The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden

(PERSGA)

Current Status of the Ornamental Fish Trade in the Red Sea and Gulf of Aden with Guidelines for a Self-financing Monitoring, Control and Surveillance Programme and Proposals for Quotas

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PERSGA is an intergovernmental organisation dedicated to the conservation of coastal and marine environments and the wise use of the natural resources in the Region.

The Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah Convention) 1982 provides the legal foundation for PERSGA. The Secretariat of the Organization was formally established in Jeddah following the Cairo Declaration of September 1995. The PERSGA member states are Djibouti, Egypt, Jordan, Saudi Arabia, Somalia, Sudan, and Yemen.

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This document is a combination of two reports prepared for PERSGA in 2003. The first was titled 'The Current Status of the Ornamental Fish Trade in the Red Sea and Gulf of Aden' and was prepared by Drs Maroof A. Khalaf and Mohamed Abdallah. The second was a 'Report on Guidelines for a Self-financing Monitoring, Control and Surveillance Programme for the Ornamental Fish Trade in the Red Sea and Gulf of Aden with Proposals for Quotas' prepared by Drs Alasdair Edwards, Jeremy Hills and Martin Le Tissier.

The work was carried out through the Living Marine Resources Component of the Strategic Action Programme for the Red Sea and Gulf of Aden, a Global Environment Facility (GEF) project executed by PERSGA and implemented by the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP) and the World Bank with supplementary funding provided by the Islamic Development Bank.

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Guidelines for a Self-financing Monitoring, Control and Surveillance Programme for the Ornamental Fish Trade in the Red Sea and Gulf of Aden with Proposals for Quotas

Background

The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA) is executing a Strategic Action Programme (SAP) funded by the World Bank, United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP) and other donor organisations.

The SAP was prepared following an extensive analysis of regional environmental issues and has been endorsed by the PERSGA Council of Ministers. The SAP provides a cooperatively developed framework for the long-term conservation and management of the coastal and marine resources of the Region. A programme of activities is being carried out through eight complementary components: 1) institutional strengthening, 2) reduction of navigation risks and maritime pollution, 3) sustainable use and management of living marine resources, 4) conservation of habitats and biodiversity, 5) the establishment of a network of marine protected areas, 6) support for integrated coastal zone management, 7) the promotion of public awareness and participation and 8) monitoring and evaluation of programme impacts (HARIRI et al. 2000).

As part of the activities to promote sustainable use of living marine resources in the region, PERSGA/SAP Living Marine Resources (LMR) component conducted a training course to build the capacity of the local specialists conduct studies on the status of ornamental fish collecting activities and to assess the impact of the aquarium fish trade in the region. Preliminary studies on the aquarium fish trade in the region have been conducted by ABDALLAH (2000), ABDUL GHANI & GAZZAZ (2000), and BARRANIA (2000).

A Participatory Training Workshop in Methodologies for Assessing the Status and Potential for Ornamental Fisheries and their Environmental Impact was conducted by Dr. Alasdair Edwards at the Faculty of Marine Science of King Abdul Aziz University, Jeddah in April 2002. The methodologies developed in participation with the regional attendees at the training workshop were applied in the field by a regional team led by Dr. Maroof Khalaf (Jordan) and Dr. Mohamed Abdallah (PERSGA) at sites in Jordan, Egypt, Saudi Arabia, Djibouti and Yemen during 2002 (KHALAF & ABDALLAH 2003). An abbreviated report of this work is presented as part 1 in this volume. These studies have produced data that allow some estimates to made of the standing stocks of selected fish species which are important in the ornamental fish trade in the region.

Building on these data, part 2 of this publication seeks to:

- Present guidelines for a management strategy for the ornamental fish trade in the Red Sea and Gulf of Aden, including self-financing monitoring, control and surveillance.
- Propose quotas for PERSGA member countries based on previous studies.

PART 1

CURRENT STATUS OF THE ORNAMENTAL FISH TRADE IN THE RED SEA AND GULF OF ADEN

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ABBREVIATIONS AND ACRONYMS

AA	Average abundance
Alk	Al Kherq site (Saudi Arabia)
AlM	Al Murk site (Yemen)
AlS	Al-Lith site (Saudi Arabia)
Alz	Zorab site (Egypt)
ArtPla	Arta Plaga (Djibouti)
Awj Tho	Awjam Thoal site (Saudi Arabia)
Bai	Bayada site (Saudi Arabia)
BigPie	Big Piece site (Saudi Arabia) Al Kabeera
BosTho	Bostek/Thoal site (Saudi Arabia)
ECFFG	Egyptian Company for Fishing and Fishing Gears
FA	Frequency of appearance
FanAld	Fanar-Al Dolphin site (Egypt)
GEF	Global Environment Facility
Geh	Gehere (Djibouti)
Ill	Illi site (Egypt)
Kad	Kadaman site (Yemen)
Kam	Kamaran site (Yemen)
KhoAmb	Khor Ambado (Djibouti)
Mah	Mahmoudat site (Egypt)
Mas	Maskali (Djibouti)
MSS	Marine Science Station site (Aqaba-Jordan)
Mus	Moucha (Djibouti)
Nok	Noksh site (Egypt)
PERSGA	Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden
PY	Potential Yield
RA	Relative abundance
RasMohS	Ras Mohammed site (Egypt)
RSGA	Red Sea and Gulf of Aden
SAlB	Al Badi site (Yemen)
SCUBA	Self Contained Underwater Breathing Apparatus
SETek	South East Tekfash site (Yemen)
SmaPie	Small Piece site (Saudi Arabia) Al Sagheera
SouBay	South Bayada site (Saudi Arabia)
SWTek	South West Tekfash site (Yemen)
TA	Total abundance
Taj	Tadjoura (Djibouti)
TC	Tourist Camp site (Aqaba-Jordan)
VC	Visitors Centre site (Aqaba-Jordan)

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We appreciate the cooperation and help of the ornamental fish trade companies in the study area; PERSGA/SAP National Programme Coordinators in Djibouti and Yemen; the Marine Science Station, Aqaba, Jordan; the Fisheries Research Centre of the Ministry of Agriculture, and the Faculty of Marine Science at King Abdulaziz University, Saudi Arabia. Many thanks are due to everyone who provided assistance during the field surveys and with the final preparation of the documents for printing.

EXECUTIVE SUMMARY

A Participatory Training Workshop in Methodologies for Assessing the Status and Potential for Ornamental Fisheries and their Environmental Impact was conducted by Dr. Alasdair Edwards at the Faculty of Marine Science of King Abdul Aziz University, Jeddah in April 2002. The methodologies developed at the workshop were applied in the field by a regional team led by Dr. Maroof Khalaf (Jordan) and Dr. Mohamed Abdallah (PERSGA) at sites in Jordan, Egypt, Saudi Arabia, Djibouti and Yemen from July to November 2002.

The main objectives of the field work were: (1) to compare populations of coral reef fish used in the aquarium trade in different countries of the region; (2) to outline the nature of the aquarium trade in the Red Sea and Gulf of Aden region and to establish baseline data against which future changes can be monitored; (3) to examine the densities of aquarium fishes on Red Sea reefs and estimate potential yields.

Selected ornamental reef fish species were surveyed by the visual census technique using SCUBA. A total of 122 transects of 100 m length and 5 m width (500 m²) were performed at 32 sites, including exploited and control sites. At each site a visual census was conducted along three transects at a shallow reef slope (5 m) and deep reef slope (10 m) respectively.

Surveys of the benthic habitat were also carried out using the point intercept transect method. Records were taken of percentage cover of live hard coral, live soft coral, dead coral, coral rock, sand, rubble, macro algae, algal turf, sponge, and others. Abundance of fishes was described by relative abundance and frequency of appearance. Species richness, species diversity and evenness were calculated.

Butterflyfish assemblages in the southern Red Sea differ from those in the north. The marked variation from north to south may be attributed to the variability of the habitat. Based on the results of underwater surveys, export data, literature and interviews with aquaria personnel, four categories of species were identified that might need special consideration. These include:

- Species with poor survivorship in captivity (for example, easily stressed species, obligate corallivores and those that release toxins), i.e. *Chaetodon austriacus, Chaetodon melapterus, Chaetodon trifascialis, Chaetodon larvatus, Chaetodon auriga, Amphiprion bicinctus, Ostracion cyanurus.*
- Easily overexploited species, such as rare or endemic species, i.e. *Pomacanthus imperator, Pygoplites diacanthus, Rhinecanthus assasi, Pterois miles, Pseudochromis fridmani, Pseudochromis flavivertex, Pseudochromis springeri, Amphiprion bicinctus.*
- Species for which collection may involve collateral damage, such as those that shelter in branching coral, i.e. *Dascyllus aruanus, Dascyllus marginatus, Dascyllus trimaculatus, Chromis viridis, Chromis dimidiata and Pseudanthias squamipinnis.*
- Ecologically important species, such as cleaners, i.e. *Labroides dimidiatus, L. larabicus* and *L. bicolor*.

Some data on the marine ornamental fish trade was extracted from the relevant government export statistics. The authors visited the holding facilities of the companies involved in the ornamental fish trade in Egypt, Saudi Arabia and Yemen and recorded all aquarium fishes present at the time.

These studies combined have produced data that allow some estimates to made of the standing stocks of selected fish species which are important in the ornamental fish trade in the region. Building on these data, part 2 of this publication seeks to present guidelines for a management strategy for the ornamental fish trade in the region and to propose quotas for PERSGA member countries. See separate executive summary for part 2.

Conclusions and Recommendations - Summary

The imposition of a closed season, during which time no fishing can take place, together with the establishment of reserve areas would serve to protect the resource against over-exploitation and maintain species diversity.

Scientific research should be encouraged in the region to clarify the distribution of the species concerned. Particular attention needs to be given to rare or endemic species targeted by the ornamental fish trade.

All collectors should be trained and provided with appropriate equipment. They should also be paid according to the amount of time actually spent catching fish rather than the value of the fish. This would prevent the selective fishing of highly priced and vulnerable species.

Species unsuitable for aquaria should not be collected, such as obligate coral feeders, including corallivorous butterfly-fish. The removal of large numbers of key predators, such as the pufferfish (*Canthigaster margaritata*) and trigger-fish should be avoided, as should collection of vulnerable species, such as the attractive boxfishes (*Ostracion cubicus* and *Ostracion cyanurus*) which are slow moving and easily caught.

Reserve areas should be established, enabling pristine areas of reefs to be preserved, which can then provide recruitment stock for the fisheries.

Temporary closure of areas or fisheries would be particularly helpful where immature fish are often targeted.

Monitoring programmes need to be established to investigate the effects of collection and the effectiveness of management strategies.

Species-specific quotas need to be established, based on numbers of fish captured.

Restrictions should be placed on the exploitation of rare and/or endemic species.

Licensing can provide a way of monitoring and regulating aquarium fisheries and improving standards within the industry.

Regular monitoring needs to be undertaken on impacts of collecting practices on bottom habitats, catches, fishing effort and export volumes in each country, in order to manage this valuable resource in a sustainable manner.

1. INTRODUCTION

The collection of tropical marine fish for sale to aquaria had begun in Sri Lanka by the early 1930s. The trade then expanded gradually during the 1950s as dealers started exporting fish by air (JONKLAAS 1985). In the early 1980s, marine fish and invertebrate imports for the aquarium trade were estimated to be worth US$ 24-40 million annually with more than 40 countries participating in supplying the market (WOOD 1985).

Coral reefs are valuable and important ecosystems. They are among the most productive and diverse of all natural ecosystems and are often called the tropical rainforests of the sea. Coral reefs have many functions, amongst which is the provision of a variety of habitats for a wealth of organisms. Fishes are a dominant group of coral reef fauna, in terms of both their biomass and their diversity. Reef ecosystems provide fishes with shelter and habitats for feeding, spawning and nurseries. Pollution, destructive fishing, over-fishing, coral bleaching, tourism development and other stresses and activities threaten these valuable ecosystems and it is important that the capture of reef animals for the aquarium trade does not add further unwelcome pressures.

Exports for the aquarium trade from the Red Sea appear to have started in Egypt in 1985 and several companies in Egypt, Saudi Arabia, Yemen and Djibouti have been established. These countries represent a very attractive base for the aquarium trade due to the availability of direct flights to Europe and the United States together with the abundance and richness of coral reefs in these countries supporting a wealth of highly marketable aquarium fishes. The size, status and profile of fisheries, export market volume and value of trade, in addition to the regulation, management and monitoring in the region is summarized by WOOD (2001).

An assessment of the aquarium reef fishery in Djibouti has been given by BARRATT & MEDLEY (1988).

There are positive and negative aspects to the aquarium trade. On the positive side, aquaria can help to educate the public and increase their awareness of the need to conserve reef ecosystems. This industry provides jobs and income for many people, particularly in supplier countries. However, the aquarium trade has generated concerns about the conservation of coral reef fish and their habitats. The main issues are possible over-exploitation of target species, damaging collection methods and post-harvest mortalities.

At the time of the present study, the trade in aquarium fish from the Red Sea and Gulf of Aden (RSGA) region was expanding rapidly and concerns about negative environmental impacts and the need for management of this valuable resource were being expressed by the governments of the respective countries.

This study was carried out through the Sustainable Use and Management of Living Marine Resources component of the Strategic Action Programme for the Red Sea and Gulf of Aden (SAP) executed by PERSGA between 1999 and 2003. The study was conducted to provide a snapshot of the aquarium fish trade being conducted in the Red Sea and to assemble some comparative regional data.

The main objectives were: (1) to compare populations of coral reef fish used in the aquarium trade in different countries of the region; (2) to outline the nature of the aquarium trade in the Red Sea and Gulf of Aden region and to establish baseline data against which future changes can be monitored; (3) to examine the densities of aquarium fishes on Red Sea reefs and estimate potential yields.

2. METHODS AND SOURCES OF INFORMATION

2.1 Study Area

Figure 1. Areas in the Red Sea and Gulf of Aden (RSGA) region assessed for impacts from the aquarium fish trade.

The present study was conducted at coral reef sites along Jordanian, Egyptian, Saudi Arabian, Yemeni and Djiboutian coasts of the Red Sea (Figure 1). In countries such as Jordan and Djibouti where no ornamental fish collection takes place, well separated sites of high quality were selected for assessment. In countries such as Egypt and Yemen sites were selected where collection occurs (exploited sites) and where it is known that no collection occurs (control sites). In Saudi Arabia collection of ornamental fishes is very widespread and it was difficult to find valid control sites.

Exploited sites can be compared with control sites in order to check for other factors such as environmental conditions, coral bleaching, crown-of-thorns starfish out-breaks or global/local environmental change that might be impacting the area. If future changes in abundance of aquarium fish species are recorded at collected sites but not at control sites then one may confidently attribute this change to aquarium fish collection.

2.2 Visual Census

Selected ornamental reef fish species from shallow water habitats along the coasts of Jordan, Egypt, Saudi Arabia, Yemen and Djibouti were surveyed by the visual census technique using SCUBA, as described in ENGLISH et al. (1994). A total of 122 transects of 100 m length and 5 m width (500 m²) were performed at 32 sites, including exploited and control sites as indicated in Table 1.

Table 1. Sampling sites along the Jordanian, Egyptian, Saudi Arabian, Yemeni and Djiboutian coasts of the Red Sea, dates of surveys and locations of survey sites

Country	Site	*n*	2-4m	*n*	5m	*n*	10m	N	E
Jordan	Marine Science			3	26.7.02	3	26.7.02	29° 26.276	34° 58.275
	Visiting Centre			3	25.7.02	3	25.7.02	NR	NR
	Tourist Camp			3	24.7.02	3	24.7.02	29° 26.276	34° 58.275
Egypt	Noksh			3	7.11.02	3	7.11.02	27° 46.723	34° 02.915
	Mahmoudat			3	12.7.02	3	12.7.02	27° 44.460	34° 08.881
	Fanar Al-Dolphin			3	13.7.02	3	13.7.02	27° 42.303	34° 07.133
	Illi			3	14.7.02	3	14.7.02	27° 47.334	33° 53.227
	Zorab			5	16.7.02			27° 50.146	34° 00.230
	Ras Mohammad			2	15.7.02	3	15.7.02	27° 43.886	34° 15.663
Saudi Arabia	Al-Kabeera			3	30.10.02	3	27.10.02	21° 41.581	39° 00.741
	Bayada			3	28.10.02			NR	NR
	South Patch Bayada			3	30.10.02	3	29.10.02	21° 44.602	38° 57.798
	Al-Sagheera			3	31.10.02			21° 39.721	38° 58.850
	Al-Kherq			3	31.10.02			21° 43.039	38° 59.253
	Bostek/Thoal					3	2.11.02	22° 19.647	39° 02.350
	Thoal-Awjam			3	2.11.02			22° 19.648	39° 02.351
	Al-Lith			3	3.11.02	3	3.11.02	20° 06.326	40° 13.030
Yemen	Kadaman	3	10.8.02					15° 33.949	42° 13.585
	Kamaran	3	10.5.02					15° 16.593	42° 36.192
	Tekfash	3	10.7.02					15° 41.979	42° 23.654
	Quish	3	10.7.02					15° 41.084	42° 28.110
	Al-Murk	3	10.8.02					NR	NR
	Al-Badi	3	10.9.02					NR	NR
Djibouti	Khor Ambado	3	13.10.02					11° 35.780	43° 01.985
	Maskali	3	14.10.02					11° 42.937	43° 09.246
	Moucha	3	14.10.02					11° 44.669	43° 12.440
	Tadjoura	3	15.10.02					11° 46.245	42° 56.860
	Arta Plaga	3	16.10.02					11° 35.394	42° 49.981
	Gehere	3	17.10.02					12° 16.662	43° 22.926
	n=number of transects	36		50		36			

At each site a visual census was conducted along three transects at a shallow reef slope (5 m) and deep reef slope (10 m) respectively. The distance between transects at each site was approximately 5 m. The observer waited for about five minutes after deploying the transect to allow the fish to settle and resume their normal behaviour. Divers then swam along the transects and recorded all fishes (from a list of 50 species) encountered within 2.5 m either side and 5 m above the transect line for a duration of 25-30 minutes. To minimise observer error, only the counts taken by the first author were used in the present study. Fish identification in the field was checked using MYERS (1991), RANDALL (1993), SMITH & HEEMSTRA (1996) and KHALAF & DISI (1997). Appendix 1 gives a list of the fish species recorded. Details of holding facilities and captive fish at all existing ornamental fish companies were recorded by both authors during the inspection period.

Surveys of the benthic habitat were carried out by an assistant, Kamal Aldahoudi, in Jordan, Egypt, Saudi Arabia and Djibouti and by two Yemeni assistants, Zaher Ali and Aref Hamoud, in Yemen. The point intercept transect method was used with the tape stretched taut. Records were taken of percentage cover of live hard coral, live soft coral, dead coral, coral rock, sand, rubble, macro algae, algal turf, sponge, and others as described by EDWARDS (2002).

2.3 Statistical Analysis

Abundance of fishes was described by relative abundance (RA) and frequency of appearance (FA). RA was calculated as (the pooled average abundance of species *i* from each depth and site/the pooled average abundance of all species from each depth and site) x 100. RA was calculated for each site in each country and for the country as a whole. FA was determined as (the number of transects in which species *i* was present/the total number of all transects) x 100 (Appendix 3). Species richness, species diversity and evenness were calculated using PRIMER-5 ecological software (PRIMER-E 2000). Multivariate analysis of the data such as cluster analysis, multi-dimensional scaling (MDS) ordination, and analysis of similarities were also performed using the same software.

Correlation of fish assemblage parameters such as number of species, number of individuals, species richness and Shannon-Wiener diversity between different countries in the region or with hard and soft coral cover were performed using STAT VIEW.

The potential yields (PY) for the common commercial species in each country were estimated in EDWARDS et al. (2003) using data from this study and are included in Part 2 of this publication.

Some data on the marine ornamental fish trade was extracted from the relevant government export statistics, but unfortunately such information is not fully reported. Where records are available they generally provide the number of specimens. The authors visited the holding facilities of the companies involved in the ornamental fish trade in Egypt, Saudi Arabia and Yemen and recorded all aquarium fishes present at the time.

3. RESULTS

3.1 Benthic Habitat

The data was recorded on standard Reef-Check data sheets. The full dataset is available from PERSGA offices, Jeddah and the main points are summarised below. Percentages are given rounded to the nearest unit.

3.1.1 Jordan

Along the Jordanian Gulf of Aqaba coast the highest cover of live hard coral was 47% occurring at the Visitors Centre at 10 m depth. The average live hard coral cover across all sites was 27%. The highest soft coral cover was at the Visitors Centre at 5 m depth, and the average of all sites was 6% (Appendix 2a).

3.1.2 Egypt

Along the Egyptian coast, Gulf of Suez, the highest hard coral cover was 41% found at both Noksh (5 m depth) and at Mahmoudat (5 m depth). The highest soft coral cover was 48% and 41% at Fanar Al Dolphin and Ras Mohammed respectively, both at 10 m depth (Appendix 2b).

3.1.3 Saudi Arabia

On the Saudi Arabian Red Sea coast the highest hard coral cover (49%) was recorded at Al-Lith at 9 m depth, while the highest soft coral cover (73%) was found at Al Kabeera (Big Piece) (Appendix 2c).

3.1.4 Yemen

The highest hard coral cover along the Yemeni Red Sea coast was 41% at South West Tekfash, followed by 40% at Al-Badi island. Soft coral cover was 0.3% at South West Tekfash and no soft coral was recorded at the other sites (Appendix 2d).

3.1.5 Djibouti

Along the Djiboutian coast in the Gulf of Aden the highest hard coral cover was 61%, recorded at Tadjoura followed by 44% at Arta Plaga, while the soft coral cover was highest at Gehere, with 16% (Appendix 2e).

The overall mean percentage cover for both hard and soft coral (HC and SC combined) was 48% for Egypt, 33% Jordan, 31% Saudi Arabia, 28% Yemen and 21% for Djibouti (Appendix 2f).

3.2 Fish Assemblages and Community Indices

The original abundance data for the 50 ornamental fish species used in the aquarium trade recorded at the survey sites can be acquired from PERSGA offices on request. The data includes the abundance of each species and the estimated size of each fish. Appendix 3 summarises the total abundance (TA), average abundance (AA), relative abundance (RA) and frequency of appearance (FA) of fish species at all sites surveyed in Jordan, Egypt, Saudi Arabia, Yemen and Djibouti respectively. The main points are summarised below and given in Table 2.

3.2.1 Jordan

A total of 29,485 fishes were counted along the 18 transects performed in Jordan. The average abundance (AA) ranged from 475 fishes per transect at Tourist Camp [TC] 5 m depth to 3,117 fish per transect at Visitors Centre, 5 m depth (Appendix 3a). The average abundance across all transects was 1,638 fishes per transect (Appendix 3f). Out of the 50 ornamental fish species considered, only 35 were reported from the Jordanian sites. The number of species observed ranged from 23, at the 10 m depth at TC, to 30 at the 5 m depth at MSS, with an average of 26.3 species per transect.

In terms of RA on the Jordanian reefs, the most abundant species was *Pseudanthias squamipinnis*. This species accounted for 48.9%, 60.1%, 33.9%, 39.4%, 30.0% and 36.1% of the fish abundance recorded from MSS at 5 m, MSS at 10 m, TC at 5 m, TC at 10 m, VC at 5 m and VC at 10 m respectively

(Appendix 3a), with an average RA across all transects of 40.7% (Appendix 3f) calculated from total abundance figures. The second most abundant species was *Chromis viridis*, accounting for 12.0%, 9.5%, 21.1%, 17.7%, 51.3% and 25.4% of the fish abundance recorded from MSS at 5 m, MSS at 10 m, TC at 5 m, TC at 10 m, VC at 5 m and VC at 10 m respectively (Appendix 3a), with an average RA across all transects of 27.5%. *Dascyllus aruanus, Paracheilinus octotaenia* and *Dascyllus marginatus* were the next most abundant, all with a RA averaging around 7% across all transects. These five species made up 90% of all the fish recorded from Jordanian sites. (Appendix 3f).

In terms of their FA, the most common species were *Pseudanthias squamipinnis*, *Dascyllus aruanus*, *Dascyllus marginatus*, *Amphiprion bicinctus*, *Thalassoma klunzingeri* and *Chaetodon paucifasciatus* which were recorded on each transect. *Chromis viridis*, *Larabicus quadrilineatus*, *Anampses twistii* and *Gomphosus caeruleus* were found in 17 out of the 18 transects, or 94.4% of the surveys (Appendix 3f).

Appendix 4 shows the number of species, number of individuals, species richness and Shannon-Wiener diversity (H) recorded from Jordanian, Egyptian, Saudi Arabian, Yemeni and Djiboutian reefs. Along the Jordanian reefs species richness ranged from 2.98 at TC (10 m depth) to 4.03 at MSS (5 m depth), with an average of 3.49. The lowest species diversity (Shannon-Wiener H) was found at VC at the 5 m depth (H = 1.37) and the highest was at TC at the 10 m depth (H = 2.15). The average diversity was H = 1.70). The data are presented graphically in Figure 2.

3.2.2 Egypt

A total of 196,379 fishes were counted during the 31 transects that were performed in Egypt. The AA ranged from 310 at Mahmoudat (10 m depth) to 13,358 fishes per transect at Fanar Al-Dolphin/(Manar Dolphin) (5 m depth). The average abundance of all transects was 6,334 fishes per transect (Appendix 3f). Out of the 50 ornamental fish species considered, only 43 were reported from the Egyptian sites. The number of species observed ranged from 26 at Mahmoudat (10 m depth) to 34 at Al-Noksh (9 m depth), with an average of 29.9 species per transect.

In terms of RA the most abundant species was *Pseudanthias squamipinnis*. This species accounted for 58.1% of the fish recorded at Al-Noksh at 5 m, 66.2% at Al-Noksh 9 m, 95.8% Fanar Al-Dolphin (FA) at 5 m, 97.7% FA at 10 m, 95.4% Illi at 5 m, 90.5 % Illi at 10 m, 92.6% Ras Mohammed (RM) at 5 m, 96.5% RM at 10 m, and 5.6% Al-Zaraba at 3 m giving an average abundance of 84.6% (Appendix 3b). However, this species was not recorded at Mahmoudat at the 10 m depth. The second most abundant species was *Chromis viridis*, accounting for 33.2%, 32.0%, and 37.6% of fish abundance at Al-Noksh at 5 m, Al-Noksh at 9 m, and Mahmoudat at 10 m depths respectively (Appendix 3b). However, *C. viridis* was the least common or was absent from the remaining sites, with an overall average of 10.4%. Together these two species made up 95% of all fish recorded from Egypt.

In terms of FA, the most common species was *Labroides dimidiatus* at 94%, followed by *Chaetodon austriacus* and *Thalassoma klunzingeri* each with 90%. Other common species were *Gomphosus caeruleus*, *Chaetodon auriga* (87% each), *Paracirrhites forsteri* (84%) and *Chaetodon paucifasciatus* (81%) (Appendix 3f).

Species richness ranged from 2.92 at Illi (5 m depth) to 4.4 at Mahmoudat (10 m depth) with an average of 3.47. The lowest Shannon-Wiener diversity was recorded at Fanar Al-Dolphin at the 10 m depth (H = 0.18) and the highest was at Mahmoudat at the 10 m depth (H = 2.01). The average across all transects in Egypt was H = 0.69 (Appendix 4).

3.2.3 Saudi Arabia

A total of 113,286 fishes were counted along the 33 transects performed in Saudi Arabia. AA ranged from 163 fishes per transect at Small Piece (shallow depth) to 13,043 fishes per transect at Al-Lith (shallow depth). The average abundance of all transects was 3,433 fishes per transect (Appendix 3c). Out of the 50 ornamental fish species considered, only 45 were reported from the Saudi Arabian sites. The number of species observed ranged from 25 at Biada (shallow depth) and South Biada (deep) to 34 at Al-Lith (shallow depth), with an average of 28.7 species per transect (Table 2).

In terms of RA, the most abundant species was *Chromis viridis*. This species accounted for 7.0%, 41.9%, 65.8%, 91.9%, 82.8%, 85.3%, 96.6% and 78.7% of the fish abundance recorded from Big Piece (shallow depth), Big Piece (deep), Al Biada (shallow), South Biada (shallow), South Biada (deep), Al-Kherq (6 m depth), Al-Lith (shallow) and Al-Lith (deep) respectively, with an average across all sites of 81.2%. However, it was not seen at the Small Piece, Thoal Bostek and Thoal Awjam sites (Appendix 3c). The next most abundant species were *Dascyllus aruanus*, averaging 9.3% across all transects and *Pseudanthias squamipinnis* which averaged 3.0%. These three species made up 93.5 % of all fish species recorded from Saudi Arabia (Figure 2).

In terms of FA the most common species were *Labroides dimidiatus* and *Gomphosus caeruleus* which both occurred on all transects. Other frequently observed species were *Heniochus intermedius* seen on 90.9% of swims (30 of 33 transects) and *Chaetodon austriacus*, *Chaetodon larvatus*, *Larabicus quadrilineatus*, *Thalassoma klunzingeri*, *Thalassoma lunare*, and *Pygoplites diacanthus* each with an 84.9% FA (Appendix 3f).

Species richness ranged from 2.71 at Biada (shallow depth) to 5.30 at Small Piece (shallow depth) with an average of 3.97. The lowest Shannon-Wiener diversity was recorded at Al-Lith at the shallow depth (H = 0.23) and the highest was at Small Piece at the shallow depth (H = 2.63). The average across all transects in Saudi Arabia was H = 1.34 (Appendix 4).

3.2.4 Yemen

A total of 129,932 fishes were counted during the 18 transects that were performed in Yemen. The AA ranged from 95 fishes per transect at Al-Murk (exploited site) at 2-3 m depth, to 24,906 fishes per transect at Quish (exploited site) at 4 m depth (Appendix 3d). The average fish abundance calculated from all transects was 7,218 fish/transect. Out of the 50 ornamental fish species considered, only 28 were reported from the Yemeni sites. The number of species observed ranged from 11 at Al Murk (3 m depth) to 18 at both Quish and Al Badi Island (shallow depth), with an average of 15.3 species per transect (Table 2).

In terms of RA, the most abundant species was *Chromis viridis*. This species accounted for 88.5% of the fish abundance recorded at Kamaran, 79.1% at Tekfash, 93.3% at Quish and 85.3% at Al Badi, (Appendix 3d) but was not observed at Kadaman or Al-Murk. It occurred with an average of 88.8% using TA data (Appendix 3f). The second most abundant fish species was *Dascyllus marginatus* accounting for 4.1%, 14.1%, 3.1% and 8.7% of fish abundance from Kamaran, Tekfash, Quish and Al-Badi respectively though not observed at Kadaman or Al Murk; overall an average of 5.8% from TA data. Other abundant species included *Larabicus quadrilineatus* (average 1.6%), *Dascyllus trimaculatus* (average 1.0%) and *Chaetodon larvatus* (average 0.8%). These five species made up 99% of all fish recorded in Yemen.

In terms of FA, the most common fish species were *Pomacanthus maculosus*, *Thalassoma lunare*, *Larabicus quadrilineatus* and *Chaetodon larvatus* all occurring at 100% of transects. Other commonly occurring species were *Pomacanthus asfur*

(17 out of 18 transects or 94.4%) and *Heniochus intermedius* (15 out of 18 transects or 83.3%).

Species richness ranged from 1.7 in Quish and Kamaran to 2.48 in Kadaman with an average for all transects of 1.96. The lowest Shannon-Wiener diversity was recorded at Quish (H = 0.35) and the highest was at Kadaman (H = 2.12). The average across all transects in Yemen was H = 1.06 (Figure 2).

