



ABU DHABI FISHERIES & AQUACULTURE BULLETIN

Fisheries and Aquaculture Production
in the Emirate of Abu Dhabi - 2018





هيئة البيئة - أبوظبي
Environment Agency - ABU DHABI

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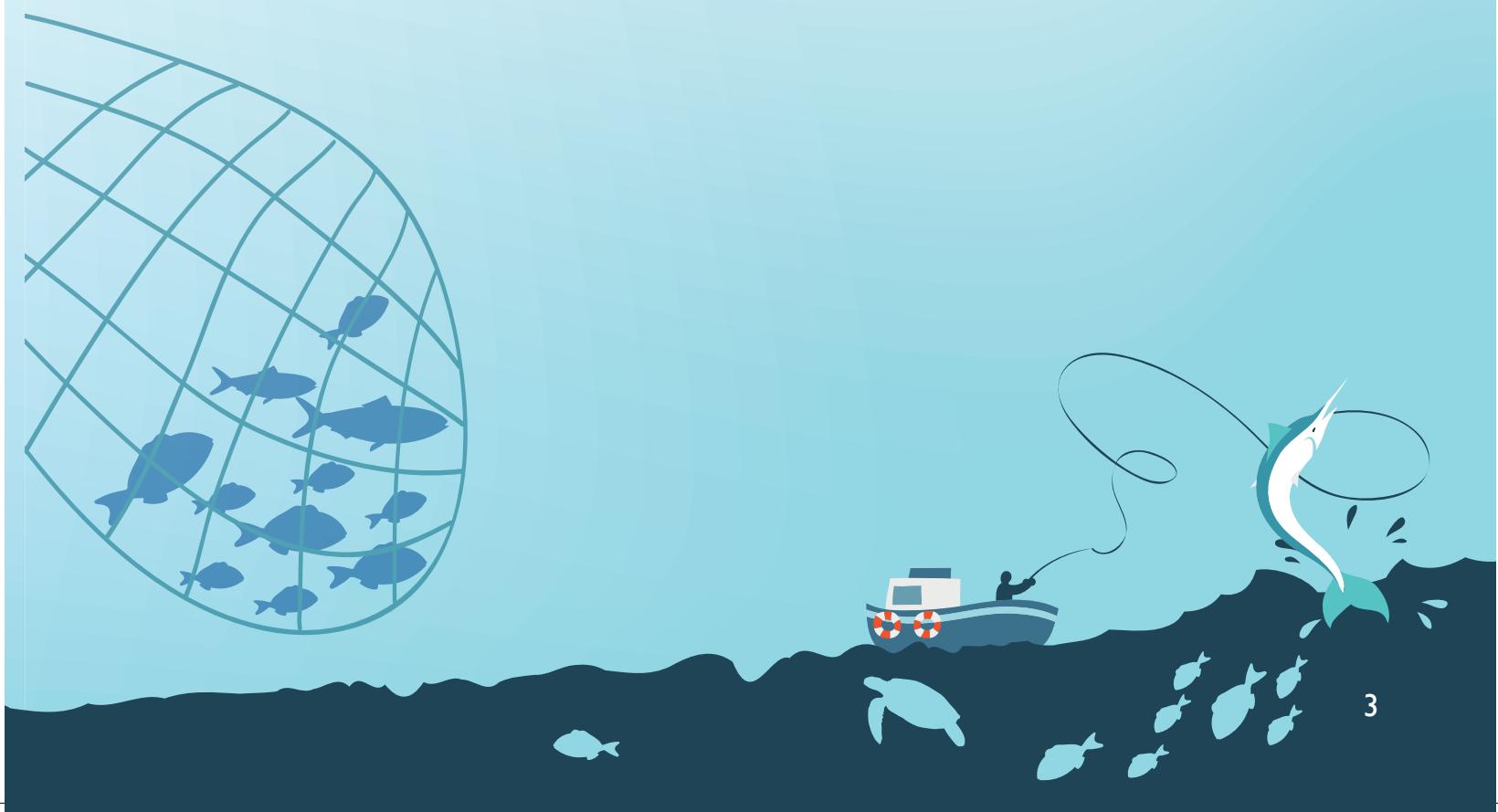
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ABOUT EAD

Established in 1996, the Environment Agency – Abu Dhabi (EAD) is committed to protecting and enhancing air quality, groundwater as well as the biodiversity of our desert and marine ecosystem. By partnering with other government entities, the private sector, NGOs and global environmental agencies, we embrace international best practice, innovation and hard work to institute effective policy measures. We seek to raise environmental awareness, facilitate sustainable development and ensure environmental issues remain one of the top priorities of our national agenda.



ACKNOWLEDGEMENTS

This bulletin provides information on fisheries and aquaculture activities in the Emirate of Abu Dhabi and is a direct result of enhanced cooperation and information sharing between a number of government entities, without which the publication of this bulletin would not have been possible.

Gratitude goes out to the Ministry of Climate Change and Environment (MOCCAE), who leads, in partnership with the Environment Agency – Abu Dhabi (EAD), the 'UAE Sustainable Fisheries Programme', as well as initiatives on developing the aquaculture industry for the UAE.

EAD is thankful to the Critical Infrastructure &

Coastal Protection Authority (CICPA), the Abu Dhabi Fishermen's Cooperative Society and the Delma Island Cooperative Society for the supportive provision of their datasets critical to the compilation of fisheries statistics.

Special thanks goes out to the Statistics Centre - Abu Dhabi (SCAD), which assists the EAD in the realisation of the bulletin presented.

Last, but not least, appreciation is awarded to all fishermen and aquaculture workers who volunteered their time and dedication to provide us with valuable information on the operations of commercial fisheries and fish production in the Emirate of Abu Dhabi.

SUMMARY

This bulletin outlines the landing statistics of commercial fisheries, the key performance indicators on fish resources status and on the sustainability of associated fisheries, plus an overview of aquaculture production in Abu Dhabi Emirate for 2018. The information presented contribute to EAD's strategic goal of developing a management regime for the fisheries and aquaculture production in Abu Dhabi Emirate and is produced by the fisheries and aquaculture teams of EAD.

Fisheries Statistics

An estimated 4,892 tonnes of fish was landed in the Emirate of Abu Dhabi during 2018, which represented an increase of 3 % from 4,739 tonnes in 2017. The major landing sites were Free Port (1,438 tonnes), Al Marfa (1,106 tonnes) and Sila with 900 tonnes, respectively. Ghazal pelagic nets were the dominant gear type, accounting for 2,717 tonnes, followed by Hadaq hand line (938 tonnes) and Gargoor fish traps (895 tonnes).

The total wholesale value of landed catch decreased by 0.5 % to 120.5 million AED, compared to 121.1

million in 2017. The families of Scombridae (Kanaad) and Epinephelidae (Hamour) accounted for 43 % and 22 % respectively of the total wholesale value of catch landed in the Emirate of Abu Dhabi in 2018.

Resources Indicators

The UAE Sustainable Fisheries Programme measures the achievement of its overall objective 'Sustainable fisheries for the UAE by 2030' through two Key Performance Indicators:

1. Sustainable Exploitation Index (SEI) describes the trend in the proportion of the catch volume of sustainable exploited species against the total volume of assessed species landed by the commercial fishery in Abu Dhabi Emirate. The target SEI is set at 70 % for 2030, but the actual value decreased from 8.4 % in 2017 to 5.7 % in 2018. This is a slight decrease from the previous year; which may be attributed to natural variance.

2. Mean relative adult stock size (Mean SBR) describes the proportion of the average adult stock size for three commercially exploited key species (Hamour; Shaari and Farsh) compared to its virgin,

unexploited size. The target Mean SBR is set at 30 %, and the actual value increased from 6.6 % in 2017, to 7.6 % in 2018, which increase may be attributed to natural variation. The value remains well below 10 %, the level at which stocks are considered severely over-exploited.

In 2018, there were five permitted aquaculture operations in the Emirate of Abu Dhabi contributing to a total aquaculture production of 807.6 tonnes of seafood with a farm gate value of approximately AED 18.6 million. Shrimps (*Penaeus indicus*) and Hamour (*Epinephelus coioides*) dominated production.

Aquaculture Production

This bulletin provides information on Abu Dhabi's aquaculture sector as it stands today in terms of production in volume and value.



Figure 1 – Indian white prawn (*Penaeus indicus*) at harvest.



INTRODUCTION

The Ministry of Climate Change and Environment (MOCCAE), in collaboration with the Environment Agency – Abu Dhabi (EAD), implements the UAE Sustainable Fisheries Programme with the overall objective to achieve ‘sustainable fisheries for the UAE’ by 2030. The programme comprises of nine key projects aimed at:

- understanding the current state of key fish stocks;
- re-building strategic fish stocks;
- retaining existing stock levels for other fish stocks;
- preserving the ecosystem; and
- reducing risks of future over-exploitation.

The status of UAE’s fisheries resources, the socio-economic conditions, and the fact that sound fisheries management is a strategic priority for the UAE government justifies this programme, which started in 2015 and runs for four years until 2018. The status of UAE’s fisheries resources is summarised as follows and illustrated in Figure 3:

- Out of 28 species for which stock assessments have been conducted, 13 species are harvested beyond sustainable levels (over-exploited), accounting for 71 % of the commercial landings and 81 % of the commercial fishery revenue in 2018.
- UAE’s principal fish species Hamour, Farsh, Safi Arabi, Qabit, Zuraidy and Kanaad are being fished, on average, 3.5 times the sustainable limit and these resources are considered severely over-exploited.

- Other over-exploited species are Dhil'e, Shaari Eshkheli, Shaari, Kofar, Jesh Um Al Hala, Eshnenuh and Marjaan.

There is a critical need to move from the current “severely overexploited” state of the fishery toward a “recovering” and finally by 2030, a sustainably managed fishery. Although given the slow rate of recovery in fish stocks and the shared nature of some of them, this target is highly ambitious. The UAE Sustainable Fisheries Programme is a change management process at the federal level, strengthening UAE institutional framework with the MOCCAE leading the way and continued support from strategic partners including Critical Infrastructure and Coastal Protection Authority (CICPA), Federal Transport Authority – Land and Maritime (FTA), and the EAD. But, foremost, it is a holistic programme that recognises that all stakeholders – commercial fishers, recreational fishers, wholesalers, retailers and consumers alike – need to become engaged, through a suite of awareness campaigns, dialogue sessions and workshops, in the planning and implementation of UAE fisheries management measures.

This bulletin forms part of EAD’s information outreach to stakeholders and the wider public and is a continuation of the Fisheries Statistical Bulletin series (2005-2014). The bulletin provides an overview of Abu Dhabi’s Fisheries and Aquaculture in 2018, presented in three corresponding sections: Fisheries Statistics, Resources Indicators and Aquaculture Production.



Figure 2 – Tarad boats arriving at fishing port in Al Marfa.

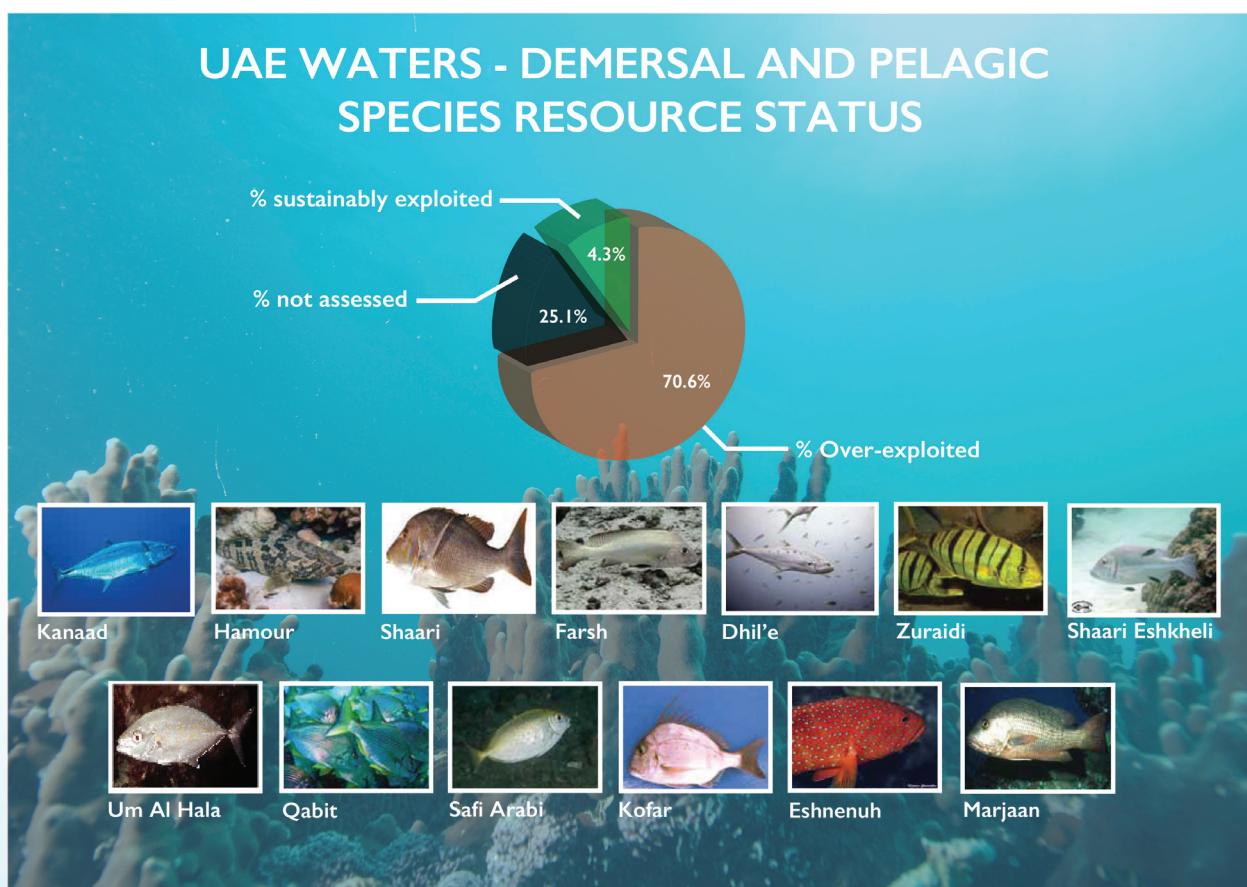


Figure 3 – UAE over-exploited species, as per 2018.¹

FISHERIES STATISTICS

BACKGROUND

Since 2001, the EAD has consistently collected and recorded fisheries statistics for the Emirate of Abu Dhabi. After a major system upgrade in 2004, the EAD joined hands with the Ministry of Climate Change and Environment (MOCCAE) to establish an online National Fisheries Information System (NFIS) for the whole of the UAE in 2009. Under this initiative, a comprehensive catch and effort data recording system emerged with data input from strategic partners, such as the Critical Infrastructure & Coastal Protection Authority (CICPA) and the Fishermen's Cooperative Societies (FCS), vital to the compilation of Abu Dhabi fisheries statistics.



