

THE COMMERCIAL VALUE OF FISH AT FASHT AD-DIBAL AND ITS ASSOCIATED BIOTA IN THE QATARI WATERS, ARABIAN GULF

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الأسماك التجارية والأحياء المرافقة في فشت الديبل بالمياه القطرية، الخليج العربي

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الدراسة الحالية هي محاولة لدراسة تنوع الأسماك في فشت الديبل الواقع في الشمال الغربي من الساحل القطري. ثلاثة وثلاثون نوعا من الأسماك تنتمي إلى 25 عائلة تم صيدها بالشباك الخيشومية، الأقفاص (القراقير) والخيط اليدوي (الهداق). غالبية هذه الأسماك ذات أهمية اقتصادية. وكشفت الدراسة أيضا أن فشت الديبل ذو أهمية في كونه منطقة حضانة لعدد من الأنواع الهامة اقتصاديا مثل أسماك الشعري والصافي. أدوات الصيد المستخدمة أعطت نتائج مختلفة حيث تم صيد 32 نوعا من الأسماك بالشباك الخيشومية، 21 نوعا بالأقفاص (القراقير) و20 نوعا بالخيط (الهداق). الأنواع التي تم صيدها بالطريقتين الأخيرتين تم صيدهم أيضا بالشباك الخيشومية، باستثناء نوعا واحدا تم صيده بالقراقير.

تركيبة تجمعات الأحياء القاعية في فشت الديبل بينت بعض الاختلافات فيما بين المحطات المختارة. المحطة FDN تضم أعلى نسبة من التنوع يصل إلى 31 نوعا، وفي المحطة FDW 21 نوعا بينما المحطات FDS و FDE تحتوي كل منهما على 16 نوعا. تشكل الرخويات أعلى نسبة من الأنواع القاعية (18 نوعا)، يتبعها الطحالب 8 أنواع، والأعشاب 3 أنواع والديدان 4 أنواع والسرطانات البحرية 8 أنواع ونوعا واحدا من متساوية الأرجل .

Keywords: Fasht Ad-Dibal, Fisheies, Biota diversity, Qatar.

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ABSTRACT

The present study is an attempt to study the fish diversity of Fasht Ad-Dibal in the north-western coast of Qatar. Thirty three species belonging to 25 families were caught using gill nets, gargoor (metal traps) and hand line. Most of these fish are of economical importance. The study also revealed that Fasht Ad-Dibal is an important nursery ground for a number of economically important species such as *Lethrinus* spp.(Family: Lethrinidae), *Siganus canaliculatus* (Family: Siganidae) and *Gerres oyena* (Family: Gerreidae). The fishing methods used gave different results 32 species were caught by gill nets, 21 species by traps (gargoor) and 20 species by hand-lines.

The species caught by the latter 2 methods were caught by the former except for the fish *Arothron stellatus* caught only by gargoor trabs. The community structure of macrobenthic biota of Fasht Ad-Dibal showed some variation between stations. Station FDN sustained the highest diversity recording with 31 species recorded, station FDW with 21 species, while FDS and FDE each with 16 species. Molluscs form the main component of the catch (18 species), followed by 8 algal species, 3 seagrasses, 4 polychaete, 8 crabs and one isopod.

Introduction

Low-tide elevations are naturally formed land areas which are surrounded by water at low tide and submerged at high tide. Fasht Ad-Dibal is a low-tide elevation Fasht (Ar.) is a term used by the locals to describe a limestone and coral aggregate. These are found at a few locations in the southern Gulf and more frequently in Qatar, Bahrain and Saudi Arabia [1]. "Fashts" and life corals have played an important role in the economy of the region for hundreds of years and continue to constitute a reservoir and refuge for many seaweeds, invertebrates and fishes. They support commercial and recreational fisheries and provide many other direct and indirect benefits in the sea food web.

There is no previous description of the "Fasht" fauna and flora in the Qatari waters and with the exception of [2], who studied coral reef and its associated biota in Qatari waters. However, there has been many studies on macrobenthic communities in the Arabian Gulf, particularly those of coral and coral communities of Saudi Arabia, Bahrain and Kuwait [3,4,5].

