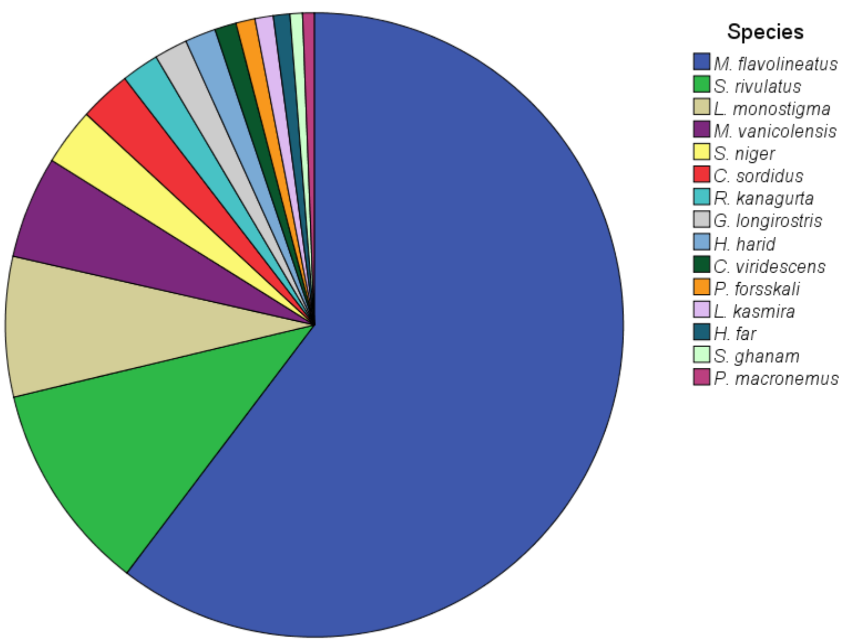

Fig. 4. Percentage contribution of the most abundant species in coastal bays along Marsa Alam, coast, Red Sea.

Table 3. Abundance of the commercial reef fish species in the different studied coastal bays of Marsa Alam, Red Sea, Egypt.

Family	Species	Saifen	Fujiri	Shoni2	Shoni4	Nakari	Hamata	Total
Scaridae	*Scarus niger*	10	7	24	15	8	4	68
	Chlorurus sordidus	6	14	20	13	9		62
	Chlorurus gibbus						1	1
	Hipposcarus harid	6	15		8	3	5	37
	Calotomus viridescens		3	11	12			26
	Scarus frenatus	3	3	2		3		11
	Scarus ferrugineus		2	4		3	1	10
	Cetoscarus bicolor	2			4			6
Serranidae	*Variola louti*	1		1	1			3
	Cephalopholis miniata			1	1	3		5
	Cephalopholis argus	3	1	2	2			8
	Cephalopholis hemistiktos		2	3		1		6
	Epinephelus tauvina						1	1
	Epinephelus summana						1	1
Mullidae	*Mulloidichthys flavolineatus*	418	324	236	104	158	150	1390
	Mulloidichthys vanicolensis	122						122
	Parupeneus macronemus	3	3	2			6	14
	Parupeneus cyclostomus		5	2	2	3		12
	Parupeneus forsskali	3	8	2	3	3	4	23
Lutjanidae	*Lutjanus monostigma*		10	107	40	10		167
	Lutjanus bohar	1	1		1			3
	Macolor niger	1	2		7	1		11
	Lutjanus kasmira	19	3					22
Lethrinidae	*Monotaxis grandoculis*		3	3	2			8
	Lethrinus harak		2		7		1	10
	Lethrinus nebulosus		5					5
	Lethrinus mahsena						5	5
Siganidae	*Siganus luridus*			3	3			6
	Siganus stellatus			2				2
	Siganus rivulatus		54	25	34	97	41	251
Carangidae	*Caranx melampygus*	4						4
	Carangoides bajad	3	8			2		13
Heamulidae	*Plectorhinchus schotaf*				1			1
	Plectorhinchus gaterinus	1					1	2
Gerridae	*Gerres longirostris*						40	40
	Gerres oyena					2		2
Synodontidae	*Synodus variegatus*	1				2		3
	Saurida gracilis	2						2
Hemiramphidae	*Hemiramphus far*			5	10	5		20
Nemipteridae	*Scolpsis ghanam*		1	7		1	6	15
Kyphosidae	*Kyphosus vaigiensis*				10			10
Priacanthidae	*Priacanthus hamrur*			1			3	4
Scombridae	*Rastrelliger kanagurta*		20			25		45
Platycephallidae	*Papilloculiceps longiceps*						1	1
Total diversity	Number	19	23	21	21	19	17	44
	%	43.2	52.3	47.7	47.7	43.2	38.6	100
Total abundance	Number	609	496	463	280	339	271	2458
	%	24.8	20.2	18.8	11.4	13.8	11.0	100