3.2.5 Djibouti

A total of 53,856 fishes were counted during the 18 transects that were performed in Djibouti. The AA ranged from 262 fishes per transect at Khor Ambado, to 6,478 fishes per transect at a site to the north of Maskali. The average fish abundance of all transects was 2,992 per transect. Out of the 50 ornamental fish species considered, only 33 were reported from the Djiboutian sites. The number of species observed ranged from 18 at Gehere to 27 at Plaga Arta, with an average of 23.8 species per transect (Table 2).

In terms of RA, the most abundant species was *Chromis viridis*. This species accounted for 10.2%, 95.2%, 91.0, 82.3, 92.0 and 83.8% of the fish abundance recorded at Khor Ambado, North of Maskali, Moucha, Tadjoura, Arta Plaga and Gehere respectively (Appendix 3e), with an average of 90.1% across all transects (Appendix 3f). The second most abundant fish species was *Thalassoma lunare* with an average of 2.1% per transect, followed by *Larabicus quadrilineatus* (average 1.9%) and *Zebrasoma xanthurum* (average 1.0%). These four species made up more than 95% all fish species recorded in Djibouti.

In terms of FA, the most common fish species were *Thalassoma lunare*, *Larabicus quadrilineatus* and *Chaetodon larvatus* all occurring in 100% of transects, followed by *Heniochus intermedius*, *Chromis viridis*, *Gomphosus caeruleus* and *Chaetodon melapterus* (94.4% each).

Species richness ranged from 2.27 at Gehere to 4.13 at Khor Ambado with an average for all transects of 3.06. The lowest Shannon-Wiener diversity was recorded at North Maskali (H = 0.29) and the highest was at Khor Ambado (H = 2.64). The average across all transects in Yemen was H = 0.92 (Appendix 4).

Figure 2 shows pooled data of average (abundance, number of species, species richness, Shannon-Wiener Index, and Evenness distribution) per 500 m² transect of all reef sites surveyed in Jordan, Egypt, Saudi Arabia, Yemen and Djibouti.

Table 2. Summary of ornamental fish surveys in the Red Sea and Gulf of Aden, by country

	Jordan		Egypt		Saudi Arabia		Yemen		Djibouti	
Total no. of fish recorded	29,485		196,379		113,286		129,932		53,856	
No. of transects	18		31		33		18		18	
Average Abundance (min)	475 at TC 5m		310 at Mah 10m		163 at SmaPie 6m		95 at Al Murk 3m		262 at KhoAmb 3m	
Average Abundance (max)	3,117 at VC 5m		13,358 at FanAld. 5m		13,043 at Al-Lith 5m		24,906 at Quish 4m		6,478 at Maskali 3m	
AA across all transects	1,638		6,334		3,433		7,218		2,992	
No. of species (from 50)	35		43		45		28		33	
Range of no. species (min)	23 at TC 10m		26 at Mah 10m		25 at Bia 5m & SouBia 8m		11 at Al Murk 3m		18 at Gehere	
Range of no. species (max)	30 at MSS 5m		34 at Al Noksh 9m		34 Al-Lith 5m		18 at Quish & SAlB		27 at ArtPla	
Av. no. of species/transect	26.3		29.9		28.7		15.3		23.8	
Highest Relative Abundance	*P. squamipinnis*	40.7%	*P. squamipinnis*	84.6%	*C. viridis*	81.2%	*C. viridis*	88.8%	*C. viridis*	90.1%
Second highest RA	*C. viridis*	27.5%	*C. viridis*	10.4%	*D. aruanus*	9.3%	*D. marginatus*	5.8%	*T. lunare*	2.1%
Other abundant species RA from Appendix 3f	*D. aruanus*	7.7%			*P. squamipinnis*	3.0%	*L. quadrilineatus*	1.6%	*L. quadrilineatus*	1.9%
	P. octotaenia	7.3%					*D. trimaculatus*	1.0%	*Z. xanthurum*	1.0%
	D. marginatus	6.8%					*C. larvatus*	0.8%		
Frequency of Abundance FA 100% (all transects)	*P. squamipinnis; D. aruanus; D. marginatus; A. bicinctus; C. paucifasciatus; T. klunzingeri*				*L. dimidiatus; G. caeruleus*		*P. maculosus; C. larvatus; L. quadrilineatus; T. lunare*		*T. lunare; L. quadrilineatus; C. larvatus*	
FA >90%	*C. viridis; L. quadrilineatus; G. caeruleus; A. twistii*		*L. dimidiatus; C. austriacus; T. klunzingeri*		*H. intermedius*		*P. asfur*		*H. intermedius; C. viridis; G. caeruleus; C. melapterus*	
FA >80%			*G. caeruleus; C. auriga; P. forsteri; C. paucifasciatus*		*C. austriacus; P. diacanthus; C. larvatus; T. klunzingeri; T. lunare; L. quadrilineatus*		*H. intermedius*			
Species richness (min)	2.98 at TC 10m		2.92 at Illi 5m		2.71 at Bia 5m		1.7 at Quish 4m & Kam		2.27 at Gehere	
Species richness (max)	4.03 at MSS 5m		4.4 at Mah 10m		5.3 at SmaPie 6m		2.48 at Kad		4.13 at KhoAmb	
Average species richness	3.49		3.47		3.97		1.96		3.06	
Lowest species diversity 'H'	1.37at VC 5m		0.18 at FanAld.		0.23 at Al-Lith 5m		0.35 at Quish		0.29 at Maskali	
Highest species diversity	2.15 at TC 10m		2.01 at Mah 10m		2.63 at SmaPie 6m		2.12 at Kad		2.64 at KhoAmb	
Average species diversity	1.7		0.69		1.34		1.06		0.92	

See Abbreviations section for full names of sites where necessary

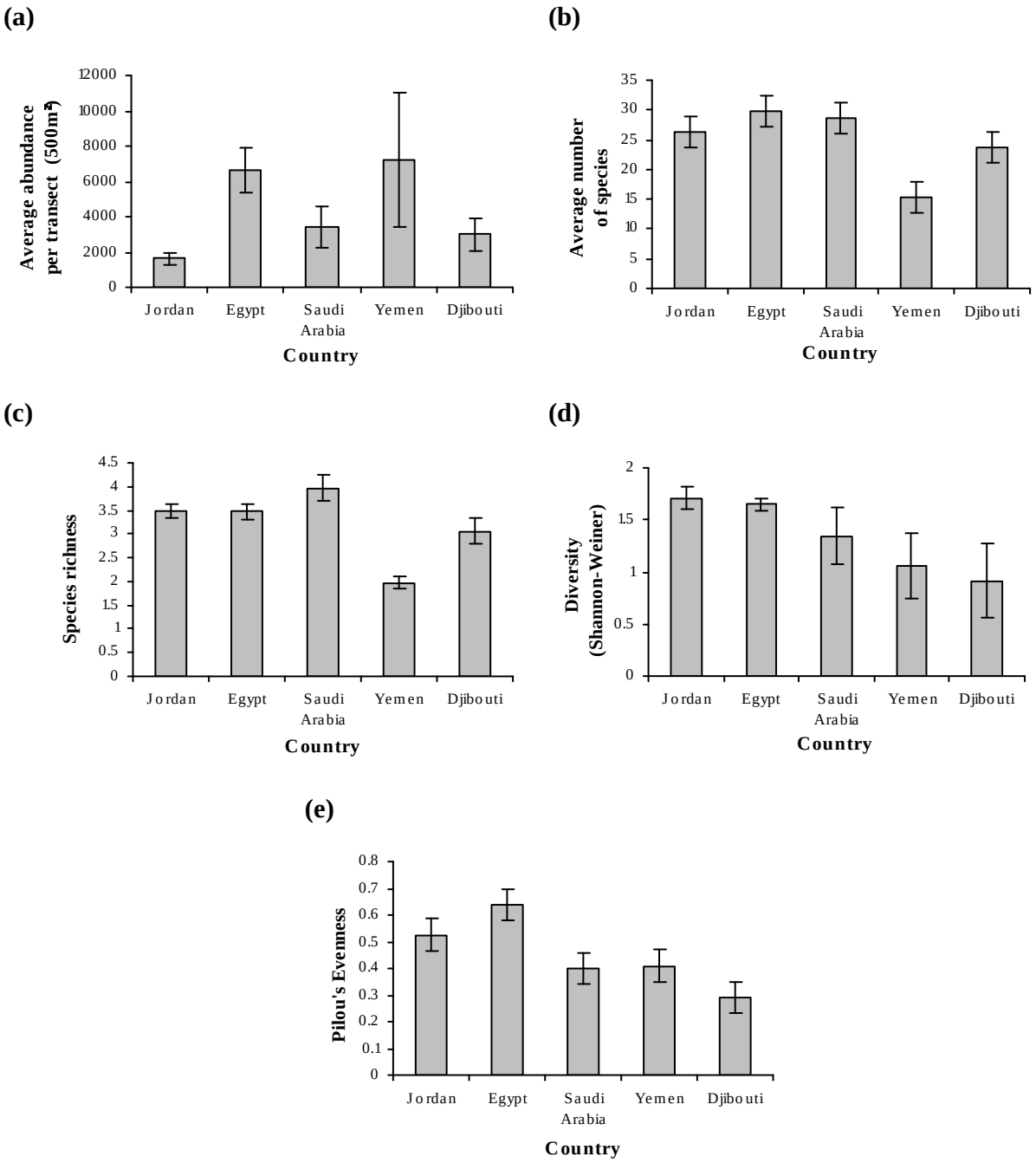


Figure 2. (a) Average abundance, (b) number of species, (c) species richness *d*, (d) species diversity (Shannon-Wiener Index) and (e) Pilou's evenness of fish assemblages per 500m^2 transect at countries along the Red Sea and Gulf of Aden coasts.

3.3 Fish Distributions and Correlation with Coral Cover

3.3.1 Ornamental fish stock

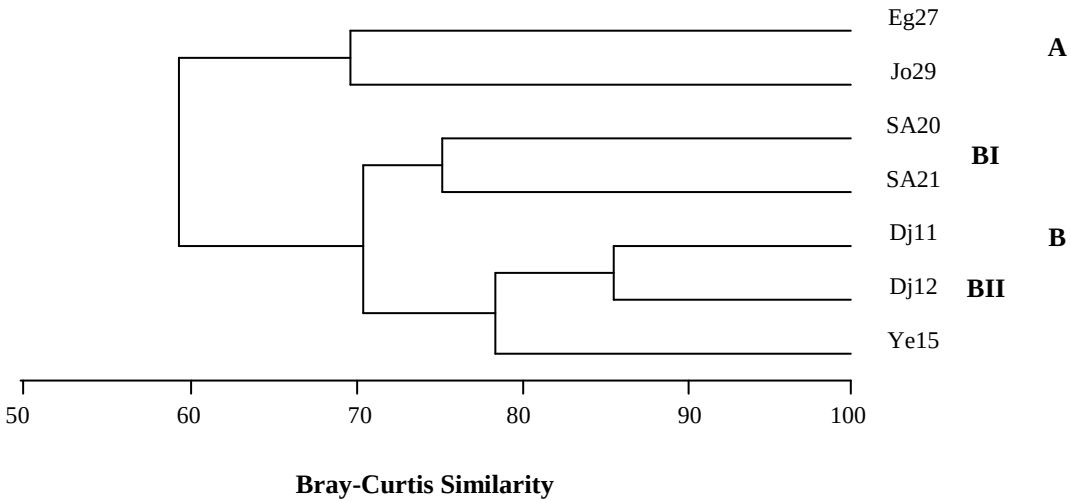
Appendix 5 gives an indication of the relative abundance for each of the 50 ornamental fish species surveyed in each country. This is given as percentage average abundance (in numbers per 500 m²) from all sites in the countries studied. The percentage average abundance of the following species along the Jordanian coast was: *Amphiprion*

bicinctus (76.3%), *Chaetodon paucifasciatus* (66.2%), *Bodianus anthioides* (38.6%), and *Anampses twistii* (40.0%). This means that these species were relatively more abundant on Jordanian reefs than reefs in other countries; these species occurred with greater abundance on the Jordanian coasts than in other countries surveyed. This does not mean that the total number of individuals will be greater on the Jordanian coast (total reef area) compared to the Egyptian or Saudi Arabian coasts as the Jordanian coastline is much shorter. On Egyptian coasts of the Red Sea the following species were relatively most abundant: *Coris aygula* (81.9%), *Arothron diadematus* (67.6%), *Chaetodon auriga* (63.8%), *Pterois miles* (78.6%), *Pomacanthus imperator* (50.1%), *Pseudochromis fridmani* (48.5%), *Thalassoma klunzingeri* (44.5%). This simply indicates that these species are more dominant and their stocks are higher along the Egyptian reefs than at other reefs in Jordan, Saudi Arabia, Yemen and Djibouti in terms of average abundance per transect. Along the Saudi Arabian Red Sea coast the species *Novaculichthys taeniourus* was found in very low numbers, but as it was not seen in other countries it forms 100% of the average abundance. The following species were relatively most abundant on Saudi Arabian reefs: *Dascyllus aruanus* (84.9%), *Rhinecanthus assasi* (82.1%), *Balistoides viridescens* (81.6%), *Balistapus undulates* (76.7%), *Paracirrhites forsteri* (75.3%), *Pseudochromis flavivertex* (74.1%), *Pygoplites diacanthus* (70.2%), *Chaetodon lineolatus* (58.5%), *Gomphosus caeruleus* (55.1%), *Labroides dimidiata* (54.4%), *C. melannotus* (54.0%), *Chaetodon fasciatus* (48.8%) and *Chaetodon austriacus* (47.7%). Along the Yemeni coast of the Red Sea it was found that the average abundance of the following species, *Dascyllus trimaculatus*, *Pomacanthus maculosus*, *D. marginatus*, *C. larvatus*, *P. asfur*, *Larabicus quadrilineatus* and *Cheilinus lunulatus*, represented 80.7%, 80.5%, 75.8%, 68.8%, 55.4%, 49.9% and 33.0% respectively of their abundance in all other countries. The following fish species were found to be more abundant along the Djiboutian reefs and their percentage of average abundance in relation to other countries investigated was: *Chaetodon melapterus* and *C. vagabundus* 100% (as these two species were not seen at sites in other countries), *Zebrasoma xanthurum* (57.4%), *Naso lituratus* (53.7%), *Thalassoma lunare* (44.8%), and *Heniochus intermedius* (41.2%).

3.3.2 Biogeographic affinities

Cluster analysis and MDS ordination show that two primary groups of sites can be distinguished from the data (Figure 3). Group A incorporates sites in the countries of Jordan (latitude 29º) and Egypt (latitude 27º) which exhibit about 70% similarity (according to the Bray-Curtis Coefficient). Group B is split into two sub groups. Sub group BI includes the sites from Saudi Arabia, situated at latitudes 20º and 21º, which show a similarity of about 75%. The second subgroup, BII, incorporates the sites at latitudes 11º and 12º from Djiboutian reefs, which have a similarity of about 95% and the sites at latitude 15º on the Yemeni reefs which exhibit about 83% similarity. These two main groups (A and B) are only about 58% similar according to the Bray-Curtis Co-efficient. The data clearly show that ornamental fish communities in the RSGA fall into two distinct biogeographical groups. One of the groups characterises the northern Red Sea whilst the other is present in the central and southern Red Sea and Gulf of Aden.

(a)



(b)

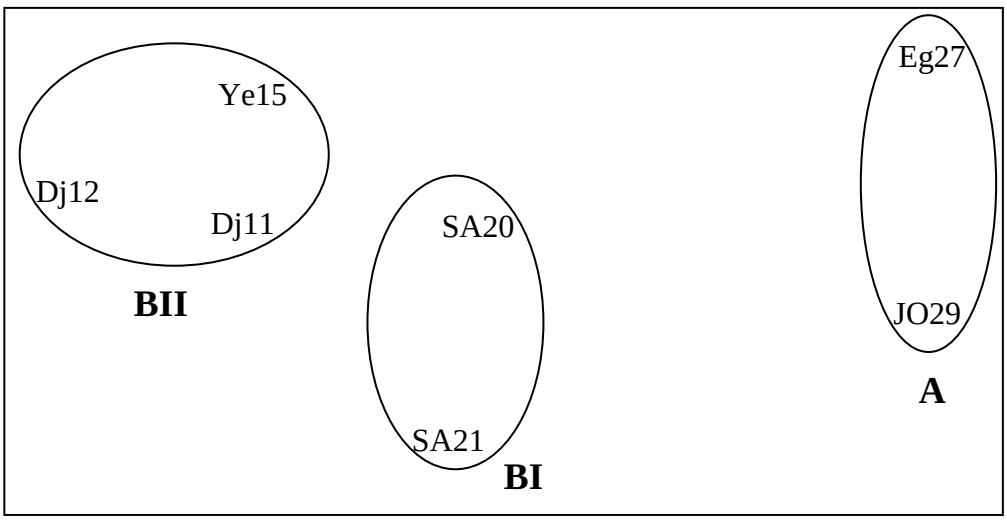


Figure 3. Cluster analysis (a), and MDS ordination plot (b), of relationships between ornamental fish assemblages (Bray-Curtis similarity, square root transformation of data, standardisation, group average, stress = 0.3) from different countries in the Red Sea and Gulf of Aden region.

Country key: Jo29º = sites at latitude 29º on the Jordanian coast; Eg27º = sites at latitude 27º in Egypt; SA20º and SA21º = sites at latitudes 20 and 21º on the Saudi Arabian coast; Ye15º = sites at latitude 15º along the Yemeni coast; Dj11º and Dj12º = sites at latitudes 11 and 12º along the Djiboutian coast.

Figure 4 illustrates differences in average abundance according to latitudinal distribution among the 25 primary ornamental fish species. These belong mainly to the families Chaetodontidae, Acanthuridae, Pomacanthidae, Pomacentridae and Labridae but also include (Figure 4f) two other dominant schooling fish species that are utilised by the aquarium trade in the region.

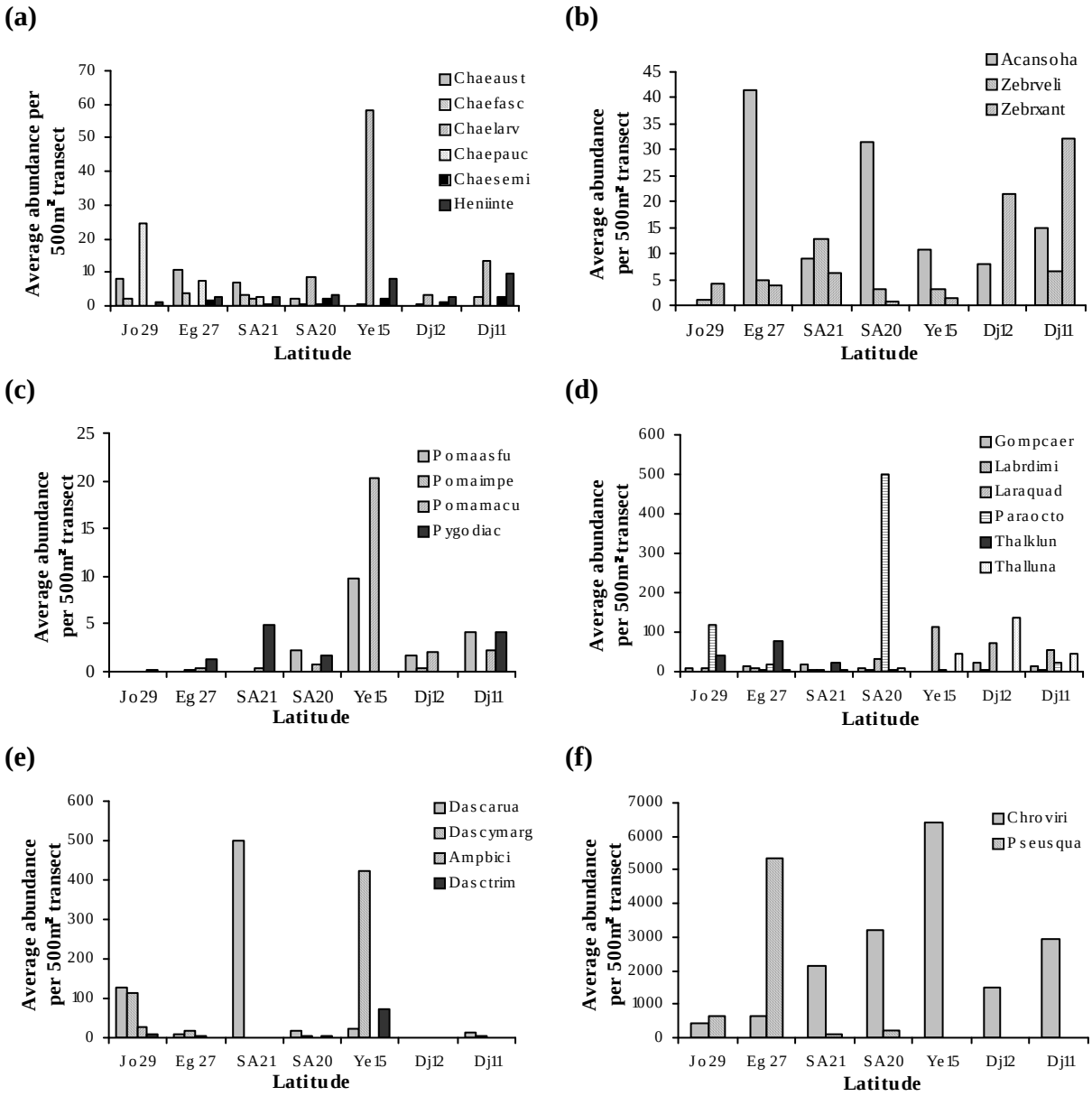


Figure 4. Differences in the average abundance of the most important 25 fish species from the primary families (a) Acanthuridae, (b) Chaetodontidae, (c) Pomacanthidae, (d) Labridae and (e) Pomacentridae, and (f) two dominant schooling fish species being utilised by the aquarium trade in the RSGA region, according to their latitudinal distribution.

Species Key: *Chaeaust - Chaetodon austriacus*; *Chaefasc - C. fasciatus*; *Chaelarv – C. larvatus*; *Chaepauc - C. paucifasciatus*; *Chaesemi - C. semilarvatus*; *Heniinte - Heniochus intermedius*; *Acansoha - Acanthurus sohal*; *Zebrveil - Zebrasoma veliferum*; *Zebrxant - Z. xanthurum*; *Pomaasfu - Pomacanthus asfur*; *Pomaimpe - P. imperator*; *Pomamacu - P. maculosus*; *Pygodiac - Pygoplites diacanthus*; *Gompcaer - Gomphosus caeruleus*; *Labrdimi - Labroides dimidiatus*; *Laraquad - Larabicus quadrilineatus*; *Paraocto - Paracheilinus octotaenia*; *Thalklun - Thalassoma klunzingeri*; *Thalluna - T. lunare*; *Dascarua - Dascyllus aruanus*; *Dascmarg - D. marginatus*; *Amphbici - Amphiprion bicinctus*; *Dasctrim - D. trimaculatus*; *Chroviri - Chromis viridis*; *Pseusqua - Pseudanthias squamipinnis.*

3.3.3 Correlation of fish community parameters with coral cover

The simple regression procedure of STAT VIEW was used to correlate benthic habitat with fish community univariate parameters, including average fish abundance (N), number of species (S), species richness (d) and Shannon-Wiener diversity index (H`). Correlations with hard coral cover are presented in Table 3 and with soft coral cover in Table 4.

The strongest correlation with hard coral cover found on Jordanian reefs was with average fish abundance (r = 0.477), followed by species richness. Fish community patterns correlated least well with hard coral cover on Egyptian reefs relative to the other countries. In Saudi Arabia the parameter that correlated best with hard coral cover was average fish abundance (r = 0.805), followed by Shannon-Wiener diversity index. At Yemeni reefs, all fish community parameters showed the highest correlation with hard coral cover relative to the other countries, except for average fish abundance, which correlated better in Saudi Arabia. The Shannon-Wiener diversity index correlated best with hard coral cover (r = 0.960) at Yemeni reefs, followed by species richness. On Djiboutian reefs the highest correlation with hard coral cover was the number of species parameter (r = 0.653), followed by species richness.

The fish community parameters were also correlated against soft coral cover. The strongest correlation from reefs in Jordan was found with average fish abundance (r = 0.663), followed by Shannon-Wiener diversity index. On Egyptian reefs, the parameter that correlated best with soft coral cover was the Shannon-Wiener diversity index (r = 0.538), followed by species richness. The highest correlation with soft coral cover (r = 0.487) on Saudi Arabian reefs was obtained using number of species, followed by Shannon-Wiener diversity index. On Yemeni reefs the best correlation was with average fish abundance (r = 0.935), followed by Shannon-Wiener diversity index. Finally, on Djiboutian reefs the parameter that correlated best with soft coral cover was number of species (r = 0.894), followed by species richness.

Table 3. Correlation (simple regression) of fish community parameters with hard coral cover on reefs from different countries in the Red Sea and Gulf of Aden. (N) = average fish abundance, (S) = number of species, (d) = species richness and (H`) = Shannon-Wiener Index.

Country	N	S	d	H`
Jordan	0.477	0.320	0.393	0.381
Egypt	0.154	0.053	0.124	0.231
Saudi Arabia	0.805	0.393	0.405	0.545
Yemen	0.741	0.936	0.867	0.960
Djibouti	0.352	0.653	0.492	0.073

Table 4. Correlation (simple regression) of fish community parameters with soft coral cover at reefs from different countries in the Red Sea and Gulf of Aden. (N) = average fish abundance, (S) = number of species, (d) = species richness and (H`) = Shannon-Wiener Index.

Country	N	S	d	H`
Jordan	0.663	0.234	0.212	0.641
Egypt	0.308	0.130	0.390	0.538
Saudi Arabia	0.247	0.487	0.466	0.258
Yemen	0.935	0.454	0.442	0.455
Djibouti	0.232	0.894	0.634	0.180

3.4 Marine Aquarium Fish Trade

Historical Background, Collection Practices and Transportation

3.4.1 Egypt

The Egyptian Company for Fishing and Fishing Gears (ECFFG), a public sector company affiliated to the General Authority for Fishing Resources Development, is the only body authorised for collecting ornamental coral reef fish in Egypt. Their fishing ground is estimated to cover 2800 km², but they are not allowed to fish in the marine protected areas along the Egyptian Red Sea coast. The company began activities in the aquarium trade in 1985. They started their collection of ornamental fish with the help of divers from the Philippines, then trained Egyptian staff and divers in the fishing methods and techniques involved. A total of 25 people work for the company including office staff, workers and divers.

The company's holding facility is located in Al-Tour and consists of about 150 glass aquaria. Seawater is supplied directly from the sea through a pipeline connected to a water suction pump. The main countries that import fish from Egypt are Japan, Singapore, Taiwan, Hong Kong, France, Italy, Germany and Holland. The company previously exported ornamental fish to the United States of America, but has not done so for the last four years. Most of the catch is exported to international markets and only about 8% goes to the Egyptian market.

Fishing Methods

The divers catch fish according to order lists coming from headquarters in Cairo. They use two types of nets. The first is a single-layered net with small mesh size (<2 cm), a length of 5-7 m and a width of about 2 m. Floats are attached to the upper end of the net and lead weights attached to the lower end. This type of net is used to catch larger fish species such as angelfishes, surgeonfishes and butterflyfishes. The net is placed in a semicircle and divers flush the fish towards the net. A hand net is then used to catch the fish which is then transferred to a floating basket with a narrow mesh size. The second type of net is smaller with a very small mesh size (<5 mm) and an area of about one meter square. This type of net is designed to catch smaller fishes such as blennids and dottybacks.

Transportation

The collected fishes are transported on the same day from the jetty to the holding facility in Al-Tour in 50 litre plastic tanks. A total of 3-50 fishes are kept in each tank and the water is changed during transportation as required. Tanks are aerated via a battery-operated air pump in order to maintain the health of the fish.

The fishes are kept in aquaria when they reach the holding facility in Al-Tour. The fishes are not supplied with food for about 20 days. Sick fish that do not respond to treatment with anti fungal or anti bacterial medicines are returned to the sea. According to the company records less than 3% of fish die in the holding facility. When asked which fish species suffer highest mortality within the facility, one of the staff advised that the most susceptible species were *Chaetodon semilarvatus*, *Chaetodon auriga*, *Chaetodon austriacus* and *Heniochus intermedius*. He also advised that *Zebrasoma xanthurum* is stronger and less susceptible to diseases than *Acanthurus sohal*.

3.4.2 Saudi Arabia

In Saudi Arabia ornamental fish collection for export began in 1997. The Ministry of Agriculture and Water, represented by the fisheries department, has the responsibility for issuing licences for this sector. There are no regulations regarding fishing gear, season, location (fishing grounds) or species allowed to be collected for the trade. Up to the present date there have been five temporary licences issued. They have been issued in Thoal town, 90 km north of Jeddah, and others south of Jeddah in Al-Shu'aibah and Al-Lith.

Fishing Methods

The survey team visited the holding facilities and went out with two of the companies to see what fishing gear was used, how fish were collected and the catch composition. The survey team dived with three highly skilled Sri Lankan fish collectors for one hour in Al-Shu'aibah with the Red Sea Secrets company and with two Philippine fish collectors from the Imad Softa company in Al-Lith.

Fishing gear

Fishing gear used included rounded, hand made fins, 'ticklers' (long metal rods about 120 cm in length), buckets, barrow nets and hand nets. SCUBA equipment was also used. However, in Al-Lith an air compressor fixed to the boat and attached to long (over 200 m) plastic pipes was used instead of SCUBA.

Collection of marine aquarium fish

Both the divers seeking target species for collection, and the barrier net layers, try to drive target fish into the net using ticklers. The barrier net (about 2.5 m deep) with floats at the top and weights along the bottom was deployed in sandy areas adjacent to the coral reef. Non-target species were freed from the net with the help of a fine mesh hand net. Target fish were caught by hand (each collector wore string gloves) and carefully transferred to a large plastic laundry basket where the fish appeared fairly relaxed. Fish captured by Red Sea Secrets were transferred to tanks situated on the boat. Those captured by Imad Softa at Al-Lith were transferred to large plastic jars (Plates 1-8).

In other companies the captured fish were transferred to individual holding boxes, with holes to allow water circulation. Holding boxes were placed in a net, anchored to the sea bed in calm water a few meters deep and would remain there for two days for acclimatization. If the fish showed no ill effects they would be transferred to tanks in the holding facilities less than a kilometre away.

The fish catch by Red Sea Secrets in Al-Shu'aibah and by Imad Softa in Al-Lith during visits by the survey team included 13 species (Table 5).