Although there has been some studies conducted principally on fisheries and features of fish biology in Qatar waters [6,7,8,9,10,11,12] knowledge and literature are lacking on fish diversity and fisheries of the north western coast of Qatar. The main aim of the present study is to record the fish diversity, habitats and their status, as well as their economic importance. The data from Fasht Ad-Dibal is compared with those of neighbouring countries in the region. Equally, the present study provides the first general account of macrobenthic fauna and flora associated with Fasht Ad-Dibal habitat in the Qatari waters.

Material And Methods

Fasht Ad-Dibal is located in the north west of Qatar exclusive economical zone (EEZ). The survey was carried out between March and April 2003 at four

selected stations (Figure 1) using a gill nets (locally known as "mansab"), gargoor (a local name for baited wire-mesh fish trap) and hand-lines (locally known as "haddag"). Bottom-set gill nets (locally known as "sharkh") are sheets of netting up to 3m in depth and about 60m long fixed above and below on ropes. The lower rope is weighted with lead weights while floats are fixed on the upper rope. This causes the nets to stretch vertically from the seabed. The nets are made of a mono-filament twine with a mesh size of around 37mm and are virtually invisible underwater. The gill nets were set hour before high tide and were removed on the following low tide one thus allowing a 6 hours fishing time.

Gargoor is a hemispherical wire-mesh construction with a flat base approximately across 1.20m and a funnel like entrance. The mesh size of the gargoor is around 40mm. The base is reinforced with a cross lattice of steel bars, providing structural strength and ensuring that the trap lands upright when dropped from the boat. The catch is collected by removing the entrance funnel.

The bait used included green algae, bread, cuttlefish (*Sepia paranoids*) meat, heads and pieces of fish. The traps were set early morning and were removed after 6 hours. The catch is collected and the traps were lowered once more.

Hand-lines consist primarily of a length of mono-filament twine furnished with lead weights and single or multiple barbed hooks of variable sizes depending on targeted species. The bait comprised of pieces of shrimp, cuttlefish or fish. The catch then sorted. Fish specimens were identified according to morphometric characters using standard references [7,13] and the specimens were measured. Water temperature, salinity, pH were recorded using a water Quality logging system (YSI-650 MDS, Model 6820-C-M) and chlorophyll-a was determined by acetone extraction.

Quantitative macrobenthic fauna and flora specimens, specially those attached to rocky substrate or corals were obtained from each station around Fasht Ad-Daibal by SCUBA diving. In muddy or sandy sea bottom the benthic macrofauna and flora were collected by Ekman Grab.

Grab samples was twice hauled at each station. Samples were sieved using a 1 mm mesh size and the residue of each samples were preserved in labeled jars with 10% buffered formalin in seawater solution.

At the laboratory, each sample was rewashed with tap water and the biota were sorted using a zoom stereo microscope (X 20) and identified using standard references [14,15,16,17,18]. The degree of abundance was obtained for each species within the sampling area and was assessed on a five point DAFOR scale (D = dominant, A = abundant, F = frequent, O = occasional, and R = rare).