Highly Abundant (orange) — Moderately abundant (green) — Less abundant (white)

Highly abundant (orange rows): *Scarus niger*, *Chlorurus sordidus*, *Mulloidichthys flavolineatus*, *Mulloidichthys vanicolensis*, *Lutjanus monostigma*, *Siganus rivulatus*.

Moderately abundant (green rows): *Hipposcarus harid*, *Calotomus viridescens*, *Parupeneus forsskali*, *Lutjanus kasmira*, *Gerres longirostris*, *Hemiramphus far*, *Rastrelliger kanagurta*.

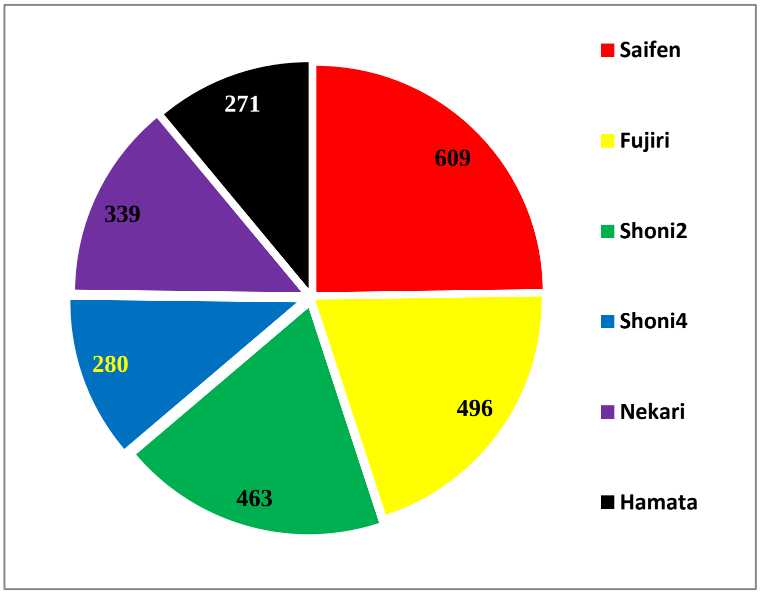

Fig. 5. Abundance of commercial reef fish at different bays along Marsa Alam coast, Red Sea.