Plate 1. Fins

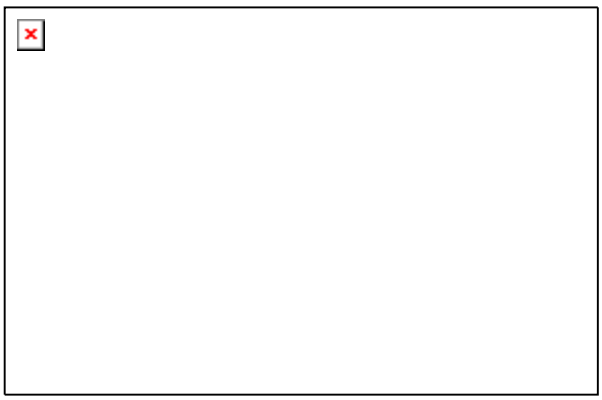


Plate 2. Tickler

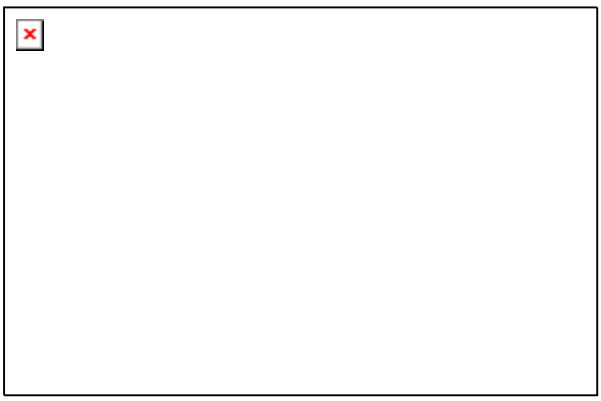


Plate 3. Barrow net

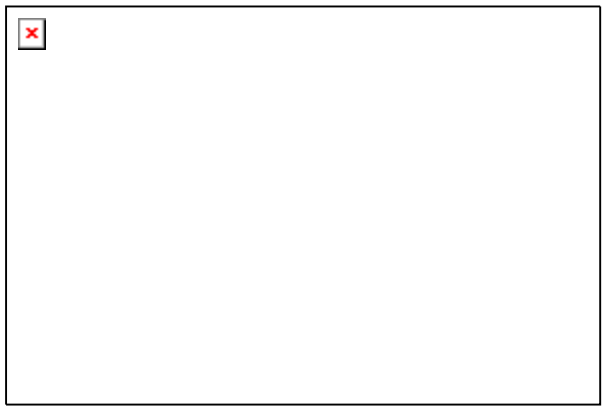


Plate 4. Collecting bucket

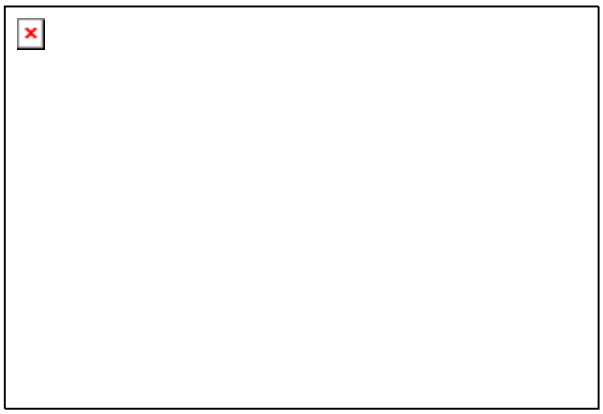


Plate 5. Storage tank (local name Mahya)

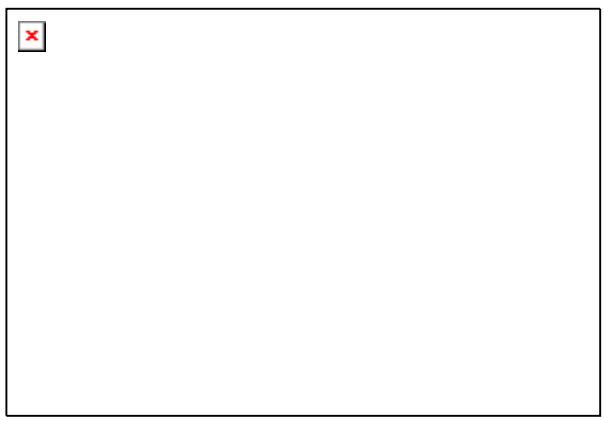


Plate 6. Diver spreading the net

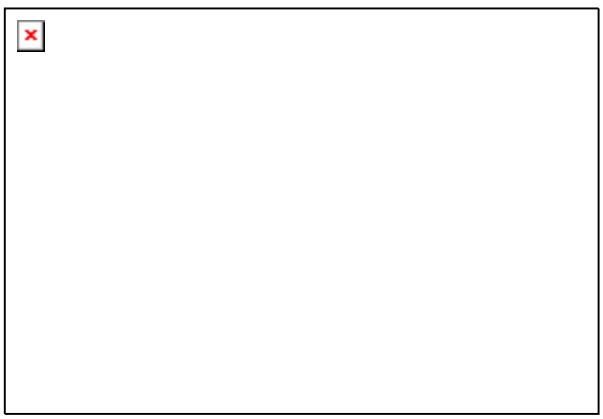


Plate 7. Diver collecting *Naso lituratus* with hand net

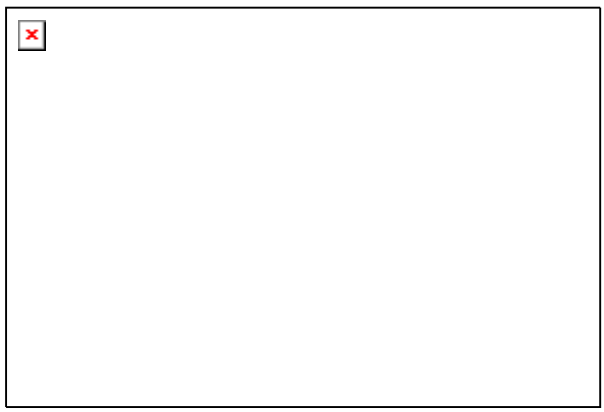


Plate 8. Removing the barrow net after collection

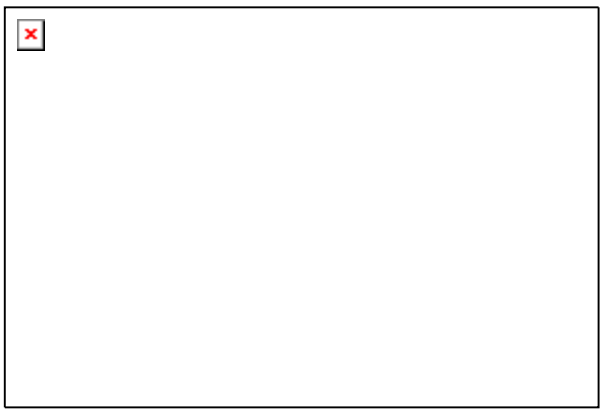


Table 5. Fish catch by Red Sea Secrets at Al-Shu'aibah and by Imad Softa in Al-Lith during visits by the survey team in October 2002

Company	**Red Sea Secrets/Al-Shu'aibah**	**Imad Softa/Al-Lith**
Date	29-10-2002	3-11-2002
Number of divers	3	2
Duration of fish catch	60 minutes	45 minutes
Species	**Number of fishes**	
Zebrasoma xanthurum	24	1
Naso lituratus	2	18
Parupeneus cyclostomus	5	
Parupeneus forsskali		2
Chaetodon paucifasciatus	1	
Chaetodon semilarvatus		3
Pygoplites diacanthus	3	1
Amphiprion bicinctus		9
Oxycheilinus digramma	1	
Gomphosus caeruleus		24
Chlorurus gibbus	2	
Chlorurus sordidus	1	
Arothron diadematus	2	2
Total	**41**	**60**

3.4.3 Yemen

In Yemen the collection of ornamental fish for export started around 1996. There are two companies actively involved in this trade, both with headquarters situated in Hudaydah (Hodeidah) on the Red Sea coast.

The Al-Bousi Centre for Aquarium is a private sector company established in 1997. Four divers are currently involved in collection of ornamental fish, including two from the Philippines and two from Yemen. Prior to the events of September 11th 2001 however, there were seven Philippine divers working in ornamental fish collection. The fishing grounds for this company are located mainly in Kadaman, Kotama, Al-Sawabeh, Talaween, Tekfash and previously in Kamaran. Their catch has decreased significantly since September 11th, mainly because many airlines such as KLM and Lufthansa have changed their routes. Most of the species are caught to order but some species, which have a regular market, may be collected and kept in stocks.

The Saif Company is also from the private sector. Five Yemeni divers are actively involved in collection. They collect to order from fishing grounds located in Al-Saleef, Dier Salim, Salt factory, Al-Qarya, Al-Jawiya, and Al-Sawabeh. The majority of their fishing is carried out at shallow depths

ranging from 3 to 5 m. Occasionally, they may fish in deeper waters up to 10 m and in very rare cases at depths up to 20 m. According to one of the employees in Al-Jawiya, they were previously able to catch about 150 *Pomacanthus asfur* within a short period, but now the stock of this species has been depleted in the area and few are to be found. The Ministry of Agriculture in Yemen monitors fish catches and some enumerators from the ministry used to go with the collectors during fishing trips.

3.5 Aquarium Fish Export Data

It is useful to try to estimate both the numbers and value of each species of ornamental fish exported from the region for the aquarium trade.

Most of the companies in Egypt (the Egyptian Company for Fishing and Fishing Gears) and Saudi Arabia have reports containing export data, including the number of specimens of each of the species being traded. In Yemen the reports on catch or export data are not well organized and they are arranged by family or group of fishes according to their local names. Appendix 6 includes data from companies in the region involved in the export of ornamental fishes. Appendices 6a and 6b show monthly exports from specific companies in Egypt and Saudi Arabia. Appendices 6c and 6d show the relative commercial importance of the different fish species traded in these two countries. Percentages given are rough estimates extrapolated from the available data. Price is stated according to the available information supplied by companies or after EDWARDS (2002). Appendices 6e and 6f show data from Yemen. Appendix 6g gives the actual number of fish counted during visits to the companies in Egypt, Yemen and Saudi Arabia, as well as a summary of their relative abundance. Appendix 6i shows the apparent relative importance of these three countries to the export trade in the region.

3.5.1 Egypt

The available data on production/exports for the Egyptian Company for Fishing and Fishing Gears is presented in Appendix 6a.

In Egypt a total of 67 fish species were traded in 1990, 1991 and during 2001-2002. 58 of these species were being traded during the period November 1990 to June 1991, whereas 53 species were utilised for the aquarium trade during May 2001 to June 2002. In terms of volume (Appendix 6c) the percentage of ornamental fish traded was: boxfish 10.3%; *Chaetodon semilarvatus* and *Anthias* sp. 9.9% each; *Zebrasoma xanthurum* 8.9%; damselfish 7.4%; *Acanthurus sohal* 5.3%; *Pomacanthus maculosus* 4.5%; *Zebrasoma veliferum* 3.7% and *Pseudochromis flavivertex* 3.6%. In terms of the percentage economic value of fish traded: *C. semilarvatus* gave 19.4%; *Z. xanthurum* 17.5%; *A. sohal* 10.4%; boxfish 10.1%; *P. maculosus* 8.8%; *C. paucifasciatus* 2.7%; and groupers 2.7%.

3.5.2 Saudi Arabia

Data on monthly exports of ornamental fish from several companies is given in Appendix 6b. Data are available for the Red Sea Aquarium Fish and Coral Reef Trading Establishment for 1998, 1999, and January to July 2001; Red Sea Secrets for January to June 2002; and Kamal Imad Softa for the year 2001. Unfortunately, data from the Isham company, one of the biggest companies involved with the ornamental fish trade in Saudi Arabia, was not available.

Saudi Arabian companies use 151 fish species in the aquarium trade. The highest number of species (107) was exported by Kamal Imad Softa during a 12 month period in 2001, followed by the Red Sea Aquarium company, which traded 97 species during 31 months of export in the years 1998-99 and the first seven months of 2001. Red Sea Secrets exported 83 fish species in a 6 month period in 2002. The lowest number of species exported was reported by the Coral

Reef Trading Establishment. It recorded 73 species during 33 months in the years 1998-99 and nine months of 2001.

In terms of the percentage of fish exported (Appendix 6d) *Chromis viridis* made up 14.5% of the total number of fishes traded, followed by *Pseudanthias squamipinnis* (4.3%), *Pseudochromis fridmani* and *Dascyllus marginatus* (4.2% each), *Acanthurus sohal* (3.6%), *Zebrasoma xanthurum* (3.1%), *Naso lituratus* (2.7%), *Chaetodon fasciatus* (2.6%) and *Chromis dimidiata* and *Larabicus quadrilineatus* (2.5% each). In terms of percentage of export value, *Z. xanthurum* accounts for 7.1%, followed by *A. sohal* (7.0%), *Chaetodon semilarvatus* (4.7%), *Pomacanthus asfur* (4.5%), *P. maculosus* (4.2%), *Naso lituratus* (4.0%), and *Pseudochromis fridmani* (3.2%).

3.5.3 Yemen

In Yemen data on fish export (by species and not by groups) is only available for the Al-Bousi company for three months of 2002 (Appendix 6e). Nine species of fish are exploited for the aquarium fish trade. *Chaetodon semilarvatus* accounts for 60.9% of the total number of fish exported, followed by *Pomacanthus asfur* (16.0%) and *Acanthurus sohal* (8.1%). Additionally, these species account for 72.5%, 13.1% and 6.0% respectively, in terms of percentage of export value. However, the available data may not reflect the actual picture, as the information available only covered a three month period, May to July 2002.

Monthly catch and export data (2000-2002) from the Saif company in Yemen was only available with local fish names, not scientific names (Appendix 6f). Hence the usefulness of the data is reduced.

3.5.4 Djibouti

Data on exports of ornamental fish from Djibouti for the period 1991-94 are available from PERSGA offices. Since 1994 there has been no collection of fish for the aquarium trade.

3.5.5 Jordan

Fish are no longer collected for the aquarium trade in Jordan, but the Jafar Centre for aquarium fish used to import some ornamental fish from Yemen and Egypt. No data are available for the present report.

3.6 Holding Facilities

Visits were made to the holding facilities of the Egyptian Company for Fishing and Fishing Gears in Egypt; Isham, Red Sea Secrets, Thoal Red Sea and Kamal Imad Softa in Saudi Arabia; and the Bousi and Saif companies in Yemen. A list was made of the fish species found in the respective holding facilities at the time (Appendix 6g).

3.6.1 Egypt

In Egypt a total of 241 fishes were counted; 33 species from eight families. *Chaetodon semilarvatus* represented 25.7% of the total number of individuals of all ornamental fishes reported from the holding facility, followed by *Chromis viridis* (23.7%), *Zebrasoma xanthurum* (9.5%), *Pomacanthus maculosus* (7.5%), *Chaetodon larvatus* (5.8%) and *Zebrasoma veliferum* (4.2%). The highest number of individuals were from the family Chaetodontidae, representing 36.5% of all fishes recorded. This was followed by the families Pomacentridae (28.2%), Acanthuridae (14.1%), Pomacanthidae (8.3%), and Labridae (7.9%).

3.6.2 Saudi Arabia

A total of 10,143 individuals comprising 114 species in 26 families were found in holding facilities of the Saudi Arabian companies. The Isham company had 5,735 individuals from 80 species, Red Sea Secrets had 839 from 59 species, Kamal Imad Softa held 1,645 fish representing 58 species and Thoal Red Sea held 518 individuals from 31 species. The majority of these fishes were

blue green damselfish, *Chromis viridis*, accounting for 44.3% of all fish reported from the above-mentioned companies. Following these were *Pseudanthias squamipinnis* (4.5%), *Dascyllus trimaculatus* (2.8%), *Pomacanthus asfur* (2.4%), *Amphiprion bicinctus* (2.3%), *Zebrasoma veliferum* (2.2%), and *Chaetodon fasciatus* (2.0%). The highest number of individuals (53.4% of all fishes recorded) were from the family Pomacentridae, followed by the Acanthuridae (7.0%), Chaetodontidae (5.3%), Serranidae (4.7%), Labridae (4.1%) and Pomacanthidae (3.8%).

3.6.3 Yemen

A total of 1,165 individuals representing 32 species in eight families were reported in the holding facilities of the Yemeni companies. Al-Bousi held 545 individuals from 11 species and Saif held 620 individuals from 29 species The majority of these were *Zebrasoma xanthurum*, which accounted for 29.8% of all fishes reported from these two companies, followed by *Pomacanthus asfur* (17.7%), *Acanthurus sohal* (16.7%), *Chromis viridis* (8.6%), *Pomacanthus maculosus* (6.4%), *Chaetodon semilarvatus* (4.5%), *Heniochus intermedius* (3.3%) and *Chaetodon larvatus* (3.1%). The family Acanthuridae was most commonly represented with 47.3% of recorded fish coming from this family, followed by the Pomacanthidae (25.8%), Chaetodontidae (12.1%) and Pomacentridae (8.6%).

Appendix 6h indicates the percentages of fish counted from the holding facilities in Egypt, Saudi Arabia and Yemen. Most of these, 86.1%, were in Saudi Arabian companies, with Isham holding 56.5%, Kamal Imad Softa holding 16.2%, Red Sea Secrets 8.3% and Thoal Red Sea 5.1%. By contrast, Yemeni Companies held only 11.5%, shared between Saif Company, with 6.1% and Al-Bousi with 5.4% and Egyptian companies (Egyptian Company for Fishing and Fishing Gears) held only 2.4%.

3.7 Potential Yields

To translate information on abundances into crude estimations of potential (maximum sustainable) yield requires a number of assumptions. These assumptions are discussed in part 2 of this publication, taken from EDWARDS et al. (2003).

In order to calculate the maximum sustainable yield for each species it would be necessary to know the size of the reef where collections take place and the export data; this was beyond the scope of the present study.

The selective nature of ornamental fish collecting for the aquarium trade means that a species under heavy collecting pressure could be completely removed from certain localities. Stocks of each ornamental fish species therefore need to be monitored and managed on a country-by-country and reef-by-reef basis due to variability in abundance of particular species at different localities.

In general, endemic species or those with restricted geographic distributions will be more vulnerable to over-exploitation than more widely distributed species. However, the abundance of the species concerned, and the level of exploitation to which it is subjected will also influence its vulnerability.

4. DISCUSSION

Visual census is a widely used technique for performing ecological studies of fish on coral reefs (ENGLISH et al. 1994). However, differences in the skill levels and technique of observers can be a source of imprecision and/or bias (THOMPSON & MAPSTONE 1997). Therefore, only the underwater fish counting performed by the first author was used to avoid bias in the present study. A total of 14 species of butterflyfishes are reported from the Red Sea, of which seven are endemic or range no further than the Gulf of Aden (RANDALL 1992). In the present study 14 species of butterflyfish have also been reported.

Butterflyfish assemblages in the southern Red Sea differ from those in the north (RIGHTON et al. 1996). The fish fauna of the Djiboutian coast is shared with the Indian Ocean and the Red Sea. However, in terms of species composition, the Red Sea influence dominates, especially in areas near to Bab el Mandeb (BARRATT & MEDLEY 1990). A biogeographic analysis of the Indian Ocean coral fauna, based on presence/absence of species, revealed a clear pattern of faunal relationships between the Red Sea, southern Arabia and the Indian Ocean (KHALAF & KOCHZIUS 2002).

The results presented in this report demonstrate that there are many differences between the reef fish fauna of the northern Red Sea and that of the southern and central Red Sea. For example, *Pseudanthias squamipinnis* dominated the fish assemblages in the northern Red Sea along the Jordanian and Egyptian coasts, whereas *Chromis viridis* dominated in the central Red Sea, along the Saudi Arabian coast at both latitudes 20 and 21º, and in the Gulf of Aden. Other differences occur among the butterflyfish. For example, *Chaetodon paucifasciatus* is abundant in the Gulf of Aqaba and Gulf of Suez but is absent or rare in the southern Red Sea area. However, *Chaetodon larvatus* is a dominant species in the south but rare in the northern Red Sea and Gulf of Suez and absent entirely from the Gulf of Aqaba. *Chaetodon vagabundus* and *Chaetodon melapterus* are absent from the Red Sea, Gulf of Aqaba and Gulf of Suez, at least from the sites studied during this survey, but were present along the Djiboutian coast.

It is clear that *Chaetodon larvatus* is common in the central Red Sea, southern Red Sea and Gulf of Aden and this explains some of the similarity between the two main clusters. The present study indicates that there is marked variation from north to south, which may be attributed to the variability of the habitat exerting a major influence on the fish assemblages. This finding is consistent with ROBERTS et al. (1992).

Latitudinal gradients in water quality (temperature, salinity, plankton production) may be the cause of north-south variation in fish community structure. Differences in environmental tolerance among species could mean that some are better adapted to conditions prevailing in the south than those further north or vice-versa. CARTER & PRINCE (1981) concluded that the gradual changes in salinity and temperature could generate abrupt boundaries for species` distributions.

Habitat strongly influences which species are able to live in a particular place. There are considerable differences in reef structure and coral assemblages from north to south within the Red Sea. In the south, reef structures become shallow with macroalgal dominated frameworks (Yemen and Djibouti). In the far south there are few areas of hard substrata and these are mainly coralline-algal reefs covered with dense growths of brown algae, Sargassum and Turbinaria.

Using several criteria, including which species were utilised by the aquarium trade, endemism, ecological rarity and level of demand, EDWARDS (2002) recommended 42 fish species to be included in monitoring programmes in the Red Sea and Gulf of Aden region. However, in the surveys undertaken for the present study the authors increased this number to 50 fish species.

4.1 Species Needing Special Consideration

Based on the results of underwater surveys, export data, literature and interviews with aquaria personnel and officials, four categories of species were identified that might need special consideration. These include:

a) Species with poor survivorship in captivity (for example, easily stressed species, obligate corallivores and those that release toxins),
b) Easily overexploited species, such as rare or endemic species,
c) Species for which collection may involve collateral damage, such as those that shelter in branching coral,
d) Ecologically important species, such as cleaners.

(a) Species with poor survivorship in captivity

A number of species in the region were identified as not being suitable for normal marine aquaria, including:

- Exquisite butterflyfish, *Chaetodon austriacus*
- Arabian butterflyfish, *Chaetodon melapterus*
- Chevron butterflyfish, *Chaetodon trifascialis*
- Orangeface butterflyfish, *Chaetodon larvatus*
- Threadfin butterflyfish, *Chaetodon auriga*
- Clownfish, *Amphiprion bicinctus*
- Bluetail trunkfish, *Ostracion cyanurus*

The first four species feed exclusively on coral polyps which tend to die after a few months in captivity unless kept in large aquaria containing live corals. The fifth species, *Chaetodon auriga*, is very difficult to maintain. The clownfish, *Amphiprion bicinctus*, lives symbiotically with sea-anemones (*Stoichactis* sp.). They are present at fairly low densities on reefs from all countries surveyed, except Jordanian reefs, but are easily collected. The bluetail trunkfish, *Ostracion cyanurus*, secretes highly toxic substances when alarmed which may be lethal to other fishes or even to themselves in the confined space of an aquarium.

(b) Easily overexploited species

Collection needs to be especially carefully controlled for rare or endemic fish species such as the following:

- *Pomacanthus imperator*
- *Pygoplites diacanthus*
- *Rhinecanthus assasi*
- *Pterois miles*
- *Pseudochromis fridmani*
- *Pseudochromis flavivertex*
- *Pseudochromis springeri*
- *Amphiprion bicinctus*

The first four species are fairly common, in that they may be seen on most dives, but are present at relatively low densities and could be locally overexploited by the marine aquarium trade. *Pseudochromis fridmani*, *Pseudochromis flavivertex*, *Pseudochromis springeri* and *Amphiprion bicinctus* are endemic to the Red Sea and Gulf of Aden. Such species need to be monitored carefully (using catch and effort data or direct observation, for example) to ensure that overexploitation does not occur.

(c) Collateral damage caused by collection

This issue centres on destructive fishing practices. The main problem relates to the collection of small fishes, such as *Dascyllus aruanus*, *Dascyllus marginatus*, *Dascyllus trimaculatus*, *Chromis viridis*, *Chromis dimidiata* and *Pseudanthias squamipinnis* which take shelter in branching corals when under threat. As indicated by WOOD (1985), some collectors destroy the corals to extract the fish. The extent of damage caused by such activities is unknown, but with several thousand individuals being exported each

year it could be considerable. Such impacts could be detected by long-term monitoring of live branching coral cover at 'collected' and comparable 'uncollected' sites.

(d) Ecologically important species

Ecologically important species such as the cleaner wrasses, *Labroides dimidiatus*, *L. larabicus* and *L. bicolor* perform the valuable service of removing ectoparasites from other reef fishes (RANDALL 1958). They establish cleaning stations on the reef to which host fishes come for service. If over collected, the parasite loads on larger fish (many of which are economically important as food fish) could potentially increase, with adverse consequences. Accordingly, the levels of ecologically important species need to be carefully monitored to ensure they are not overexploited.

5. CONCLUSIONS AND RECOMMENDATIONS FOR MANAGEMENT PLANS

- The imposition of a closed season, during which time no fishing can take place, together with the establishment of reserve areas would serve to protect the resource against over-exploitation and maintain species diversity.
- Scientific research should be encouraged in the region to clarify the distribution of the species concerned, both by depth at the same site and between sites at different areas. The reproductive cycles of important fish species should be examined in order to determine their recruitment potential. Particular attention needs to be given to rare or endemic species targeted by the ornamental fish trade.
- All collectors should be trained and provided with appropriate equipment. They should also be paid according to the amount of time actually spent catching fish rather than the value of the fish. This would prevent the selective fishing of highly priced and vulnerable species.
- Species unsuitable for aquaria should not be collected, such as obligate coral feeders, including corallivorous butterfly-fish. The removal of large numbers of key predators, such as the pufferfish (*Canthigaster margaritata*) and trigger-fish should be avoided, as should collection of vulnerable species, such as the attractive boxfishes (*Ostracion cubicus* and *Ostracion cyanurus*) which are slow moving and easily caught.
- Reserve areas should be established, enabling pristine areas of reefs to be preserved, which can then provide recruitment stock for the fisheries.
- Monitoring programmes need to be established to investigate the effects of collection and the effectiveness of management strategies and this will need to be done on a country by country basis.
- Quotas need to be established, based on numbers of fish captured. Species-specific quotas are much more effective in conservation terms and could have an important role to play in the management of fisheries exploited for the aquarium trade. However, restrictions on numbers of specimens that can be collected or exported will be effective only if they are based on rigorous scientific research and are species-specific so that they ensure conservation of vulnerable species.
- Restricted access sites and fishery reserves should be imposed, and would offer the following benefits:
  - Preserving a sector of the fish population from over-exploitation
  - Providing undisturbed spawning grounds for these species
  - Boosting recruitment to adjacent fished areas through larval dispersal
  - Reducing conflict with other resource users, in particular recreational divers
- Temporary closure of areas or fisheries could be particularly helpful where immature fish are often targeted. Such restrictions would give juveniles time to grow beyond the size at which they are collected for the ornamental trade. For this approach to work, more needs to be known about the breeding cycles of the targeted species, the time(s) of year that recruitment takes place and growth rates of recruits.
- Restrictions should be placed on the exploitation of rare and/or endemic species. Rarity of a species may be natural or caused by human activities that have a direct or indirect effect on the species concerned.
- Licensing can provide a way of monitoring and regulating aquarium fisheries and improving standards within the industry. As discussed in WOOD (1985) conditions

on licences should seek to ensure that traders:

  - Keep records of fish caught, bought and sold
  - Maintain well run facilities with minimal losses
  - Do not deal in fishes for which chances of survival are low

- Licensing of collectors provides an opportunity for managers to control or limit fishing activities, collect catch data and ensure that trained collectors are allowed to work.
- Limitation of collecting effort could be helpful as it would reduce the number of collectors that can operate.
- Research and education should be encouraged and research collaboration should be initiated between the scientific community and ornamental fish companies in order to accelerate scientific progress.
- Regular monitoring needs to be undertaken on impacts of collecting practices on bottom habitats, catches, fishing effort and export volumes in each country, in order to manage this valuable resource in a sustainable manner.

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8. APPENDICES

Appendix 1. Ornamental fish species included in the survey.

Acanthurus sohal	*Naso lituratus*	*Zebrasoma veliferum*
Zebrasoma xanthurum	*Balistapus undulatus*	*Balistoides viridescens*
Rhinecanthus assasi	*Chaetodon auriga*	*Chaetodon austriacus*
Chaetodon fasciatus	*Chaetodon larvatus*	*Chaetodon lineolatus*
Chaetodon melapterus	*Chaetodon melannotus*	*Chaetodon mesoleucos*
Chaetodon paucifasciatus	*Chaetodon pictus*	*Chaetodon semilarvatus*
Chaetodon trifascialis	*Heniochus diphreutes*	*Heniochus intermedius*
Paracirrhites forsteri	*Anampses twistii*	*Bodianus anthioides*
Cheilinus lunulatus	*Coris aygula*	*Gomphosus caeruleus*
Labroides dimidiata	*Larabicus quadrilineatus*	*Novaculichthys taeniourus*
Paracheilinus octotaenia	*Thalassoma klunzingeri*	*Thalassoma lunare*
Ostracion cubicus	*Pomacanthus asfur*	*Pomacanthus imperator*
Pomacanthus maculosus	*Pygoplites diacanthus*	*Amphiprion bicinctus*
Dascyllus aruanus	*Dascyllus marginatus*	*Dascyllus trimaculatus*
Pseudochromis fridmani	*Pseudochromis flavivertex*	*Pseudochromis springeri*
Pterois miles	*Pterois radiata*	*Arothron diadematus*
Chromis viridis	*Pseudanthias squamipinnis*	

Important Ornamental Fish Species

Summary data for the 25 **primary** ornamental fish species from Jordan (JO), Egypt (EG), Saudi Arabia (SA), Yemen (YE) and Djibouti (DJ).