Figure 4 – The entrance to the fish market in Abu Dhabi.

¹Although Shaari Eshkheli (*Lethrinus lentjan*) is sustainably exploited in Abu Dhabi Emirate (Table 2), MOCCAE assessed the same species as over-exploited in the Northern Emirates.





Figure 5 – Recording the weight of landed Dhil'e (*Scomberoides commersonianus*) at Sila.

DESCRIPTION OF THE FISHERY

Fisheries in the Emirate of Abu Dhabi are artisanal with the fleet constituting of small-sized boats operating traditional fishing gears. There are two types of fishing vessels namely; tarads and lanshes.

Tarads are open fibreglass dories measuring 6-8 metres in length which are equipped with one to two outboard engines. The duration of a fishing trip is usually 6-8 hours with a maximum trip length of one day. The number of crew varies from 1-4 persons.

Lanshes are traditionally built wooden dhows ranging from 12–22 metres in length. They are decked and equipped with inboard diesel engines. Fish are stored whole, on ice, in insulated cool boxes. Fishing trips usually last between 3 and 5 days. The number of crew varies from 4-6 persons.



Figure 6 – Tarads moored at the new fishing port in Al Marfa.



Figure 7 – Lansh leaving Abu Dhabi Free Port.

In addition to 750 tarads and 350 lanshes licensed to fish by the EAD, a considerable fleet of licensed fishing boats from other emirates also operates in Abu Dhabi waters under the condition that they follow Abu Dhabi's fishing gear regulations.

Whilst there are a wide variety of methods, the main fishing gear type used to target demersal species is the Gargoor which is a dome-shaped wire trap. Gargoors are licensed to fishermen on lanshes only, with a maximum of 125 gargoors per vessel. Hadaq (hand line) is usually operated in combination with the Gargoor fishing method.

Demersal fishing methods such as Sakkar (inter-tidal barrier net), Hadhra (inter-tidal enclosure trap) and Defara (encircling net) are mainly operated by tarad fishermen as these gears are confined to shallower waters. Other popular fishing gears include Ghazal (gill net for large pelagics), and Nesaab (standing gill net for small demersals).



Figure 8 – Hadaq (hand line) ready for deployment.





Figure 9 – Landing of Kanaad (*Scomberomorus commerson*) in Al Marfa.

Over 100 species from more than 35 families are caught by the gears operated in the different fisheries in the Emirate of Abu Dhabi. Some of the main families of fish making up the catch are Epinephelidae (Groupers), Lethrinidae (Emperors),

Lutjanidae (Snappers), Haemulidae (Sweetlips), Sparidae (Seabreams), Carangidae (Jacks), Mugilidae (Mullets), Gerreidae (Silver-biddies) and Scombridae (Mackerels).



Figure 10 – Mixture of fish showing Faskar (*Acanthopagrus bifasciatus*), Farsh (*Diagramma pictum*), Shaari Eshkheli (*Lethrinus lentjan*) and many more.

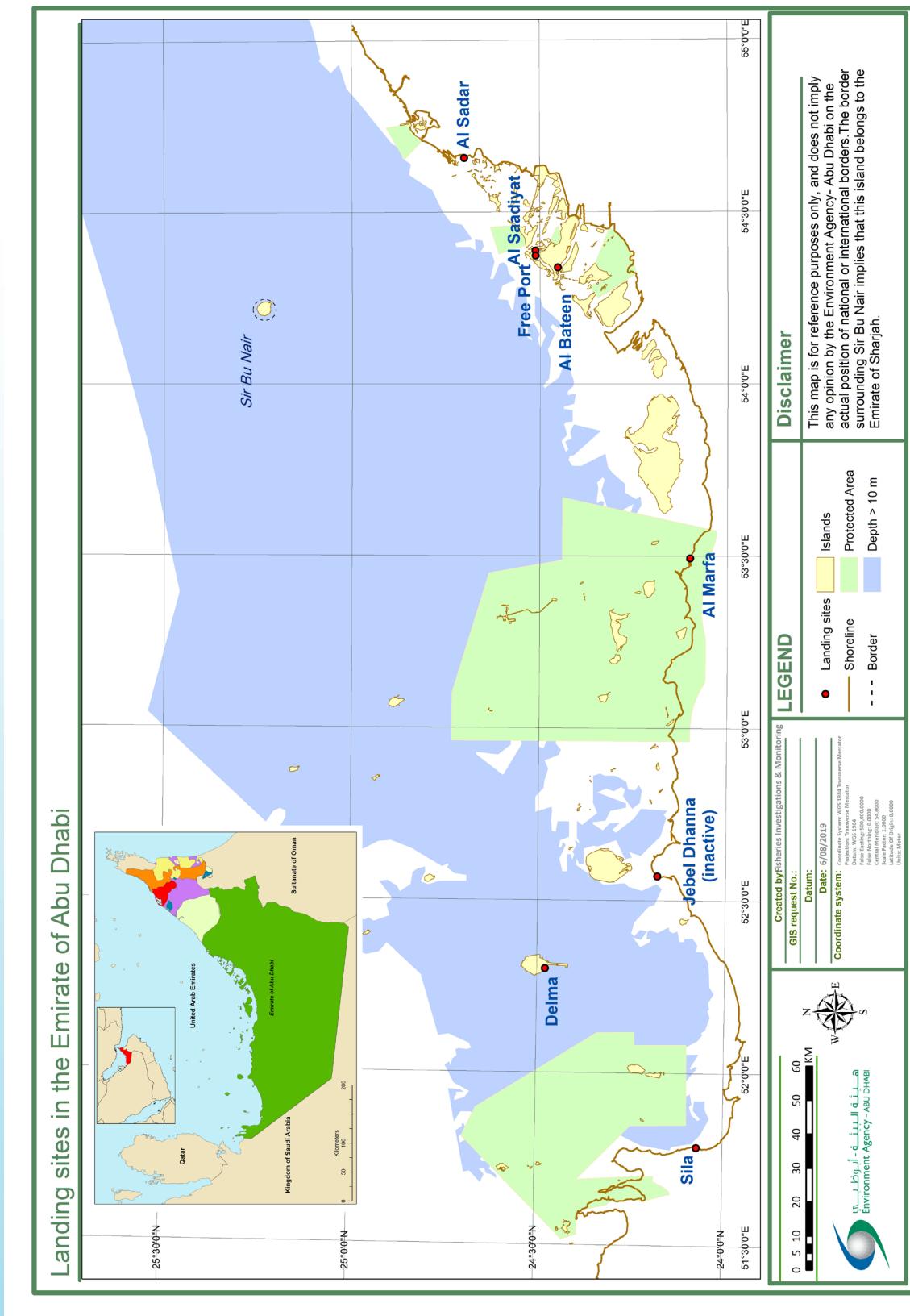


Figure II – Commercial fish landing sites in the Emirate of Abu Dhabi

CATCH, EFFORT, SPECIES COMPOSITION AND VALUE OF LANDINGS IN 2018²

The total catch landed in the Emirate of Abu Dhabi was 4,892 tonnes in 2018, of which 18% was realised by lanshes and 82 % by tarads.

Figure 12 depicts total catch by landing site and boat type in 2018. Nearly all lansh landings were realized

at the Free Port in Abu Dhabi or on Delma island (99.6%). Landings by tarad, on the other hand, were more spread out and occurred at all landing sites in the Emirate of Abu Dhabi, with the highest volume recorded in Al Mirfa, Sila and Al Sadar.

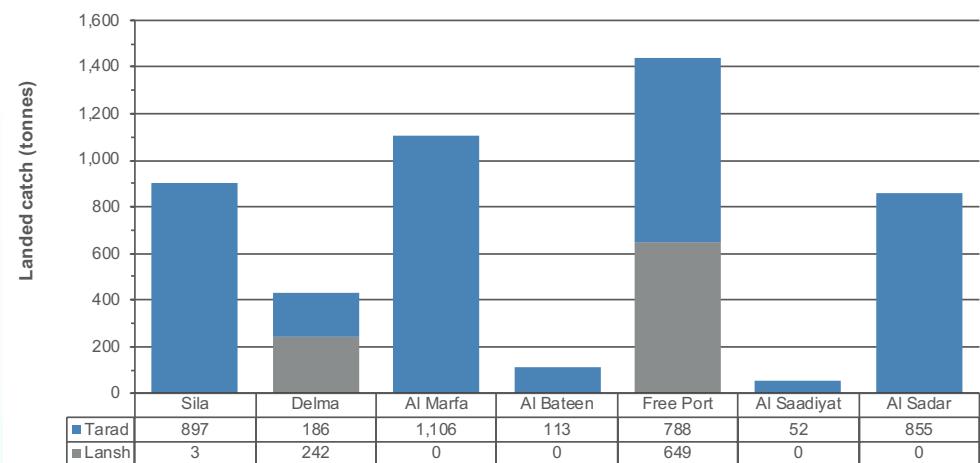


Figure 12 – Total catch by landing site and boat type in 2018.

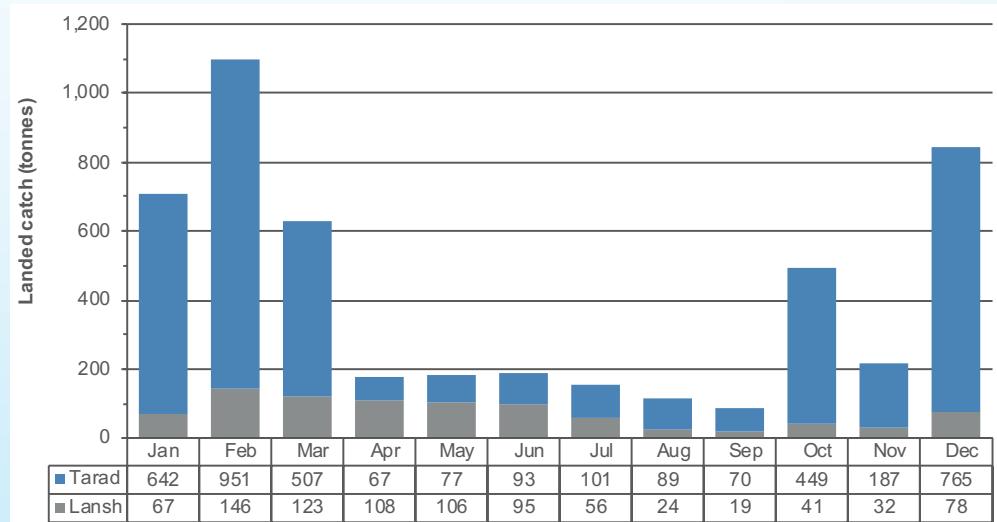


Figure 13 – Total catch by month and boat type in 2018.

Figure 13 summarizes the total catch by month and boat type in 2018.

A clear drop in the landings occurred during the hot summer months (June–September), when fish are known to move away to deeper and cooler waters, and become less accessible to the fishermen. The apparent dip in the overall catch during November is attributed to repeated spells of bad weather in this month limiting fishermen to go out and fish.

The surge in catch by tarad fishing boats during the period October – March is related to the Ghazal fishing season in Abu Dhabi Emirate (15 October – 31 March) targeting the pelagic Kanaad (*Scomberomorus commerson*). The catch peak in February is attributed to huge Tarad Ghazal landings of Dhil'e (*Scomberoides commersonianus*) in Sila, and of Garfah (*Rastrelliger kanagurta*) in Al Sadar.

²Note: Small differences in the totals of the statistics presented are due to rounding of numbers.