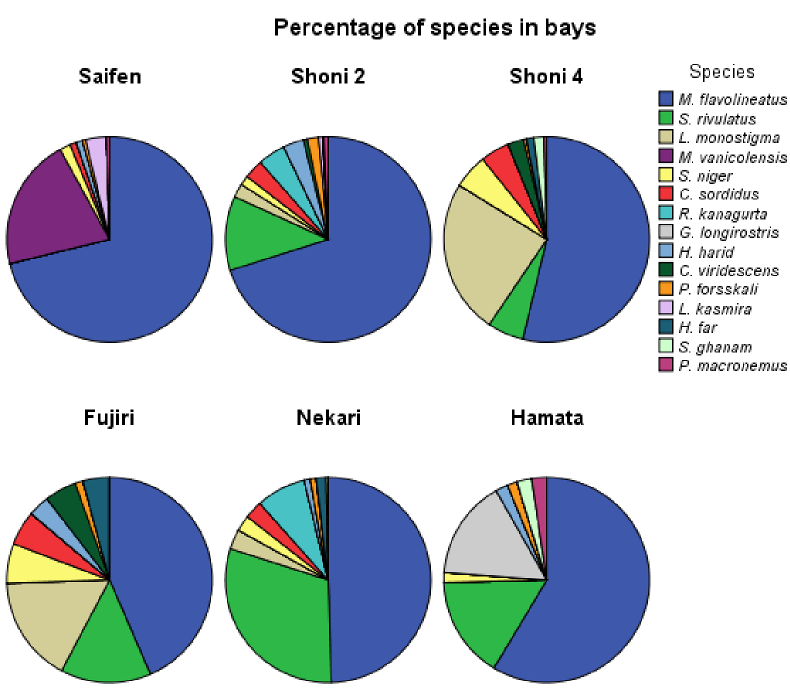

Fig. 6. Percentage contribution of the most abundant species in different bays.

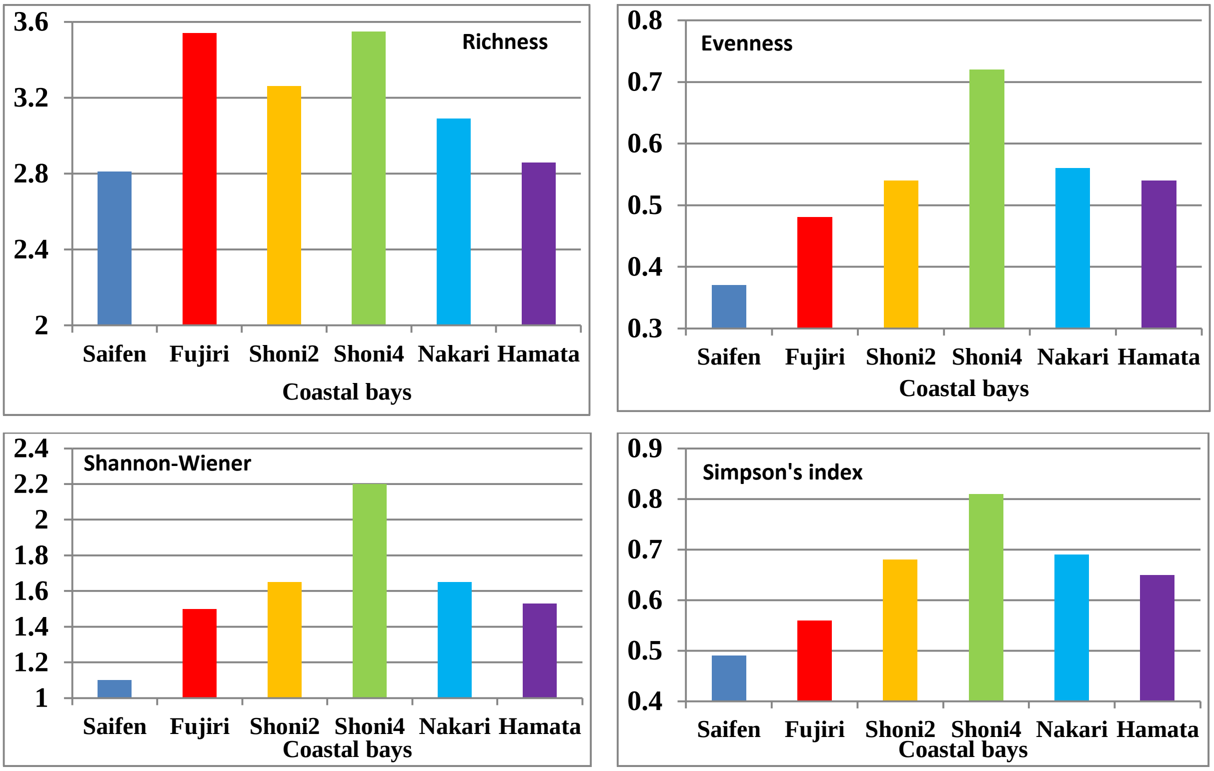

Fig. 7. Diversity and abundance indices for different coastal bays of Marsa Alam.