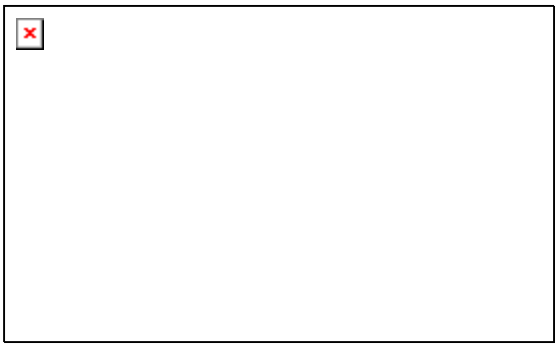
The data include:

1- Survey data: Average abundance (AA); Relative abundance (RA); Frequency of appearance (FA); Percentage of average abundance relative to the Red Sea and Gulf of Aden (RSGA) data

2- Holding facility data

3- Export data

Chromis viridis

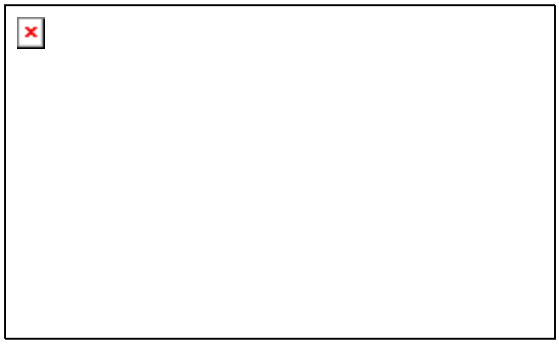


Survey data	JO	EG	SA	YE	DJ
AA	450.0	657.6	8363	6411.1	2696
RA	27.5%	10.4%	81.2%	88.8%	90.1%
FA	94.4%	54.8%	63.6%	55.6%	94.4%
%AA	2.4%	3.5%	45.0%	34.5%	14.5%

Holding facility	EG	SA	YE	
RA	23.7%	44.3%	8.6%	

Export data	EG	SA		
RA		14.5%		

Pseudanthias squamipinnis

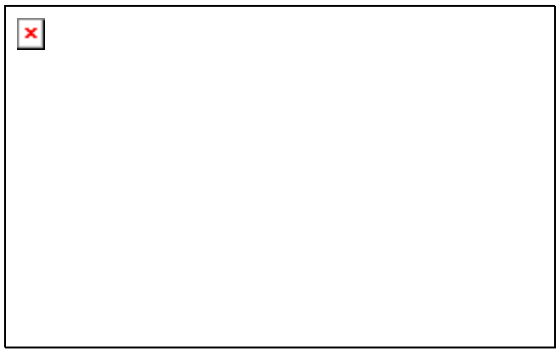


Survey data	JO	EG	SA	YE	DJ
AA	666.2	5356.2	311.3	0.0	0.0
RA	40.7%	84.6%	3.0%	0.0%	0.0%
FA	100.0%	71.0%	48.5%	0.0%	0.0%
%AA	10.5%	84.6%	4.9%	0.0%	0.0%

Holding facility	EG	SA	YE	
RA	2.1%	4.5%	0.0%	

Export data	EG	SA		
RA	9.9%	4.3%		

Zebrasoma xanthurum

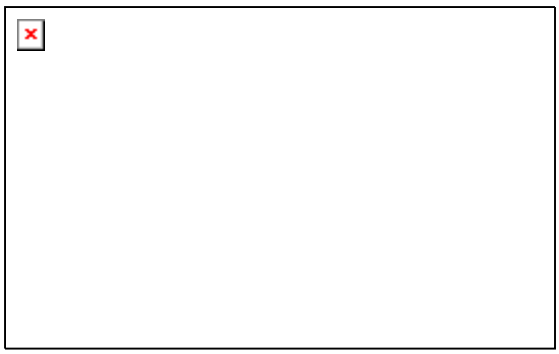


Survey data	JO	EG	SA	YE	DJ
AA	4.1	3.7	13.4	1.3	30.3
RA	0.3%	0.1%	0.1%	0.0%	1.0%
FA	88.9%	41.9%	39.4%	22.2%	88.9%
%AA	7.8%	6.9%	25.3%	2.5%	57.4%

Holding facility	EG	SA	YE
RA	9.5%	1.6%	29.8%

Export data	EG	SA	
RA	3.7%	2.3%	

Zebrasoma veliferum



Survey data	JO	EG	SA	YE	DJ
AA	1.1	4.9	35.1	3.06	5.5
RA	0.1%	0.1%	0.3%	0.0%	0.2%
FA	44.4%	48.4%	63.6%	38.9%	72.9%
%AA	2.2%	9.9%	70.6%	6.2%	11.1%

Holding facility	EG	SA	YE
RA	4.2%	2.2%	0.0%

Export data	EG	SA	
RA	3.7%	2.3%	

Acanthurus sohal

Survey data	JO	EG	SA	YE	DJ
AA	0.0	41.4	46.9	10.8	13.8
RA	0.0%	0.7%	0.5%	0.2%	0.5%
FA	0.0%	32.3%	75.8%	50.0%	55.6%
%AA	0.0%	36.6%	41.5%	9.6%	12.3%

Holding facility	EG	SA	YE
RA	0.4%	1.5%	16.7%

Export data	EG	SA	
RA	5.3%	3.7%	

Chaetodon austriacus

Survey data	JO	EG	SA	YE	DJ
AA	8.22	10.7	17.3	0.0	0.0
RA	0.5%	0.2%	0.2%	0.0%	0.0%
FA	83.3%	90.3%	84.9%	0.0%	0.0%
%AA	22.7%	29.6%	47.7%	0.0%	0.0%

Holding facility	EG	SA	YE	
RA	0.4%	0.2%	0.6%	

Export data	EG	SA		
RA	1.8%	0.6%		

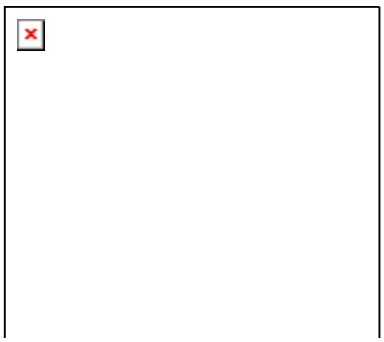
Chaetodon fasciatus

Survey	JO	EG	SA	YE	DJ
AA	2.2	3.6	8.3	0.44	2.4
RA	0.1%	0.1%	0.1%	0.0%	0.1%
FA	72.2%	74.2%	78.8%	16.7%	61.1%
%AA	13.1%	21.3%	48.8%	2.6%	14.1%

Holding facility	EG	SA	YE	
RA	3.3%	2.0%	0.2%	

Export data	EG	SA		
RA	2.2%	2.6%		

Chaetodon larvatus



Survey	JO	EG	SA	YE	DJ
AA	0.0	0.1	14.7	58.1	11.6
RA	0.0%	0.0%	0.1%	0.8%	0.4%
FA	0.0%	3.2%	84.9%	100.0%	100.0%
%AA	0.0%	0.1%	17.4%	68.8%	13.7%

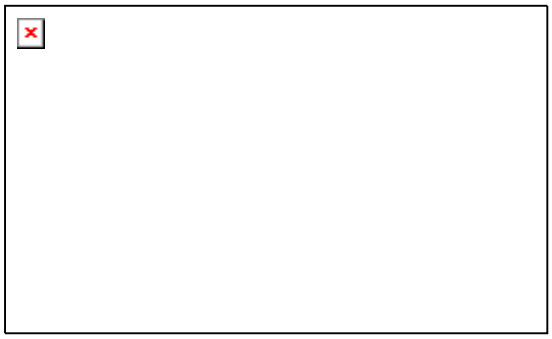
Holding facility	EG	SA	YE	
RA	5.8%	0.4%	3.1%	

Export data	EG	SA		
RA	1.8%	1.1%		

Chaetodon paucifasciatus

Survey data	JO	EG	SA	YE	DJ
AA	24.5	7.23	5.27	0.0	0.0
RA	1.5%	0.1%	0.1%	0.0%	0.0%
FA	100.0%	80.7%	39.4%	0.0%	0.0%
%AA	66.2%	19.5%	14.3%	0.0%	0.0%
Holding facility		EG	SA	YE	
RA		0.4%	0.2%	0.0%	
Export data		EG	SA		
RA		2.8%	1.3%		

Chaetodon semilarvatus

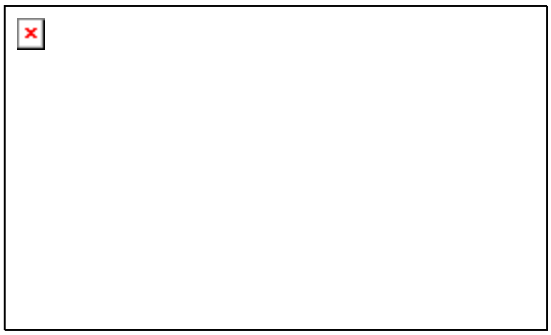


Survey data	JO	EG	SA	YE	DJ
AA	0.0	1.6	2.5	2.1	2.3
RA	0.0%	0.0%	0.0%	0.0%	0.1%
FA	0.0%	45.2%	33.3%	50.0%	66.7%
%AA	0.0%	18.6%	29.4%	24.7%	27.3%

Holding facility	EG	SA	YE	
RA	25.7%	1.2%	4.5%	

Export data	EG	SA		
RA	9.9%	1.5%		

Heniochus intermedius

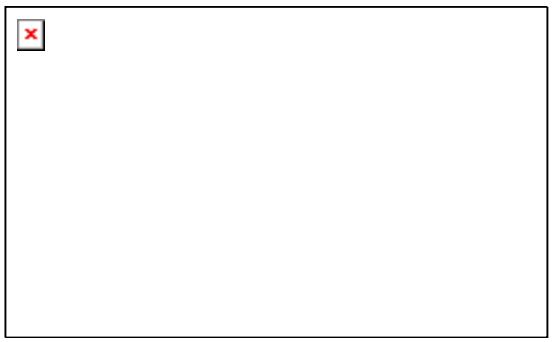


Survey data	JO	EG	SA	YE	DJ
AA	1.1	2.8	0.0	8.2	8.4
RA	0.1%	0.0%	0.0%	0.1%	0.3%
FA	44.4%	67.75	0.0%	83.3%	94.4%
%AA	5.2%	13.8%	0.0%	39.8%	41.2%

Holding facility	EG	SA	YE	
RA	0.0%	0.6%	3.3%	

Export data	EG		YE	
RA	1.5%		0.9%	

Pomacanthus maculosus

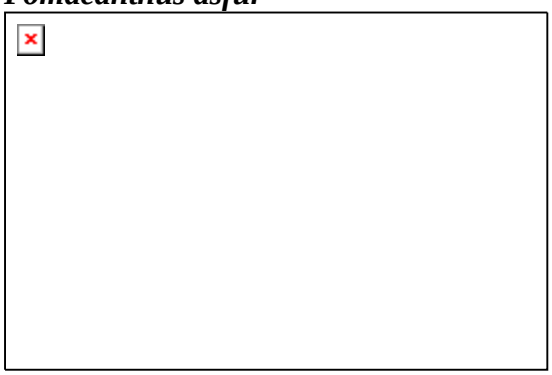


Survey data	JO	EG	SA	YE	DJ
AA	0.0	0.4	2.4	20.2	2.2
RA	0.0%	0.0%	0.0%	0.3%	0.1%
FA	0.0%	22.6%	30.3%	100.0%	83.3%
%AA	0.0%	1.4%	9.4%	80.5%	8.6%

Holding facility	EG	SA	YE	
RA	7.5%	0.2%	6.4%	

Export data	EG	SA		
RA	4.5%	1.1%		

Pomacanthus asfur



Survey data	JO	EG	SA	YE	DJ
AA	0.0	0.0	4.1	9.8	3.8
RA	0.0%	0.0%	0.0%	0.1%	0.1%
FA	0.0%	0.0%	27.3%	94.4%	77.8%
%AA	0.0%	0.0%	23.2%	55.4%	21.4%

Holding facility	EG	SA	YE	
RA	0.0%	2.4%	17.7%	

Export data	EG	SA		
RA	0.1%	2.1%		

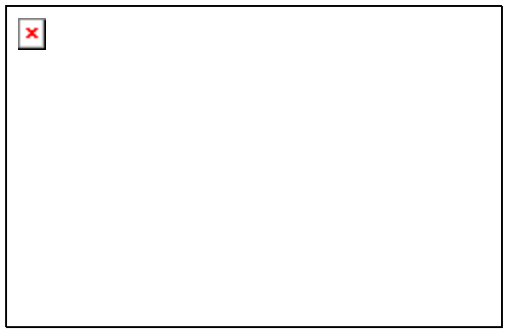
Pygoplites diacanthus

Survey data	JO	EG	SA	YE	DJ
AA	0.2	1.3	11.5	0.0	3.4
RA	0.0%	0.0%	0.1%	0.0%	0.1%
FA	5.6%	58.8%	84.9%	0.0%	66.7%
%AA	1.0%	7.7%	70.2%	0.0%	21.1%

Holding facility	EG	SA	YE	
RA	0.8%	1.0%	0.9%	

Export data	EG	SA		
RA	1.2%	1.4%		

Pomacanthus imperator

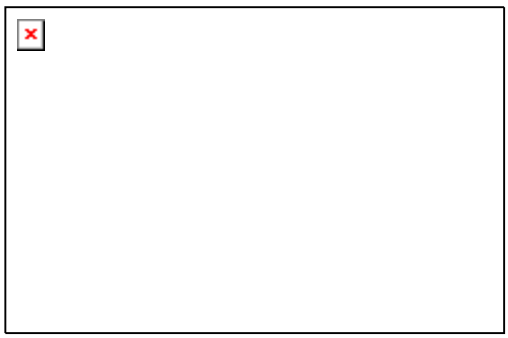


Survey data	JO	EG	SA	YE	DJ
AA	0.1	0.3	0.1	0.1	0.1
RA	0.0%	0.0%	0.0%	0.0%	0.0%
FA	0.0%	19.4%	3.0%	5.6%	5.6%
%AA	10.8%	50.1%	17.6%	10.8%	10.8%

Holding facility	EG	SA	YE	
RA	0.0%	0.2%	0.7%	

Export data	EG	SA		
RA	0.2%	0.4%		

Gomphosus caeruleus

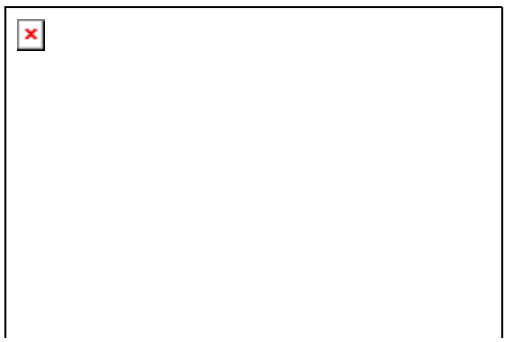


Survey data	JO	EG	SA	YE	DJ
AA	8.3	13.1	47.1	0.4	16.6
RA	0.5%	0.2%	0.5%	0.0%	0.6%
FA	94.4%	87.1%	100.0%	22.2%	94.4%
%AA	9.7%	15.4%	55.1%	0.5%	19.4%

Holding facility	EG	SA	YE	
RA	0.0%	0.8%	0.4%	

Export data	EG	SA		
RA	0.3%	1.3%		

Larabicus quadrilineatus

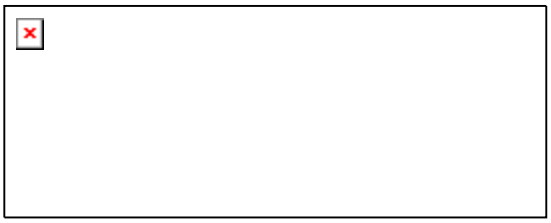


Survey data	JO	EG	SA	YE	DJ
AA	6.8	3.8	46.1	14.6	58.2
RA	0.4%	0.1%	0.5%	1.6%	1.9%
FA	94.4%	74.2%	84.9%	100.0%	100.0%
%AA	3.0%	1.7%	20.1%	50.0%	25.3%

Holding facility	EG	SA	YE	
RA	0.4%	0.2%	2.8%	

Export data	EG	SA		
RA	1.4%	2.6%		

Labroides dimidiatus



Survey data	JO	EG	SA	YE	DJ
AA	1.7	11	19.2	0.4	2.9
RA	0.1%	0.2%	0.2%	0.0%	0.1%
FA	66.7%	93.6%	100.0%	27.8%	72.2%
%AA	4.9%	31.2%	54.4%	1.3%	8.3%

Holding facility	EG	SA	YE	
RA	0.0%	0.1%	0.0%	

Export data	EG	SA		
RA	0.1%	0.7%		

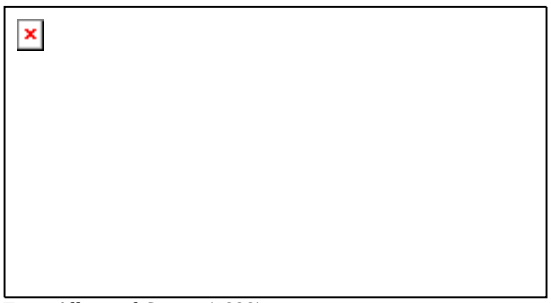
Paracheilinus octotaenia

Survey data	JO	EG	SA	YE	DJ
AA	119.9	17.1	181.8	5.6	17.6
RA	7.3%	0.3%	1.8%	0.1%	0.6%
FA	55.6%	9.7%	21.2%	5.6%	27.8%
%AA	35.1%	5.0%	53.2%	1.6%	5.2%

Holding facility	EG	SA	YE	
RA	0.0%	0.2%	0.0%	

Export data	EG	SA		
RA	0.8%	1.1%		

Thalassoma klunzingeri



From Allen and Steene (1999)

Survey data	JO	EG	SA	YE	DJ
AA	42.0	78.7	56.2	0.0	0.0
RA	2.6%	1.2%	0.6%	0.0%	0.0%
FA	100.0%	90.3%	84.6%	0.0%	0.0%
%AA	23.7%	44.5%	31.8%	0.0%	0.0%

Holding facility	EG	SA	YE	
RA	2.9%	0.4%	0.0%	

Export data	EG	SA		
RA	0.1%	1.0%		

Thalassoma lunare

Survey data	JO	EG	SA	YE	DJ
AA	0.8	2.6	28.9	44.4	62.2
RA	0.1%	0.0%	0.3%	0.6%	2.1%
FA	22.2%	48.4%	84.9%	100.0%	100.0%
%AA	0.6%	1.9%	20.8%	32.0%	44.8%

Holding facility	EG	SA	YE	
RA	0.0%	0.6%	0.1%	

Export data	EG	SA		
RA	0.2%	0.6%		

Dascyllus aruanus

Survey data	JO	EG	SA	YE	DJ
AA	125.7	10.7	957.2	24.0	10.4
RA	7.7%	0.2%	9.3%	0.3%	0.4%
FA	100.0%	22.6%	57.6%	16.7%	38.9%
%AA	11.2%	0.9%	84.9%	2.1%	0.9%

Holding facility	EG	SA	YE	
RA	2.1%	2.0%	0.0%	

Export data	EG	SA		
RA		1.8%		

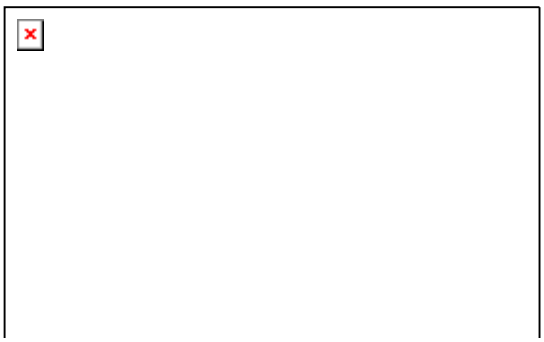
Dascyllus marginatus

Survey data	JO	EG	SA	YE	DJ
AA	111.8	17.4	3.2	420.9	2.2
RA	6.8%	0.3%	0.0%	5.8%	0.1%
FA	100.0%	19.4%	6.1%	50.0%	16.7%
%AA	20.1%	3.1%	0.6%	75.8%	0.4%

Holding facility	EG	SA	YE	
RA	0.4%	0.7%	0.8%	

Export data	EG	SA		
RA		4.2%		

Amphiprion bicinctus

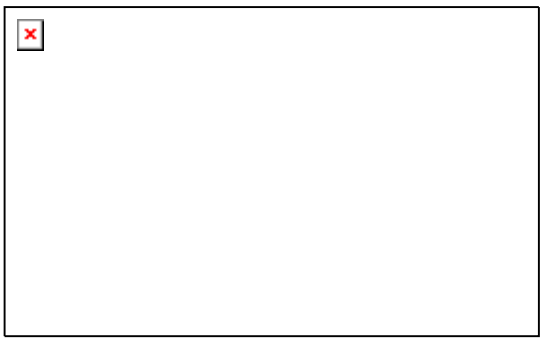


Survey data	JO	EG	SA	YE	DJ
AA	25.2	2.8	3.9	0.1	1.1
RA	1.54%	0.0%	0.0%	0.0%	0.0%
FA	100.0%	45.2%	48.5%	11.1%	22.2%
%AA	76.3%	8.4%	11.8%	0.3%	3.2%

Holding facility	EG	SA	YE	
RA	0.0%	2.3%	0.0%	

Export data	EG	SA		
RA	2.0%	2.0%		

Dascyllus trimaculatus



Survey data	JO	EG	SA	YE	DJ
AA	7.2	0.8	8.4	72.9	1.1
RA	0.4%	0.0%	0.1%	1.0%	0.0%
FA	44.4%	16.1%	15.2%	11.1%	11.1%
%AA	7.9%	0.9%	9.3%	80.7%	1.2%

Holding facility	EG	SA	YE	
RA	0.0%	2.8%	0.0%	

Export data	EG	SA		
RA		2.2%		

Appendix 2. Results of benthic habitat surveys.

Appendix 2(a). Jordan - benthic habitat survey results; average percentage cover of substrate recorded from sites.

		Substrate Codes										
Site		**AT**	**CR**	**DC**	**HC**	**MA**	**RB**	**SC**	**SN**	**SP**	**OT**	**Total**
Marine Science Station	D I,II &III	0.17	11.83	35.83	25.33	0.00	3.50	7.33	15.33	0.33	0.33	100.00
Marine Science Station	S I, II &III	0.00	10.00	9.00	17.83	0.00	8.50	4.50	49.17	0.83	0.17	100.00
Visitors Centre	S I, II &III	0.17	12.33	16.00	35.33	0.00	4.00	8.00	23.83	0.17	0.17	100.00
Visitors Centre	D I,II &III	1.17	17.50	13.50	46.67	0.00	3.33	6.83	10.50	0.33	0.17	100.00
Tourist Camp	S I, II &III	0.00	25.33	32.50	17.17	0.00	4.33	5.50	14.67	0.33	0.17	100.00
Tourist Camp	D I,II &III	0.00	7.00	27.17	20.67	0.00	0.17	4.83	40.00	0.17	0.00	100.00
Total Average		**0.25**	**14.00**	**22.33**	**27.17**	**0.00**	**3.97**	**6.17**	**25.58**	**0.36**	**0.17**	**100.00**
SD		**0.46**	**6.53**	**11.00**	**11.66**	**0.00**	**2.67**	**1.43**	**15.61**	**0.25**	**0.11**	**0.00**

Abbreviations/codes: AT = algal turf, CR = coral rock, DC = dead coral, HC = live hard coral, MA = Macroalgae, RB = rubble, SC = live soft coral, SN = sand, SP = sponge, OT = others; D = deep; S = shallow

Appendix 2(b). Egypt (Gulf of Suez) - benthic habitat survey results; average percentage cover of substrate recorded from sites.

		Substrate Codes										
Site		**AT**	**CR**	**DC**	**HC**	**MA**	**RB**	**SC**	**SN**	**SP**	**OT**	**Total**
Noksh	S I, II & III	0.00	16.17	29.17	41.17	0.00	0.00	13.50	0.00	0.00	0.00	100.00
Noksh	D I, II & III	0.33	10.33	20.50	18.33	0.00	11.17	4.50	34.50	0.33	0.00	100.00
Mahmoudat	S I, II & III	0.17	25.17	18.33	41.17	0.00	0.00	14.00	1.00	0.17	0.00	100.00
Mahmoudat	D I, II & III	0.00	9.00	16.67	23.33	0.00	7.33	17.17	26.50	0.00	0.00	100.00
Fanar Dolphin	S I, II & III	0.00	24.33	10.50	38.83	0.00	0.00	24.17	0.00	2.17	0.00	100.00
Fanar Dolphin	D I, II & III	0.00	25.50	5.50	19.17	0.00	0.00	47.83	0.17	1.83	0.00	100.00
Illi	S I, II & III	0.00	14.50	42.83	23.33	0.00	0.00	19.17	0.00	0.00	0.17	100.00
Illi	D I, II & III	0.00	30.67	26.50	18.17	0.00	0.00	24.33	0.33	0.00	0.00	100.00
Zorab	D I, II, III, IV & V	0.70	19.00	29.30	35.90	0.00	2.10	3.80	9.20	0.00	0.00	100.00
Ras Mohammed	S I, II & III	0.00	40.67	13.00	29.67	0.00	0.00	16.33	0.00	0.33	0.00	100.00
Ras Mohammed	D I, II & III	3.00	22.67	8.83	14.00	0.00	2.17	41.33	4.00	3.50	0.50	100.00
Total average		**0.38**	**21.64**	**20.10**	**27.55**	**0.00**	**2.07**	**20.56**	**6.88**	**0.76**	**0.06**	**100.00**
SD		**0.90**	**9.24**	**11.06**	**10.17**	**0.00**	**3.75**	**13.66**	**12.14**	**1.19**	**0.15**	**0.00**

Abbreviations/codes: AT = algal turf, CR = coral rock, DC = dead coral, HC = live hard coral, MA = Macroalgae, RB = rubble, SC = live soft coral, SN = sand, SP = sponge, OT = others; D = deep; S = shallow

Appendix 2(c). Saudi Arabia - benthic habitat survey results; average percentage cover of substrate recorded from sites.

		Substrate Codes										
Site		**AT**	**CR**	**DC**	**HC**	**MA**	**RB**	**SC**	**SN**	**SP**	**OT**	**Total**
Al Kabeera	S I, II & III	0.00	8.00	12.00	7.00	0.00	0.00	72.83	0.00	0.00	0.17	100.00
Al Kabeera	D I, II & III	0.17	23.50	21.67	4.33	0.00	3.50	32.00	14.83	0.00	0.00	100.00
Biada	D I, II & III	1.00	4.83	48.50	22.83	0.00	5.00	2.50	14.83	0.50	0.00	100.00
South Patch Biada	S I, II & III	0.00	17.83	59.83	14.17	0.00	1.17	5.00	1.00	0.67	0.33	100.00
South Patch Biada	D I, II & III	0.00	6.00	51.17	10.67	0.00	2.00	2.17	27.50	0.50	0.00	100.00
Al-Sagheera	S I, II &III	0.00	39.83	34.00	15.17	0.00	0.17	10.67	0.17	0.00	0.00	100.00
Al-Kherq	D I, II & III	0.00	24.83	46.00	12.50	0.00	2.67	9.33	4.33	0.17	0.17	100.00
Bousty/Thoal	D I, II & III/7m	2.00	19.50	42.50	6.33	0.33	1.67	14.33	13.33	0.00	0.00	100.00
Thoal Awjam	S I, II & III	4.17	46.33	27.50	11.17	0.00	4.50	1.00	2.83	2.50	0.00	100.00
Al-Lith	S I, II & III	0.00	28.00	6.33	49.33	0.17	1.00	14.83	0.17	0.17	0.00	100.00
Al-Lith	D I, II & III	0.00	26.00	9.67	39.50	0.00	1.50	20.17	1.67	1.33	0.17	100.00
Total Average		**0.67**	**22.24**	**32.65**	**17.55**	**0.05**	**2.11**	**16.80**	**7.33**	**0.53**	**0.08**	**100.00**
SD		**1.32**	**13.20**	**18.45**	**14.36**	**0.11**	**1.65**	**20.72**	**9.02**	**0.77**	**0.11**	**0.00**

Abbreviations/codes: AT = algal turf, CR = coral rock, DC = dead coral, HC = live hard coral, MA = Macroalgae, RB = rubble, SC = live soft coral, SN = sand, SP = sponge, OT = others; D = deep; S = shallow

Appendix 2(d). Yemen - benthic habitat survey results; average percentage cover of substrate recorded from sites.

		Substrate Codes										
Site		**AT**	**CR**	**DC**	**HC**	**MA**	**RB**	**SC**	**SN**	**SP**	**OT**	**Total**
Kadaman	S I, II & III	0.33	30.17	0.67	9.67	16.33	15.67	0.00	15.67	0.00	11.50	100.00
Kamaran	D I, II & III	1.00	21.50	0.00	31.83	0.00	17.67	0.00	16.00	8.00	4.00	100.00
SE Tekfash	S I, II & III	0.00	51.33	0.17	27.67	0.00	14.50	0.00	3.17	0.17	3.00	100.00
SW Tekfash	D I, II & III	0.17	24.17	0.83	40.50	0.00	12.17	0.33	20.33	0.50	1.00	100.00
Al-Badi Island S	S I, II & III	0.00	27.33	0.00	39.83	0.00	26.00	0.00	0.83	0.50	5.50	100.00
Al-Murk SI	S I, II & III	0.00	15.17	0.00	7.50	39.00	10.83	0.00	11.50	0.50	15.50	100.00
Total Average		**0.21**	**28.14**	**0.24**	**28.12**	**7.90**	**17.55**	**0.05**	**9.76**	**1.45**	**6.57**	**100.00**
SD		**0.37**	**11.34**	**0.36**	**14.19**	**15.00**	**6.19**	**0.13**	**8.08**	**2.89**	**5.11**	**0.00**

Abbreviations/codes: AT = algal turf, CR = coral rock, DC = dead coral, HC = live hard coral, MA = Macroalgae, RB = rubble, SC = live soft coral, SN = sand, SP = sponge, OT = others; D = deep; S = shallow

Appendix 2(e). Djibouti - benthic habitat survey results; average percentage cover of substrate recorded from sites.

		Substrate Codes										
Site		**AT**	**CR**	**DC**	**HC**	**MA**	**RB**	**SC**	**SN**	**SP**	**OT**	**Total**
Khor Ambado	D I, II & III	22.50	12.83	24.00	35.67	0.17	0.33	0.17	3.33	0.50	0.50	100.00
Maskali	D I, II & III	2.33	46.67	12.67	21.33	1.33	2.33	0.00	12.83	0.33	0.17	100.00
Moucha	D I, II & III	2.00	20.33	13.33	41.33	5.50	8.00	2.67	4.17	2.67	0.00	100.00
Tadjoura	D I, II & III	0.33	14.00	15.50	61.33	0.00	4.33	0.17	3.33	0.67	0.33	100.00
Arta Plaga	D I, II & III	0.00	26.50	20.83	44.00	0.00	1.83	1.67	3.67	0.17	1.33	100.00
Gehere	D I, II & III	3.83	10.00	14.17	23.83	0.50	0.50	15.83	29.83	1.50	0.00	100.00
Total average		**5.17**	**21.72**	**16.75**	**37.92**	**1.25**	**2.89**	**3.42**	**9.53**	**0.97**	**0.39**	**100.00**
SD		**8.61**	**13.59**	**4.60**	**14.67**	**2.14**	**2.89**	**6.17**	**10.61**	**0.95**	**0.50**	**0.00**

Abbreviations/codes: AT = algal turf, CR = coral rock, DC = dead coral, HC = live hard coral, MA = Macroalgae, RB = rubble, SC = live soft coral, SN = sand, SP = sponge, OT = others; D = deep; S = shallow

Appendix 2(f). Benthic habitat survey results; average percentage cover of substrate recorded at transect sites for each country.

		Substrate Codes										
Country		**AT**	**CR**	**DC**	**HC**	**MA**	**RB**	**SC**	**SN**	**SP**	**OT**	**Total**
Jordan	Total Average	0.25	14.00	22.33	27.17	0.00	3.97	6.17	25.58	0.36	0.17	100.00
Jordan	SD	0.46	6.53	11.00	11.66	0.00	2.67	1.43	15.61	0.25	0.11	
Egypt	Total average	0.38	21.64	20.10	27.55	0.00	2.07	20.56	6.88	0.76	0.06	100.00
Egypt	SD	0.90	9.24	11.06	10.17	0.00	3.75	13.66	12.14	1.19	0.15	
Saudi Arabia	Total Average	0.67	22.24	32.65	17.55	0.05	2.11	16.80	7.33	0.53	0.08	100.00
Saudi Arabia	SD	1.32	13.20	18.45	14.36	0.11	1.65	20.72	9.02	0.77	0.11	
Yemen	Total Average	0.21	28.14	0.24	28.12	7.90	17.55	0.05	9.76	1.45	6.57	100.00
Yemen	SD	0.37	11.34	0.36	14.19	15.00	6.19	0.13	8.08	2.89	5.11	
Djibouti	Total average	5.17	21.72	16.75	37.92	1.25	2.89	3.42	9.53	0.97	0.39	100.00
Djibouti	SD	8.61	13.59	4.60	14.67	2.14	2.89	6.17	10.61	0.95	0.50	

Abbreviations/codes: SD = standard deviation; AT = algal turf, CR = coral rock, DC = dead coral, HC = live hard coral, MA = Macroalgae, RB = rubble, SC = live soft coral, SN = sand, SP = sponge, OT = others; D = deep; S = shallow

Appendix 3. The total abundance (TA), average abundance (AA), relative abundance (RA), and frequency of appearance (FA) of each ornamental fish species recorded for each transect (500m²). FA recorded as the number of transects in which the species was present.

Appendix 3(a). Results for the Jordanian coast. The following species were not observed during surveys in Jordan: *Chaetodon lineolatus*, *Chaetodon melapterus*, *Chaetodon pictus*, *Heniochus diphreutes*, *Pseudochromis flavivertex*.