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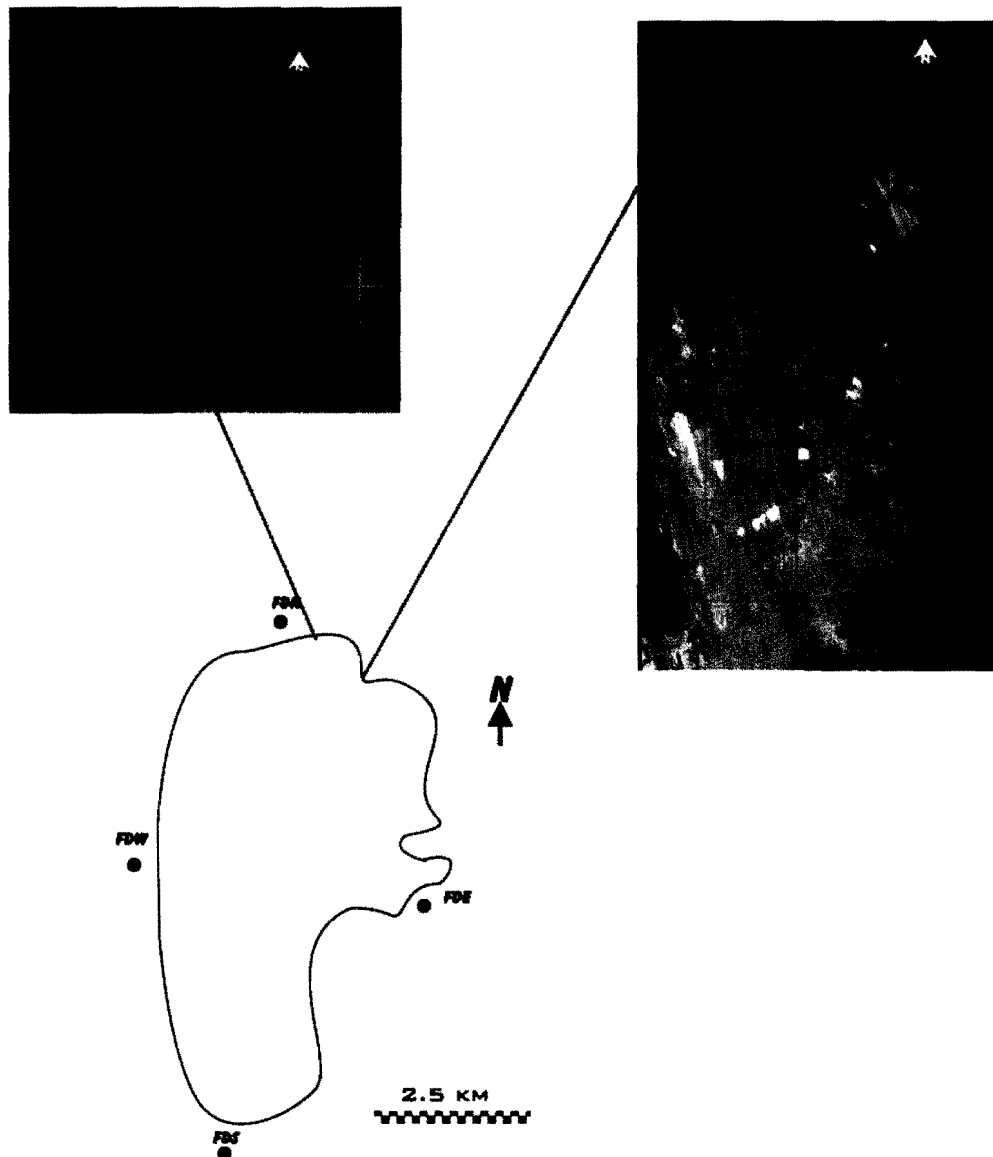


Figure 1: Position of Fasht Ad-dibal and the surveyed stations.

Results

Environmental parameters

The physical parameters during the study period are shown in Table 1. The temperatures ranged between 20.8-22.6°C; salinity ranged between 41.72-42.04‰; hydrogen ion concentrations of both the surface and the bottom seawater showed a very narrow limit variations ranging from 7.98 and 8.17; chlorophyll-a concentrations of the surface seawater was low ranging from 0.39±0.03 µ/l to 0.91±0.03 µ/l.

Table 1: Physical parameters and water depth at the surveys stations, Fasht Ad-Dibal, Qatari waters (March-April, 2003).

Station	Location		Temp. °C	pH	S ‰	Chl-a µ/l	Station total depth (m)
FDN	N 26 °17'42.7" E 050°57'43.2"	Surface	22.6 ±1.22	8.17 ±0.25	41.76 ±0.22	0.63±0.05	3.90
		Bottom	21.37 ±1.05	8.14 ±0.23	42.04 ±0.83		
FDS	N 26 °13'09.6" E 050°56'51.8"	Surface	21.36 ±1.10	8.07 ±0.21	41.76 ±1.15	0.47±0.05	2.55
		Bottom	21.18 ±1.09	8.09 ±0.13	41.75 ±1.32		
FDE	N 26 °15'12.2" E 050°58'36.3'	Surface	21.11 ±1.13	7.98 ±0.25	41.79 ±1.35	0.39±0.03	2.40
		Bottom	21.91 ±1.20	8.16 ±0.22	41.80 ±1.15		
FDW	N 26 °15'32.9" E 050°55'46.8"	Surface	21.37 ±1.11	8.13 ±0.14	41.72 ±2.01	0.91±0.03	5.20
		Bottom	20.80 ±1.12	8.12 ±0.23	41.73 ±1.36		

Fish diversity

The fish catch of the 4 stations of comprised 35 species belonging to 23 families (Table 2). One swimming crab *Portunus pelagicus* and one cuttlefish species *Sepia pharaonis* were collected from the same stations. Bony fish were the most abundant representing 86.5% (24 species), whereas the cartilaginous fish were only 3 species (8.1%), crabs and cuttlefish were each represented by one species (2.7%). Crustaceans and cuttlefish were presented by one family each, the Portunidae and Sepiidae respectively.