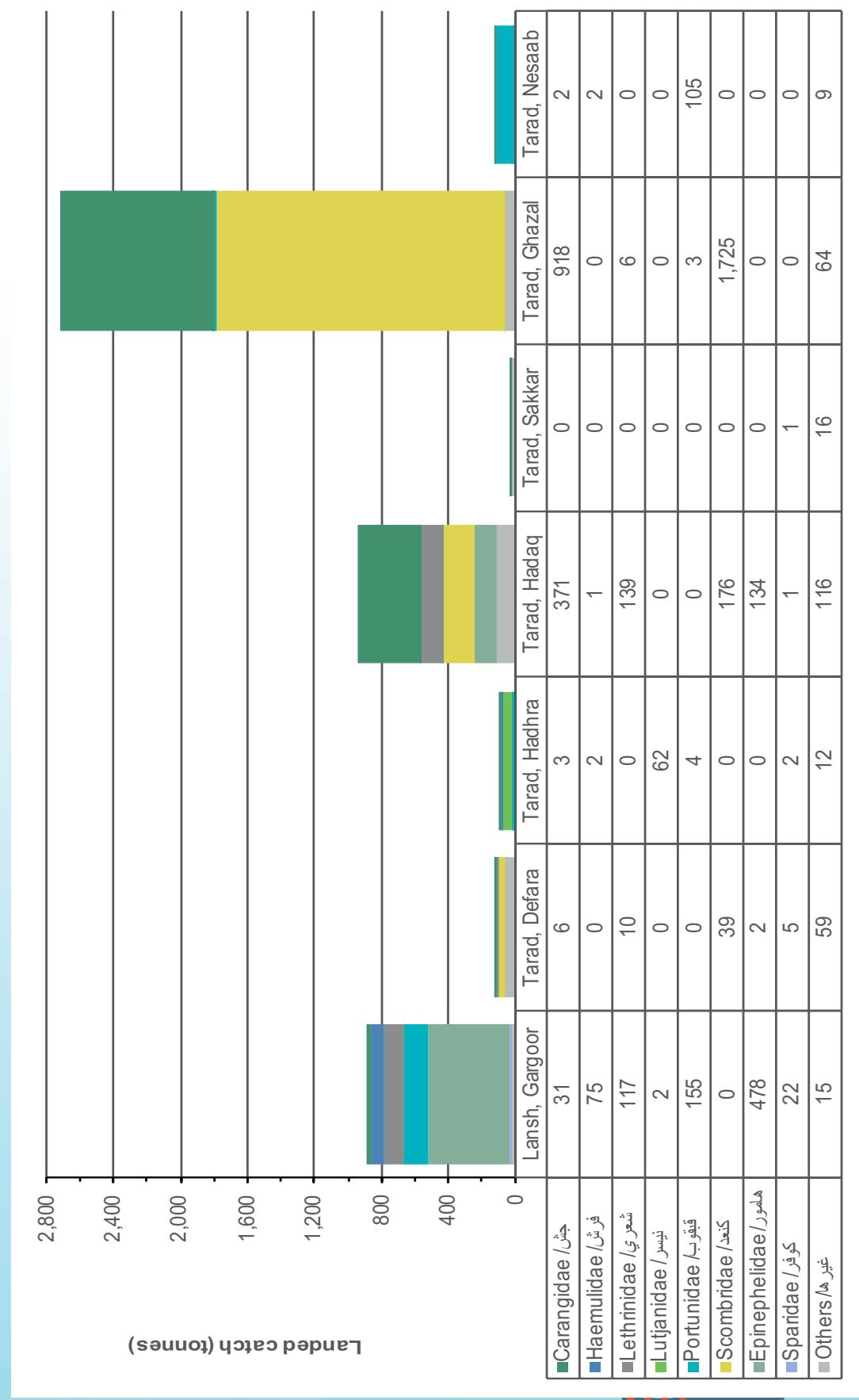


Figure 14 – Total catch of principal fish families landed by fishing method.

Figure 14 plots the total catch by fishing method. Tarad fishermen operating Ghazal (gill net targeting large pelagics) dominated the fishery in the Emirate of Abu Dhabi, accounting for 56 % of the total catch. Hadaq (hand line) from tarads accounted for 19 % and traditional Gargoor traps deployed from lansh vessels for 18 % of the total catch landed in 2018. From the species composition in Figure 14 it becomes clear that Gargoor and Hadaq gear types target multiple species. In contrast, Ghazal and Hadhra are more selective gear types in nature.

Figure 16 demonstrates a different trend in the composition of fish caught by lanshes and tarads. The dominance of Lethrinidae (Shaari) in the landings



Figure 15 – Landing of Qabqoob (*Portunus pelagicus*) in Free Port.

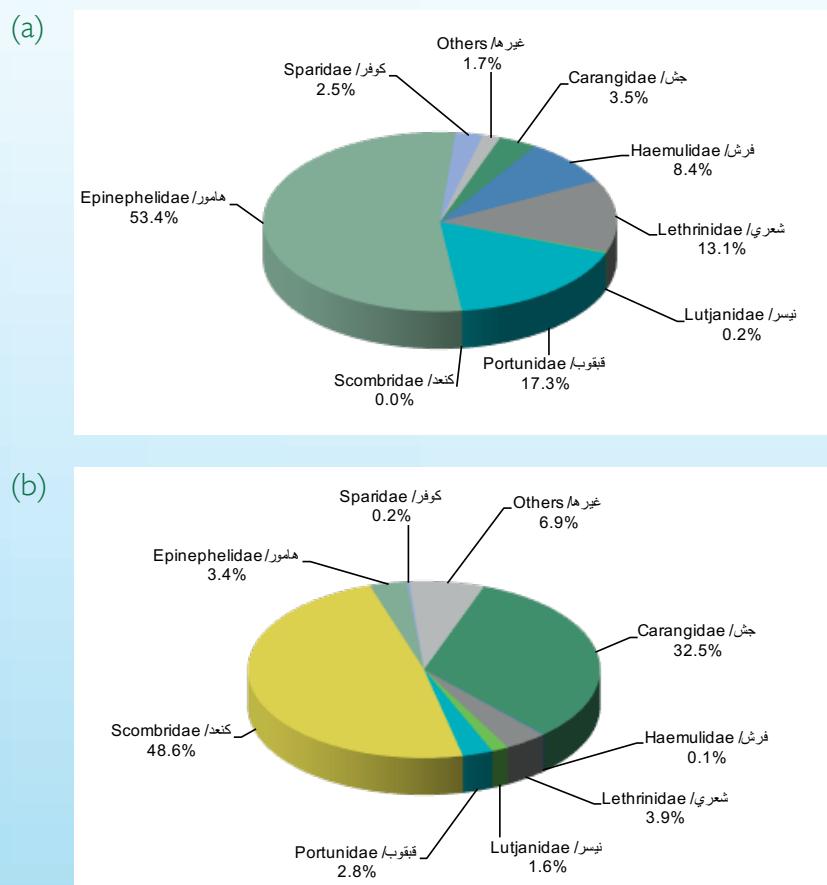


Figure 16 – Species composition of landings by a Lansh (a) and Tarad (b)

of Lansh fishing boats dropped from 22% in 2015 to 13% in 2018, due to the season ban prohibiting the catch and trade of Safi and Shaari in the months of March and April (Figure 16a). The bulk of fish landed by Lansh remained Epinephelidae (Hamour) with 53% of the total catch, followed by the opportunistic share of Portunidae (Qabqoob) equal to 17% of total Lansh landings.

The species composition of landings from tarad fishermen in 2018 has two major species groups: Scombridae (Kanaad) 49 % and Carangidae (Jesh) 33 %.

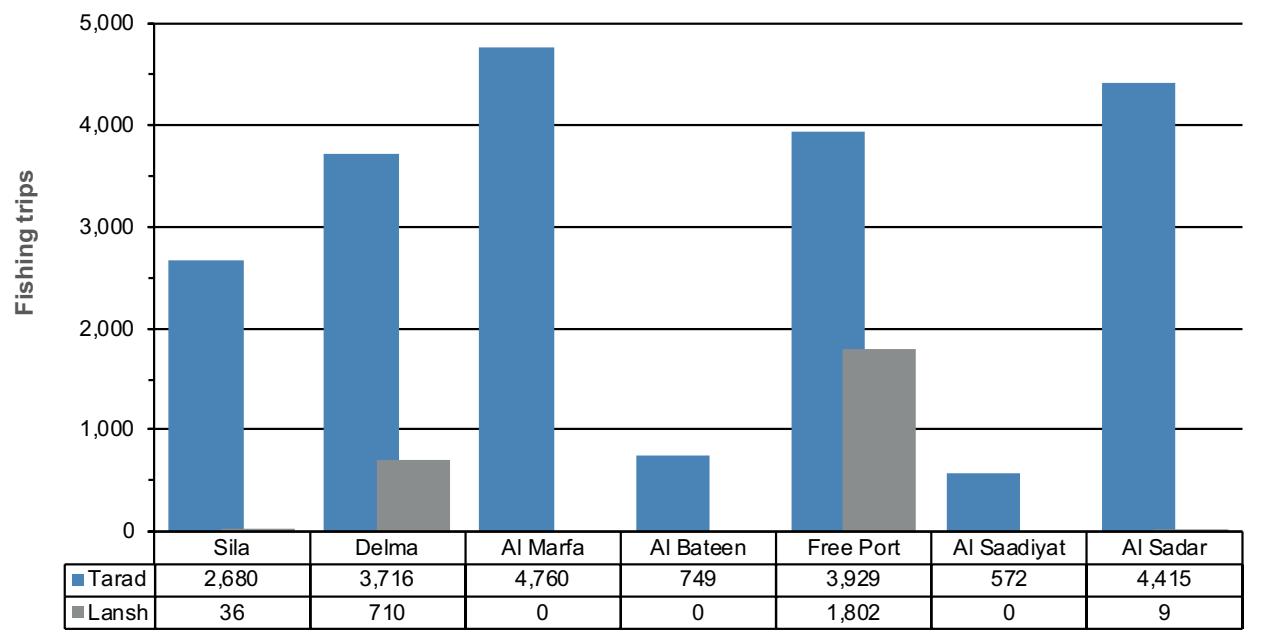


Figure 17 – Number of trips by landing site and boat type in 2018.

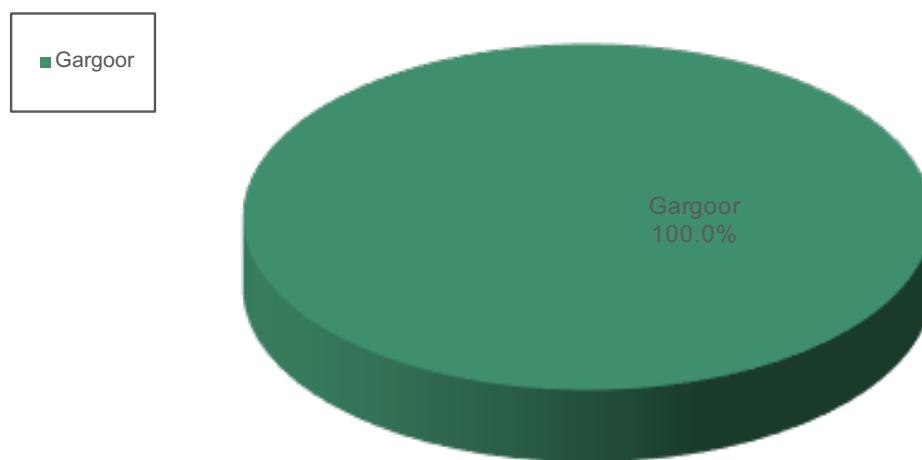
Where the total landings by tarads (3,998 mt) is 4.5 times higher than that of lanshes (895 mt) in 2018, tarad fishermen undertook 8.1 times more fishing

trips (20,821 trips) than lansh fishermen (2,557 trips) in the same period (Figure 17).



Figure 18 – Ghazal net ready for deployment in a fishing boat at Al Marfa.

(a)



(b)

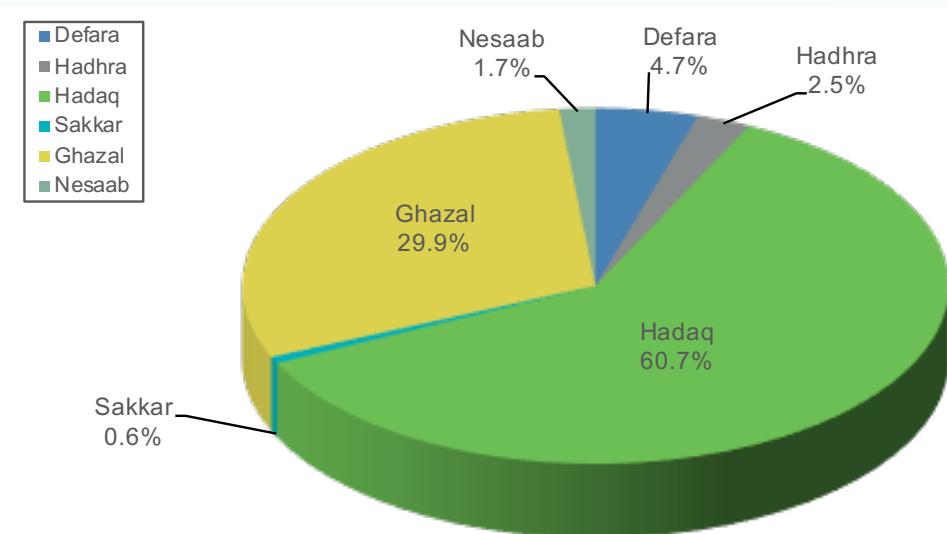


Figure 19 – Breakdown of fishing trips by fishing methods used on a Lansh (a) and Tarad (b).