Site	Marine Science Station								Tourist Camp								Visitor Centre							
Status	Unexploited				Unexploited				Unexploited				Unexploited				Unexploited				Unexploited			
n	3				3				3				3				3				3			
Depth	Shallow 5m				Deep 10m				Shallow 5m				Deep 10m				Shallow 5m				Deep 10m			
Species	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA
Acanthurus sohal	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Naso lituratus	1	0.3	0.0	1	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Zebrasoma veliferum	2	0.7	0.0	1	2	0.7	0.0	1	6	2.0	0.4	2	3	1.0	0.1	1	2	0.7	0.0	1	5	1.7	0.1	2
Zebrasoma xanthurum	15	5.0	0.4	3	10	3.3	0.2	3	16	5.3	1.1	3	2	0.7	0.0	1	21	7.0	0.2	3	10	3.3	0.2	3
Balistapus undulatus	2	0.7	0.0	2	7	2.3	0.1	3	0	0.0	0.0	0	2	0.7	0.0	1	2	0.7	0.0	2	1	0.3	0.0	1
Balistoides viridescens	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Rhinecanthus assasi	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Chaetodon auriga	1	0.3	0.0	1	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	2	0.7	0.0	1	0	0.0	0.0	0
Chaetodon austriacus	9	3.0	0.2	2	24	8.0	0.5	2	16	5.3	1.1	3	8	2.7	0.2	2	45	15.0	0.5	3	46	15.3	1.0	3
Chaetodon fasciatus	6	2.0	0.1	3	2	0.7	0.0	1	4	1.3	0.3	2	7	2.3	0.1	2	13	4.3	0.1	3	8	2.7	0.2	2
Chaetodon larvatus	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Chaetodon melannotus	2	0.7	0.0	1	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	4	1.3	0.0	2	4	1.3	0.1	2
Chaetodon mesoleucos	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Chaetodon paucifasciatus	49	16.3	1.2	3	89	29.7	1.7	3	56	18.7	3.9	3	55	18.3	1.1	3	110	36.7	1.2	3	82	27.3	1.8	3
Chaetodon semilarvatus	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Chaetodon trifascialis	1	0.3	0.0	1	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	2	0.7	0.0	1
Heniochus intermedius	4	1.3	0.1	2	6	2.0	0.1	2	4	1.3	0.3	2	0	0.0	0.0	0	5	1.7	0.1	2	0	0.0	0.0	0
Paracirrhites forsteri	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Anampses twistii	30	10.0	0.7	3	58	19.3	1.1	3	25	8.3	1.8	3	8	2.7	0.2	2	24	8.0	0.3	3	31	10.3	0.7	3
Bodianus anthioides	14	4.7	0.3	3	12	4.0	0.2	3	4	1.3	0.3	2	2	0.7	0.0	1	2	0.7	0.0	1	2	0.7	0.0	1
Cheilinus lunulatus	4	1.3	0.1	3	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	2	0.7	0.0	1	0	0.0	0.0	0
Coris aygula	3	1.0	0.1	2	1	0.3	0.0	1	0	0.0	0.0	0	0	0.0	0.0	0	2	0.7	0.0	2	0	0.0	0.0	0
Gomphosus caeruleus	7	2.3	0.2	2	23	7.7	0.4	3	32	10.7	2.2	3	14	4.7	0.3	3	51	17.0	0.5	3	22	7.3	0.5	3
Labroides dimidiata	4	1.3	0.1	2	16	5.3	0.3	3	2	0.7	0.1	1	1	0.3	0.0	1	5	1.7	0.1	2	3	1.0	0.1	3
Larabicus quadrilineatus	7	2.3	0.2	3	12	4.0	0.2	2	20	6.7	1.4	3	14	4.7	0.3	3	41	13.7	0.4	3	29	9.7	0.6	3
Novaculichthys taeniourus	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Paracheilinus octotaenia	100	33.3	2.5	1	60	20.0	1.1	1	8	2.7	0.6	1	1030	343.3	21.1	3	50	16.7	0.5	1	910	303.3	20.1	3
Thalassoma klunzingeri	151	50.3	3.7	3	130	43.3	2.5	3	110	36.7	7.7	3	78	26.0	1.6	3	155	51.7	1.7	3	132	44.0	2.9	3
Thalassoma lunare	5	1.7	0.1	1	5	1.7	0.1	1	0	0.0	0.0	0	2	0.7	0.0	1	0	0.0	0.0	0	2	0.7	0.0	1
Ostracion cubicus	1	0.3	0.0	1	6	2.0	0.1	2	0	0.0	0.0	0	0	0.0	0.0	0	2	0.7	0.0	2	0	0.0	0.0	0
Pomacanthus asfur	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Pomacanthus imperator	0	0.0	0.0	0	0	0.0	0.0	0	1	0.3	0.1	1	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Pomacanthus maculosus	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Pygoplites diacanthus	0	0.0	0.0	0	3	1.0	0.1	1	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0
Amphiprion bicinctus	109	36.3	2.7	3	60	20.0	1.1	3	86	28.7	6.0	3	85	28.3	1.7	3	49	16.3	0.5	3	65	21.7	1.4	3
Dascyllus aruanus	452	150.7	11.2	3	305	101.7	5.8	3	133	44.3	9.3	3	395	131.7	8.1	3	901	300.3	9.6	3	77	25.7	1.7	3
Dascyllus marginatus	514	171.3	12.7	3	730	243.3	13.8	3	40	13.3	2.8	3	318	106.0	6.5	3	171	57.0	1.8	3	240	80.0	5.3	3
Dascyllus trimaculatus	68	22.7	1.7	2	18	6.0	0.3	2	8	2.7	0.6	1	25	8.3	0.5	1	5	1.7	0.1	1	5	1.7	0.1	1
Pseudochromis fridmani	14	4.7	0.3	2	13	4.3	0.2	2	62	20.7	4.4	3	21	7.0	0.4	3	72	24.0	0.8	3	57	19.0	1.3	3
Pseudochromis springeri	0	0.0	0.0	0	8	2.7	0.2	2	4	1.3	0.3	1	19	6.3	0.4	3	4	1.3	0.0	3	6	2.0	0.1	2
Pterois miles	0	0.0	0.0	0	0	0.0	0.0	0	2	0.7	0.1	2	1	0.3	0.0	1	0	0.0	0.0	0	0	0.0	0.0	0
Pterois radiata	2	0.7	0.0	1	1	0.3	0.0	1	3	1.0	0.2	1	0	0.0	0.0	0	2	0.7	0.0	1	0	0.0	0.0	0
Arothron diadematus	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	0.0	0.0	0	1	0.3	0.0	1	1	0.3	0.0	1
Chromis viridis	485	161.7	12.0	3	500	166.7	9.5	3	300	100.0	21.1	2	865	288.3	17.7	3	4800	1600.0	51.3	3	1150	383.3	25.4	3
Pseudanthias squamipinnis	1971	657.0	48.9	3	3170	1056.7	60.1	3	483	161.0	33.9	3	1923	641.0	39.4	3	2810	936.7	30.0	3	1635	545.0	36.1	3
Total	**4033**	**1344.3**	**100.0**		**5271**	**1757.0**	**100.0**		**1425**	**475.0**	**100.0**		**4878**	**1626.0**	**100.0**		**9353**	**3117.7**	**100.0**		**4525**	**1508.3**	**100.0**	

Appendix 3(b). Results from the Egyptian coast (Gulf of Suez). Species not observed in Egypt: *Chaetodon melapterus*, *Chaetodon pictus*, *Heniochus diphreutes*, *Pseudochromis flavivertex*.

	Al -Noksh								Mahmoudat				Fanar Al-Dolphin							
Status																				
n	3				3				3				3				3			
Depth	Shallow 5m				Deep 9m				Deep 10m				Shallow 5m				Deep 10m			
Species	**TA**	**AA**	**RA**	**FA**	**TA**	**AA**	**RA**	**FA**	**TA**	**AA**	**RA**	**FA**	**TA**	**AA**	**RA**	**FA**	**TA**	**AA**	**RA**	**FA**
Acanthurus sohal	0	0.00	0.00	0	3	1.00	0.01	1	0	0.00	0.00	0	1090	363.33	2.72	3	0	0.00	0.00	0
Naso lituratus	26	8.67	0.30	3	21	7.00	0.08	2	5	1.67	0.54	1	8	2.67	0.02	2	2	0.67	0.01	1
Zebrasoma veliferum	2	0.67	0.02	1	0	0.00	0.00	0	0	0.00	0.00	0	7	2.33	0.02	2	16	5.33	0.07	2
Zebrasoma xanthurum	4	1.33	0.05	2	3	1.00	0.01	1	0	0.00	0.00	0	9	3.00	0.02	1	0	0.00	0.00	0
Balistapus undulatus	1	0.33	0.01	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	6	2.00	0.03	3
Balistoides viridescens	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Rhinecanthus assasi	2	0.67	0.02	1	2	0.67	0.01	1	0	0.00	0.00	0	3	1.00	0.01	1	0	0.00	0.00	0
Chaetodon auriga	228	76.00	2.64	3	77	25.67	0.28	3	20	6.67	2.15	3	16	5.33	0.04	3	7	2.33	0.03	2
Chaetodon austriacus	42	14.00	0.49	2	20	6.67	0.07	2	11	3.67	1.18	3	24	8.00	0.06	3	12	4.00	0.05	2
Chaetodon fasciatus	29	9.67	0.34	3	9	3.00	0.03	2	7	2.33	0.75	3	6	2.00	0.01	2	17	5.67	0.07	2
Chaetodon larvatus	2	0.67	0.02	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Chaetodon lineolatus	2	0.67	0.02	1	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.00	1	0	0.00	0.00	0
Chaetodon melannotus	5	1.67	0.06	1	16	5.33	0.06	2	0	0.00	0.00	0	19	6.33	0.05	2	6	2.00	0.03	2
Chaetodon mesoleucos	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Chaetodon paucifasciatus	15	5.00	0.17	3	16	5.33	0.06	2	55	18.33	5.91	3	28	9.33	0.07	3	28	9.33	0.12	2
Chaetodon semilarvatus	8	2.67	0.09	3	4	1.33	0.01	2	5	1.67	0.54	1	6	2.00	0.01	3	12	4.00	0.05	1
Chaetodon trifascialis	48	16.00	0.56	3	15	5.00	0.06	2	6	2.00	0.64	2	65	21.67	0.16	3	14	4.67	0.06	3
Heniochus intermedius	8	2.67	0.09	2	4	1.33	0.01	2	0	0.00	0.00	0	12	4.00	0.03	3	16	5.33	0.07	3
Paracirrhites forsteri	33	11.00	0.38	2	20	6.67	0.07	2	3	1.00	0.32	1	36	12.00	0.09	3	16	5.33	0.07	3
Anampses twistii	15	5.00	0.17	2	11	3.67	0.04	1	36	12.00	3.87	3	7	2.33	0.02	3	31	10.33	0.13	3
Bodianus anthioides	0	0.00	0.00	0	1	0.33	0.00	1	2	0.67	0.21	1	0	0.00	0.00	0	29	9.67	0.12	3
Cheilinus lunulatus	6	2.00	0.07	2	6	2.00	0.02	2	2	0.67	0.21	1	4	1.33	0.01	2	8	2.67	0.03	3
Coris aygula	31	10.33	0.36	2	25	8.33	0.09	2	1	0.33	0.11	1	2	0.67	0.00	1	4	1.33	0.02	2
Gomphosus caeruleus	73	24.33	0.85	3	46	15.33	0.17	2	22	7.33	2.36	3	48	16.00	0.12	3	12	4.00	0.05	2
Labroides dimidiata	31	10.33	0.36	3	21	7.00	0.08	2	15	5.00	1.61	3	45	15.00	0.11	2	36	12.00	0.15	3
Larabicus quadrilineatus	14	4.67	0.16	3	8	2.67	0.03	2	0	0.00	0.00	0	22	7.33	0.05	3	19	6.33	0.08	3
Novaculichthys taeniourus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Paracheilinus octotaenia	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Thalassoma klunzingeri	88	29.33	1.02	3	25	8.33	0.09	2	27	9.00	2.90	3	168	56.00	0.42	2	21	7.00	0.09	2
Thalassoma lunare	12	4.00	0.14	2	8	2.67	0.03	1	2	0.67	0.21	1	2	0.67	0.00	1	20	6.67	0.08	2
Ostracion cubicus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Pomacanthus asfur	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Pomacanthus imperator	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	3	1.00	0.01	2	1	0.33	0.00	1
Pomacanthus maculosus	2	0.67	0.02	1	0	0.00	0.00	0	4	1.33	0.43	2	3	1.00	0.01	2	0	0.00	0.00	0
Pygoplites diacanthus	1	0.33	0.01	1	2	0.67	0.01	1	4	1.33	0.43	3	2	0.67	0.00	2	5	1.67	0.02	2
Amphiprion bicinctus	0	0.00	0.00	0	5	1.67	0.02	2	3	1.00	0.32	1	0	0.00	0.00	0	8	2.67	0.03	2
Dascyllus aruanus	0	0.00	0.00	0	3	1.00	0.01	1	200	66.67	21.48	2	0	0.00	0.00	0	2	0.67	0.01	1
Dascyllus marginatus	0	0.00	0.00	0	15	5.00	0.06	1	135	45.00	14.50	2	0	0.00	0.00	0	0	0.00	0.00	0
Dascyllus trimaculatus	0	0.00	0.00	0	3	1.00	0.01	1	5	1.67	0.54	1	0	0.00	0.00	0	3	1.00	0.01	1
Pseudochromis fridmani	6	2.00	0.07	2	28	9.33	0.10	2	8	2.67	0.86	2	35	11.67	0.09	3	152	50.67	0.63	3
Pseudochromis springeri	0	0.00	0.00	0	2	0.67	0.01	1	0	0.00	0.00	0	0	0.00	0.00	0	54	18.00	0.23	2
Pterois miles	1	0.33	0.01	1	9	3.00	0.03	3	1	0.33	0.11	1	1	0.33	0.00	1	0	0.00	0.00	0
Pterois radiata	0	0.00	0.00	0	3	1.00	0.01	3	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.01	1
Arothron diadematus	15	5.00	0.17	2	42	14.00	0.15	2	2	0.67	0.21	1	0	0.00	0.00	0	4	1.33	0.02	2
Chromis viridis	2864	954.67	33.20	3	8700	2900.00	32.02	3	350	116.67	37.59	1	0	0.00	0.00	0	0	0.00	0.00	0
Pseudanthias squamipinnis	5012	1670.67	58.10	3	18000	6000.00	66.24	3	0	0.00	0.00	0	38400	12800.00	95.82	0	23400	7800.00	97.65	3
													73	**13357.67**	**100.00**		**23963**	**7987.67**	**100.00**	

Site	Illi								Ras Mohammad								Al-Zarba				All Sites			
Status									Unexploited				Unexploited				Exploited							
n	3				3				2				3				5				31			
Depth	Shallow 5m				Deep 10m				Shallow 5m				Deep 10m				Shallow 5m							
Species	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA
Acanthurus sohal	167	55.67	0.53	3	0	0.00	0.00	0	20	10.00	0.19	2	3	1.00	0.01	1	0	0.00	0.00	0	1283	41.39	0.65	32.26
Naso lituratus	0	0.00	0.00	0	0	0.00	0.00	0	18	9.00	0.17	1	51	17.00	0.24	3	0	0.00	0.00	0	131	4.23	0.07	41.94
Zebrasoma veliferum	5	1.67	0.02	1	0	0.00	0.00	0	52	26.00	0.48	2	38	12.67	0.18	3	33	6.60	0.34	4	153	4.94	0.08	48.39
Zebrasoma xanthurum	7	2.33	0.02	1	10	3.33	0.04	3	59	29.50	0.55	2	18	6.00	0.09	2	3	0.60	0.03	1	113	3.65	0.06	41.94
Balistapus undulatus	0	0.00	0.00	0	0	0.00	0.00	0	10	5.00	0.09	2	11	3.67	0.05	3	0	0.00	0.00	0	28	0.90	0.01	29.03
Balistoides viridescens	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.00	1	0	0.00	0.00	0	1	0.03	0.00	3.23
Rhinecanthus assasi	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	6	2.00	0.03	2	2	0.40	0.02	1	15	0.48	0.01	19.35
Chaetodon auriga	8	2.67	0.03	2	4	1.33	0.02	1	8	4.00	0.07	2	12	4.00	0.06	3	41	8.20	0.42	5	421	13.58	0.21	87.10
Chaetodon austriacus	26	8.67	0.08	3	26	8.67	0.12	3	25	12.50	0.23	2	25	8.33	0.12	3	121	24.20	1.23	5	332	10.71	0.17	90.32
Chaetodon fasciatus	5	1.67	0.02	2	17	5.67	0.08	2	2	1.00	0.02	1	4	1.33	0.02	2	16	3.20	0.16	4	112	3.61	0.06	74.19
Chaetodon larvatus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	2	0.06	0.00	3.23
Chaetodon lineolatus	0	0.00	0.00	0	0	0.00	0.00	0	2	1.00	0.02	1	0	0.00	0.00	0	0	0.00	0.00	0	6	0.19	0.00	9.68
Chaetodon melannotus	5	1.67	0.02	1	0	0.00	0.00	0	13	6.50	0.12	1	30	10.00	0.14	3	2	0.40	0.02	1	96	3.10	0.05	41.94
Chaetodon mesoleucos	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Chaetodon paucifasciatus	14	4.67	0.04	3	31	10.33	0.14	2	12	6.00	0.11	2	12	4.00	0.06	2	13	2.60	0.13	3	224	7.23	0.11	80.65
Chaetodon semilarvatus	0	0.00	0.00	0	2	0.67	0.01	1	3	1.50	0.03	1	4	1.33	0.02	1	4	0.80	0.04	1	48	1.55	0.02	45.16
Chaetodon trifascialis	37	12.33	0.12	3	12	4.00	0.05	2	0	0.00	0.00	0	0	0.00	0.00	0	89	17.80	0.91	5	286	9.23	0.15	74.19
Heniochus intermedius	4	1.33	0.01	1	16	5.33	0.07	3	4	2.00	0.04	1	11	3.67	0.05	2	13	2.60	0.13	4	88	2.84	0.04	67.74
Paracirrhites forsteri	6	2.00	0.02	2	16	5.33	0.07	3	28	14.00	0.26	2	22	7.33	0.11	3	18	3.60	0.18	5	198	6.39	0.10	83.87
Anampses twistii	28	9.33	0.09	2	39	13.00	0.17	3	0	0.00	0.00	0	24	8.00	0.11	3	26	5.20	0.27	4	217	7.00	0.11	77.42
Bodianus anthioides	3	1.00	0.01	1	9	3.00	0.04	1	2	1.00	0.02	1	2	0.67	0.01	1	0	0.00	0.00	0	48	1.55	0.02	29.03
Cheilinus lunulatus	9	3.00	0.03	3	1	0.33	0.00	1	6	3.00	0.06	2	4	1.33	0.02	1	19	3.80	0.19	3	65	2.10	0.03	64.52
Coris aygula	17	5.67	0.05	3	5	1.67	0.02	2	4	2.00	0.04	1	10	3.33	0.05	2	45	9.00	0.46	5	144	4.65	0.07	67.74
Gomphosus caeruleus	84	28.00	0.27	3	28	9.33	0.12	3	3	1.50	0.03	1	5	1.67	0.02	2	86	17.20	0.88	5	407	13.13	0.21	87.10
Labroides dimidiata	41	13.67	0.13	3	30	10.00	0.13	3	25	12.50	0.23	2	65	21.67	0.31	3	32	6.40	0.33	5	341	11.00	0.17	93.55
Larabicus quadrilineatus	7	2.33	0.02	3	6	2.00	0.03	2	2	1.00	0.02	1	13	4.33	0.06	2	28	5.60	0.29	4	119	3.84	0.06	74.19
Novaculichthys taeniourus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Paracheilinus octotaenia	0	0.00	0.00	0	530	176.67	2.36	3	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	530	17.10	0.27	9.68
Thalassoma klunzingeri	357	119.00	1.13	3	56	18.67	0.25	3	37	18.50	0.34	2	36	12.00	0.17	3	1625	325.00	16.57	5	2440	78.71	1.24	90.32
Thalassoma lunare	11	3.67	0.03	2	13	4.33	0.06	2	0	0.00	0.00	0	0	0.00	0.00	0	13	2.60	0.13	4	81	2.61	0.04	48.39
Ostracion cubicus	0	0.00	0.00	0	0	0.00	0.00	0	1	0.50	0.01	1	0	0.00	0.00	0	0	0.00	0.00	0	1	0.03	0.00	3.23
Pomacanthus asfur	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Pomacanthus imperator	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	3	1.00	0.01	2	1	0.20	0.01	1	8	0.26	0.00	19.35
Pomacanthus maculosus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.00	1	1	0.20	0.01	1	11	0.35	0.01	22.58
Pygoplites diacanthus	4	1.33	0.01	2	8	2.67	0.04	3	3	1.50	0.03	1	10	3.33	0.05	2	0	0.00	0.00	0	39	1.26	0.02	54.84
Amphiprion bicinctus	50	16.67	0.16	2	8	2.67	0.04	2	0	0.00	0.00	0	4	1.33	0.02	2	8	1.60	0.08	3	86	2.77	0.04	45.16
Dascyllus aruanus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	125	25.00	1.27	3	330	10.65	0.17	22.58
Dascyllus marginatus	0	0.00	0.00	0	310	103.33	1.38	2	0	0.00	0.00	0	0	0.00	0.00	0	80	16.00	0.82	1	540	17.42	0.27	19.35
Dascyllus trimaculatus	0	0.00	0.00	0	5	1.67	0.02	1	0	0.00	0.00	0	10	3.33	0.05	1	0	0.00	0.00	0	26	0.84	0.01	16.13
Pseudochromis fridmani	34	11.33	0.11	2	53	17.67	0.24	3	240	120.00	2.22	2	249	83.00	1.19	3	3	0.60	0.03	1	808	26.06	0.41	74.19
Pseudochromis springeri	7	2.33	0.02	2	10	3.33	0.04	2	0	0.00	0.00	0	0	0.00	0.00	0	3	0.60	0.03	1	76	2.45	0.04	25.81
Pterois miles	0	0.00	0.00	0	2	0.67	0.01	1	3	1.50	0.03	1	0	0.00	0.00	0	2	0.40	0.02	1	19	0.61	0.01	29.03
Pterois radiata	2	0.67	0.01	1	2	0.67	0.01	1	2	1.00	0.02	1	0	0.00	0.00	0	3	0.60	0.03	2	14	0.45	0.01	29.03
Arothron diadematus	1	0.33	0.00	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	2	0.40	0.02	2	66	2.13	0.03	32.26
Chromis viridis	515	171.67	1.63	3	900	300.00	4.00	2	210	105.00	1.95	1	45	15.00	0.22	1	6800	1360.00	69.34	3	20384	657.55	10.38	54.84
Pseudanthias squamipinnis	30130	10043.33	95.40	3	20350	6783.33	90.45	3	10000	5000.00	92.64	1	20200	6733.33	96.52	3	550	110.00	5.61	3	166042	5356.19	84.55	70.97
Total	**31584**	**10528.00**	**100.00**		**22499**	**7499.67**	**100.00**		**10794**	**5397.00**	**100.00**		**20929**	**6976.33**	**100.00**		**9807**	**1961.40**	**100.00**		**196379**	**6334.81**	**100.00**	

***Appendix* 3(c). Results from the Saudi Arabian coast.** Species not observed in Saudi Arabia: *Chaetodon melapterus, Chaetodon pictus, Heniochus diphreutes, Pseudochromis springeri.*

Site	Big Piece								Al-Biada				South of Biada								Small Piece			
Sta	Unexploited				Unexploited				Exploited				Exploited				Exploited				Exploited			
	3				3				3				3				3				3			
Depth	Shallow 4m				Deep 8m				Shallow 5-6m				Shallow 5.5m				Deep 7.9-8m				Shallow 5.9-6m			
Species	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA
Acanthurus sohal	23	7.67	2.31	3	0	0.00	0.00	0	60	20.00	0.28	3	45	15.00	0.67	3	4	1.33	0.03	1	42	14.00	8.57	3
Naso lituratus	5	1.67	0.50	1	0	0.00	0.00	0	12	4.00	0.06	3	19	6.33	0.28	3	13	4.33	0.10	2	28	9.33	5.71	3
Zebrasoma veliferum	8	2.67	0.80	2	0	0.00	0.00	0	202	67.33	0.96	2	2	0.67	0.03	1	11	3.67	0.09	1	35	11.67	7.14	2
Zebrasoma xanthurum	3	1.00	0.30	1	3	1.00	0.07	1	0	0.00	0.00	0	104	34.67	1.55	3	12	4.00	0.10	2	7	2.33	1.43	1
Balistapus undulatus	13	4.33	1.31	3	25	8.33	0.58	3	0	0.00	0.00	0	5	1.67	0.07	3	2	0.67	0.02	1	7	2.33	1.43	3
Balistoides viridescens	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.00	1	1	0.33	0.01	1	0	0.00	0.00	0	1	0.33	0.20	1
Rhinecanthus assasi	11	3.67	1.10	3	7	2.33	0.16	2	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.41	1
Chaetodon auriga	6	2.00	0.60	1	3	1.00	0.07	2	19	6.33	0.09	3	6	2.00	0.09	2	4	1.33	0.03	2	16	5.33	3.27	2
Chaetodon austriacus	10	3.33	1.00	3	30	10.00	0.70	3	20	6.67	0.09	3	24	8.00	0.36	3	22	7.33	0.18	3	14	4.67	2.86	2
Chaetodon fasciatus	11	3.67	1.10	3	14	4.67	0.33	3	21	7.00	0.10	3	7	2.33	0.10	3	7	2.33	0.06	3	4	1.33	0.82	2
Chaetodon larvatus	10	3.33	1.00	3	4	1.33	0.09	2	10	3.33	0.05	3	4	1.33	0.06	2	0	0.00	0.00	0	9	3.00	1.84	3
Chaetodon lineolatus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.01	1	0	0.00	0.00	0	0	0.00	0.00	0
Chaetodon melannotus	38	12.67	3.82	3	8	2.67	0.19	2	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.41	1
Chaetodon mesoleucos	2	0.67	0.20	1	4	1.33	0.09	1	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.02	1	4	1.33	0.82	1
Chaetodon paucifasciatus	12	4.00	1.20	3	30	10.00	0.70	3	0	0.00	0.00	0	1	0.33	0.01	1	2	0.67	0.02	1	6	2.00	1.22	2
Chaetodon semilarvatus	6	2.00	0.60	3	0	0.00	0.00	0	4	1.33	0.02	2	0	0.00	0.00	0	0	0.00	0.00	0	3	1.00	0.61	1
Chaetodon trifascialis	1	0.33	0.10	1	3	1.00	0.07	1	3	1.00	0.01	1	5	1.67	0.07	2	4	1.33	0.03	2	3	1.00	0.61	2
Heniochus intermedius	12	4.00	1.20	3	4	1.33	0.09	2	4	1.33	0.02	2	7	2.33	0.10	3	8	2.67	0.06	2	6	2.00	1.22	3
Paracirrhites forsteri	30	10.00	3.01	3	66	22.00	1.54	3	2	0.67	0.01	1	21	7.00	0.31	3	11	3.67	0.09	3	27	9.00	5.51	3
Anampses twistii	3	1.00	0.30	1	14	4.67	0.33	3	4	1.33	0.02	2	4	1.33	0.06	2	14	4.67	0.11	3	6	2.00	1.22	1
Bodianus anthioides	0	0.00	0.00	0	4	1.33	0.09	1	1	0.33	0.00	1	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.41	1
Cheilinus lunulatus	3	1.00	0.30	1	0	0.00	0.00	0	5	1.67	0.02	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Coris aygula	1	0.33	0.10	1	2	0.67	0.05	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.41	1
Gomphosus caeruleus	35	11.67	3.51	3	32	10.67	0.74	3	42	14.00	0.20	3	54	18.00	0.80	3	52	17.33	0.42	3	47	15.67	9.59	3
Labroides dimidiata	19	6.33	1.91	3	9	3.00	0.21	3	16	5.33	0.08	3	20	6.67	0.30	3	28	9.33	0.23	3	21	7.00	4.29	3
Larabicus quadrilineatus	0	0.00	0.00	0	7	2.33	0.16	2	12	4.00	0.06	2	53	17.67	0.79	3	22	7.33	0.18	3	8	2.67	1.63	3
Novaculichthys taeniourus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Paracheilinus octotaenia	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Thalassoma klunzingeri	95	31.67	9.54	3	120	40.00	2.79	3	10	3.33	0.05	2	46	15.33	0.68	3	33	11.00	0.27	3	143	47.67	29.18	3
Thalassoma lunare	11	3.67	1.10	3	17	5.67	0.40	2	42	14.00	0.20	2	19	6.33	0.28	3	24	8.00	0.19	3	15	5.00	3.06	2
Ostracion cubicus	0	0.00	0.00	0	1	0.33	0.02	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Pomacanthus asfur	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Pomacanthus imperator	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Pomacanthus maculosus	0	0.00	0.00	0	9	3.00	0.21	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Pygoplites diacanthus	12	4.00	1.20	3	34	11.33	0.79	2	1	0.33	0.00	1	10	3.33	0.15	3	9	3.00	0.07	3	24	8.00	4.90	3
Amphiprion bicinctus	10	3.33	1.00	3	6	2.00	0.14	2	4	1.33	0.02	2	0	0.00	0.00	0	7	2.33	0.06	2	0	0.00	0.00	0
Dascyllus aruanus	0	0.00	0.00	0	786	262.00	18.28	2	6730	2243.33	31.84	3	58	19.33	0.86	2	1810	603.33	14.55	3	0	0.00	0.00	0
Dascyllus marginatus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Dascyllus trimaculatus	5	1.67	0.50	1	5	1.67	0.12	1	0	0.00	0.00	0	0	0.00	0.00	0	25	8.33	0.20	1	0	0.00	0.00	0
Pseudochromis fridmani	10	3.33	1.00	1	0	0.00	0.00	0	0	0.00	0.00	0	29	9.67	0.43	2	14	4.67	0.11	3	6	2.00	1.22	2
Pseudochromis flavivertex	0	0.00	0.00	0	0	0.00	0.00	0	10	3.33	0.05	3	1	0.33	0.01	1	0	0.00	0.00	0	0	0.00	0.00	0
Pterois miles	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Pterois radiata	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Arothron diadematus	1	0.33	0.10	1	2	0.67	0.05	2	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
Chromis viridis	70	23.33	7.03	1	1800	600.00	41.87	2	13900	4633.33	65.77	3	6180	2060.00	91.88	3	10300	3433.33	82.80	3	0	0.00	0.00	0
Pseudanthias squamipinnis	520	173.33	52.21	2	1250	416.67	29.08	3	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0
																	12440	**4146.67**	**100.00**		**490**	**163.33**	**100.00**	