Table 2: Fish catch and methods employed in fishing them (Fasht Ad-Diba, March-April 2003).

Species	Common name	Gill nets	Gargoor (Traps)	Hand-lines
Cartilaginous fish				
Family: Orectolobidae				
<i>Chiloscyllium griseum</i> (Muller & Henle)	carpet shark	□		□
Family: Dasyatidae				
<i>Himantura uarnak</i> (Forsskål)	Spotted stingray	□		
Family: Myliobatidae				
<i>Aetomyleus nichofii</i> (Bloch & Schneider)	eagle ray	□		
Bony Fish				
Family: Ariidae				
<i>Arius thalassinus</i> (Ruppell)	Giant catfish	□	□	□
Family: Balistidae				
<i>Abalistes stellaris</i>	Starry triggerfish	□		
Family: Belonidae				
<i>Ablennes hians</i>	Barred needlefish	□		□
<i>Tylosurus leiurus</i> (Bleeker)	Square tail alligator gar	□		□

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Family: Carangidae				
<i>Carangoides bajad</i> (Forsskål)	Yellow spot cavalla	☐	☐	☐
<i>Seriolina nigrofasciata</i> (Ruppell)	Black banded cavalla	☐	☐	☐
Family: Echeneidae				
<i>Echeneis naucrates</i> Linnaeus	Slender sucker fish	☐		☐
Family: Gerreidae				
<i>Gerres oyena</i> (Forsskål)	Common mojarra	☐	☐	☐
Family: Hemiramphidae				
<i>Hemiramphus marginatus</i> (Forsskål)	Barred halfbeak			☐
Family: Lethrinidae				
<i>Lethrinus elongatus</i> Cuvier	Long-nose emperor	☐	☐	☐
<i>Lethrinus lentjan</i> Lacépède	Red spot emperor	☐	☐	☐
<i>Lethrinus mahsenoides</i> Valenciennes	Red-fin emperor	☐	☐	☐
Family: Lutjanidae				
<i>Lutjanus fulviflamma</i> (Forsskål)	Black spot snapper	☐	☐	☐
Family: Monacanthidae				
<i>Paramonocanthus oblongus</i>	Grey leather jacket	☐		
<i>Stephanolepis diaspros</i> Fraser-Brunner	leather jacket	☐		
<i>Plotosus anguillaris</i> (Bloch)	Striped catfish eel	☐		
Family: Pomacanthidae				
<i>Pomacanthus maculosus</i>	Angelfish		☐	
Family: Pomadasyidae				
<i>Plectorhynchus sordidus</i> (Klunzinger)	Brown sweetlip	☐	☐	☐
Family: Scombridae				
<i>Scomberomorus commerson</i> (Lacepede)	King mackerel	☐		
Family: Serranidae				
<i>Epinephelus suillus</i> Valenciennes	Grouper	☐	☐	☐
Family: Siganidae				
<i>Siganus canaliculatus</i> (Park)	Rabbitfish	☐	☐	
Family: Sparidae				
<i>Diplodus kotschy</i> (Steindachner)	Onespot bream	☐	☐	☐
<i>Acanthopagrus berda</i> (Forsskål)	Black bream	☐	☐	☐
<i>Mylio bifasciatus</i> (Forsskål)	Porgy	☐	☐	☐
<i>Rhabdosargus sarba</i> (Forsskål)	Goldlined bream	☐	☐	☐
<i>Sparidentex hasta</i> (valenciennes)	Sobaity bream	☐	☐	
Family: Sphyraenidae				
<i>Sphyraena jello</i> Cuvier	Barracuda	☐	☐	☐
<i>Sphyraena obtusata</i> Cuvier	Obtuse barracuda	☐	☐	
Family: Tetraodontidae				
<i>Arothron stellatus</i> (Bolch and Schneider)	Starry blowfish		☐	
Family: Triacanthidae				
<i>Traicanthus biaculeatus</i> (Bloch)	Tripodfish	☐		
Crustacea				
Family: Portunidae				
<i>Portunus pelagicus</i> (Linnaeus)	Swimming crab	☐	☐	
Cephalopoda				
Family: Sepiidae				
<i>Sepia pharaonis</i> Ehrenberg	Cuttlefish	☐		
Total catch		32	21	20

☐ = Present

It is apparent from that Fasht Ad-Dibal area has a high number of fish species

Economical important

Fasht Ad-Dibal water comprised fish of varied economical value. Eleven species ranked as of high economic importance, five have moderate economic importance, six have low economic importance and eleven have no economic importance.