As indicated earlier, Gargoor is the leading gear type used in lanshes (Figure 19a). Gargoor traps target bottom dwelling species, of which Hamour (*Epinephelus coioides*) is the most common species. Other fishing methods, such as hand line or trolling, are operated in between the hauling and setting of Gargoor traps by lanshes.

Tarad fishermen in the Emirate of Abu Dhabi operate a wide range of fishing methods of which Hadaq (hand line) is the most common gear type (Figure 19b), followed by the seasonal Ghazal.

Figure 20 shows the distribution of fishing trips by fishing gear and landing site. Gargoor is predominantly operated by lansh fishermen in Free Port and on Delma island, while tarad fishermen deploy Hadaq and Ghazal throughout the Emirate of Abu Dhabi. Defara and Al Sakkar are two fishing gears restricted to fishermen authorised to fish inside privately leased sea areas (buhoors) in and around Al Mirfa and Al Saadiyat. Al Hadhra fishing method is predominantly used in and around Al Bateen, while Nesaab is principally deployed in Al Bateen and Al Mirfa.

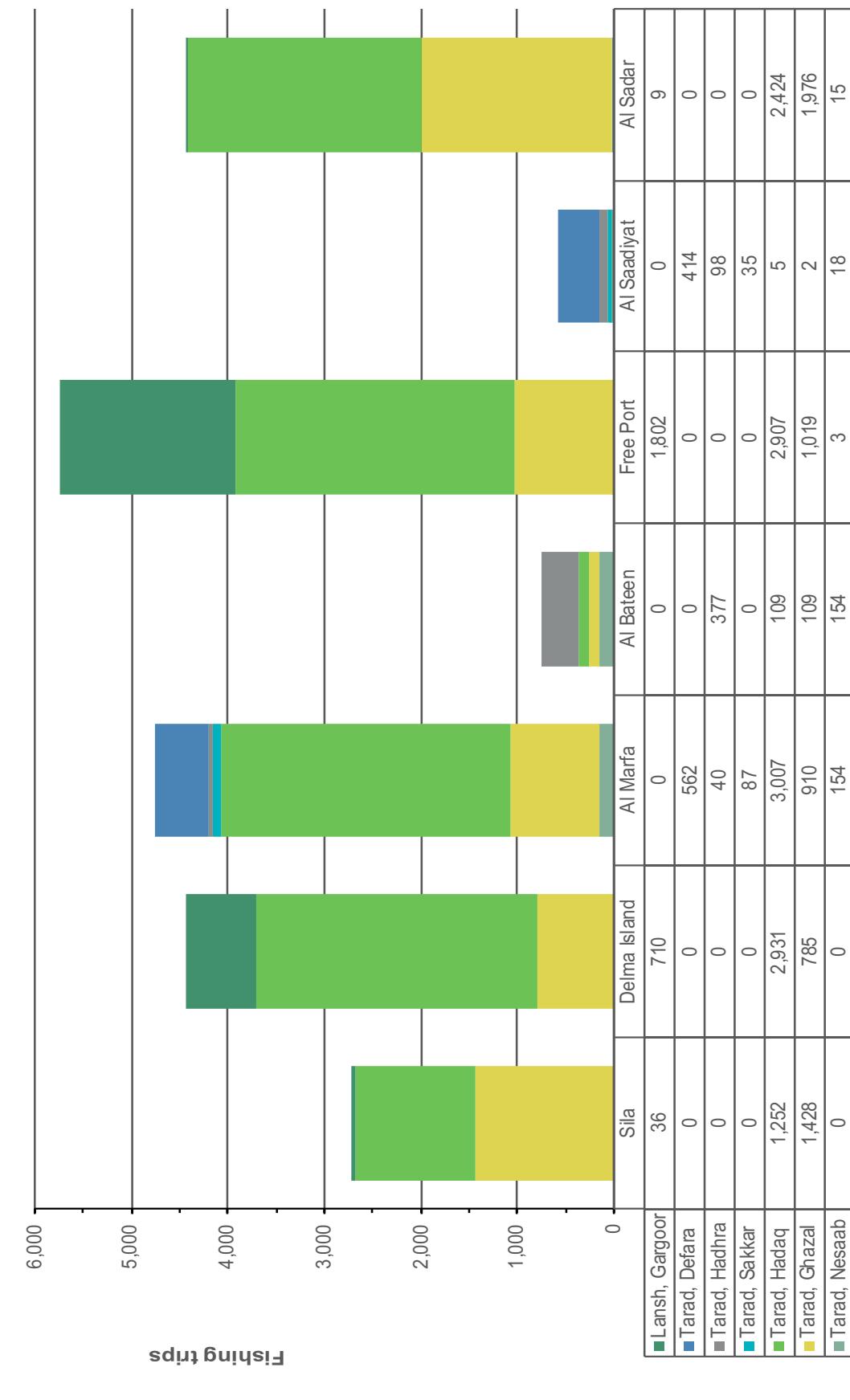


Figure 20 – Distribution of fishing trips by fishing methods and landing sites.



Figure 21 – Setting Al Sakkar (intertidal barrier net) in Marawah island.

Figure 22 shows the seasonality of fishing gears used. Gargoor is constantly operated throughout the year having no apparent seasonality. Ghazal is operated during the winter months October–April, while Hadhra is only used in the summer (April–September). Hadaq, Sakkar, Defara and Nesaab are deployed throughout the year, albeit with lesser intensity during the summer months.

Figures 24 and 25 portray the value of landings of different species by fishery method and landing sites. The total wholesale value of fish landed in the Emirate of Abu Dhabi is estimated at AED 120.5 million in 2018, of which 25% was realised by lanshes and 75% by tarads.

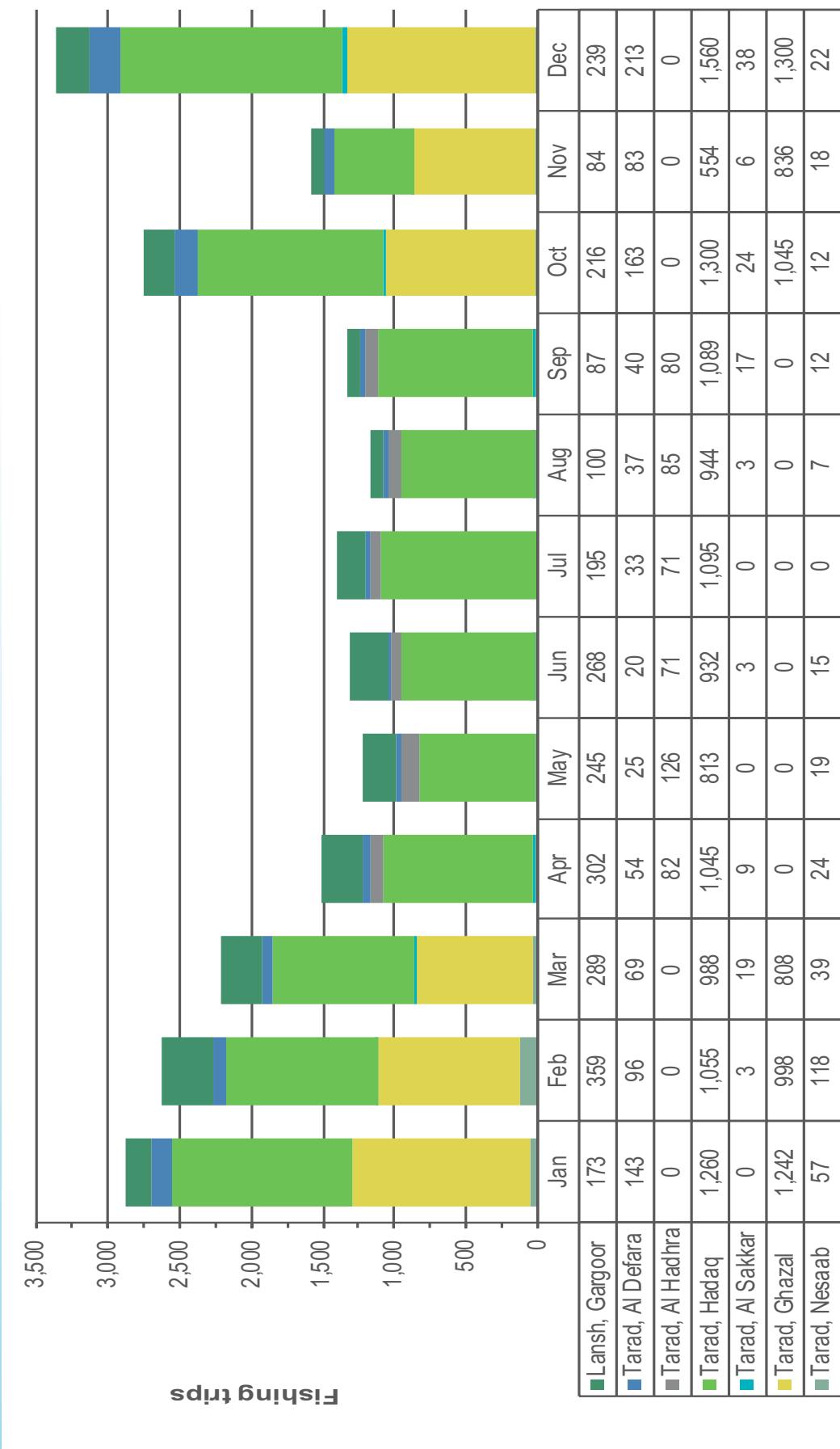


Figure 22 – Number of fishing trips by fishing methods and months.

Ghazal fishing operations generated AED 58 million in revenues, followed by Gargoor (AED 30 million) and Hadaq (AED 28 million). The Scombridae (Kanaad) and Epinephelidae (Hamour) families accounted for

43% and 22% respectively of the total wholesale value of catch landed in the Emirate of Abu Dhabi in 2018.



Figure 23 – Assortment of local fish at Al Mushrif Fish Market.

The Free Port was the principal landing site in 2018, contributing to 41% of the total wholesale value. Followed by Marfa with 19% and Al Sadar ranked third with 15% of the total wholesale value.

Table I shows the average wholesale unit price which principal species groups fetched in the Emirate of Abu Dhabi during 2018.



Figure 24 – Wholesale value of principal families by fishing method.

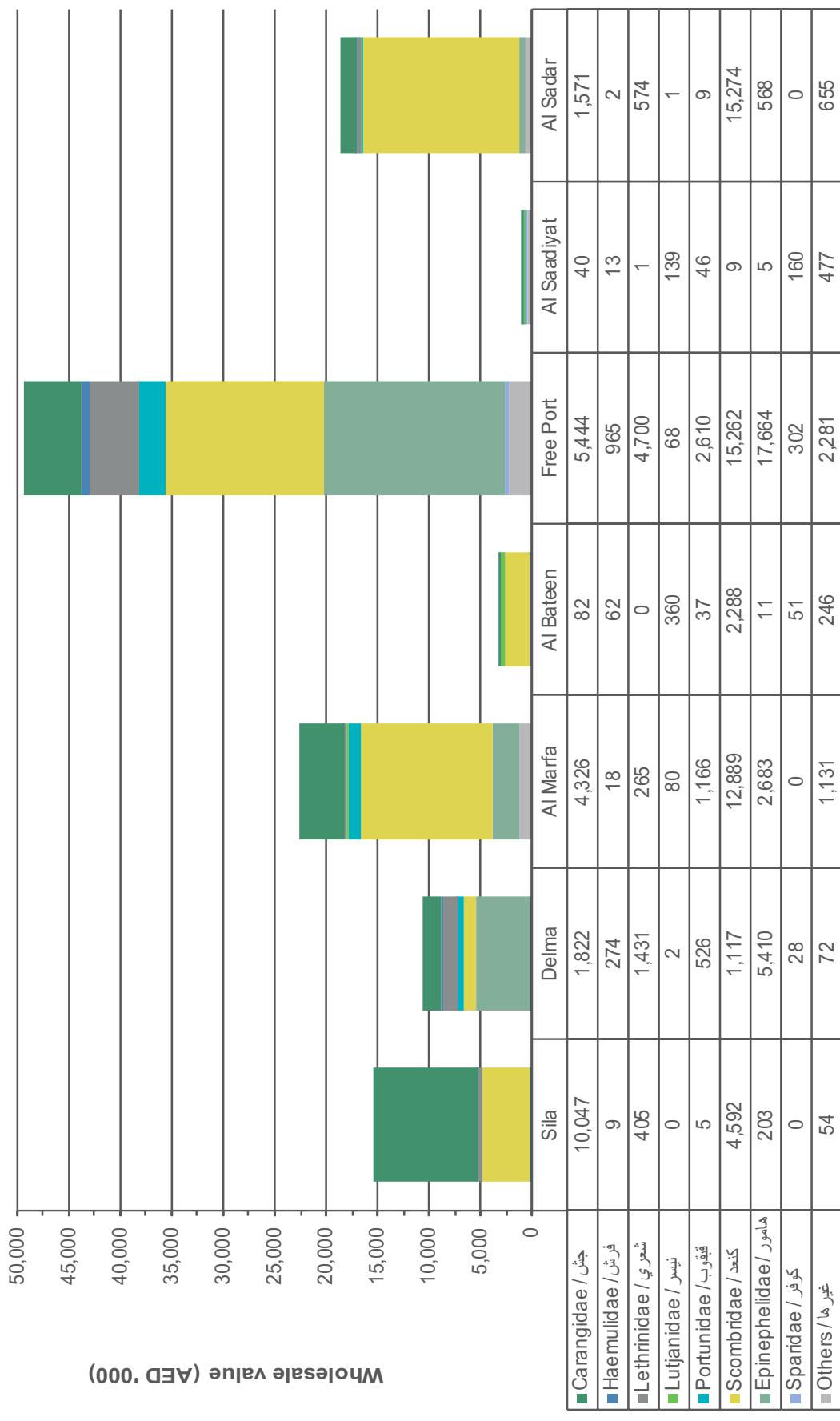


Figure 25 – Wholesale value of principal families by landing site.