Site	Al-Kherq				Thoal – Bostek				Thoal - Awjam				Al-Leith								All Sites			
Status	Exploited				Exploited				Exploited				Exploited				Exploited							
n	3				3				3				3				3				33			
Depth	Shallow 6-6.8m				Shallow 7.5-8m				Shallow 4m				Shallow 5.5m				Deep 10m							
Species	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA
Acanthurus sohal	12	4.00	0.08	2	2	0.67	0.33	1	169	56.33	21.92	3	65	21.67	0.17	3	94	31.33	0.77	3	516	46.91	0.46	75.76
Naso lituratus	10	3.33	0.07	3	40	13.33	6.57	3	0	0.00	0.00	0	26	8.67	0.07	3	0	0.00	0.00	0	153	13.91	0.14	63.64
Zebrasoma veliferum	14	4.67	0.10	2	9	3.00	1.48	3	80	26.67	10.38	3	16	5.33	0.04	2	9	3.00	0.07	3	386	35.09	0.34	63.64
Zebrasoma xanthurum	4	1.33	0.03	2	12	4.00	1.97	2	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.02	1	147	13.36	0.13	39.39
Balistapus undulatus	13	4.33	0.09	3	7	2.33	1.15	2	4	1.33	0.52	2	6	2.00	0.02	2	1	0.33	0.01	1	83	7.55	0.07	69.70
Balistoides viridescens	0	0.00	0.00	0	1	0.33	0.16	1	1	0.33	0.13	1	2	0.67	0.01	1	0	0.00	0.00	0	7	0.64	0.01	18.18
Rhinecanthus assasi	9	3.00	0.06	3	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.00	1	0	0.00	0.00	0	30	2.73	0.03	30.30
Chaetodon auriga	8	2.67	0.06	2	6	2.00	0.99	2	11	3.67	1.43	3	2	0.67	0.01	1	2	0.67	0.02	1	83	7.55	0.07	63.64
Chaetodon austriacus	25	8.33	0.17	3	14	4.67	2.30	3	18	6.00	2.33	3	7	2.33	0.02	1	6	2.00	0.05	1	190	17.27	0.17	84.85
Chaetodon fasciatus	4	1.33	0.03	2	2	0.67	0.33	1	16	5.33	2.08	3	4	1.33	0.01	2	1	0.33	0.01	1	91	8.27	0.08	78.79
Chaetodon larvatus	4	1.33	0.03	3	10	3.33	1.64	3	6	2.00	0.78	3	80	26.67	0.20	3	25	8.33	0.20	3	162	14.73	0.14	84.85
Chaetodon lineolatus	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.26	1	0	0.00	0.00	0	0	0.00	0.00	0	3	0.27	0.00	6.06
Chaetodon melannotus	2	0.67	0.01	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	50	4.55	0.04	21.21
Chaetodon mesoleucos	2	0.67	0.01	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.02	1	16	1.45	0.01	18.18
Chaetodon paucifasciatus	5	1.67	0.03	2	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.02	1	58	5.27	0.05	39.39
Chaetodon semilarvatus	2	0.67	0.01	1	0	0.00	0.00	0	1	0.33	0.13	1	4	1.33	0.01	1	7	2.33	0.06	2	27	2.45	0.02	33.33
Chaetodon trifascialis	2	0.67	0.01	2	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	21	1.91	0.02	33.33
Heniochus intermedius	14	4.67	0.10	3	12	4.00	1.97	3	35	11.67	4.54	3	11	3.67	0.03	3	10	3.33	0.08	3	123	11.18	0.11	90.91
Paracirrhites forsteri	52	17.33	0.36	3	4	1.33	0.66	2	0	0.00	0.00	0	1	0.33	0.00	1	0	0.00	0.00	0	214	19.45	0.19	66.67
Anampses twistii	16	5.33	0.11	2	7	2.33	1.15	2	0	0.00	0.00	0	7	2.33	0.02	3	0	0.00	0.00	0	75	6.82	0.07	57.58
Bodianus anthioides	0	0.00	0.00	0	2	0.67	0.33	1	4	1.33	0.52	2	0	0.00	0.00	0	5	1.67	0.04	1	18	1.64	0.02	21.21
Cheilinus lunulatus	1	0.33	0.01	1	7	2.33	1.15	2	11	3.67	1.43	3	6	2.00	0.02	3	3	1.00	0.02	1	36	3.27	0.03	36.36
Coris aygula	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.26	1	0	0.00	0.00	0	0	0.00	0.00	0	7	0.64	0.01	12.12
Gomphosus caeruleus	75	25.00	0.52	3	39	13.00	6.40	3	56	18.67	7.26	3	62	20.67	0.16	3	24	8.00	0.20	3	518	47.09	0.46	100.00
Labroides dimidiata	24	8.00	0.17	3	31	10.33	5.09	3	19	6.33	2.46	3	15	5.00	0.04	3	9	3.00	0.07	3	211	19.18	0.19	100.00
Larabicus quadrilineatus	26	8.67	0.18	3	43	14.33	7.06	3	127	42.33	16.47	3	114	38.00	0.29	3	95	31.67	0.77	3	507	46.09	0.45	84.85
Novaculichthys taeniourus	19	6.33	0.13	1	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.00	1	0	0.00	0.00	0	20	1.82	0.02	6.06
Paracheilinus octotaenia	0	0.00	0.00	0	15	5.00	2.46	2	0	0.00	0.00	0	485	161.67	1.24	2	1500	500.00	12.23	3	2000	181.82	1.77	21.21
Thalassoma klunzingeri	5	1.67	0.03	1	50	16.67	8.21	3	34	11.33	4.41	2	66	22.00	0.17	3	16	5.33	0.13	2	618	56.18	0.55	84.85
Thalassoma lunare	7	2.33	0.05	2	34	11.33	5.58	3	43	14.33	5.58	3	73	24.33	0.19	2	33	11.00	0.27	3	318	28.91	0.28	84.85
Ostracion cubicus	0	0.00	0.00	0	3	1.00	0.49	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	4	0.36	0.00	6.06
Pomacanthus asfur	0	0.00	0.00	0	4	1.33	0.66	1	19	6.33	2.46	3	15	5.00	0.04	3	7	2.33	0.06	2	45	4.09	0.04	27.27
Pomacanthus imperator	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.00	1	0	0.00	0.00	0	1	0.09	0.00	3.03
Pomacanthus maculosus	0	0.00	0.00	0	4	1.33	0.66	2	3	1.00	0.39	2	8	2.67	0.02	3	2	0.67	0.02	2	26	2.36	0.02	30.30
Pygoplites diacanthus	13	4.33	0.09	3	8	2.67	1.31	3	1	0.33	0.13	1	9	3.00	0.02	3	5	1.67	0.04	3	126	11.45	0.11	84.85
Amphiprion bicinctus	1	0.33	0.01	1	3	1.00	0.49	1	2	0.67	0.26	1	8	2.67	0.02	3	2	0.67	0.02	1	43	3.91	0.04	48.48
Dascyllus aruanus	1075	358.33	7.45	3	8	2.67	1.31	2	0	0.00	0.00	0	5	1.67	0.01	1	57	19.00	0.46	3	10529	957.18	9.29	57.58
Dascyllus marginatus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	25	8.33	0.06	1	10	3.33	0.08	1	35	3.18	0.03	6.06
Dascyllus trimaculatus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	43	14.33	0.11	1	14	4.67	0.11	1	92	8.36	0.08	15.15
Pseudochromis fridmani	40	13.33	0.28	2	0	0.00	0.00	0	12	4.00	1.56	3	0	0.00	0.00	0	47	15.67	0.38	2	158	14.36	0.14	45.45
Pseudochromis flavivertex	0	0.00	0.00	0	0	0.00	0.00	0	92	30.67	11.93	3	0	0.00	0.00	0	0	0.00	0.00	0	103	9.36	0.09	21.21
Pterois miles	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Pterois radiata	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.00	1	0	0.00	0.00	0	1	0.09	0.00	3.03
Arothron diadematus	1	0.33	0.01	1	2	0.67	0.33	2	3	1.00	0.39	2	1	0.33	0.00	1	0	0.00	0.00	0	10	0.91	0.01	27.27
Chromis viridis	12300	4100.00	85.27		0	0.00	0.00	0	0	0.00	0.00	0	37800	12600.00	96.60	3	9650	3216.67	78.68	3	92000	8363.64	81.21	63.64
Pseudanthias squamipinnis	640	213.33	4.44	3.00	230	76.67	37.77	3	0	0.00	0.00	0	160	53.33	0.41	3	625	208.33	5.10	2	3425	311.36	3.02	48.48
Total	**14425**	**4808.33**	**100.00**		**609**	**203.00**	**100.00**		**771**	**257.00**	**100.00**		**39130**	**13043.33**	**100.00**		**12265**	**4088.33**	**100.00**		**113286**	**3432.91**	**100.00**	

Appendix 3(d). Results from the Yemeni coast. The following species were not observed in Yemen: *Chaetodon lineolatus*, *Chaetodon melapterus*, *Chaetodon pictus*, *Heniochus diphreutes*, *Chaetodon melannotus*, *Pseudochromis springeri*.

Site	Kadaman				Kamaran				Tekfash				Quish				Al-Murk				Al-Badi Island/Al-Bodei				All Sites			
Status	Exploited				Exploited				Unexploited				Exploited				Exploited				Unexploited							
n	3				3				3				3				3				3				18			
Depth	Shallow 2.5-3.5m				Shallow 4m				Shallow 4m				Shallow 4m				Shallow 2-3m				Shallow 3m							
Species	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA
Acanthurus sohal	34	11.33	8.99	3	19	6.33	0.18	1	0	0.67	0.01	1	93	31.00	0.12	2	0	0.00	0.00	0	47	15.67	0.19	2	195	10.83	0.15	50.00
Naso lituratus	0	0.00	0.00	0	0	0.00	0.00	0	26	8.67	0.14	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	26	1.44	0.02	5.56
Zebrasoma veliferum	9	3.00	2.38	0	20	6.67	0.19	2	7	2.33	0.04	1	10	3.33	0.01	1	5	1.67	1.75	2	4	1.33	0.02	1	55	3.06	0.04	38.89
Zebrasoma xanthurum	6	2.00	1.59	1	0	0.00	0.00	0	15	5.00	0.08	2	3	1.00	0.00	1	0	0.00	0.00	0	0	0.00	0.00	0	24	1.33	0.02	22.22
Balistapus undulatus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Balistoides viridescens	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Rhinecanthus assasi	2	0.67	0.53	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	2	0.11	0.00	5.56
Chaetodon auriga	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Chaetodon austriacus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Chaetodon fasciatus	8	2.67	2.12	3	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	8	0.44	0.01	16.67
Chaetodon larvatus	16	5.33	4.23	3	129	43.00	1.20	3	418	139.33	2.22	3	278	92.67	0.37	3	61	20.33	21.33	3	144	48.00	0.58	3	1046	58.11	0.81	100.00
Chaetodon mesoleucos	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.01	1	1	0.33	0.00	1	0	0.00	0.00	0	13	4.33	0.05	2	16	0.89	0.01	22.22
Chaetodon paucifasciatus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Chaetodon semilarvatus	15	5.00	3.97	3	0	0.00	0.00	0	14	4.67	0.07	1	2	0.67	0.00	1	2	0.67	0.70	1	4	1.33	0.02	3	37	2.06	0.03	50.00
Chaetodon trifascialis	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	10	3.33	3.50	1	0	0.00	0.00	0	10	0.56	0.01	5.56
Heniochus intermedius	10	3.33	2.65	3	17	5.67	0.16	3	24	8.00	0.13	3	8	2.67	0.01	1	19	6.33	6.64	2	69	23.00	0.28	3	147	8.17	0.11	83.33
Paracirrhites forsteri	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Anampses twistii	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Bodianus anthioides	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Cheilinus lunulatus	18	6.00	4.76	3	0	0.00	0.00	0	11	3.67	0.06	3	5	1.67	0.01	2	5	1.67	1.75	2	24	8.00	0.10	3	63	3.50	0.05	72.22
Coris aygula	0	0.00	0.00	0	1	0.33	0.01	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	1	0.06	0.00	5.56
Gomphosus caeruleus	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.01	1	4	1.33	0.01	2	0	0.00	0.00	0	1	0.33	0.00	1	7	0.39	0.01	22.22
Labroides dimidiata	0	0.00	0.00	0	3	1.00	0.03	2	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	5	1.67	0.02	3	8	0.44	0.01	27.78
Larabicus quadrilineatus	94	31.33	24.87	3	291	97.00	2.71	3	568	189.33	3.02	3	709	236.33	0.95	3	72	24.00	25.17	3	329	109.67	1.32	3	2063	114.61	1.59	100.00
Novaculichthys taeniourus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Paracheilinus octotaenia	0	0.00	0.00	0	100	33.33	0.93	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	100	5.56	0.08	5.56
Thalassoma klunzingeri	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Thalassoma lunare	83	27.67	21.96	3	97	32.33	0.90	3	140	46.67	0.74	3	211	70.33	0.28	3	23	7.67	8.04	3	245	81.67	0.98	3	799	44.39	0.61	100.00
Ostracion cubicus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.00	1	0	0.00	0.00	0	0	0.00	0.00	0	1	0.06	0.00	5.56
Pomacanthus asfur	20	6.67	5.29	3	10	3.33	0.09	2	19	6.33	0.10	3	27	9.00	0.04	3	36	12.00	12.59	3	64	21.33	0.26	3	176	9.78	0.14	94.44
Pomacanthus imperator	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.35	1	0	0.00	0.00	0	1	0.06	0.00	5.56
Pomacanthus maculosus	63	21.00	16.67	3	42	14.00	0.39	3	22	7.33	0.12	3	45	15.00	0.06	3	52	17.33	18.18	3	140	46.67	0.56	3	364	20.22	0.28	100.00
Pygoplites diacanthus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Amphiprion bicinctus	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.01	1	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.00	1	2	0.11	0.00	11.11
Dascyllus aruanus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.00	1	0	0.00	0.00	0	430	143.33	1.72	2	432	24.00	0.33	16.67
Dascyllus marginatus	0	0.00	0.00	0	442	147.33	4.12	1	2660	886.67	14.13	3	2310	770.00	3.09	2	0	0.00	0.00	0	2165	721.67	8.66	3	7577	420.94	5.83	50.00
Dascyllus trimaculatus	0	0.00	0.00	0	3	1.00	0.03	1	0	0.00	0.00	0	1310	436.67	1.75	1	0	0.00	0.00	0	0	0.00	0.00	0	1313	72.94	1.01	11.11
Pseudochromis fridmani	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Pseudochromis flavivertex	0	0.00	0.00	0	58	19.33	0.54	3	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.00	1	59	3.28	0.05	22.22
Pterois miles	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Pterois radiata	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Arothron diadematus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Chromis viridis	0	0.00	0.00	0	9500	3166.67	88.52	1	14900	4966.67	79.12	3	69700	23233.33	93.28	3	0	0.00	0.00	0	21300	7100.00	85.25	3	115	6411.11	88.82	55.56
Pseudanthias squamipinnis	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Total	**378**	**126.00**	**100.00**		**10732**	**3577.33**	**100.00**		**18831**	**6277.00**	**100.00**		**74719**	**24906.33**	**100.00**		**286**	**95.33**	**100.00**		**24986**	**8328.67**	**100.00**		**129**	**7218.44**	**100.00**	

Appendix 3(e). Results from the Djiboutian coast. The following species were not observed in Djibouti: *Chaetodon lineolatus*, *Pseudochromis springeri*.

Site	Khor Ambado				North of Maskali				Moucha				Tadjoura				Plaga Arta				Gehere				All Sites			
Status	Unexploited				Unexploited				Unexploited				Unexploited				Unexploited				Unexploited							
n	3				3				3				3				3				3				18			
Depth	Shallow 2.5-3.5m				Shallow 2-3m				Shallow 2-4m				Shallow 4-6m				Shallow 3-6m				Shallow 3-5.6m							
Species	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA
Acanthurus sohal	105	35.00	13.34	3	0	0.00	0.00	0	0	0.00	0.00	0	111	37.00	2.40	3	9	3.00	0.07	2	24	8.00	0.45	2	249	13.83	0.46	55.56
Naso lituratus	0	0.00	0.00	0	410	136.67	2.11	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	410	22.78	0.76	5.56
Zebrasoma veliferum	26	8.67	3.30	3	22	7.33	0.11	2	24	8.00	0.23	2	19	6.33	0.41	3	8	2.67	0.06	3	0	0.00	0.00	0	99	5.50	0.18	72.22
Zebrasoma xanthurum	59	19.67	7.50	3	69	23.00	0.36	3	197	65.67	1.92	3	45	15.00	0.97	2	111	37.00	0.83	3	64	21.33	1.19	2	545	30.28	1.01	88.89
Balistapus undulatus	0	0.00	0.00	0	8	2.67	0.04	3	1	0.33	0.01	1	1	0.33	0.02	1	1	0.33	0.01	1	0	0.00	0.00	0	11	0.61	0.02	33.33
Balistoides viridescens	0	0.00	0.00	0	2	0.67	0.01	2	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	2	0.11	0.00	11.11
Rhinecanthus assasi	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Chaetodon auriga	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Chaetodon austriacus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Chaetodon fasciatus	17	5.67	2.16	3	8	2.67	0.04	2	3	1.00	0.03	1	8	2.67	0.17	2	5	1.67	0.04	2	2	0.67	0.04	1	43	2.39	0.08	61.11
Chaetodon larvatus	42	14.00	5.34	3	17	5.67	0.09	3	22	7.33	0.21	3	63	21.00	1.36	3	55	18.33	0.41	3	10	3.33	0.19	3	209	11.61	0.39	100.00
Chaetodon melapterus	8	2.67	1.02	3	34	11.33	0.17	3	31	10.33	0.30	3	20	6.67	0.43	2	13	4.33	0.10	3	22	7.33	0.41	3	128	7.11	0.24	94.44
Chaetodon melannotus	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.01	1	0	0.00	0.00	0	3	1.00	0.02	1	0	0.00	0.00	0	4	0.22	0.01	11.11
Chaetodon mesoleucos	3	1.00	0.38	2	8	2.67	0.04	2	4	1.33	0.04	2	3	1.00	0.06	1	8	2.67	0.06	3	0	0.00	0.00	0	26	1.44	0.05	55.56
Chaetodon paucifasciatus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Chaetodon pictus	11	3.67	1.40	3	4	1.33	0.02	2	15	5.00	0.15	3	4	1.33	0.09	2	1	0.33	0.01	1	18	6.00	0.34	3	53	2.94	0.10	77.78
Chaetodon semilarvatus	1	0.33	0.13	1	12	4.00	0.06	2	6	2.00	0.06	2	6	2.00	0.13	3	12	4.00	0.09	3	4	1.33	0.07	1	41	2.28	0.08	66.67
Chaetodon trifascialis	0	0.00	0.00	0	0	0.00	0.00	0	7	2.33	0.07	1	18	6.00	0.39	2	8	2.67	0.06	2	4	1.33	0.07	1	37	2.06	0.07	33.33
Heniochus diphreutes	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.02	1	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	2	0.11	0.00	5.56
Heniochus intermedius	28	9.33	3.56	3	10	3.33	0.05	2	5	1.67	0.05	3	18	6.00	0.39	3	83	27.67	0.62	3	8	2.67	0.15	3	152	8.44	0.28	94.44
Paracirrhites forsteri	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Anampses twistii	4	1.33	0.51	2	3	1.00	0.02	1	2	0.67	0.02	1	0	0.00	0.00	0	6	2.00	0.04	2	0	0.00	0.00	0	15	0.83	0.03	33.33
Bodianus anthioides	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Cheilinus lunulatus	16	5.33	2.03	3	1	0.33	0.01	1	5	1.67	0.05	2	1	0.33	0.02	1	1	0.33	0.01	1	1	0.33	0.02	1	25	1.39	0.05	50.00
Coris aygula	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Gomphosus caeruleus	29	9.67	3.68	3	26	8.67	0.13	2	114	38.00	1.11	3	23	7.67	0.50	3	43	14.33	0.32	3	63	21.00	1.17	3	298	16.56	0.55	94.44
Labroides dimidiata	9	3.00	1.14	3	7	2.33	0.04	2	18	6.00	0.18	2	1	0.33	0.02	1	9	3.00	0.07	2	9	3.00	0.17	3	53	2.94	0.10	72.22
Larabicus quadrilineatus	174	58.00	22.11	3	105	35.00	0.54	3	223	74.33	2.17	3	148	49.33	3.20	3	176	58.67	1.32	3	221	73.67	4.12	3	1047	58.17	1.94	100.00
Novaculichthys taeniourus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Paracheilinus octotaenia	30	10.00	3.81	1	0	0.00	0.00	0	0	0.00	0.00	0	32	10.67	0.69	1	255	85.00	1.91	3	0	0.00	0.00	0	317	17.61	0.59	27.78
Thalassoma klunzingeri	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Thalassoma lunare	68	22.67	8.64	3	86	28.67	0.44	3	151	50.33	1.47	3	221	73.67	4.78	3	188	62.67	1.41	3	406	135.33	7.56	3	1120	62.22	2.08	100.00
Ostracion cubicus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Pomacanthus asfur	9	3.00	1.14	3	6	2.00	0.03	1	9	3.00	0.09	3	23	7.67	0.50	3	16	5.33	0.12	3	5	1.67	0.09	1	68	3.78	0.13	77.78
Pomacanthus imperator	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	1	0.33	0.02	1	1	0.06	0.00	5.56
Pomacanthus maculosus	10	3.33	1.27	3	1	0.33	0.01	1	5	1.67	0.05	2	12	4.00	0.26	3	5	1.67	0.04	3	6	2.00	0.11	3	39	2.17	0.07	83.33
Pygoplites diacanthus	14	4.67	1.78	3	12	4.00	0.06	3	1	0.33	0.01	1	10	3.33	0.22	2	25	8.33	0.19	3	0	0.00	0.00	0	62	3.44	0.12	66.67
Amphiprion bicinctus	6	2.00	0.76	1	0	0.00	0.00	0	0	0.00	0.00	0	2	0.67	0.04	1	11	3.67	0.08	2	0	0.00	0.00	0	19	1.06	0.04	22.22
Dascyllus aruanus	23	7.67	2.92	3	81	27.00	0.42	2	84	28.00	0.82	2	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	188	10.44	0.35	38.89
Dascyllus marginatus	15	5.00	1.91	1	0	0.00	0.00	0	0	0.00	0.00	0	10	3.33	0.22	1	15	5.00	0.11	1	0	0.00	0.00	0	40	2.22	0.07	16.67
Dascyllus trimaculatus	0	0.00	0.00	0	2	0.67	0.01	1	0	0.00	0.00	0	17	5.67	0.37	1	0	0.00	0.00	0	0	0.00	0.00	0	19	1.06	0.04	11.11
Pseudochromis fridmani	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Pseudochromis flavivertex	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Pterois miles	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
Pterois radiata	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	3	1.00	0.06	2	1	0.33	0.01	1	0	0.00	0.00	0	4	0.22	0.01	16.67
Arothron diadematus	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00	0.00
[illegible]	[illegible]				[illegible]				[illegible]				[illegible]				100.00	92.01	3		4500	1500.00	83.83	3	48530	2696.11	90.11	94.44
																	0.00	0.00	0	0	0	0.00	0.00	0	0	0.00	0.00	0.00
																	456.00	**100.00**			**5368**	**1789.33**	**100.00**		**53856**	**2992.00**	**100.00**	

Appendix 3(f). Country records for the total abundance (TA), average abundance (AA), relative abundance (RA), and frequency of appearance (FA) for each ornamental fish species.

Country	Jordan				Egypt				Saudi Arabia				Yemen				Djibouti			
Number of Survey Sites	3				6				11				6				6			
Number of Transects	18				31				33				18				18			
Species	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA	TA	AA	RA	FA
Acanthurus sohal	0	0.00	0.00	0.00	1283	41.39	0.65	32.26	516	46.91	0.46	75.76	195	10.83	0.15	50.00	249	13.83	0.46	55.56
Naso lituratus	1	0.06	0.00	5.56	131	4.23	0.07	41.94	153	13.91	0.14	63.64	26	1.44	0.02	5.56	410	22.78	0.76	5.56
Zebrasoma veliferum	20	1.11	0.07	44.44	153	4.94	0.08	48.39	386	35.09	0.34	63.64	55	3.06	0.04	38.89	99	5.50	0.18	72.22
Zebrasoma xanthurum	74	4.11	0.25	88.89	113	3.65	0.06	41.94	147	13.36	0.13	39.39	24	1.33	0.02	22.22	545	30.28	1.01	88.89
Balistapus undulatus	14	0.78	0.05	50.00	28	0.90	0.01	29.03	83	7.55	0.07	69.70	0	0.00	0.00	0.00	11	0.61	0.02	33.33
Balistoides viridescens	0	0.00	0.00	0.00	1	0.03	0.00	3.23	7	0.64	0.01	18.18	0	0.00	0.00	0.00	2	0.11	0.00	11.11
Rhinecanthus assasi	0	0.00	0.00	0.00	15	0.48	0.01	19.35	30	2.73	0.03	30.30	2	0.11	0.00	5.56	0	0.00	0.00	0.00
Chaetodon auriga	3	0.17	0.01	11.11	421	13.58	0.21	87.10	83	7.55	0.07	63.64	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Chaetodon austriacus	148	8.22	0.50	83.33	332	10.71	0.17	90.32	190	17.27	0.17	84.85	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Chaetodon fasciatus	40	2.22	0.14	72.22	112	3.61	0.06	74.19	91	8.27	0.08	78.79	8	0.44	0.01	16.67	43	2.39	0.08	61.11
Chaetodon larvatus	0	0.00	0.00	0.00	2	0.06	0.00	3.23	162	14.73	0.14	84.85	1046	58.11	0.81	100.00	209	11.61	0.39	100.00
Chaetodon lineolatus	0	0.00	0.00	0.00	6	0.19	0.00	9.68	3	0.27	0.00	6.06	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Chaetodon melapterus	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00	128	7.11	0.24	94.44
Chaetodon melannotus	10	0.56	0.03	27.78	96	3.10	0.05	41.94	50	4.55	0.04	21.21	0	0.00	0.00	0.00	4	0.22	0.01	11.11
Chaetodon mesoleucos	0	0.00	0.00	0.00	0	0.00	0.00	0.00	16	1.45	0.01	18.18	16	0.89	0.01	22.22	26	1.44	0.05	55.56
Chaetodon paucifasciatus	441	24.50	1.50	100.00	224	7.23	0.11	80.65	58	5.27	0.05	39.39	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Chaetodon pictus	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00	53	2.94	0.10	77.78
Chaetodon semilarvatus	0	0.00	0.00	0.00	48	1.55	0.02	45.16	27	2.45	0.02	33.33	37	2.06	0.03	50.00	41	2.28	0.08	66.67
Chaetodon trifascialis	3	0.17	0.01	11.11	286	9.23	0.15	74.19	21	1.91	0.02	33.33	10	0.56	0.01	5.56	37	2.06	0.07	33.33
Heniochus diphreutes	0	0.00	0.00	0.00	0	0.00	0.00	0.00	123	11.18	0.11	90.91	0	0.00	0.00	0.00	2	0.11	0.00	5.56
Heniochus intermedius	19	1.06	0.06	44.44	88	2.84	0.04	67.74	0	0.00	0.00	0.00	147	8.17	0.11	83.33	152	8.44	0.28	94.44
Paracirrhites forsteri	0	0.00	0.00	0.00	198	6.39	0.10	83.87	214	19.45	0.19	66.67	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Anampses twistii	176	9.78	0.60	94.44	217	7.00	0.11	77.42	75	6.82	0.07	57.58	0	0.00	0.00	0.00	15	0.83	0.03	33.33
Bodianus anthioides	36	2.00	0.12	61.11	48	1.55	0.02	29.03	18	1.64	0.02	21.21	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Cheilinus lunulatus	6	0.33	0.02	22.22	65	2.10	0.03	64.52	36	3.27	0.03	36.36	63	3.50	0.05	72.22	25	1.39	0.05	50.00
Coris aygula	6	0.33	0.02	27.78	144	4.65	0.07	67.74	7	0.64	0.01	12.12	1	0.06	0.00	5.56	0	0.00	0.00	0.00
Gomphosus caeruleus	149	8.28	0.51	94.44	407	13.13	0.21	87.10	518	47.09	0.46	100.00	7	0.39	0.01	22.22	298	16.56	0.55	94.44
Labroides dimidiata	31	1.72	0.11	66.67	341	11.00	0.17	93.55	211	19.18	0.19	100.00	8	0.44	0.01	27.78	53	2.94	0.10	72.22
Larabicus quadrilineatus	123	6.83	0.42	94.44	119	3.84	0.06	74.19	507	46.09	0.45	84.85	2063	114.61	1.59	100.00	1047	58.17	1.94	100.00
Novaculichthys taeniourus	0	0.00	0.00	0.00	0	0.00	0.00	0.00	20	1.82	0.02	6.06	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Paracheilinus octotaenia	2158	119.89	7.32	55.56	530	17.10	0.27	9.68	2000	181.82	1.77	21.21	100	5.56	0.08	5.56	317	17.61	0.59	27.78
Thalassoma klunzingeri	756	42.00	2.56	100.00	2440	78.71	1.24	90.32	618	56.18	0.55	84.85	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Thalassoma lunare	14	0.78	0.05	22.22	81	2.61	0.04	48.39	318	28.91	0.28	84.85	799	44.39	0.61	100.00	1120	62.22	2.08	100.00
Ostracion cubicus	9	0.50	0.03	27.78	1	0.03	0.00	3.23	4	0.36	0.00	6.06	1	0.06	0.00	5.56	0	0.00	0.00	0.00
Pomacanthus asfur	0	0.00	0.00	0.00	0	0.00	0.00	0.00	45	4.09	0.04	27.27	176	9.78	0.14	94.44	68	3.78	0.13	77.78
Pomacanthus imperator	1	0.06	0.00	5.56	8	0.26	0.00	19.35	1	0.09	0.00	3.03	1	0.06	0.00	5.56	1	0.06	0.00	5.56
Pomacanthus maculosus	0	0.00	0.00	0.00	11	0.35	0.01	22.58	26	2.36	0.02	30.30	364	20.22	0.28	100.00	39	2.17	0.07	83.33
Pygoplites diacanthus	3	0.17	0.01	5.56	39	1.26	0.02	54.84	126	11.45	0.11	84.85	0	0.00	0.00	0.00	62	3.44	0.12	66.67
Amphiprion bicinctus	454	25.22	1.54	100.00	86	2.77	0.04	45.16	43	3.91	0.04	48.48	2	0.11	0.00	11.11	19	1.06	0.04	22.22
Dascyllus aruanus	2263	125.72	7.68	100.00	330	10.65	0.17	22.58	10529	957.18	9.29	57.58	432	24.00	0.33	16.67	188	10.44	0.35	38.89
Dascyllus marginatus	2013	111.83	6.83	100.00	540	17.42	0.27	19.35	35	3.18	0.03	6.06	7577	420.94	5.83	50.00	40	2.22	0.07	16.67
Dascyllus trimaculatus	129	7.17	0.44	44.44	26	0.84	0.01	16.13	92	8.36	0.08	15.15	1313	72.94	1.01	11.11	19	1.06	0.04	11.11
Pseudochromis fridmani	239	13.28	0.81	88.89	808	26.06	0.41	74.19	158	14.36	0.14	45.45	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Pseudochromis flavivertex	0	0.00	0.00	0.00	0	0.00	0.00	0.00	103	9.36	0.09	21.21	59	3.28	0.05	22.22	0	0.00	0.00	0.00
Pseudochromis springeri	41	2.28	0.14	61.11	76	2.45	0.04	25.81	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Pterois miles	3	0.17	0.01	16.67	19	0.61	0.01	29.03	0	0.00	0.00	0.00	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Pterois radiata	8	0.44	0.03	22.22	14	0.45	0.01	29.03	1	0.09	0.00	3.03	0	0.00	0.00	0.00	4	0.22	0.01	16.67
Arothron diadematus	2	0.11	0.01	11.11	66	2.13	0.03	32.26	10	0.91	0.01	27.27	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Chromis viridis	8100	450.00	27.47	94.44	20384	657.55	10.38	54.84	92000	8363.64	81.21	63.64	115400	6411.11	88.82	55.56	48530	2696.11	90.11	94.44
Pseudanthias squamipinnis	11992	666.22	40.67	100.00	166042	5356.19	84.55	70.97	3425	311.36	3.02	48.48	0	0.00	0.00	0.00	0	0.00	0.00	0.00
Total	**29485**	**1638.06**	**100.00**		**196379**	**6334.81**	**100.00**		**113286**	**3432.91**	**100.00**		**129932**	**7218.44**	**100.00**		**53856**	**2992.00**	**100.00**	

Appendix 4. Statistical analysis results: richness, evenness and diversity.