One crab *Portunus pelagicus* and the cuttlefish *Sepia pharaonis* have a medium economical value (Table 3). Throughout, all species were of good sizes.

Fish habitats

The fish species around Fasht Ad-Dibal harbour the seabed with old and dead coral. Some species were caught as they passed or swam around the area.

The pelagic migratory species *Scomberomorus commerson* (Family: Scombridae) appear in very large number around Fasht Ad-dibal particularly during the cooler months.

Other pelagic fish species foreexample *Hemiramphus marginatus* (Family: Hemiramphidae) swim actively and in shoaling. *Chiloscyllium griseum* (Family: Orectolobidae). *Himantura uarnak* (Family: Dasyatidae) are bottom dwellers in shallow muddy seabeds, while *Gerres oyena* (Family: Gerreidae) is very common on sandy seabeds around Fasht Ad-Dibal.

Trophic levels

The fish species around Fasht Ad-Dibal can be grouped into two main atrophic levels:

- a. Carnivore feeders (including sharks, rays, barracudas, carangids, groupers, mackerel and snappers) were the most abundant in Fasht Ad-Dibal and they feed on invertebrates and small fish.
- b. Herbivore feeders such as *Siganus canaliculatus* and *Arothron stellatus* Scrape micro-organisms off coral and browse on seaweeds.

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Table 3: List of species of economical values around Fasht Ad-Dibal and their length ranges.

Species	Length range (cm)	Economical values
Cartilaginous fish		
<i>Chiloscyllium griseum</i> (Muller & Henle)	40-50	N
<i>Himantura uarnak</i> (Forsskål)	40-80	N
<i>Aetomyleus nichofii</i> (Bloch & Schneider)	35-50	N
Bony Fish		
<i>Arius thalassinus</i> (Ruppell)	30-90	L
<i>Abalistes stellaris</i>	20-40	N
<i>Ablennes hians</i>	25-60	L
<i>Tylosurus leiurus</i> (Bleeker)	25-35	N
<i>Carangoides bajad</i> (Forsskål)	20-35	M
<i>Seriolina nigrofasciata</i> (Ruppell)	20-30	L
<i>Echeneis naucrates</i> Linnaeus	50-69	N
<i>Gerres oyena</i> (Forsskål)	22-27	H
<i>Hemiramphus marginatus</i> (Forsskål)	30-35	L
<i>Lethrinus elongatus</i> Cuvier	20-30	H
<i>Lethrinus lentjan</i> Lacépède	20-35	H
<i>Lethrinus mahsenoides</i> Valenciennes	35-25	H
<i>Lutjanus fulviflamma</i> (Forsskål)	16-20	H
<i>Paramonocanthus oblongus</i>	6-10	N
<i>Stephanolepis diaspros</i> Fraser-Brunner	15-20	N
<i>Plotosus anguillaris</i> (Bloch)	15-18	N
<i>Pomacanthus maculosus</i>	25-35	L
<i>Plectorhynchus sordidus</i> (Klunzinger)	19-22	L
<i>Scomberomorus commerson</i> (Lacepede)	40-95	H
<i>Epinephelus suillus</i> Valenciennes	50-80	H
<i>Siganus canaliculatus</i> (Park)	15-25	H
<i>Diplodus kotschy</i> (Steindachner)	15-26	M
<i>Acanthopagrus berda</i> (Forsskål)	20-35	H
<i>Mylio bifasciatus</i> (Forsskål)	20-35	H
<i>Rhabdosargus sarba</i> (Forsskål)	15-22	M
<i>Sparidentex hasta</i> (valenciennes)	25-40	H
<i>Sphyræna jello</i> Cuvier	25-90	M
<i>Sphyræna obtusata</i> Cuvier	20-40	M
<i>Arothron stellatus</i> (Bloch and Schneider)	25-38	N
<i>Traicanthus biaculeatus</i> (Bloch)	10-20	N
Crustacea		
<i>Portunus pelagicus</i> (Linnaeus)	2-5	M
Cephalopoda		
<i>Sepia pharaonis</i> Ehrenberg	20-30	M