Family	Arabic Name	Scientific Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg	St. Dev	
Carangidae	Bassar	<i>Scomberoides tol</i>	11.5	14.0	13.3	15.0	12.8	10.0	11.0	5.2	6.3	5.5	10.0	10.4	3.45		
Dhilé		<i>Scomberoides commersonianus</i>	15.0	15.0	16.0	14.5	16.5	11.3	15.0	15.0	12.5	15.0	15.0	14.7	1.41		
Durduman		<i>Atule mate</i>	22.0	17.7	25.0	21.0	22.0	12.5			10.0	12.0		17.8	5.61		
Gufdar		<i>Caranx ignobilis</i>			31.3	33.3	32.0	22.7	33.3	32.0	24.7	32.0	30.0	29.1	4.84		
Halwayoh		<i>Parastromateus niger</i>												28.0	28.0		
Hamam		<i>Seriola nigrofasciata</i>					20.0							20.0			
Jesh Sal		<i>Caranxoides malabaricus</i>	24.0											24.0			
Jib	Jesh Um Al Hala	<i>Caranxoides bajad</i>	22.0	28.7	28.8	38.0	35.0	38.0	25.2	27.2	26.8	28.0	28.0	24.0	29.1	5.19	
Jib		<i>Seriola dumerili</i>	18.0				15.0	19.3	20.0					18.1	2.22		
Sima		<i>Decapterus russelli</i>					19.0							19.0			
Tala		<i>Trachinotus moakalee</i>												12.0	12.0		
Zuraidi		<i>Gnathanodon speciosus</i>	33.5	41.7	46.0	45.7	43.0	37.3	43.3	37.0	34.5	39.3	32.7	31.2	38.7	5.16	
Epinephelidae	Hamour	<i>Epinephelus coioides</i>	38.7	42.5	32.0	44.5	47.5	37.0	42.9	41.5	44.5	42.5	43.0	42.5	41.6	4.04	
Haemulidae	Farsh	<i>Diagramma pictum</i>	10.0	17.0	18.0	19.0	19.0	23.3	20.0	20.0	17.5	18.3	15.0	16.5	17.8	3.23	
Hialai		<i>Plectrohinchus gaterinus</i>			18.0	19.0	20.0	20.0	15.0					13.0	10.0	16.4	3.87
Naqroot		<i>Pomadasys argenteus</i>	30.0	32.0	30.0	36.5	32.0							20.0		28.9	5.86
Yaham		<i>Plectrohinchus sordidus</i>	10.0	7.6	13.0	10.5	11.0	10.3	11.3	10.5	10.5	10.5	11.5	13.5	11.1	1.61	
Lethrinidae	Shaari	<i>Lethrinus nebulosus</i>	26.0	24.1			31.0	32.5	30.0	31.3	31.0	25.3	26.3	21.0	27.8	3.82	
	Shaari Eshkheli	<i>Lethrinus lentjan</i>			28.0	24.0	23.3	25.0	35.0	40.0	37.0	28.0	29.0	20.0	28.6	6.25	
	Souli	<i>Lethrinus microdon</i>	8.6	9.6	14.3	14.3	16.5	14.7	11.3	8.8	10.0	10.0	7.3	8.5	11.2	3.03	
	Yemah	<i>Lethrinus borbonicus</i>	12.0	8.6	14.0	11.5	12.3	12.0	11.3	12.0	12.5	10.5	11.3	11.0	11.6	1.29	
Lutjanidae	Aqalah	<i>Lutjanus fulvifamma</i>		14.0	9.0	12.0	13.5	9.0	5.3	10.0	6.3	15.0		10.4	3.43		
	Hamra	<i>Lutjanus malabaricus</i>					29.0	30.0	32.0	35.0		30.0		31.2	2.39		
	Naiser	<i>Lutjanus ehrenbergii</i>			12.0	11.0	11.0	9.5	9.3	10.7	11.0			10.6	0.94		
	Umm Dhrais	<i>Lutjanus indicus</i>					23.0		65.0	70.0				100.0	64.5	31.69	
Portunidae	Qabqoob	<i>Portunus pelagicus</i>	11.0	15.7	19.0	18.8	22.5	20.0	21.0	20.3	12.1	15.0	14.0	17.3	3.66		
	Qabqoob bunnii	<i>Charybdis natator</i>			16.0		20.0	22.0	23.0			20.0	25.0	20.0	20.9	2.85	
Scombridae	Garfah	<i>Rastrelliger kanagurta</i>	17.0	17.0	18.0							12.0	10.0	14.0	3.74		
	Kanaad	<i>Scomberomorus commerson</i>	30.8	35.6	34.5	44.0	46.0	45.5	38.3	50.0	41.5	27.9	27.1	29.5	37.6	7.83	
	Saddah	<i>Euthynnus affinis</i>										28.0		28.0			
	Tabban	<i>Auxis thazard</i>	13.0											13.0			
Sparidae	Faskar	<i>Acanthopagrus bifasciatus</i>	15.0	15.0	15.0	16.5	16.3	17.0	16.0	18.0	16.0	15.5	15.5	17.0	16.1	0.94	
	Kofar	<i>Argyrops spinifer</i>		22.0	23.0	25.0	27.0							30.0	25.7	2.94	
	Qabit	<i>Rhabdosargus sarba</i>		20.0	21.0	24.0	24.0	25.0	24.0	25.0	25.0	15.0		22.6	3.36		
	Shaam	<i>Acanthopagrus latus</i>	15.0	22.5	25.7	24.3	28.3	28.3	25.3	25.0	22.5	21.5	21.8	18.3	23.2	3.86	
	Subaiti	<i>Sparidentex hastae</i>								12.0				12.0			

Table I – Average wholesale unit prices in AED per Kilogram in 2018.

TRENDS

Figure 26 shows the trend in the number of fishing trips by boat type for the period 2005 – 2018. Over the past 11 years, the number of lansh trips decreased dramatically from around 4,900 in 2008 to around 2,600 in 2018, while in the same period the number of tarad fishing trips oscillated around 20,000 trips per year.

Figure 27 shows the trend in annual production by principal species group for the period 2005 – 2018. Compared to the period 2011 - 2015, the commercial landings of Haemulidae, Lethrinidae, Epinephelidae

and Sparidae declined considerably in 2016, 2017 and in 2018. This phenomena may be attributed to the apparent declining trend of lansh - gargoor trips, and the March-April season ban on the catch and trade of Shaari and Safi which was introduced for the first time in 2016.

The annual Scombridae catch of 1,941 tonnes in 2018 is the highest catch volume recorded for this family ever since EAD started to compile fisheries statistics for the Emirate of Abu Dhabi in 2001.

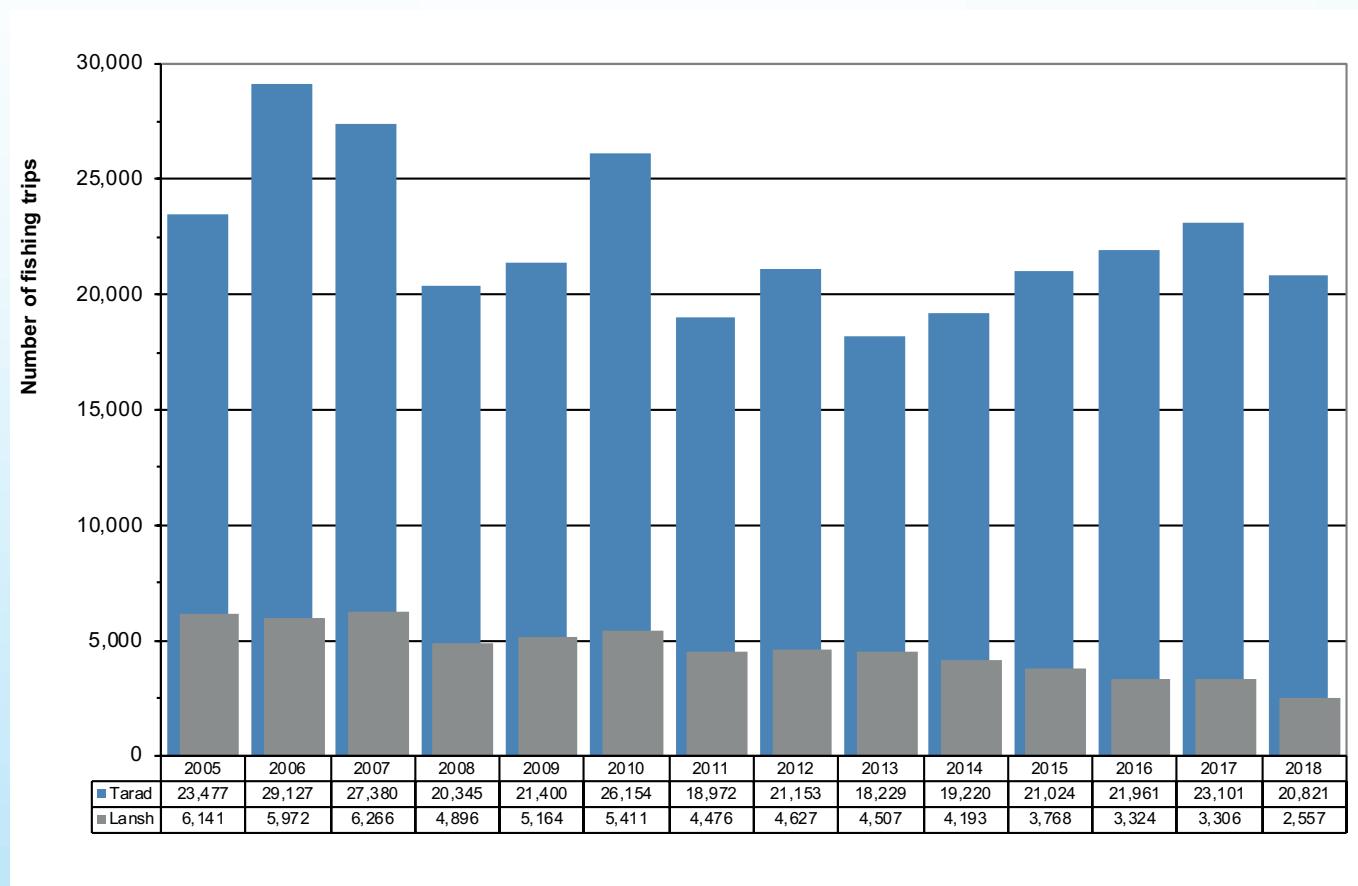


Figure 26 – Number of fishing trips in Abu Dhabi Emirate during 2005-2018.



Figure 27 – Trend of annual production in Abu Dhabi Emirate 2005-2018.

RESOURCES INDICATORS

BACKGROUND

Since 2001, the EAD conducts comprehensive fisheries research to assess the resource status of 28 commercially important species in the Emirate of Abu Dhabi. Table 2 shows the species biology and fishery characteristics (e.g. spawning season and fishery mortality) and the resource status of the assessed species, which makes up 75% of the total volume commercially landed in 2018.

The UAE Sustainable Fisheries Programme measures the achievement of its overall objective 'Sustainable

fisheries for the UAE by 2030' through two Key Performance Indicators:

1. Sustainable Exploitation Index (SEI) increase from 12.8% (Abu Dhabi) in 2014 to 70% (UAE) in 2030; and
2. Overexploited fish stocks rebuilt to minimum sustainable thresholds, with mean relative adult stock size (Mean SBR) for three key species increased from 7% average (Abu Dhabi) in 2014 to 30% in 2030.



Figure 28 – Taking length frequency measurements at the time of landings as part of EAD stock assessment programme.