	No. of species	No. of individuals	Species richness	Evenness	Shannon-Wiener Diversity
Jordan	**S**	**N (AA)**	**d**	**J'**	**H'(loge)**
JMSS5m	30	1344.33	4.03	0.51	1.75
JMSS10m	27	1757.00	3.48	0.45	1.47
JTC5m	24	475.00	3.73	0.68	2.15
JTC10m	23	1626.00	2.98	0.55	1.73
JVC5m	29	3117.67	3.48	0.41	1.37
JVC10m	25	1508.33	3.28	0.55	1.77
Average	26.33	1638.06	3.50	0.52	1.70
Egypt	**S**	**N (AA)**	**d**	**J'**	**H'(loge)**
ENuk5m	31	2875.33	3.77	0.32	1.11
ENuk9m	34	9057.67	3.62	0.22	0.76
EMah10m	26	310.33	4.36	0.62	2.01
EFAld5m	29	13357.67	2.95	0.07	0.24
EFAld10m	31	7987.67	3.34	0.05	0.18
EIll5m	28	10528.00	2.92	0.08	0.28
EIll10m	29	7499.67	3.14	0.15	0.49
ERMo5m	28	5397.00	3.14	0.13	0.43
ERMo10m	31	6976.33	3.39	0.07	0.24
EALZ5m	32	1961.40	4.09	0.33	1.15
Average	29.90	6595.11	3.47	0.20	0.69
Saudi Arabia	**S**	**N (AA)**	**d**	**J'**	**H'(loge)**
BPSh	31	332.00	5.17	0.60	2.05
BPDe	30	1433.00	3.99	0.46	1.56
Biadsh	25	7045.00	2.71	0.24	0.78
Sbiadsh	26	2242.00	3.24	0.15	0.50
SBiadDe	25	4146.67	2.88	0.19	0.61
SmPSh	28	163.33	5.30	0.79	2.63
KherqSh	32	4808.33	3.66	0.19	0.65
ThBousSh	29	203.00	5.27	0.72	2.44
ThAwjSh	26	257.00	4.51	0.77	2.49
LeithSh	34	13043.33	3.48	0.06	0.23
LeithDe	30	4088.33	3.49	0.24	0.83
Average	28.73	3432.91	3.97	0.40	1.34
Yemen	**S**	**N (AA)**	**d**	**J'**	**H'(loge)**
YKad3mExp	13	126.00	2.48	0.83	2.12
YKam4mExp	15	3577.33	1.71	0.21	0.57
YTek4mNon	17	6277.00	1.83	0.26	0.74
YQui3mExp	18	24906.33	1.68	0.12	0.35
YAlMu3mExp	11	95.33	2.19	0.81	1.94
YAlba3mNon	18	8328.67	1.88	0.22	0.64
Average	15.33	7218.44	1.96	0.41	1.06
Djibouti	**S**	**N (AA)**	**d**	**J'**	**H'(loge)**
DKAmb	24	262.33	4.13	0.83	2.64
DNmas	24	6478.00	2.62	0.09	0.29
Dmush	24	3426.67	2.83	0.16	0.50
Dtajo	26	1539.67	3.41	0.27	0.89
DPArt	27	4456.00	3.09	0.14	0.47
Dgeh	18	1789.33	2.27	0.25	0.71
Average	23.83	2992.00	3.06	0.29	0.92

Appendix 5. Percentage of average abundance of ornamental fish species for the five countries.

Country	Jordan	Egypt	Saudi Arabia	Yemen	Djibouti
Species					
Acanthurus sohal	0.00	36.64	41.53	9.59	12.25
Naso lituratus	0.13	9.96	32.79	3.41	53.71
Zebrasoma veliferum	2.24	9.93	70.62	6.15	11.07
Zebrasoma xanthurum	7.80	6.91	25.34	2.53	57.42
Balistapus undulatus	7.91	9.18	76.70	0.00	6.21
Balistoides viridescens	0.00	4.14	81.61	0.00	14.25
Rhinecanthus assasi	0.00	14.56	82.09	3.34	0.00
Chaetodon auriga	0.78	63.78	35.44	0.00	0.00
Chaetodon austriacus	22.71	29.58	47.71	0.00	0.00
Chaetodon fasciatus	13.12	21.33	48.83	2.62	14.10
Chaetodon larvatus	0.00	0.08	17.43	68.76	13.74
Chaetodon lineolatus	0.00	41.51	58.49	0.00	0.00
Chaetodon melapterus	0.00	0.00	0.00	0.00	100.00
Chaetodon melannotus	6.60	36.78	53.98	0.00	2.64
Chaetodon mesoleucos	0.00	0.00	38.40	23.47	38.13
Chaetodon paucifasciatus	66.22	19.53	14.25	0.00	0.00
Chaetodon pictus	0.00	0.00	0.00	0.00	100.00
Chaetodon semilarvatus	0.00	18.57	29.44	24.66	27.32
Chaetodon trifascialis	1.20	66.31	13.72	3.99	14.77
Heniochus diphreutes	0.00	0.00	99.02	0.00	0.98
Heniochus intermedius	5.15	13.84	0.00	39.83	41.18
Paracirrhites forsteri	0.00	24.72	75.28	0.00	0.00
Anampses twistii	40.02	28.65	27.91	0.00	3.41
Bodianus anthioides	38.57	29.86	31.56	0.00	0.00
Cheilinus lunulatus	3.15	19.80	30.90	33.04	13.11
Coris aygula	5.88	81.92	11.22	0.98	0.00
Gomphosus caeruleus	9.69	15.37	55.11	0.46	19.38
Labroides dimidiata	4.88	31.17	54.35	1.26	8.34
Larabicus quadrilineatus	2.98	1.67	20.08	49.93	25.34
Novaculichthys taeniourus	0.00	0.00	100.00	0.00	0.00
Paracheilinus octotaenia	35.06	5.00	53.17	1.62	5.15
Thalassoma klunzingeri	23.74	44.50	31.76	0.00	0.00
Thalassoma lunare	0.56	1.88	20.81	31.95	44.79
Ostracion cubicus	52.55	3.39	38.22	5.84	0.00
Pomacanthus asfur	0.00	0.00	23.18	55.41	21.41
Pomacanthus imperator	10.77	50.05	17.63	10.77	10.77
Pomacanthus maculosus	0.00	1.41	9.41	80.54	8.63
Pygoplites diacanthus	1.02	7.71	70.17	0.00	21.10
Amphiprion bicinctus	76.26	8.39	11.82	0.34	3.19
Dascyllus aruanus	11.15	0.94	84.86	2.13	0.93
Dascyllus marginatus	20.13	3.14	0.57	75.76	0.40
Dascyllus trimaculatus	7.93	0.93	9.25	80.72	1.17
Pseudochromis fridmani	24.72	48.53	26.74	0.00	0.00
Pseudochromis flavivertex	0.00	0.00	74.07	25.93	0.00
Pseudochromis springeri	48.16	51.84	0.00	0.00	0.00
Pterois miles	21.38	78.62	0.00	0.00	0.00
Pterois radiata	36.76	37.35	7.52	0.00	18.38
Arothron diadematus	3.53	67.60	28.87	0.00	0.00
Chromis viridis	2.42	3.54	45.02	34.51	14.51
Pseudanthias squamipinnis	10.52	84.57	4.92	0.00	0.00
Total	7.58	29.31	15.88	33.39	13.84

Appendix 6. Records from ornamental fish exporting companies.

Appendix 6(a). Monthly exports of ornamental fish from Egypt for the period November 1990 to June 1991 and May 2001 to June 2002 (Egyptian Company for Fishing & Fishing Gears).

		Egypt shipment from Nov 90 to June 91								Egypt shipment from May 2001 to June 2002											Nov 90 to June 91		May 01 to June 02		Both Exports	
		Nov 90	Dec 90	Jan 91	Feb 91	Mar 91	Apr 91	Jun 91		May 01	Jun 01	Oct 01	Nov 01	Dec 01	Jan 02	Feb 02	Mar 02	Apr 02	May 02	Jun 02						
Number of shipments		**9**	**1**	**5**	**5**	**3**	**3**	**3**													**Total Exp.**	**RA**	**Total Exp.**	**RA**	**Total Exp.**	**RA**
Species	**Price US$**																									
Acanthurus nigrofuscus		3					5					4			5					5	8	0.10	14	0.15	22	0.13
Acanthurus sohal	12	84	4	62	88	50	38	30		78	44	60	73	20	45	63	20	44	30	83	356	4.44	560	6.07	916	5.31
Zebrasoma veliferum	2	114	3	51	7	15	14	13		29	63	53	53	25	23	44	20	27	31	49	217	2.71	417	4.52	634	3.68
Zebrasoma xanthurum	12	153	6	111	112	67	130	33		51	127	101	63	12	138	133	35	122	34	111	612	7.64	927	10.05	1539	8.93
Naso					1	2															3	0.04			3	0.02
Rhinecanthus assasi		7		7	3	4	1	1			1	3	4	2				1		1	23	0.29	12	0.13	35	0.20
Triggerfish								1							2						1	0.01	2	0.02	3	0.02
Blennies sp	1.5	48	2		1		1			6	5	70	7	16		39				7	52	0.65	150	1.63	202	1.17
Ecsenius gravieri					10																10	0.12			10	0.06
Chaetodon auriga	4	8		45	2	21	9	19		11	21	13	17	5	17	19	5	24	6	21	104	1.30	159	1.72	263	1.53
Chaetodon fasciatus	6	39	4	58	23	17	21	27		23	13	34	19	10	19	15	10	13	8	27	189	2.36	191	2.07	380	2.20
Chaetodon austriacus	2	80		52	24	14	24			9	3	18	7		26	21	5	5	15	15	194	2.42	124	1.34	318	1.84
Chaetodon paucifasciatus	6	34	10	103	43	38	20	35		6	10	52	21	4	39	11	10	21	8	17	283	3.53	199	2.16	482	2.80
Chaetodon semilarvatus	12	179	13	127	104	21	61	95		106	93	142	126	70	138	97	37	59	97	139	600	7.49	1104	11.97	1704	9.89
Chaetodon larvatus	6	56		4	40		37	20		13	7	8	25		23	45		7	9	19	157	1.96	156	1.69	313	1.82
Chaetodon trifascialis				33	23	21	15	36				1			2			5		4	128	1.60	12	0.13	140	0.81
Chaetodon melannotus	3	24		33	8	25	15	32		1	5	7			2	8	5	2	1	2	137	1.71	33	0.36	170	0.99
Chaetodon lineolatus				16	8	13		33			2	14			10	1		2		6	70	0.87	35	0.38	105	0.61
Heniochus intermedius	6	8		54	4	2	9	9		15	25	17	16	5	22	9	5	11	16	23	86	1.07	164	1.78	250	1.45
Platax		1			8			19													28	0.35			28	0.16
Gobiodon citrinus		32				22		6					11	9	9	13		5			60	0.75	47	0.51	107	0.62
Apolemichthys xanthotis							1														1	0.01			1	0.01
Centropyge multispinnis			2								2	2				3	1	1	2	2	2	0.02	13	0.14	15	0.09
Genicanthus caudovittatus		2																			2	0.02			2	0.01
Pomacanthus imperator		3	1	6	6		4			1	1	1	3	1	4	2		5	1	2	20	0.25	21	0.23	41	0.24
Pomacanthus maculosus	12	66		50	54	9	17	21		38	50	61	95	25	64	57	25	16	49	80	217	2.71	560	6.07	777	4.51
Pomacanthus asfur		6					7			2	2				5						13	0.16	9	0.10	22	0.13
Pygoplites diacanthus	12	10	4	2	8	5	6	2		11	20	31	19	7	30	15	2	12		13	37	0.46	160	1.73	197	1.14
Pseudochromis flavivertex	3	196	10	14	46	50	54	68		36	108	15	9		6				8		438	5.47	182	1.97	620	3.60
Pseudochromis fridmani	6	8								3		29	4								8	0.10	36	0.39	44	0.26
Pseudochromis olivaceous												1	1								0	0.00	2	0.02	2	0.01
Pseudochromis springeri	4	59	2	2	7	1	3	15		43	40	17	0		6						89	1.11	106	1.15	195	1.13
Dottyback								8													8	0.10			8	0.05
Amphiprion bicinctus	1.5	35	10	70	7	7	3	7		20	37	37	23	1	19	22	7	3	4	36	139	1.73	209	2.27	348	2.02
Damselfish sp.		50		8	2	10	5	5		284	185	100	134	33	26	40	23	141	30	200	80	1.00	1196	12.96	1276	7.40
Anampses meleagrides		5		26				1								4					32	0.40	4	0.04	36	0.21
Anampses sp.		79	19	19	1	9	19	2			8	13	13	1	6		4	4	4	10	148	1.85	63	0.68	211	1.22
Bodianus anthioides																1					0	0.00	1	0.01	1	0.01
Bodianus sp.		36		24	1			1				4	4								62	0.77	8	0.09	70	0.41
Coris aygula	4	58	13	14	9	23	3				6	8	2	3	10	1		7	1	3	120	1.50	41	0.44	161	0.93
Coris sp.		10								2	1									1	10	0.12	4	0.04	14	0.08
Epibulus insidiator		2			15																17	0.21			17	0.10
Gomphosus caeruleus		8		10	1	4					4	1	5		2		4	3	1	11	23	0.29	31	0.34	54	0.31
Halichores										54		1									0	0.00	55	0.60	55	0.32
Labroides diadematus	5							4		2				1							4	0.05	3	0.03	7	0.04
Larabicus quadrilineatus		78	20	35	14	11	8	22		3	8	2	7					10	6	18	188	2.35	54	0.59	242	1.40
Macropharyngodon		14	6			5							1							1	25	0.31	2	0.02	27	0.16
Paracheilinus octotaenia					134																134	1.67			134	0.78
Stethojulis albvittatus				42	7											2		2			49	0.61	4	0.04	53	0.31
Thalassoma klunzingeri											5	1	1				2	1			0	0.00	10	0.11	10	0.06
Thalassoma lunare											13	3	7		7		2	5		2	0	0.00	39	0.42	39	0.23
Thalassoma parupeneum		1		2	1	2				31	27	7	6	2	18	2		71	13	17	6	0.07	194	2.10	200	1.16
Thalassoma sp.			8				4														12	0.15			12	0.07
Scarus niger													5								0	0.00	5	0.05	5	0.03
Scarus sp.						6		1													7	0.09			7	0.04
Pterois sp.						362					1							81			362	4.52	82	0.89	444	2.58
Pterois radiata											2										0	0.00	2	0.02	2	0.01
Pterois volitans											8			1			1			1	0	0.00	11	0.12	11	0.06
Stonefish								5			7										5	0.06	7	0.08	12	0.07
Anthias sp.	1	10	6	98	9	25	85	2		80	146	302	208	97	191	199	30	52	20	156	235	2.93	1481	16.05	1716	9.95
Grouper sp.		1		85	271																357	4.46			357	2.07
Arothron diadematus	5	14		11	2	3	11			3	3	16	2	6	113	5	3		5	3	41	0.51	159	1.72	200	1.16
Arothron hispidus											127				36						0	0.00	163	1.77	163	0.95
Canthigaster sp.							2	1							2						3	0.04	2	0.02	5	0.03
Electric ray		1																			1	0.01			1	0.01
Boxfish		1774		3	1		2														1780	22.21			1780	10.33
Unknown fish				20																	20	0.25			20	0.12
Total		3396	143	1297	1105	864	634	574		961	1230	1249	991	356	1065	871	256	762	399	1085	8013	100	9225	100	17238	100
Marine invertebrates	2			52	8		27			439	328	651.99	153	40	327	155	35	85	42	87	87		2342.99		2430	
Life rock							200				700	1140			119						200		1959		2159	
Nudibranch							1														1				1	
Starfish	0.5		29	20	11	28	6	7		12	81	100	331	98	692	899	137	530	333	675	101		3888		3989	

Export during May - Germany, USA, Spain, Hong Kong, Mexico and Belgium
Export during June - Germany, France, Cyprus, Russia, Turkey, USA, Spain, Hong Kong, Mexico and Belgium
Export during October - Local, Austria, Germany, France, Cyprus, Russia, Belgium, Switzerland, Spain, Hong Kong, Mexico and Belgium
Export during November - Germany, Netherlands, Greece, France, Cyprus and Hong Kong

Appendix 6(b). Monthly exports of ornamental fish for the aquarium trade from Saudi Arabia.

Company	Red Sea Aquarium Fish		Coral Reef Trading Establishment		Red Sea Secrets		Kamal Imad Softa Establishment		All Companies	
Period	All years 98-99 & 7 months of 2001		All years 98-99 & 9 months of 2001		6 months 2002		Year 2001			
	31 months		33 months		6 months		12 months			
Scientific Name	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**
Torpedinidae									21	0.02
Torpedo nobiliana *	21	0.10							21	0.02
Dasyatidae									146	0.15
Himantura uranak							2	0.00	2	0.00
Taeniura lymma	36	0.17	83	0.27	4	0.08	21	0.05	144	0.15
Muraenidae									114	0.12
Gymnothorax undulatus	28	0.13			5	0.10			33	0.03
Siderea grisea	58	0.28	15	0.05	8	0.16			81	0.08
Ophichthidae									22	0.02
Myrichthys colubrinus	22	0.10							22	0.02
Holocentridae									258	0.26
Neoniphon summara							64	0.15	64	0.06
Sargocentron caudimaculatum							194	0.47	194	0.20
Scorpaenidae									735	0.74
Pterois antenna							8	0.02	8	0.01
Pterois miles	218	1.04	35	0.11	41	0.80	7	0.02	301	0.30
Pterois radiata	170	0.81	165	0.53	57	1.11	34	0.08	426	0.43
Serranidae									6483	6.54
Cephalopholis argus	112	0.53			10	0.19	293	0.70	415	0.42
Cephalopholis hemistiktos							213	0.51	213	0.21
Cephalopholis miniata	150	0.71	8	0.03	9	0.17	559	1.34	726	0.73
Cephalopholis oligosticta							372	0.89	372	0.38
Cephalopholis sexmaculata							180	0.43	180	0.18
Diploprion drachi	90	0.43			0	0.00			90	0.09
Epinephelus summana							180	0.43	180	0.18
Variola louti	68	0.32	19	0.06	2	0.04			89	0.09
Pseudanthias squamipinnis	290	1.38	1972	6.32			1956	4.69	4218	4.26
Pseudochromidae									6804	6.87
Pseudochromis flavivertex	553	2.63	451	1.45	146	2.83	408	0.98	1558	1.57
Pseudochromis fridmani	669	3.18	2124	6.81	253	4.91	1130	2.71	4176	4.21
Pseudochromis olivaceus	351	1.67	17	0.05	75	1.46			443	0.45
Pseudochromis springeri			617	1.98	10	0.19			627	0.63
Priacanthidae									39	0.04
Priacanthus hamrur							39	0.09	39	0.04
Apogonidae				0.00					36	0.04
Apogon aureus			36	0.12					36	0.04
Carangidae									3	0.00
Gnathanodon speciosus							3	0.01	3	0.00
Lutjanidae									23	0.02
Lutjanus kasmira							7	0.02	7	0.01
Snappers	16	0.08							16	0.02
Haemulidae									221	0.22
Plectorhinchus gaterinus	188	0.89					33	0.08	221	0.22
Mullidae									1293	1.31
Parupeneus cyclostomus	385	1.83			60	1.17	120	0.29	565	0.57
Parupeneus forsskali	215	1.02			54	1.05	347	0.83	616	0.62
Parupeneus macronema							35	0.08	35	0.04
Parupeneus rubescens							77	0.18	77	0.08
Monodactylidae									28	0.03
Monodactylus argenteus	28	0.13							28	0.03
Ephippidae									17	0.02
Platax pinnatus	17	0.08							17	0.02
Chaetodontidae									10416	10.51
Chaetodon auriga	331	1.57	319	1.02	65	1.26	463	1.11	1178	1.19
Chaetodon austriacus	341	1.62			63	1.22	225	0.54	629	0.63
Chaetodon fasciatus	406	1.93	722	2.31	80	1.55	1386	3.33	2594	2.62
Chaetodon lineolatus			77	0.25			102	0.24	179	0.18
Chaetodon larvatus	400	1.90	133	0.43	61	1.18	506	1.21	1100	1.11
Chaetodon melannotus							21	0.05	21	0.02
Chaetodon mesoleucos	372	1.77	256	0.82	77	1.50	299	0.72	1004	1.01
Chaetodon paucifasciatus	309	1.47	799	2.56	73	1.42	69	0.17	1250	1.26
Chaetodon semilarvatus	483	2.29	738	2.37	103	2.00	204	0.49	1528	1.54
Chaetodon trifascialis							11	0.03	11	0.01
Heniochus intermedius	349	1.66	206	0.66	89	1.73	278	0.67	922	0.93
Pomacanthidae									5390	5.44
Centropyge multispinnis	118	0.56			47	0.91	81	0.19	246	0.25
Genicanthus caudovittatus	84	0.40	63	0.20	31	0.60	14	0.03	192	0.19
Pomacanthus imperator	141	0.67	170	0.54	38	0.74	69	0.17	418	0.42

Company	Red Sea Aquarium Fish		Coral Reef Trading Establishment		Red Sea Secrets		Kamal Imad Softa Establishment		All Companies	
Period	All years 98-99 & 7 months of 2001		All years 98-99 & 9 months of 2001		6 months 2002		Year 2001			
	31 months		33 months		6 months		12 months			
Scientific Name	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**
Pomacanthus asfur	536	2.55	988	3.17	90	1.75	488	1.17	2102	2.12
Pomacanthus maculosus	240	1.14	445	1.43	55	1.07	346	0.83	1086	1.10
Pygoplites diacanthus	345	1.64	505	1.62	79	1.53	417	1.00	1346	1.36
Pomacentridae									29561	29.84
Abudefduf sexfasciatus	167	0.79			84	1.63			251	0.25
Abudefduf vaigiensis						0.00			0	0.00
Amphiprion bicinctus	374	1.78	1100	3.53	126	2.45	375	0.90	1975	1.99
Amphiprion clarkii	196	0.93							196	0.20
Chromis dimidiata	192	0.91	301	0.96	97	1.88	1925	4.62	2515	2.54
Chromis viridis	744	3.53	7093	22.74	214	4.16	6300	15.12	14351	14.48
Chrysiptera annulata	191	0.91							191	0.19
Dascyllus aruanus	286	1.36	30	0.10	219	4.25	1195	2.87	1730	1.75
Dascyllus marginatus	482	2.29	2412	7.73	162	3.15	1059	2.54	4115	4.15
Dascyllus trimaculatus	459	2.18	19	0.06	118	2.29	1587	3.81	2183	2.20
Neoglyphidodon melas							350	0.84	350	0.35
Pomacentrus pikei							1325	3.18	1325	1.34
Pomacentrus sulfureus			74	0.24					74	0.07
Pomacentrus trilineatus	98	0.47			76	1.48			174	0.18
Stegastes lividus	77	0.37			54	1.05			131	0.13
Cirrhitidae									270	0.27
Cirrhichthys oxycephalus							6	0.01	6	0.01
Paracirrhites forsteri	68	0.32					196	0.47	264	0.27
Labridae									13824	13.95
Anampses meleagrides			7	0.02					7	0.01
Anampses twistii	321	1.52	64	0.21	58	1.13	195	0.47	638	0.64
Bodianus anthioides	128	0.61	185	0.59	47	0.91	178	0.43	538	0.54
Bodianus diana	69	0.33			14	0.27			83	0.08
Cheilinus abudjubee	33	0.16	2	0.01	32	0.62	13	0.03	80	0.08
Cheilinus diagrammus	93	0.44			30	0.58			123	0.12
Cheilinus fasciatus	149	0.71	1	0.00	56	1.09	422	1.01	628	0.63
Cheilinus lunulatus	186	0.88	80	0.26	38	0.74	103	0.25	407	0.41
Cheilinus mentalis							22	0.05	22	0.02
Cheilinus undulatus			13	0.04					13	0.01
Cheilio inermis	3	0.01			3	0.06			6	0.01
Coris africana	35	0.17	7	0.02	37	0.72			79	0.08
Coris aygula	131	0.62	44	0.14	26	0.50	7	0.02	208	0.21
Coris caudimaculata							22	0.05	22	0.02
Epibulus insidiator	218	1.04	2	0.01	43	0.83	354	0.85	617	0.62
Gomphosus caeruleus klunzingeri	491	2.33	396	1.27	76	1.48	305	0.73	1268	1.28
Halichoeres hortulanus	341	1.62	1	0.00	62	1.20	61	0.15	465	0.47
Halichoeres marginatus	142	0.67			41	0.80	639	1.53	822	0.83
Halichoeres scapularis	205	0.97			42	0.82	271	0.65	518	0.52
Halichoeres pardalis							89	0.21	89	0.09
Hemigymnus fasciatus							102	0.24	102	0.10
Hologymnosus annulatus							37	0.09	37	0.04
Labroides dimidiatus	212	1.01	3	0.01	46	0.89	444	1.07	705	0.71
Larabicus quadrilineatus	495	2.35	1245	3.99	103	2.00	680	1.63	2523	2.55
Macropharygodon bipartius	101	0.48	41	0.13	21	0.41	233	0.56	396	0.40
Novaculichthys taeniourus	153	0.73			30	0.58	125	0.30	308	0.31
Paracheilinus octotaenia	81	0.38	340	1.09	18	0.35	665	1.60	1104	1.11
Pseudodax molucanus							94	0.23	94	0.09
Stethojulis albovittata							215	0.52	215	0.22
Thalassoma purpureum			100	0.32					100	0.10
Thalassoma rueppellii	294	1.40	368	1.18	67	1.30	309	0.74	1038	1.05
Thalassoma lunare	350	1.66	145	0.46	54	1.05	20	0.05	569	0.57
Scaridae									1091	1.10
Cetoscarus bicolor	76	0.36			8	0.16	42	0.10	126	0.13
Chlorurus gibbus	104	0.49			13	0.25			117	0.12
Scarus ferrugineus	94	0.45			7	0.14	48	0.12	149	0.15
Scarus fuscopurpuneus							87	0.21	87	0.09
Scarus niger	113	0.54			17	0.33	131	0.31	261	0.26
Scarus psittacus	90	0.43			8	0.16	174	0.42	272	0.27
Scarus schlegeli	52	0.25							52	0.05
Pinguipedidae								0.00	0	0.00
Parapercis hexophtalma							27	0.06	27	0.03
Blennidae									2916	2.94
Ecsenius aroni			3	0.01			6	0.01	9	0.01
Ecsenius frontalis			26	0.08					26	0.03
Ecsenius gravieri	308	1.46	35	0.11	97	1.88	1208	2.90	1648	1.66
Ecsenius khaki *	8	0.04			62	1.20			70	0.07
Ecsenius midas			12	0.04					12	0.01
Exallias brevis							355	0.85	355	0.36

Company	Red Sea Aquarium Fish		Coral Reef Trading Establishment		Red Sea Secrets		Kamal Imad Softa Establishment		All Companies	
Period	**All years 98-99 & 7 months of 2001**		**All years 98-99 & 9 months of 2001**		**6 months 2002**		**Year 2001**			
	31 months		**33 months**		**6 months**		**12 months**			
Scientific Name	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**
Meiacanthus nigrolineatus			343	1.10			453	1.09	796	0.80
Gobiidae									1934	1.95
Amblygobius albimaculatus							405	0.97	405	0.41
Amblygobius hectori			95	0.30					95	0.10
Cryptocentrus caeruleopunctatus	84	0.40			63	1.22	219	0.53	366	0.37
Cryptocentrus cephalus	326	1.55			77	1.50			403	0.41
Cryptocentrus lutheri	32	0.15	508	1.63					540	0.55
Gobiodon citrinus			115	0.37					115	0.12
Istigobius ornatus							10	0.02	10	0.01
Microdesmidae									265	0.27
Ptereleotris evides			84	0.27			174	0.42	258	0.26
Ptereleotris microlepis			4	0.01				0.00	4	0.00
Ptereleotris zebra							3	0.01	3	0.00
Acanthuridae									13044	13.17
Acanthurus mata	181	0.86			33	0.64			214	0.22
Acanthurus nigricans							302	0.72	302	0.30
Acanthurus sohal	676	3.21	1164	3.73	127	2.47	1646	3.95	3613	3.65
Ctenochaetus striatus	198	0.94			32	0.62			230	0.23
Naso brevirostris							228	0.55	228	0.23
Naso hexacanthus							335	0.80	335	0.34
Naso lituratus	293	1.39	722	2.31	101	1.96	1531	3.67	2647	2.67
Naso unicornis	11	0.05			31	0.60	50	0.12	92	0.09
Zebrasoma veliferum	658	3.13	866	2.78	135	2.62	645	1.55	2304	2.33
Zebrasoma xanthurum	649	3.08	979	3.14	167	3.24	1284	3.08	3079	3.11
Siganidae									36	0.04
Siganus stellatus							36	0.09	36	0.04
Balistidae									2681	2.71
Balistoides viridescens			8	0.03					8	0.01
Balistapus undulatus	51	0.24			13	0.25	145	0.35	209	0.21
Odonus niger	305	1.45	241	0.77	71	1.38	299	0.72	916	0.92
Pseudobalistes fuscus	43	0.20	54	0.17	4	0.08			101	0.10
Rhinecanthus assasi	372	1.77	490	1.57	96	1.86	260	0.62	1218	1.23
Suflamen albicaudatus							229	0.55	229	0.23
Monacanthidae								0.00	15	0.02
Cantherhines pardalis							15	0.04	15	0.02
Oxymonacanthus halli		0.00							0	0.00
Ostraciidae		0.00		0.00		0.00			305	0.31
Ostracion cubicus	100	0.48	80	0.26	36	0.70			216	0.22
Ostracion cyanurus	89	0.42							89	0.09
Tetraodontidae									1085	1.10
Arothron diadematus	373	1.77	2	0.01	131	2.54	129	0.31	635	0.64
Arothron immaculatus	12	0.06							12	0.01
Arothron nigropunctatus	6	0.03							6	0.01
Canthigaster coronata	41	0.19			42	0.82			83	0.08
Canthigaster margaritata			12	0.04			18	0.04	30	0.03
Arothron puffer			319	1.02					319	0.32
Total	**21050**	**100.00**	**31198**	**100.00**	**5150**	**100.00**	**41678**	**100.00**	**99076**	**100.00**

Appendix 6(c). Relative commercial importance of different ornamental fish species traded in Egypt; percentage figures are estimates extrapolated from available data provided by the Egyptian Company for Fishing and Fishing Gears for the periods Nov. 90 to June 91 and from May 2001 to June 2002.