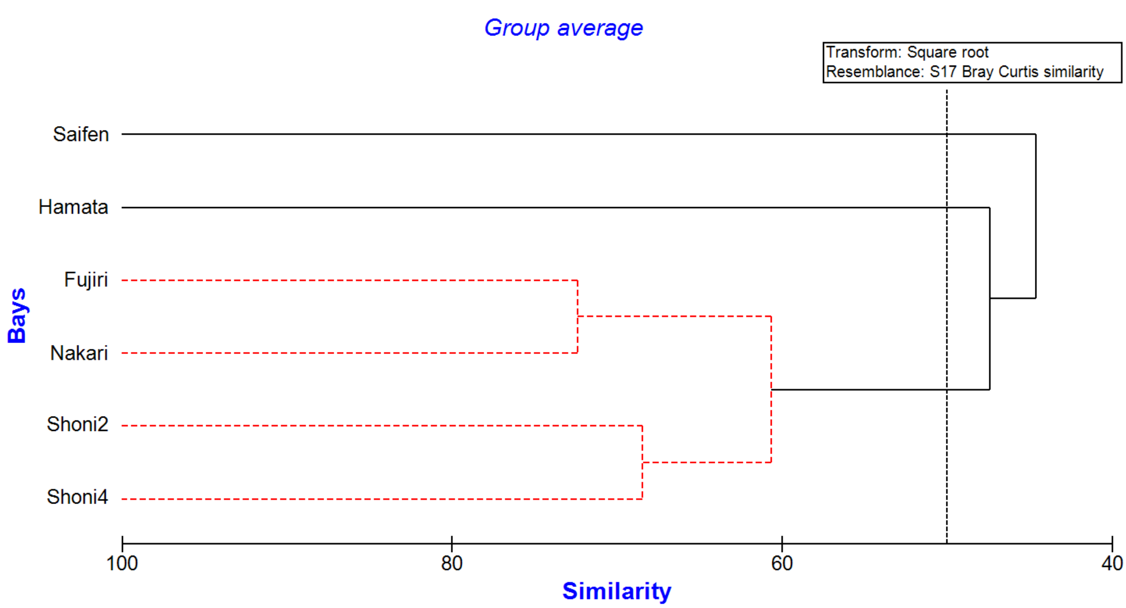

Fig. 8. Bray–Curtis similarity cluster between bays along Marsa Alam coast, Red Sea.

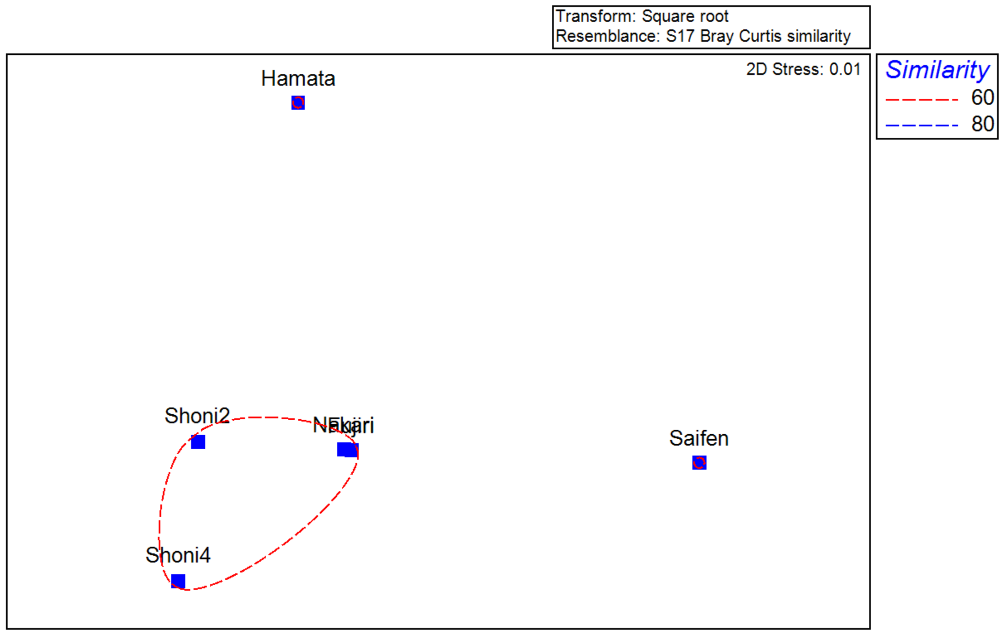

Fig. 9. Euclidean Distance Non-Metric Multi-Dimensional Scaling of bays along Marsa Alam coast, Red Sea.