Population parameters of commercially important species in Abu Dhabi waters - Updated as per March 2019

#	Species (Latin name)	Arabic name	Method	Z	F	M	F_{lim}	F/F_{lim}	SBR	Spawning season	2018 landings (mt)	Status ¹
1	<i>Epinephelus coioides</i>	Hamour	Age	0.77	0.58	0.19	0.13	4.56	5.7	Apr-May	614	2018
2	<i>Lethrinus nebulosus</i>	Shaari	Age	0.55	0.35	0.20	0.13	2.61	11.0	Apr-May	225	2018
3	<i>Diagramma pictum</i>	Farsh	Age	0.64	0.51	0.13	0.09	5.86	6.2	Apr-May	62	2018
4	<i>Scomberomorus commerson</i>	Kanaad	Length	0.73	0.47	0.26	0.17	2.71	17.3	Apr-Aug	1,307	2018
5	<i>Gnathanodon speciosus</i>	Zuraidi	Length	1.08	0.73	0.35	0.23	3.15	8.8	Apr-May	16	2014
6	<i>Rhabdoscarus sarba</i>	Qabit	Age	0.77	0.51	0.26	0.17	2.93	18.8	Jan-Jun	14	2018
7	<i>Siganus canaliculatus</i>	Safi Arabi	Age	1.41	0.87	0.54	0.36	2.40	10.7	Apr-Jul	13	2018
8	<i>Scomberoides commersonianus</i>	Dhil'e	Length	0.51	0.26	0.25	0.17	1.55	19.4	Mar-Jun	950	2013
9	<i>Argyrosomus spinifer</i>	Kofar	Age	1.07	0.68	0.38	0.26	2.67	14.6	Jan-Apr	3	2014
10	<i>Cephalopholis hemistictus</i>	Eshnenuh	Age	0.38	0.17	0.21	0.14	1.21	17.3	Jul-Nov	0	2013
11	<i>Lutjanus argentimaculatus</i>	Mariaan	Age	0.21	0.10	0.11	0.07	1.36	17.3	Sep-Oct	0	2013
12	<i>Carangoides bajad</i>	Jesh Um Al Hala	Length	1.05	0.62	0.43	0.29	2.13	22.6	May-Sep	249	2014
13	<i>Moolgarda sebæli</i>	Beyyah Arabi	Length	0.70	0.23	0.47	0.31	0.73	39.1	Feb-Apr	10	2010
14	<i>Lethrinus borbonicus</i>	Yemah	Age	0.97	0.50	0.47	0.31	1.59	30.6	Mar-Jun	19	2016
15	<i>Lethrinus microdon</i>	Souli	Age	0.68	0.21	0.47	0.31	0.67	63.6	Jun-Nov	16	2016
16	<i>Atule mate</i>	Durduman	Length	1.44	0.33	1.11	0.74	0.44	78.0	Apr-May	22	2011
17	<i>Acanthopagrus bifasciatus</i>	Faskar	Age	0.25	0.05	0.20	0.13	0.38	70.4	Jan-Apr	7	2014
18	<i>Gerres longirostris</i>	Badah	Age	0.72	0.30	0.42	0.28	1.07	40.0	Mar-Jun	26	2015
19	<i>Lethrinus lentjan</i>	Shaari Eshkheli	Age	0.58	0.29	0.29	0.19	1.49	87.5	Apr-Jun	14	2017
20	<i>Acanthopagrus latus</i>	Shaam	Age	0.46	0.16	0.30	0.20	0.80	70.0	Jan-Mar	8	2018
21	<i>Lutjanus ehrenbergii</i>	Naiser	Age	0.51	0.16	0.35	0.23	0.68	46.9	Mar-Jun	61	2009
22	<i>Lutjanus fulviflamma</i>	Aqalah	Age	0.40	0.11	0.29	0.19	0.57	64.8	Apr-Jul	2	2014
23	<i>Plectorhinchus gaterinus</i>	Hilali	Age	0.28	0.08	0.20	0.13	0.60	56.9	Apr-May	2	2010
24	<i>Plectorhinchus sordidus</i>	Yanam	Age	0.41	0.11	0.30	0.20	0.55	69.6	Mar-May	13	2018
25	<i>Pomacanthus maculosus</i>	Anfooz	Age	0.14	0.02	0.12	0.08	0.25	63.1	Sep-Oct	0	2017
26	<i>Scopelopsis taeniatus</i>	Eibzimi	Age	1.93	1.08	0.85	0.57	1.90	77.9	Mar-Apr, Sep-Oct	0	2016
27	<i>Sphyraena barracuda</i>	Jedd Kebir	Length	0.40	0.05	0.35	0.23	0.21	81.0	Apr-Sep	1	2011
28	<i>Netuma thalassina</i>	Khan	Age	0.27	0.06	0.21	0.14	0.43	56.5	May-Jun	10	2011
											3,663	Total

Note: Z: Total Mortality, F: Fishing Mortality and M: Natural Mortality, F/F_{lim} is the targeted limit Fishing Mortality, F/F_{lim} is exploitation ratio and SBR is mean relative adult stock size.

¹ Resource status of species (last assessed in year)

12 Overexploited (O; SBR < 30%)

2 Exploited within sustainable levels (S; 30% < SBR < 40%)

14 Underexploited (U; SBR > 40%)

Table 2 – The key species status summary, updated per March 2019.



KPI - SUSTAINABLE EXPLOITATION INDEX (SEI)

The Sustainable Exploitation Index (SEI) is a KPI that describes the proportion of the total catch landed that consists of sustainably exploited species, estimated each year, and defined as:

$$\text{SEI} = (\text{Total sustainable catch}/\text{Total assessed catch}) \times 100$$

Total sustainable catch is the annual landed catch (mt) of species for which stock assessments have been undertaken and classified as either sustainable or under exploited.

Total assessed catch is the total annual landed catch (mt) of all species for which stock assessments have been undertaken.

The SEI threshold value is set at 70%, while the target

value is set at 100%. The SEI is an important fisheries management performance indicator, which decreased from 8.4% in 2017 to 5.7% in 2018. This is only a slight decrease from previous year and may be attributed to natural variance.

With the exception of the year 2008, which saw a dramatic increase in the landings of Beyah Arabi (*Moolgarda sehele*), the average Sustainable Exploitation Index is 13.9% over the period 2005 – 2018.

The Sustainable Exploitation indicator remains well below the target level, and calls for stringent management measures to limit the further removal of threatened over-exploited species in the waters of the UAE.

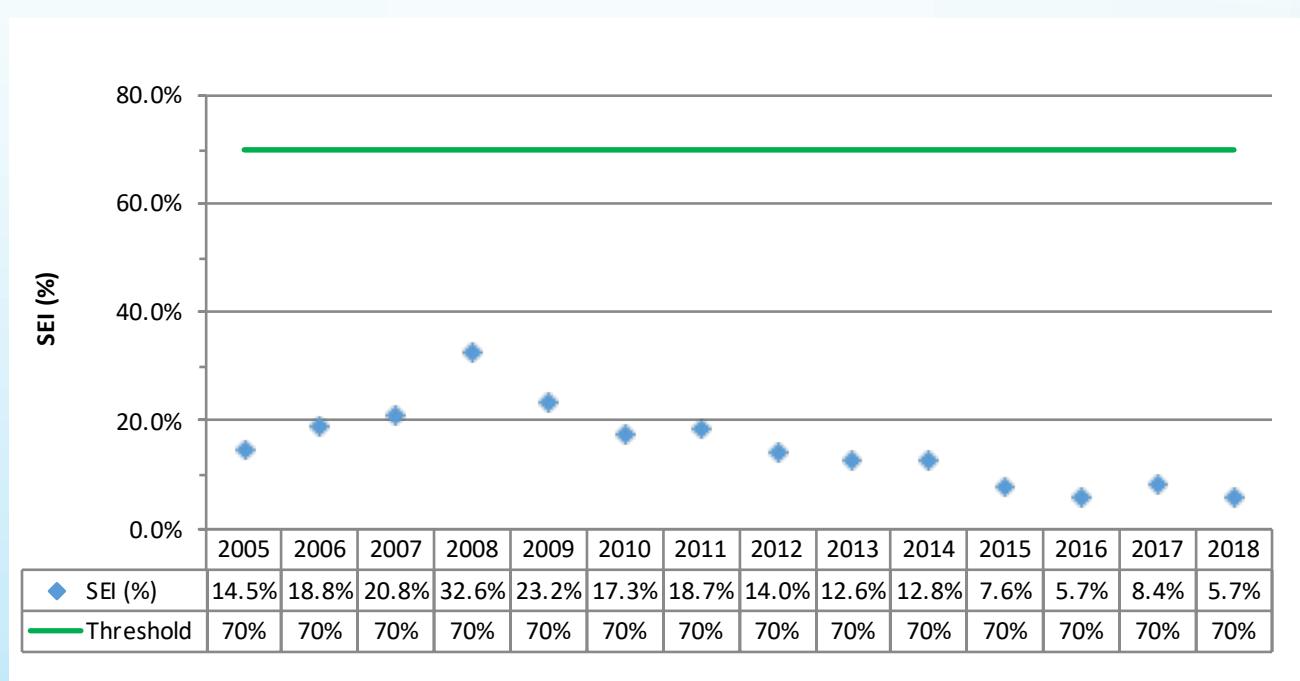


Figure 29 - Sustainable Exploitation Index (SEI) from 2005 to 2018.

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Sustainably exploited	A	968.5	971.8	1,410.8	1,134.0	955.6	657.7	556.3	439.0	495.6	358.4	212.0	313.5	209.6
Over exploited	B	4,188.2	3,711.1	2,920.3	3,746.3	4,564.2	2,853.9	3,427.9	3,040.1	3,385.1	4,329.5	3,479.2	3,425.3	3,453.2
Total assessed	C	5,156.7	4,682.9	4,331.1	4,880.3	5,519.7	3,511.6	3,984.2	3,479.0	3,880.7	4,687.9	3,691.2	3,738.8	3,662.8
Total Catch	D	5,823.7	5,336.6	5,192.4	5,977.5	6,332.5	3,921.9	4,399.0	3,862.5	4,290.4	5,234.7	4,438.5	4,739.5	4,892.2
Sustainable Exploitation (%)	A/C	18.8%	20.8%	32.6%	23.2%	17.3%	18.7%	14.0%	12.6%	12.8%	7.6%	5.7%	8.4%	5.7%

Table 3 – Sustainable Exploitation time series

³ Target rational: The threshold target is directly related to the UAE National Biodiversity Strategic Action Plan (2014-2021); TARGET 4.I. By 2021, at least 70% of important and vulnerable living marine resources are managed sustainably.

KPI - MEAN RELATIVE ADULT STOCK SIZE (MEAN SBR)

The mean relative adult stock size for 3 key species (Mean SBR) is a proxy for the adult stock size used to evaluate the status of fisheries resources. It is routinely calculated on an annual basis for the three most important commercially exploited species in the demersal fishery of Abu Dhabi; Hamour (*Epinephelus coioides*), Shaari (*Lethrinus nebulosus*), and Farsh (*Diagramma pictum*). The indicator is derived from population models with input parameters that relate to population dynamics (e.g. growth rate and the age at maturity) and fishery characteristics (e.g. the age at first capture and fishing mortality rate), as follows:

$$SBR = \sum_{t=0}^{t_{\max}} N_t W_t G_t$$

Where:

SBR = Relative spawner biomass per recruit
 t_{\max} = the maximum observed age in the fishery

N_t = the number of fish surviving to age t
 W_t = the mean weight at age t
 G_t = the fraction of mature fish at age t

Meta analyses of the relationships between stock sizes and recruitment have produced biological reference points against which the SBR is compared in order to infer the status of the population (if it is over-exploited or not).

The target reference point⁴ is a Mean SBR of 40% and the limit threshold reference point is a Mean SBR of 30 %, below which threshold management should intervene in order to prevent stock declines. The mean SBR indicator for 2018 increased from 6.6% in 2017 to 7.6% in 2018, and remains well below the critical endangered level of 10%, below which stocks are considered severely over-exploited.

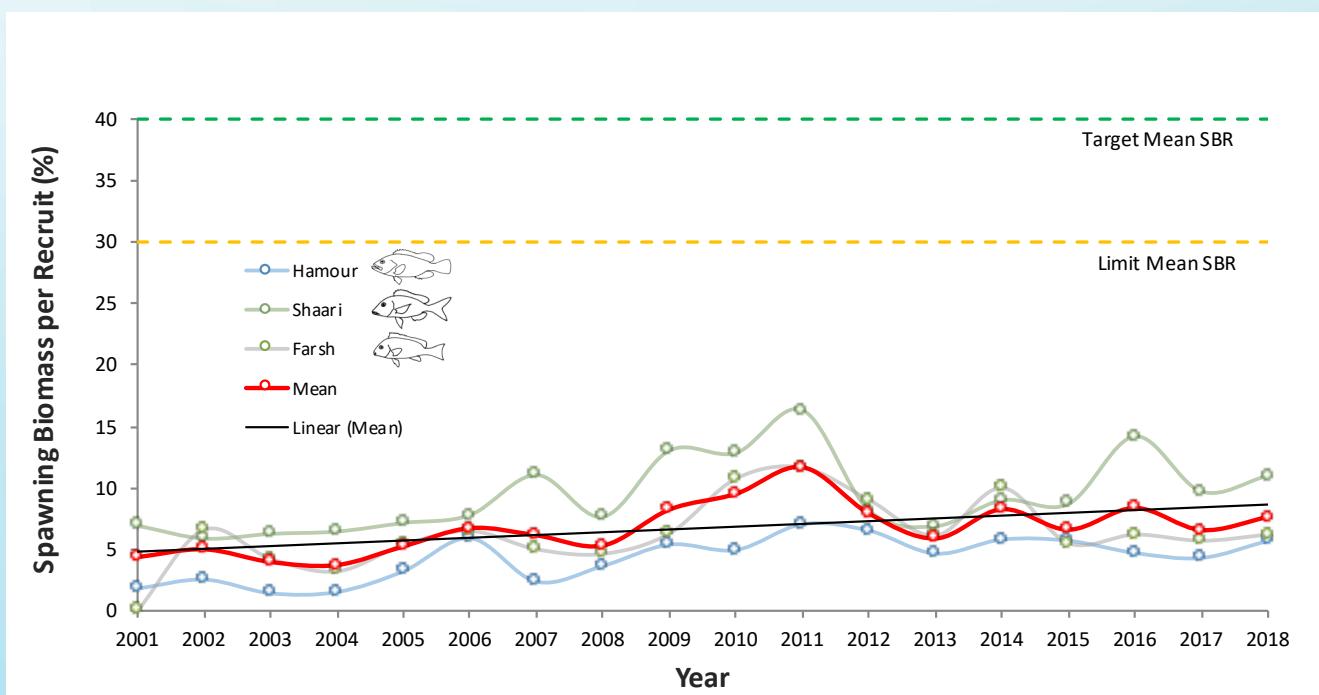


Figure 30 – Mean relative adult stock size (Mean SBR) from 2001 to 2018.