(H= High value; M= Medium value; L= Low value; N=No value)

Macro-benthic fauna and flora composition

Table 4 illustrates the degree of abundance for each species recorded at the different surveyed stations. The 39 macro-benthic fauna and flora species, include 8 species of seaweeds, 3 species of seagrasses, 4 species of polychaetes (3 families), 1 Isopod (1 family), 5 species of crabs (4 families), 12 species of gastropod (8 families), 6 species of bivalvia (4 families).

The gastropod was highest at station FDN (9 species) and as compared to 5 species at station FDW, and 2 and 4 species at stations FDS and FDE respectively. The highest number of bivalva species were found at station FDN and 3 of the polychaetes species were found at stations FDN and FDW, while two species were found at stations FDS. The five crab species were recorded at stations FDN, FDS and FDW, but only 4 species were encountered at station FDE. The only Isopod species encountered was at station FDN.

Around Fasht Ad-Daibal the seagrass *Halophila stipulacea* covered around 80% of the area specially at stations FDN and FDW, while *Halophila ovalis* was less common and covered between 5 to 10 of the area. The brown alga *Colpomenia sinuosa* was the most common in all stations and dominated locations where seagrass was absent. *Sargassum binderi* dominated station FDN (Table 4).

The Surveyed Stations

Station FDN as compared to the other stations displayed a richness faunal and floral diversity (31 species). The macroalgae *Sargassum binderi* and *Sarionema filiforme* were abundant and the Polychaete *Neries* sp. and the Isopod *Cirollana mascarenensis* were equally dominant. Three crabs (*Portunus pelagicus*, *Petrolisthes rufescens* and *Epixanthus frontalis*) with the gastropods *Thais tissoti* dominated over, the rest of the gastropods.

At station FDS a total of 16 species were identified: The seaweeds *Colpomenia sinuosa* (dominant) and *Ulva lactuca* (frequent). The seagrasses *Halophila stipulacea* (frequent) and *Halodule uninervis* (rare).

The Polychaete *Lepidonotus* sp was dominant and *Neries* sp was occasional. The most abundant crabs recorded were *Portunus pelagicus* and *Epixanthus frontalis*; others crab species were occasional to rare. Five mollusca species identified in this station, most of them was rare, except *Pinctada radiata* was found occasional. At station FDE, the seaweed *Colpomenia sinuosa*, was most dominant, *Ulva lactuca* and *Hypnea cornuta* were frequent.

The seagrass *Halophila stipulacea* was frequent. The most abundant crabs were *Portunus pelagicus* and *Epixanthus frontalis*, other species were occasional or rare. The occurrence of the gastropoda *Strombus decorus persicus* was occasional and other species were rare. Two bivalves was recorded *Pinctada radiata* (frequent) and *chama aspersa* (occasional).

Station FDW was the second as richness of biota (23 species) is concerned. The biotic composition comprised *Sargassum binderi*, *Digenia simplex* (dominant) and *Bryopsis hypnoides* (rare), crabs (*Petrolisthes rufescens*, *Portunus pelagicus* and *Epixanthus frontalis* (abundant), *Thalamita* sp and *Metopograpsus messor* (rare) and though mollusca were rare bivalve *Pinctada radiata* was frequent.

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Table 4: Benthic biota associated with Fasht Ad-Dibal at 4 surveyed locations.