4. Discussion

The present visual censuses recorded 44 commercial reef fish species belonging to 16 families. The family Scaridae was the most diverse family and it comprised 8 species followed by Serranidae and Mullidae which included 6 and 5 species, respectively. Each of Lutjanidae and Letherinidae had 4 species. On the other hand, 6 fish families (Hemiramphidae, Nemipteridae, Kyphosidae, Priacanthidae, Scombridae and Platycephallidae) were represented by only one species.

However, Shellem *et al*. (2021), in their study on the coral reef fish market diversity and abundance in the central Red Sea of Saudi Arabian water, that a high proportion of the market composition is generated by 46 species from six family-level groups, Serranidae, Lethrinidae, Scaridae, Labridae, Carangidae and Lutjanidae. They recorded that the family Serranidae was the most diverse family, followed by Lethrinidae and Scaridae.

Abu El-Regal (2014) recorded 4388 fish constituting 94 species in 23 families of coral reef fish in Wadi El-Gemal protected area and Maaty *et al*. (2021) recorded 93 reef fish species, belonging to 26 families along the northern Egyptian Red Sea coast in Hurghada and Safaga. Abundance and diversity of reef fish recorded by Abu El-Regal (2014) and Maaty *et al*. (2021) seems comparable to the abundance and diversity of fish recorded during the present study. The present study focuses only on the species of commercial importance and other species were excluded from the analysis. The more diverse family in this area was Labridae containing 16 species, followed by Chaetodontidae and Scaridae with 10 and 9 species, respectively, then Acanthuridae and Pomacentridae with 7 species for each, and Holocentridae, Mullidae and Serranidae were represented by 5 species for each. In this respect, many authors concluded that the diversity of coral reef fish families in the Red Sea was varied according to the distribution of these fishes in different areas of the Red Sea due to the local and global human impacts

(Roberts & Ormond, 1987; Roberts *et al*., 1992; Pandolfi *et al*., 2003; Bellwood *et al*., 2004).

The present study recorded that four families (Mullidae, Siganidae, Scaridae and Lutjanidae) were the most abundant and they formed about 91.3% of the total number of recorded individuals. The most abundant family was Mullidae (contained 63.5% of the total number of individuals). These results were in agreement with that recorded by Maaty *et al*. (2021) in waters along the northern Egyptian Red Sea coast; where they showed that, from the recorded 93 reef fish species, only 10 species belonging to 6 families (Acanthuridae, Mullidae, Labridae, Siganidae, Atherinidae and Pomacanthidae) were the mostly abundant fishes (representing 55.6% of all recorded fish individuals) in the coral reef of their studied areas.

The current study showed that the highest number of species (23 species) were observed in Marsa Fujiri represented about 52.3% of the total collected fish species, whereas the lowest number of species was recorded in Hamata (17 species) representing about 38.6% of the total collected fish species. While the highest abundance of fish was recorded in Marsa Saifen (609 individuals) and the lowest abundance was recorded at Hamata (271 individuals). These results indicated that diversity and abundance were decreased from north to south bays. In the same way, Maaty *et al*. (2021) found that the highest diversity (54 species) was recorded in north Hurghada, while the lowest (18 species) was detected in middle Hurghada; the highest fish abundance was recorded in north Hurghada with 4432 fishes, and the lowest fish abundance was found in middle Hurghada with 292 individuals.

5. Conclusion and Recommendations

Knowledge of the ecology of marine fish communities is sparse and quantitative ecological studies are needed. Action plans and research programs must be developed in order to reduce early stages bycatch and initiate fisheries management strategies for commercially exploited species.