⁴The Spawner Biomass per Recruit (SBR) is a proxy for the adult fish stock size that directly reflects the resource status when compared to target (40%) and limit (30%) biological reference points that are recognised as international fisheries management conventions. This is a commonly used international convention for fisheries management. Meta analyses indicate that ground fish (demersal) stocks can be exploited sustainably without normal reproductive processes being impaired if the adult stock size is reduced to 40% of its virgin, unexploited size (SBR = 40%).



Year	Limit	Target	SBR (%)				Mean
			Hamour	Shaari	Farsh		
2001	30	40	1.8	6.9	-	4.4	
2002	30	40	2.5	5.9	6.6	5.0	
2003	30	40	1.4	6.3	4.2	4.0	
2004	30	40	1.5	6.4	3.2	3.7	
2005	30	40	3.2	7.1	5.4	5.2	
2006	30	40	5.9	7.8	6.5	6.7	
2007	30	40	2.4	11.0	5.0	6.1	
2008	30	40	3.7	7.6	4.6	5.3	
2009	30	40	5.4	13.0	6.3	8.2	
2010	30	40	4.9	12.8	10.8	9.5	
2011	30	40	7.1	16.3	11.7	11.7	
2012	30	40	6.5	8.2	9.0	7.9	
2013	30	40	4.7	6.9	6.1	5.9	
2014	30	40	5.8	9.0	10.0	8.3	
2015	30	40	5.7	8.7	5.5	6.6	
2016	30	40	4.7	14.2	6.2	8.4	
2017	30	40	4.3	9.7	5.7	6.6	
2018	30	40	5.7	11.0	6.2	7.6	

Table 4 – Spawner Biomass per Recruit (SBR) time series.

AQUACULTURE PRODUCTION

In 2018, there were five permitted aquaculture operations in the Emirate of Abu Dhabi contributing to a total aquaculture production of 808 tonnes of

seafood with a farm gate value of approximately AED 19 million. Shrimps (*Penaeus indicus*) and Hamour (*Epinephelus coioides*) dominated production.

AQUACULTURE LANDSCAPE OF ABU DHABI

According to 2018 data, five licensed aquaculture operations are within the Emirate of Abu Dhabi (Figure 31), four of which are commercial facilities and one is a research facility. Amongst those, there are two large-scale farms; one producing shrimp in ponds near Abu Dhabi city and the other is producing

Hamour in a high-tech recirculating system in Al Wathba. There are also two medium scale aquaponics farms producing Tilapia (*Oreochromis niloticus*) with vegetables in a symbiotic environment in Bani Yas and Al Faya. In addition, a small-scale research facility produces Tilapia in Masdar city.



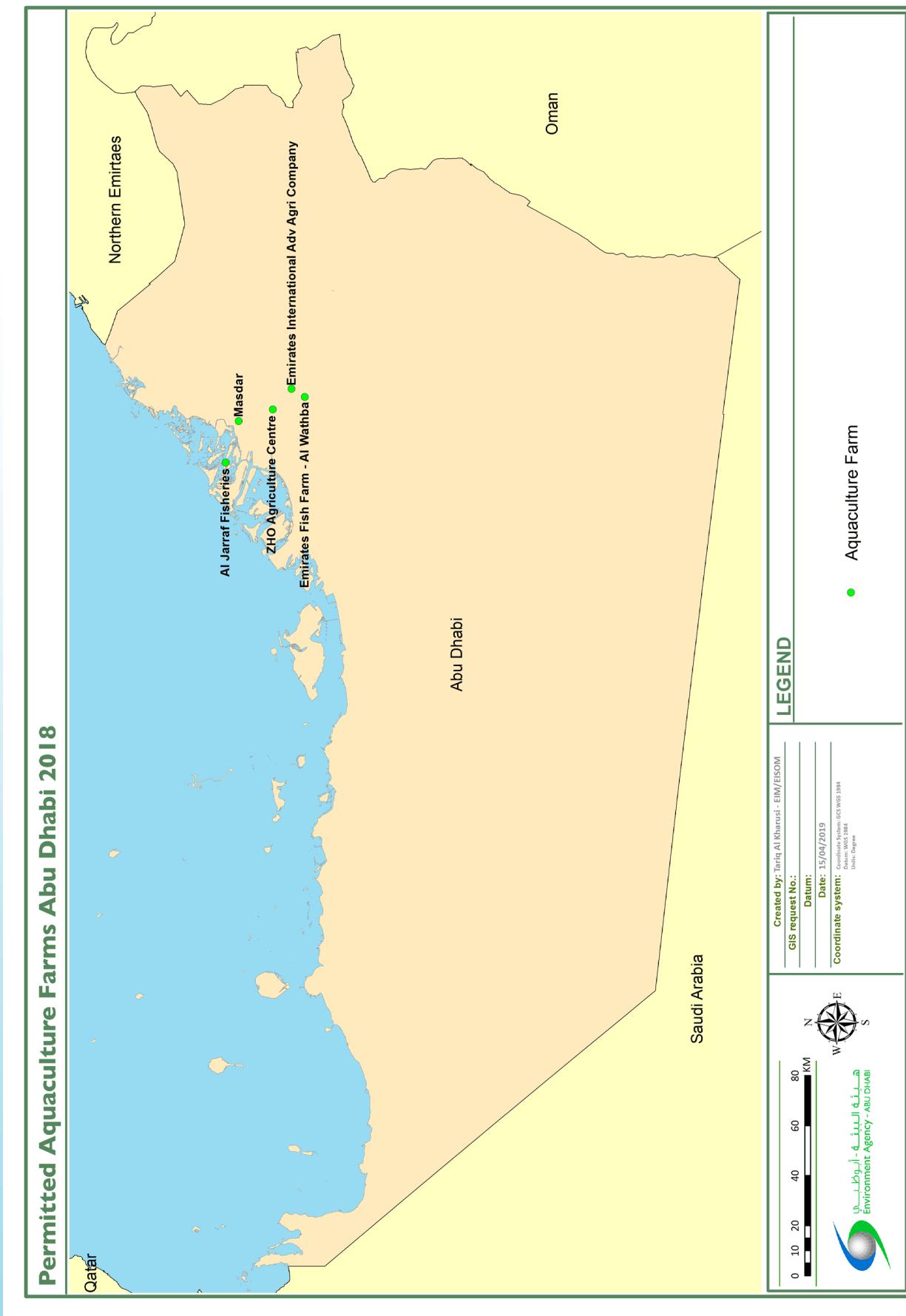


Figure 31 – Locations of permitted aquaculture farms in Abu Dhabi

TOTAL AQUACULTURE PRODUCTION AND VALUE IN 2018

At approximately 808 tonnes in 2018, aquaculture production in Abu Dhabi is still modest. Figure 32 shows the volume of species produced in 2018 where shrimps (*Penaeus indicus*) was the principal species produced, accounting for 38% of output (305 mt). The second most produced species was Tilapia (*Oreochromis niloticus*) contributing 163 mt to the total aquaculture production of Abu Dhabi Emirate in 2018, followed by Hamour (*Epinephelus coioides*) and Seabream (*Sparus aurata*) with 120 mt each.

Other species include Barramundi (*Lates calcarifer*) 60 mt and Seabass (*Dicentrarchus labrax*) 40 mt. It is worth mentioning that there is an unknown number of unlicensed farms that are not reported. Therefore, the contribution of their production to the sector is potentially undervalued.

The total farm gate value associated with aquaculture production in 2018 was approximately 19 million AED. Shrimps accounted for 6 million AED of the

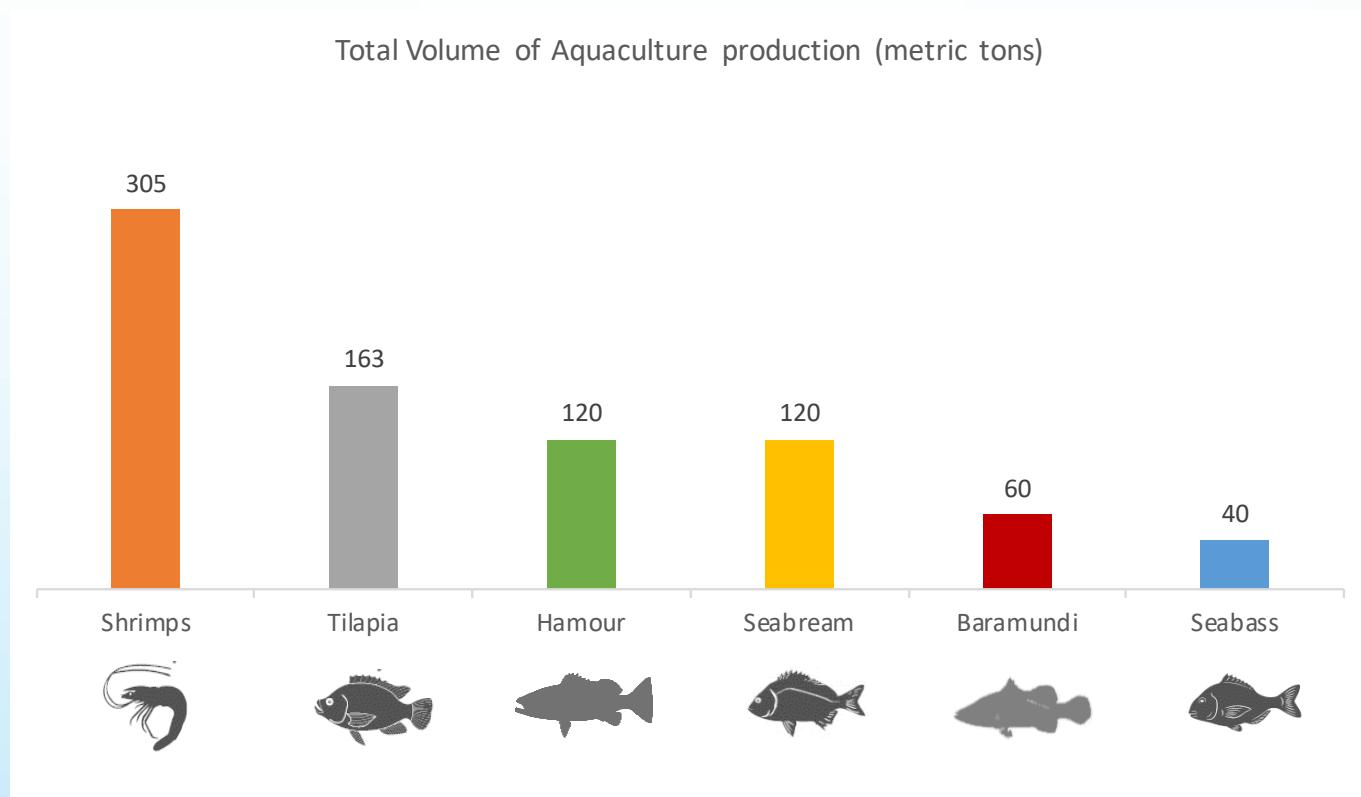


Figure 32 –Total volume of aquaculture production (tons) in 2018.

total value, while the other species accounted for about 12 million AED (Figure 33).

The aquaculture production reached a peak in 2018 at 808 mt, almost double the production in 2014. In

2015, the production accounted for 418 mt, slightly more than the production in 2014 (388 mt). However, the aquaculture production had fallen a little in 2016 to 375 mt but increased again in 2017 to 647 mt (Figure 34).