Species	Station	FDN	FDS	FDE	FDW
Seaweeds					
<i>Bryopsis hypnoides</i> (O. Dargent)		O			R
<i>Ulva lactuca</i> Linnaeus			F	F	
<i>PAdina</i> sp.		O			
<i>Sargassum binderi</i> Sonder		A			D
<i>Colpomenia sinuosa</i> (Mertens ex Roth) Derbes et Solier		A	A	A	A
<i>Sarconema filiforme</i> (O. Dargent)		D			
<i>Hypnea cornuta</i> (Kützing) J. Agardh		F		F	
<i>Digenia simplex</i> (Wulfen)					D
Seagrasses					
<i>Halodule uninervis</i> (Forskål) Ascherson		O	R		O
<i>Halophila ovalis</i> (Brown) Hooker		R			R
<i>Halophila stipulacea</i> (Forskål) Ascherson		D	F	F	D
Polychaetes					
Family: Aphroditidae					
<i>Lepidonotus</i> sp.			D		
Family: Syllidae					
<i>Syllis cornuta</i> Rathke		R		R	R
<i>Syllis</i> sp.		R			R
Family: Nereidae					
<i>Neries</i> sp.		D	O	O	F
Isopods					
Family: Cirolanidae					
<i>Cirolana mascarenensis</i>		D			
Crabs					
Family: Procellanidae					
<i>Petrolisthes rufescens</i> (Heller)		D	O	O	A
Family: Portunidae					
<i>Portunus pelagicus</i> (Linnaeus)		D	A	A	A
<i>Thalamita</i> sp.		O	R		R
Family: Xanthidae					
<i>Epixanthus frontalis</i> (H. Milne Edwards)		A	A	A	A
Family: Grapsidae					
<i>Metopograpsus messor</i> (Forskål)		R	R	R	R
Gastropods					
Family: Turbinidae					
<i>Lunella coronata</i> (Gmelin)					R
Family: Conidae					
<i>Conus</i> sp.		F	R		

Cont. Table4

Species	Station	FDN	FDS	FDE	FDW
Family: Trochidae					
<i>Euchelus asper</i> (Gmelin)		F		R	R
<i>Clanculus</i> sp.		F			
Family: Muricidae					
<i>Hexaplex kuesterianus</i> (Tapparone-Canefri)		R			
<i>Thais tissoti</i> (Petit)		A		R	R
Family: Strombidae					
<i>Strombus decorus persicus</i> Swainson		R		O	
<i>Strombus</i> sp.		R	R		
Family: Cassidae					
<i>Semicassis faurotis</i> (Jousseau)					R
Family: Muricidae					
<i>Cronia cf margaritcola</i> (Broderip)				R	
<i>Murex</i> sp.		R			R
Family: Lottiidae					
<i>Patelloida</i> sp.		R			
Bivalve					
Family: Pteriidae					
<i>Pinctada radiata</i> (Leach)		A	O	F	F
Family: Ungulinidae					
<i>Chama aspersa</i> Reeve		O		O	
<i>Diplodonta</i> sp.			R		
Family: Cardiidae					
<i>Acrosterigma lacunosa</i> (Reefe)			R		R
Family: Veneridae					
<i>Circe</i> sp.		R			R
<i>Tapes</i> sp.					

(D=Dominant; A=Abundant; F=Frequent; O=Occasional and R= Rare).

Discussion

Salinity of the Arabian Gulf is generally high due to the effect of high temperatures and consequent evaporation since sea temperatures and salinities are closely related and a direct result of climate. Water temperature off the Qatari waters ranges between 14.1°C and 36°C [19] with a minimum in January and maximum in July. Aquatic species living in subtropical ecosystem zones are sensitive to changes in the water temperature and quality since these biota live close to their upper thermal limits. This is of particular concern to marine organisms in the Arabian Gulf with temperatures varying widely with seasonality [19,20].

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The Arabian Gulf supports more than 500 fish species, most of which live in pelagic or soft substrate demersal habitats [21,22]. Sheppard *et al.*, [19] reported at least 125 species from coral reefs. Peak fish species diversity and population densities of the dominant species were observed on the well-developed offshore reefs of Saudi Arabia, where seasonal variation in temperature and salinity are particularly high on the near shore reefs [23,24]. The Arabian Sea and Gulf of Oman have a greater diversity of fish species (about 1000 fish species) [25]. More than 400 species are demersal, 511 species inhabit coral reefs and coastal lagoons, two are mesopelagic species, and the remainder are pelagic (157 species), bathypelagic (30 species), and bath demersal (7 species) [25].

In the Arabian Gulf, although the individual species numbers are high, fish species are of low diversity. Environmental extremes have limited the distribution of many species in the Gulf [23,24].

There are about 150 species, belonging to about 54 fish families in Qatar waters. These comprise the fish resource. Of these 110 bony fish species and 7 cartilaginous fish species are typically bottom-living [8]. Emperor-fish, Jacks, snappers, and sweetlips the predominant bottom living fish families belonging to the Carangidae, Lethrinidae, Lutjanidae and Pomadasysidae respectively.