This study filled in a major gap in records for the distributions of commercial coral reef fish species and is further evidence of the changing of biodiversity in the Red Sea, which may affect the ecosystem and the commercial fisheries. The results emphasize the need for a continuous, directed, and monitoring and management plan for the detection and abundance monitoring of the commercial species. It is not just the fish populations that need protecting but also the environment that supports them.

Furthermore, a map of the spawning and nursery grounds for all fishes in the area should be prepared on the basis of sound biological research. Thus, the protection of juveniles is probably the key factor for the sustainability of the resource, through periodic spatial closure of the spawning and nursery areas. This may be achieved through the establishment of certain reserves to protect the spawning stock biomass, and then monitoring their effects as a management strategy. Moreover, the link between spawning and recruitment in the area should be established.

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تنوع ووفرة الأسماك التجارية في بعض الخلجان المرجانية الساحلية بمرسى علم، البحر الأحمر، مصر

محمود معاطي محمد معاطي[١]، وأمل زكي فرحات[١]، ومحمد أحمد أبو الرجال[٢،٣]، وأحمد مسعد عزب[٤]

[١] المعهد القومى لعلوم البحار والمصايد، NIOF، مصر، و [٢] قسم الأحياء البحرية، كلية علوم البحار، جامعة الملك عبد العزيز، جدة، المملكة العربية السعودية، و [٣] كلية العلوم، جامعة بورسعيد، بورسعيد، مصر، و [٤] قسم علم الحيوان، كلية العلوم، جامعة الأزهر، القاهرة، مصر

المستخلص. يهدف هذا العمل إلى دراسة تنوع ووفرة مجتمعات الأسماك التجارية الشائعة في ستة خلجان للشعاب المرجانية الساحلية، حول مدينة مرسى علم، على الساحل الجنوبي للبحر الأحمر المصري. تم إحصاء المجتمعات السمكية في ستة مواقع، مرسى سيفين، مرسى شوني ٢، مرسى شوني ٤، مرسى فوجيري، مرسى نكاري، ومرسى حماطة، باستخدام تقنية التعداد البصري تحت الماء (UVC). وتم التعرف على إجمالي ٢٤٥٨ سمكة تنتمي إلى ١٦ عائلة و٤٤ نوعًا من الأسماك التجارية. خمس فصائل (Scaridae، وSerranidae، وMullidae، وLutjanidae، وLethrinidae) تحتوي على ٢٧ نوعًا (٦١,٤٪ من إجمالي عدد الأنواع). كانت أربع فصائل (Mullidae، وSiganidae، وScaridae، وLutjanidae) هي الأكثر وفرة، وشكلت حوالي ٩١,٣٪ من إجمالي عدد الأفراد المسجلين. كانت Mullidae هي الأكثر وفرة، حيث شكلت حوالي ٦٣,٥٪ من مجتمع الأسماك. وكانت الأنواع الأكثر وفرة هي *Mulloidichthys flavolineatus*، من عائلة Mullidae مع ١٣٩٠ فردًا تشكل ٥٦,٥٪، يليها *Siganus rivulatus* من عائلة Siganidae (٢٥١، ١٠,٢٪). بينما سُجلت أعلى وفرة للأسماك في مرسى سيفين (٦٠٩ فردًا) وأقل وفرة سجلت في حماطة (٢٧١ فردا). وقد لوحظ أكبر عدد من الأنواع (٢٣ نوعًا) في مرسى فوجيري، في حين أن أقل عدد من الأنواع (١٧ نوعا) تم تسجيله في حماطة. إن المعرفة ببيئة المجتمعات السمكية البحرية في البحر الأحمر قليلة. ومن هنا، فإن هناك حاجة إلى دراسات بيئية للمعرفة الكمية، ويجب وضع خطط عمل وبرامج بحثية للحد من الصيد العرضي في المراحل المبكرة، وبدء استراتيجيات إدارة مصايد الأسماك للأنواع المستغلة تجاريًا.

الكلمات المفتاحية: أسماك الشعاب المرجانية التجارية، الخلجان، البحر الأحمر.