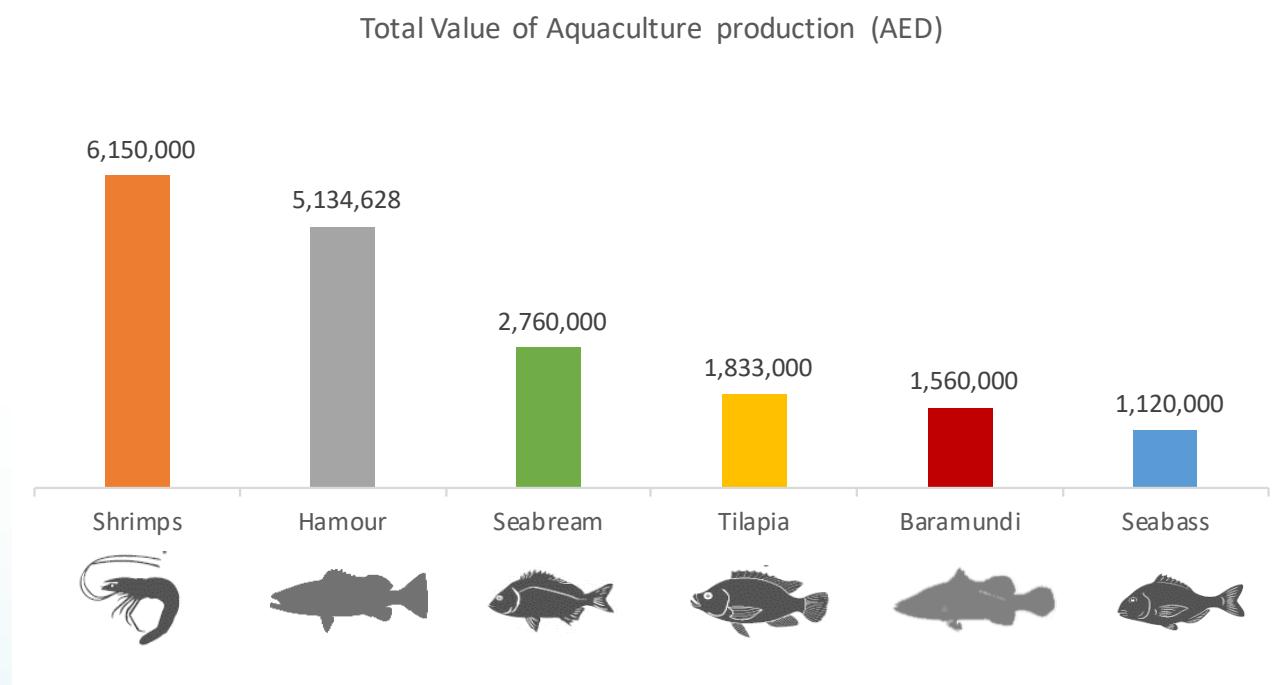


Figure 33 – Total value of aquaculture production in 2018.

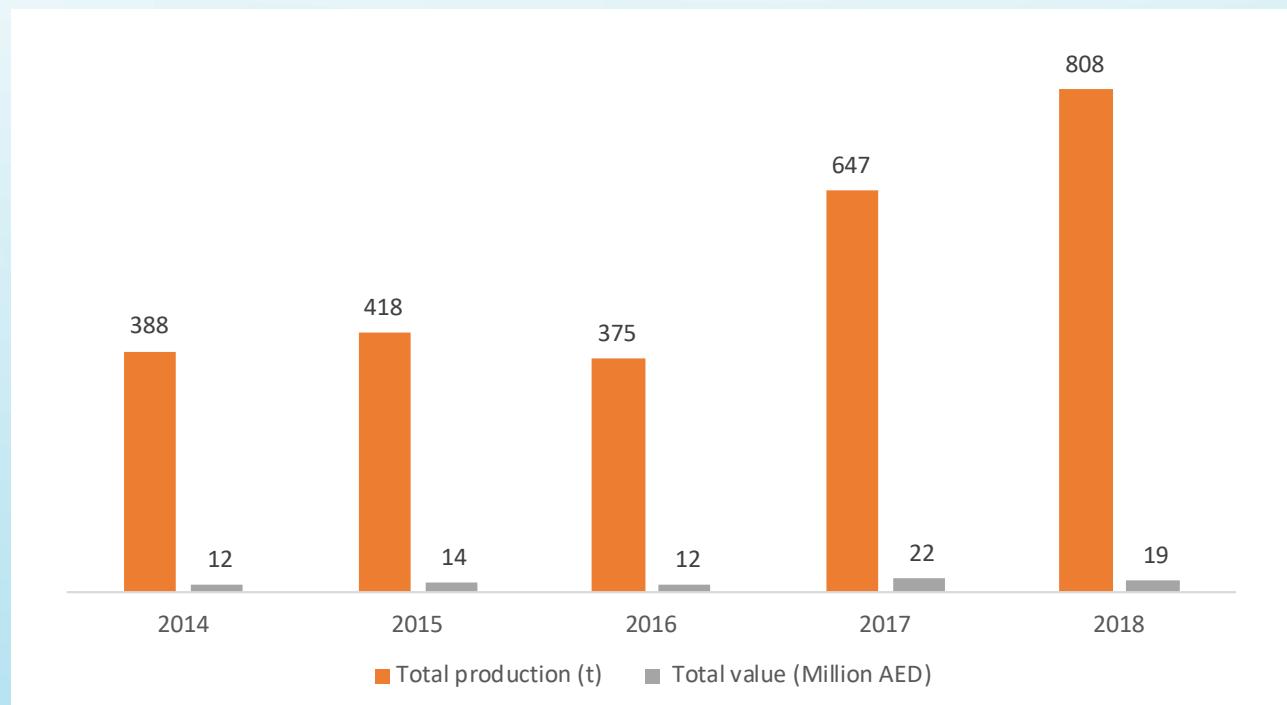
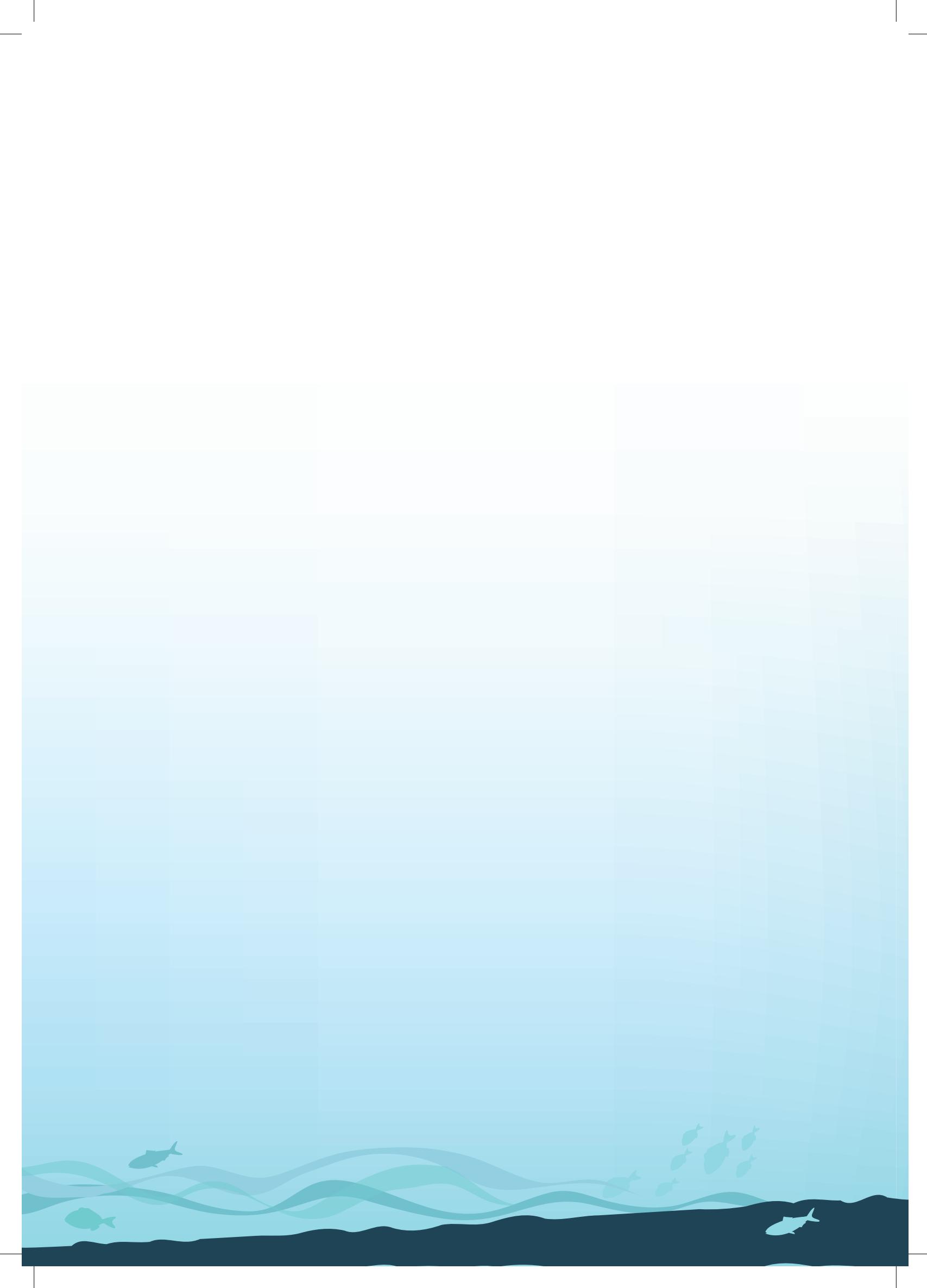
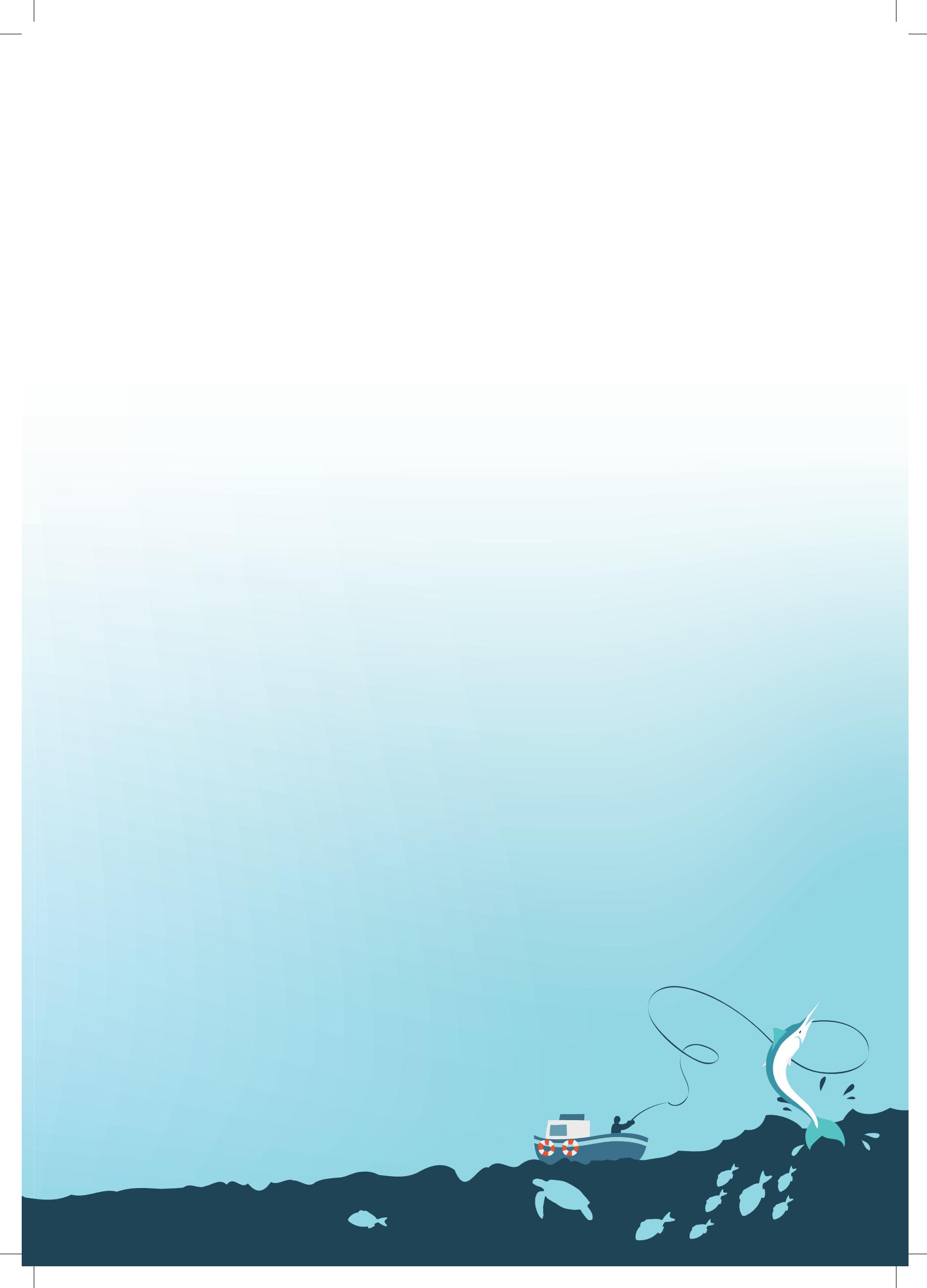


Figure 34 - Total aquaculture production and its value in Abu Dhabi Emirate from 2014 to 2018.







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