There are about 23 pelagic fish species around Qatar, of which about 4 are cartilaginous species [8]. Among the small pelagics, the sardines are the most abundant and among the large pelagics the king mackerel is the most abundant and economically important group. In Addition, there are 4 types of shellfish: crabs, cuttlefish, slipper-lobster and shrimps [8].

In the present survey from the vicinity of Fasht Ad-Dibal a total of 33 fish species. 1 crab and 1 cuttlefish were identified. Most of these are of economical important.

The study showed that the general composition of the catch depends on the type of gear used, fishing season and fishing area around Qatar. Table 2 shows that 32 species were caught by gill nets, 21 species by traps (gargoor) and 20 species by hand-lines. Traps and gill nets are less selective, catching a wide variety of species from several trophic levels, including herbivores such as rabbit-fishes and parrot-fishes, detritivores such as mullet, and planktivores such as fusiliers, as well as predatory piscivores. Hooks and line fishing targets were mainly predatory species such as groupers, snappers, emperors, and breams.

However, concerning the diversity of associated benthic biota in the investigated stations (Figure 1), as expected that station FDN sustained the highest diversity recording with 31 species. Station FDW faces open sea sustained 21 species, while FDS and FDE each with 16 species. Besides fish molluscs form the second main component, and most of species were found in crevices, settled on dead corals or on the substrata of Fasht Ad-Dibal. *Thais tissoti* and *Pinctada radiata* were most abundant and *Conus* sp, *Euchelus asper*, *Clanulus* sp were frequent. The sediments of the selected stations around Fasht Ad-Dibal were dominated by 4 polychaetes with *Neries* sp highly dominant at station FDN and occasional to rare at the rest of the stations. Macro-algae were represented by 8 species namely *Bryopsis hypnoides*, *Ulva lactuca* (chlorophyta), *Padina* sp, *Sargassum binderi*, *Colpomenia sinuosa*

(phytophyta), *Sarconema filiforme*, *Hypnea cornuta* and *Digenia simplex* (radophyta). *Colpomenia sinuosa* was highly abundant at all stations and *Sargassum binderi* and *Sarconema filiforme* were highly abundant at FDN station and the former highly dominant at FDW station. The soft substrata of the Fasht Ad-Dibal is colonized by seagrasses (*Halodule uninervis*, *Halophila ovalis* and *Halophila stipulacea*). The later species was the most dominant species at FDN and FDW stations, and occurrence frequent at the rest of the stations.

It is worth mentioning that the associated encountered biota found at Fasht Ad-Dibal has a total macrobenthic species diversity lower than these observed in other location such as coral reef habitats in the Qatari waters. Al-Ansi and Al-Khayat [2] recorded 110 species of associated biota species from Halul island coral reef habitat. South Hadead coral reef habitat sustained with 93 species and Hailt Al-Asere 88 species. Molluscs form the main component of associated biota followed by polychaetes, crustacean and echinoderms. Mohammed and Al-Sadah [26] listed 6 annelids, 10 crustaceans, 12 echinoderms and 52 molluscs from coral reef grounds as associated biota on the western side of the Arabian Gulf. Briggs [27] listed 97 gastropod, 83 bivalves and 4 scaphopoda from all habitats in the United Arab Emirates. Vousden [28] reported 187 molluscs (100 of them are gastropods) in Bahraini waters.

Moreover, from previous studies of [3,4,21,29], it is evident that the biotopes of Fasht Ad-Dibal are typical and widespread in this region of the Arabian Gulf. It is to be noted that the data presented is based on samples collected during March and April 2003. This represents a preliminary study of Fasht Ad-Dibal and its associated biota and it hence provides a foundation for further long term studies. Fashts, coral reefs areas and seagrass meadows represent zones of major commercial and scientific importance due to the presence of a number of unique and rare habitats. These are very important habitats because of their rich diversity of marine life. Consequently, it is essential that these areas and, similar habitat in Qatari waters, with their associated biota must be conserved, monitored and generally supervised and any exploitation of their national resources must be sustainably utilized.

Acknowledgment

Authors wish to thank all scientific staff on board R/V "Mukhtaber Al-Bihar" of Qatar University for assistance in collecting samples. Sincere thanks are due to Prof. Dr. Ekhlas M. Abdel Bari, Environmental Studies Centre, Qatar University for reading the manuscript and critical discussions.

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