		Total Export number	Total export price	% of export by number	% of export by value	Total Export number	Total export price	% of export by number	% of export by value	Total Export number	Total export price	% of export by number	% of export by value
Species	**Price US$**	**November 1990 – June 1991**				**May 2001 - June 2002**				**Total Exports**			
Acanthurus nigrofuscus	3	8	24.00	0.10	0.05	14.00	42.00	0.15	0.08	22	66.00	0.13	0.06
Acanthurus sohal	12	356	4272.00	4.44	8.25	560.00	6720.00	6.07	12.50	916	10992.00	5.31	10.42
Zebrasoma veliferum	2	217	434.00	2.71	0.84	417.00	834.00	4.52	1.55	634	1268.00	3.68	1.20
Zebrasoma xanthurum	12	612	7344.00	7.64	14.18	927.00	11124.00	10.05	20.68	1539	18468.00	8.93	17.50
Naso	8	3	24.00	0.04	0.05	0.00	0.00	0.00	0.00	3	24.00	0.02	0.02
Rhinecanthus assasi	3	23	69.00	0.29	0.13	12.00	36.00	0.13	0.07	35	105.00	0.20	0.10
Triggerfish	8	1	8.00	0.01	0.02	2.00	16.00	0.02	0.03	3	24.00	0.02	0.02
Blennies sp	1.5	52	78.00	0.65	0.15	150.00	225.00	1.63	0.42	202	303.00	1.17	0.29
Ecsenius gravieri	1.5	10	15.00	0.12	0.03	0.00	0.00	0.00	0.00	10	15.00	0.06	0.01
Chaetodon auriga	4	104	416.00	1.30	0.80	159.00	636.00	1.72	1.18	263	1052.00	1.53	1.00
Chaetodon fasciatus	6	189	1134.00	2.36	2.19	191.00	1146.00	2.07	2.13	380	2280.00	2.20	2.16
Chaetodon austriacus	2	194	388.00	2.42	0.75	124.00	248.00	1.34	0.46	318	636.00	1.84	0.60
Chaetodon paucifasciatus	6	283	1698.00	3.53	3.28	199.00	1194.00	2.16	2.22	482	2892.00	2.80	2.74
Chaetodon semilarvatus	12	600	7200.00	7.49	13.91	1104.00	13248.00	11.97	24.63	1704	20448.00	9.89	19.38
Chaetodon larvatus	6	157	942.00	1.96	1.82	156.00	936.00	1.69	1.74	313	1878.00	1.82	1.78
Chaetodon trifascialis	7	128	896.00	1.60	1.73	12.00	84.00	0.13	0.16	140	980.00	0.81	0.93
Chaetodon melannotus	3	137	411.00	1.71	0.79	33.00	99.00	0.36	0.18	170	510.00	0.99	0.48
Chaetodon lineolatus	3	70	210.00	0.87	0.41	35.00	105.00	0.38	0.20	105	315.00	0.61	0.30
Heniochus intermedius	6	86	516.00	1.07	1.00	164.00	984.00	1.78	1.83	250	1500.00	1.45	1.42
Platax	6	28	168.00	0.35	0.32	0.00	0.00	0.00	0.00	28	168.00	0.16	0.16
Gobiodon citrinus	3	60	180.00	0.75	0.35	47.00	141.00	0.51	0.26	107	321.00	0.62	0.30
Apolemichthys xanthotis	6	1	6.00	0.01	0.01	0.00	0.00	0.00	0.00	1	6.00	0.01	0.01
Centropyge multispinnis	2	2	4.00	0.02	0.01	13.00	26.00	0.14	0.05	15	30.00	0.09	0.03
Genicanthus caudovittatus	12	2	24.00	0.02	0.05	0.00	0.00	0.00	0.00	2	24.00	0.01	0.02
Pomacanthus imperator	14	20	280.00	0.25	0.54	21.00	294.00	0.23	0.55	41	574.00	0.24	0.54
Pomacanthus maculosus	12	217	2604.00	2.71	5.03	560.00	6720.00	6.07	12.50	777	9324.00	4.51	8.84
Pomacanthus asfur	20	13	260.00	0.16	0.50	9.00	180.00	0.10	0.33	22	440.00	0.13	0.42
Pygoplites diacanthus	12	37	444.00	0.46	0.86	160.00	1920.00	1.73	3.57	197	2364.00	1.14	2.24
Pseudochromis flavivertex	3	438	1314.00	5.47	2.54	182.00	546.00	1.97	1.02	620	1860.00	3.60	1.76
Pseudochromis fridmani	6	8	48.00	0.10	0.09	36.00	216.00	0.39	0.40	44	264.00	0.26	0.25
Pseudochromis olivaceous	4	0	0.00	0.00	0.00	2.00	8.00	0.02	0.01	2	8.00	0.01	0.01
Pseudochromis springeri	4	89	356.00	1.11	0.69	106.00	424.00	1.15	0.79	195	780.00	1.13	0.74
Dottyback	4	8	32.00	0.10	0.06	0.00	0.00	0.00	0.00	8	32.00	0.05	0.03
Amphiprion bicinctus	1.5	139	208.50	1.73	0.40	209.00	313.50	2.27	0.58	348	522.00	2.02	0.49
Damselfish sp.	0.5	80	40.00	1.00	0.08	1196.00	598.00	12.96	1.11	1276	638.00	7.40	0.60
Anampses meleagrides	5	32	160.00	0.40	0.31	4.00	20.00	0.04	0.04	36	180.00	0.21	0.17
Anampses sp.	5	148	740.00	1.85	1.43	63.00	315.00	0.68	0.59	211	1055.00	1.22	1.00
Bodianus anthioides	6	0	0.00	0.00	0.00	1.00	6.00	0.01	0.01	1	6.00	0.01	0.01
Bodianus sp.	8	62	496.00	0.77	0.96	8.00	64.00	0.09	0.12	70	560.00	0.41	0.53
Coris aygula	4	120	480.00	1.50	0.93	41.00	164.00	0.44	0.30	161	644.00	0.93	0.61
Coris sp.	4	10	40.00	0.12	0.08	4.00	16.00	0.04	0.03	14	56.00	0.08	0.05
Epibulus insidiator	6	17	102.00	0.21	0.20	0.00	0.00	0.00	0.00	17	102.00	0.10	0.10
Gomphosus caeruleus	3	23	69.00	0.29	0.13	31.00	93.00	0.34	0.17	54	162.00	0.31	0.15
Halichores	6	0	0.00	0.00	0.00	55.00	330.00	0.60	0.61	55	330.00	0.32	0.31
Labroides diadematus	5	4	20.00	0.05	0.04	3.00	15.00	0.03	0.03	7	35.00	0.04	0.03
Larabicus quadrilineatus	3	188	564.00	2.35	1.09	54.00	162.00	0.59	0.30	242	726.00	1.40	0.69
Macropharyngodon	5	25	125.00	0.31	0.24	2.00	10.00	0.02	0.02	27	135.00	0.16	0.13
Paracheilinus octotaenia	3	134	402.00	1.67	0.78	0.00	0.00	0.00	0.00	134	402.00	0.78	0.38
Stethojulis albvittatus	3	49	147.00	0.61	0.28	4.00	12.00	0.04	0.02	53	159.00	0.31	0.15
Thalassoma klunzingeri	4	0	0.00	0.00	0.00	10.00	40.00	0.11	0.07	10	40.00	0.06	0.04
Thalassoma lunare	1.5	0	0.00	0.00	0.00	39.00	58.50	0.42	0.11	39	58.50	0.23	0.06
Thalassoma parupeneum	2	6	12.00	0.07	0.02	194.00	388.00	2.10	0.72	200	400.00	1.16	0.38
Thalassoma sp.	2	12	24.00	0.15	0.05	0.00	0.00	0.00	0.00	12	24.00	0.07	0.02
Scarus niger	8	0	0.00	0.00	0.00	5.00	40.00	0.05	0.07	5	40.00	0.03	0.04
Scarus sp.	8	7	56.00	0.09	0.11	0.00	0.00	0.00	0.00	7	56.00	0.04	0.05
Pterois sp.	6	362	2172.00	4.52	4.20	82.00	492.00	0.89	0.91	444	2664.00	2.58	2.52
Pterois radiata	6	0	0.00	0.00	0.00	2.00	12.00	0.02	0.02	2	12.00	0.01	0.01
Pterois volitans	3	0	0.00	0.00	0.00	11.00	33.00	0.12	0.06	11	33.00	0.06	0.03
Stonefish	6	5	30.00	0.06	0.06	7.00	42.00	0.08	0.08	12	72.00	0.07	0.07
Anthias sp.	1	235	235.00	2.93	0.45	1481.00	1481.00	16.05	2.75	1716	1716.00	9.95	1.63
Grouper sp.	8	357	2856.00	4.46	5.52	0.00	0.00	0.00	0.00	357	2856.00	2.07	2.71
Arothron diadematus	5	41	205.00	0.51	0.40	159.00	795.00	1.72	1.48	200	1000.00	1.16	0.95
Arothron hispidus	0.75	0	0.00	0.00	0.00	163.00	122.25	1.77	0.23	163	122.25	0.95	0.12
Canthigaster sp.	3	3	9.00	0.04	0.02	2.00	6.00	0.02	0.01	5	15.00	0.03	0.01
Electric ray	12	1	12.00	0.01	0.02	0.00	0.00	0.00	0.00	1	12.00	0.01	0.01
Boxfish	6	1780	10680.00	22.21	20.63	0.00	0.00	0.00	0.00	1780	10680.00	10.33	10.12
Unknown fish	3	20	60.00	0.25	0.12	0.00	0.00	0.00	0.00	20	60.00	0.12	0.06
Total	126	8013	51744.00	100.00	100.00	9225.00	53780.25	100.00	100.00	17238	105523.75	100.00	100.00

Appendix 6(d). Relative commercial importance of different ornamental fish species traded in Saudi Arabia; percentage figures are estimates extrapolated from available data provided by the Ministry of Agriculture for the companies Red Sea Aquarium Fish, Coral Reef Trading Establishment, Red Sea Secrets, and Kamal Imad Softa during 1998 to 1999, 2001 and 2002.

		Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value
		Red Sea Aquarium Fish				Coral Reef Trading Establishment				Red Sea Secrets				Kamal Imad Softa Establishment				All companies			
		All years 98-99 & 7 months of 2001				All years 98-99 & 9 months of 2001				6 months of 2002				2001							
Species	**Price US$**	31 months				33 months				6 months				12 months							
Torpedinidae																		21	0.0		0.0
Torpedo nobiliana	15	21	315.0	0.1	0.2													21	315.0	0.0	0.1
Dasyatidae			0.0	0.0	0.0													146	0.0		0.0
Himantura uranak	20		0.0	0.0	0.0									2	40.0	0.0	0.0	2	40.0	0.0	0.0
Taeniura lymma	18	36	648.0	0.2	0.5	83	1494.0	0.3	1.0	4	72.0	0.1	0.2	21	378.0	0.1	0.2	144	2592.0	0.1	0.5
Muraenidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	114	0.0		0.0
Gymnothorax undulatus	4	28	112.0	0.1	0.1		0.0	0.0	0.0	5	20.0	0.1	0.1		0.0	0.0	0.0	33	132.0	0.0	0.0
Siderea grisea	4	58	232.0	0.3	0.2	15	60.0	0.0	0.0	8	32.0	0.2	0.1		0.0	0.0	0.0	81	324.0	0.1	0.1
Ophichthidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	22	0.0		0.0
Myrichthys colubrinus	4	22	88.0	0.1	0.1		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	22	88.0	0.0	0.0
Holocentridae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	258	0.0		0.0
Neoniphon summara	5		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	64	320.0	0.2	0.2	64	320.0	0.1	0.1
Sargocentron caudimaculatum	7		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	194	1358.0	0.5	0.7	194	1358.0	0.2	0.3
Scorpaenidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	735	0.0		0.0
Pterois antenna	14		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	8	112.0	0.0	0.1	8	112.0	0.0	0.0
Pterois miles	17	218	3706.0	1.0	2.7	35	595.0	0.1	0.4	41	697.0	0.8	2.3	7	119.0	0.0	0.1	301	5117.0	0.3	1.0
Pterois radiata	14	170	2380.0	0.8	1.8	165	2310.0	0.5	1.5	57	798.0	1.1	2.6	34	476.0	0.1	0.2	426	5964.0	0.4	1.1
Serranidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	6483	0.0		0.0
Cephalopholis argus	8	112	896.0	0.5	0.7		0.0	0.0	0.0	10	80.0	0.2	0.3	293	2344.0	0.7	1.2	415	3320.0	0.4	0.6
Cephalopholis hemistiktos	8		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	213	1704.0	0.5	0.9	213	1704.0	0.2	0.3
Cephalopholis miniata	8	150	1200.0	0.7	0.9	8	64.0	0.0	0.0	9	72.0	0.2	0.2	559	4472.0	1.3	2.3	726	5808.0	0.7	1.1
Cephalopholis oligosticta	8		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	372	2976.0	0.9	1.5	372	2976.0	0.4	0.6
Cephalopholis sexmaculata	8		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	180	1440.0	0.4	0.7	180	1440.0	0.2	0.3
Diploprion drachi	8	90	720.0	0.4	0.5		0.0	0.0	0.0	0	0.0	0.0	0.0		0.0	0.0	0.0	90	720.0	0.1	0.1
Epinephelus summana	8		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	180	1440.0	0.4	0.7	180	1440.0	0.2	0.3
Variola louti	8	68	544.0	0.3	0.4	19	152.0	0.1	0.1	2	16.0	0.0	0.1		0.0	0.0	0.0	89	712.0	0.1	0.1
Pseudanthias squamipinnis	2.5	290	725.0	1.4	0.5	1972	4930.0	6.3	3.2		0.0	0.0	0.0	1956	4890.0	4.7	2.5	4218	10545.0	4.3	2.0
Pseudochromidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	6804	0.0		0.0
Pseudochromis flavivertex	4	553	2212.0	2.6	1.6	451	1804.0	1.4	1.2	146	584.0	2.8	1.9	408	1632.0	1.0	0.8	1558	6232.0	1.6	1.2
Pseudochromis fridmani	4	669	2676.0	3.2	2.0	2124	8496.0	6.8	5.5	253	1012.0	4.9	3.3	1130	4520.0	2.7	2.3	4176	16704.0	4.2	3.2
Pseudochromis olivaceus	4	351	1404.0	1.7	1.0	17	68.0	0.1	0.0	75	300.0	1.5	1.0		0.0	0.0	0.0	443	1772.0	0.4	0.3
Pseudochromis springeri	4		0.0	0.0	0.0	617	2468.0	2.0	1.6	10	40.0	0.2	0.1		0.0	0.0	0.0	627	2508.0	0.6	0.5
Priacanthidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	39	0.0		0.0
Priacanthus hamrur	4		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	39	156.0	0.1	0.1	39	156.0	0.0	0.0
Apogonidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	36	0.0		0.0
Apogon aureus	3		0.0	0.0	0.0	36	108.0	0.1	0.1		0.0	0.0	0.0		0.0	0.0	0.0	36	108.0	0.0	0.0
Carangidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	3	0.0		0.0
Gnathanodon speciosus	5		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	3	15.0	0.0	0.0	3	15.0	0.0	0.0
Lutjanidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	23	0.0		0.0
Lutjanus kasmira	6		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	7	42.0	0.0	0.0	7	42.0	0.0	0.0
Snappers	6	16	96.0	0.1	0.1		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	16	96.0	0.0	0.0
Haemulidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	221	0.0		0.0

		Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value
		Red Sea Aquarium Fish				Coral Reef Trading Establishment				Red Sea Secrets				Kamal Imad Softa Establishment				All companies			
		All years 98-99 & 7 months of 2001				All years 98-99 & 9 months of 2001				6 months of 2002				2001							
Species	**Price US$**	31 months				33 months				6 months				12 months							
Plectorhinchus gaterinus	8	188	1504.0	0.9	1.1		0.0	0.0	0.0		0.0	0.0	0.0	33	264.0	0.1	0.1	221	1768.0	0.2	0.3
Mullidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	1293	0.0		0.0
Parupeneus cyclostomus	7	385	2695.0	1.8	2.0		0.0	0.0	0.0	60	420.0	1.2	1.4	120	840.0	0.3	0.4	565	3955.0	0.6	0.8
Parupeneus forsskali	7	215	1505.0	1.0	1.1		0.0	0.0	0.0	54	378.0	1.0	1.2	347	2429.0	0.8	1.2	616	4312.0	0.6	0.8
Parupeneus macronema	7		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	35	245.0	0.1	0.1	35	245.0	0.0	0.0
Parupeneus rubescens	9		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	77	693.0	0.2	0.3	77	693.0	0.1	0.1
Monodactylidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	28	0.0		0.0
Monodactylus argenteus	5	28	140.0	0.1	0.1		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	28	140.0	0.0	0.0
Ephippidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	17	0.0		0.0
Platax pinnatus	5	17	85.0	0.1	0.1		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	17	85.0	0.0	0.0
Chaetodontidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	10416	0.0		0.0
Chaetodon auriga	5	331	1655.0	1.6	1.2	319	1595.0	1.0	1.0	65	325.0	1.3	1.1	463	2315.0	1.1	1.2	1178	5890.0	1.2	1.1
Chaetodon austriacus	6	341	2046.0	1.6	1.5		0.0	0.0	0.0	63	378.0	1.2	1.2	225	1350.0	0.5	0.7	629	3774.0	0.6	0.7
Chaetodon fasciatus	6	406	2436.0	1.9	1.8	722	4332.0	2.3	2.8	80	480.0	1.6	1.6	1386	8316.0	3.3	4.2	2594	15564.0	2.6	3.0
Chaetodon lineolatus	8		0.0	0.0	0.0	77	616.0	0.2	0.4		0.0	0.0	0.0	102	816.0	0.2	0.4	179	1432.0	0.2	0.3
Chaetodon larvatus	4	400	1600.0	1.9	1.2	133	532.0	0.4	0.3	61	244.0	1.2	0.8	506	2024.0	1.2	1.0	1100	4400.0	1.1	0.8
Chaetodon melannotus	8		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	21	168.0	0.1	0.1	21	168.0	0.0	0.0
Chaetodon mesoleucos	4	372	1488.0	1.8	1.1	256	1024.0	0.8	0.7	77	308.0	1.5	1.0	299	1196.0	0.7	0.6	1004	4016.0	1.0	0.8
Chaetodon paucifasciatus	9	309	2781.0	1.5	2.1	799	7191.0	2.6	4.7	73	657.0	1.4	2.1	69	621.0	0.2	0.3	1250	11250.0	1.3	2.2
Chaetodon semilarvatus	16	483	7728.0	2.3	5.7	738	11808.0	2.4	7.7	103	1648.0	2.0	5.3	204	3264.0	0.5	1.6	1528	24448.0	1.5	4.7
Chaetodon trifascialis	7		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	11	77.0	0.0	0.0	11	77.0	0.0	0.0
Heniochus intermedius	5	349	1745.0	1.7	1.3	206	1030.0	0.7	0.7	89	445.0	1.7	1.4	278	1390.0	0.7	0.7	922	4610.0	0.9	0.9
Pomacanthidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	5390	0.0		0.0
Centropyge multispinnis	10	118	1180.0	0.6	0.9		0.0	0.0	0.0	47	470.0	0.9	1.5	81	810.0	0.2	0.4	246	2460.0	0.2	0.5
Genicanthus caudovittatus	12	84	1008.0	0.4	0.7	63	756.0	0.2	0.5	31	372.0	0.6	1.2	14	168.0	0.0	0.1	192	2304.0	0.2	0.4
Pomacanthus imperator	35	141	4935.0	0.7	3.7	170	5950.0	0.5	3.9	38	1330.0	0.7	4.3	69	2415.0	0.2	1.2	418	14630.0	0.4	2.8
Pomacanthus asfur	11	536	5896.0	2.5	4.4	988	10868.0	3.2	7.1	90	990.0	1.7	3.2	488	5368.0	1.2	2.7	2102	23122.0	2.1	4.5
Pomacanthus maculosus	20	240	4800.0	1.1	3.6	445	8900.0	1.4	5.8	55	1100.0	1.1	3.6	346	6920.0	0.8	3.5	1086	21720.0	1.1	4.2
Pygoplites diacanthus	8	345	2760.0	1.6	2.0	505	4040.0	1.6	2.6	79	632.0	1.5	2.1	417	3336.0	1.0	1.7	1346	10768.0	1.4	2.1
Pomacentridae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	29561	0.0		0.0
Abudefduf sexfasciatus	3	167	501.0	0.8	0.4		0.0	0.0	0.0	84	252.0	1.6	0.8		0.0	0.0	0.0	251	753.0	0.3	0.1
Abudefduf vaigiensis	3		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0	0.0	0.0	0.0
Amphiprion bicinctus	3	374	1122.0	1.8	0.8	1100	3300.0	3.5	2.1	126	378.0	2.4	1.2	375	1125.0	0.9	0.6	1975	5925.0	2.0	1.1
Amphiprion clarkii	3	196	588.0	0.9	0.4		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	196	588.0	0.2	0.1
Chromis dimidiata	1	192	192.0	0.9	0.1	301	301.0	1.0	0.2	97	97.0	1.9	0.3	1925	1925.0	4.6	1.0	2515	2515.0	2.5	0.5
Chromis viridis	1	744	744.0	3.5	0.6	7093	7093.0	22.7	4.6	214	214.0	4.2	0.7	6300	6300.0	15.1	3.2	14351	14351.0	14.5	2.8
Chrysiptera annulata	1	191	191.0	0.9	0.1		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	191	191.0	0.2	0.0
Dascyllus aruanus	1	286	286.0	1.4	0.2	30	30.0	0.1	0.0	219	219.0	4.3	0.7	1195	1195.0	2.9	0.6	1730	1730.0	1.7	0.3
Dascyllus marginatus	1	482	482.0	2.3	0.4	2412	2412.0	7.7	1.6	162	162.0	3.1	0.5	1059	1059.0	2.5	0.5	4115	4115.0	4.2	0.8
Dascyllus trimaculatus	1	459	459.0	2.2	0.3	19	19.0	0.1	0.0	118	118.0	2.3	0.4	1587	1587.0	3.8	0.8	2183	2183.0	2.2	0.4
Neoglyphidodon melas	2		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	350	700.0	0.8	0.4	350	700.0	0.4	0.1
Pomacentrus pikei			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	1325	0.0	3.2	0.0	1325	0.0	1.3	0.0
Pomacentrus sulfureus			0.0	0.0	0.0	74	0.0	0.2	0.0		0.0	0.0	0.0		0.0	0.0	0.0	74	0.0	0.1	0.0
Pomacentrus trilineatus		98	0.0	0.5	0.0		0.0	0.0	0.0	76	0.0	1.5	0.0		0.0	0.0	0.0	174	0.0	0.2	0.0
Stegastes lividus		77	0.0	0.4	0.0		0.0	0.0	0.0	54	0.0	1.0	0.0		0.0	0.0	0.0	131	0.0	0.1	0.0
Cirrhitidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	270	0.0		0.0
Cirrhichthys oxycephalus	3		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	6	18.0	0.0	0.0	6	18.0	0.0	0.0
Paracirrhites forsteri	3	68	204.0	0.3	0.2		0.0	0.0	0.0		0.0	0.0	0.0	196	588.0	0.5	0.3	264	792.0	0.3	0.2
Labridae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	13824	0.0		0.0

		Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value
		Red Sea Aquarium Fish				Coral Reef Trading Establishment				Red Sea Secrets				Kamal Imad Softa Establishment				All companies			
		All years 98-99 & 7 months of 2001				All years 98-99 & 9 months of 2001				6 months of 2002				2001							
Species	**Price US$**	31 months				33 months				6 months				12 months							
Anampses meleagrides	5		0.0	0.0	0.0	7	35.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	7	35.0	0.0	0.0
Anampses twistii	5	321	1605.0	1.5	1.2	64	320.0	0.2	0.2	58	290.0	1.1	0.9	195	975.0	0.5	0.5	638	3190.0	0.6	0.6
Bodianus anthioides	6	128	768.0	0.6	0.6	185	1110.0	0.6	0.7	47	282.0	0.9	0.9	178	1068.0	0.4	0.5	538	3228.0	0.5	0.6
Bodianus diana	8	69	552.0	0.3	0.4		0.0	0.0	0.0	14	112.0	0.3	0.4		0.0	0.0	0.0	83	664.0	0.1	0.1
Cheilinus abudjubee	10	33	330.0	0.2	0.2	2	20.0	0.0	0.0	32	320.0	0.6	1.0	13	130.0	0.0	0.1	80	800.0	0.1	0.2
Cheilinus diagrammus	8	93	744.0	0.4	0.6		0.0	0.0	0.0	30	240.0	0.6	0.8		0.0	0.0	0.0	123	984.0	0.1	0.2
Cheilinus fasciatus	13	149	1937.0	0.7	1.4	1	13.0	0.0	0.0	56	728.0	1.1	2.4	422	5486.0	1.0	2.8	628	8164.0	0.6	1.6
Cheilinus lunulatus	15	186	2790.0	0.9	2.1	80	1200.0	0.3	0.8	38	570.0	0.7	1.8	103	1545.0	0.2	0.8	407	6105.0	0.4	1.2
Cheilinus mentalis	8		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	22	176.0	0.1	0.1	22	176.0	0.0	0.0
Cheilinus undulatus	8		0.0	0.0	0.0	13	104.0	0.0	0.1		0.0	0.0	0.0		0.0	0.0	0.0	13	104.0	0.0	0.0
Cheilio inermis	10	3	30.0	0.0	0.0		0.0	0.0	0.0	3	30.0	0.1	0.1		0.0	0.0	0.0	6	60.0	0.0	0.0
Coris africana	5	35	175.0	0.2	0.1	7	35.0	0.0	0.0	37	185.0	0.7	0.6		0.0	0.0	0.0	79	395.0	0.1	0.1
Coris aygula	10	131	1310.0	0.6	1.0	44	440.0	0.1	0.3	26	260.0	0.5	0.8	7	70.0	0.0	0.0	208	2080.0	0.2	0.4
Coris caudimaculata	5		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	22	110.0	0.1	0.1	22	110.0	0.0	0.0
Epibulus insidiator	6	218	1308.0	1.0	1.0	2	12.0	0.0	0.0	43	258.0	0.8	0.8	354	2124.0	0.8	1.1	617	3702.0	0.6	0.7
Gomphosus caeruleus klunzingeri	4	491	1964.0	2.3	1.5	396	1584.0	1.3	1.0	76	304.0	1.5	1.0	305	1220.0	0.7	0.6	1268	5072.0	1.3	1.0
Halichoeres hortulanus	6	341	2046.0	1.6	1.5	1	6.0	0.0	0.0	62	372.0	1.2	1.2	61	366.0	0.1	0.2	465	2790.0	0.5	0.5
Halichoeres marginatus	7	142	994.0	0.7	0.7		0.0	0.0	0.0	41	287.0	0.8	0.9	639	4473.0	1.5	2.3	822	5754.0	0.8	1.1
Halichoeres scapularis	5	205	1025.0	1.0	0.8		0.0	0.0	0.0	42	210.0	0.8	0.7	271	1355.0	0.7	0.7	518	2590.0	0.5	0.5
Halichoeres pardalis	3		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	89	267.0	0.2	0.1	89	267.0	0.1	0.1
Hemigymnus fasciatus	10		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	102	1020.0	0.2	0.5	102	1020.0	0.1	0.2
Hologymnosus annulatus	17		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	37	629.0	0.1	0.3	37	629.0	0.0	0.1
Labroides dimidiatus	2.5	212	530.0	1.0	0.4	3	7.5	0.0	0.0	46	115.0	0.9	0.4	444	1110.0	1.1	0.6	705	1762.5	0.7	0.3
Larabicus quadrilineatus	2.5	495	1237.5	2.4	0.9	1245	3112.5	4.0	2.0	103	257.5	2.0	0.8	680	1700.0	1.6	0.9	2523	6307.5	2.5	1.2
Macropharygodon bipartius	5	101	505.0	0.5	0.4	41	205.0	0.1	0.1	21	105.0	0.4	0.3	233	1165.0	0.6	0.6	396	1980.0	0.4	0.4
Novaculichthys taeniourus	7	153	1071.0	0.7	0.8		0.0	0.0	0.0	30	210.0	0.6	0.7	125	875.0	0.3	0.4	308	2156.0	0.3	0.4
Paracheilinus octotaenia	3	81	243.0	0.4	0.2	340	1020.0	1.1	0.7	18	54.0	0.3	0.2	665	1995.0	1.6	1.0	1104	3312.0	1.1	0.6
Pseudodax molucanus	3		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	94	282.0	0.2	0.1	94	282.0	0.1	0.1
Stethojulis albovittata	3		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	215	645.0	0.5	0.3	215	645.0	0.2	0.1
Thalassoma purpureum	3		0.0	0.0	0.0	100	300.0	0.3	0.2		0.0	0.0	0.0		0.0	0.0	0.0	100	300.0	0.1	0.1
Thalassoma rueppellii	4	294	1176.0	1.4	0.9	368	1472.0	1.2	1.0	67	268.0	1.3	0.9	309	1236.0	0.7	0.6	1038	4152.0	1.0	0.8
Thalassoma lunare	3	350	1050.0	1.7	0.8	145	435.0	0.5	0.3	54	162.0	1.0	0.5	20	60.0	0.0	0.0	569	1707.0	0.6	0.3
Scaridae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	1091	0.0		0.0
Cetoscarus bicolor	8	76	608.0	0.4	0.5		0.0	0.0	0.0	8	64.0	0.2	0.2	42	336.0	0.1	0.2	126	1008.0	0.1	0.2
Chlorurus gibbus	8	104	832.0	0.5	0.6		0.0	0.0	0.0	13	104.0	0.3	0.3		0.0	0.0	0.0	117	936.0	0.1	0.2
Scarus ferrugineus	8	94	752.0	0.4	0.6		0.0	0.0	0.0	7	56.0	0.1	0.2	48	384.0	0.1	0.2	149	1192.0	0.2	0.2
Scarus fuscopurpuneus	8		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	87	696.0	0.2	0.4	87	696.0	0.1	0.1
Scarus niger	8	113	904.0	0.5	0.7		0.0	0.0	0.0	17	136.0	0.3	0.4	131	1048.0	0.3	0.5	261	2088.0	0.3	0.4
Scarus psittacus	8	90	720.0	0.4	0.5		0.0	0.0	0.0	8	64.0	0.2	0.2	174	1392.0	0.4	0.7	272	2176.0	0.3	0.4
Scarus schlegeli	8	52	416.0	0.2	0.3		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	52	416.0	0.1	0.1
Pinguipedidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0	0.0	0.0	0.0
Parapercis hexophtalma	3		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	27	81.0	0.1	0.0	27	81.0	0.0	0.0
Blennidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	2916	0.0		0.0
Ecsenius aroni	3		0.0	0.0	0.0	3	9.0	0.0	0.0		0.0	0.0	0.0	6	18.0	0.0	0.0	9	27.0	0.0	0.0
Ecsenius frontalis	2.5		0.0	0.0	0.0	26	65.0	0.1	0.0		0.0	0.0	0.0		0.0	0.0	0.0	26	65.0	0.0	0.0
Ecsenius gravieri	3	308	924.0	1.5	0.7	35	105.0	0.1	0.1	97	291.0	1.9	0.9	1208	3624.0	2.9	1.8	1648	4944.0	1.7	1.0
*Ecsenius khaki **	3	8	24.0	0.0	0.0		0.0	0.0	0.0	62	186.0	1.2	0.6		0.0	0.0	0.0	70	210.0	0.1	0.0
Ecsenius midas	3		0.0	0.0	0.0	12	36.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	12	36.0	0.0	0.0
Exallias brevis	5		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	355	1775.0	0.9	0.9	355	1775.0	0.4	0.3

		Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value	Total export number	Total export price	% of export by number	% of export by value
		Red Sea Aquarium Fish				Coral Reef Trading Establishment				Red Sea Secrets				Kamal Imad Softa Establishment				All companies			
		All years 98-99 & 7 months of 2001				All years 98-99 & 9 months of 2001				6 months of 2002				2001							
Species	**Price US$**	31 months				33 months				6 months				12 months							
Meiacanthus nigrolineatus	2.5		0.0	0.0	0.0	343	857.5	1.1	0.6		0.0	0.0	0.0	453	1132.5	1.1	0.6	796	1990.0	0.8	0.4
Gobiidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	1934	0.0		0.0
Amblygobius albimaculatus	7		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	405	2835.0	1.0	1.4	405	2835.0	0.4	0.5
Amblygobius hectori	7		0.0	0.0	0.0	95	665.0	0.3	0.4		0.0	0.0	0.0		0.0	0.0	0.0	95	665.0	0.1	0.1
Cryptocentrus caeruleopunctatus	4	84	336.0	0.4	0.2		0.0	0.0	0.0	63	252.0	1.2	0.8	219	876.0	0.5	0.4	366	1464.0	0.4	0.3
Cryptocentrus cephalus	4	326	1304.0	1.5	1.0		0.0	0.0	0.0	77	308.0	1.5	1.0		0.0	0.0	0.0	403	1612.0	0.4	0.3
Cryptocentrus lutheri	4	32	128.0	0.2	0.1	508	2032.0	1.6	1.3		0.0	0.0	0.0		0.0	0.0	0.0	540	2160.0	0.5	0.4
Gobiodon citrinus	3		0.0	0.0	0.0	115	345.0	0.4	0.2		0.0	0.0	0.0		0.0	0.0	0.0	115	345.0	0.1	0.1
Istigobius ornatus	4		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	10	40.0	0.0	0.0	10	40.0	0.0	0.0
Microdesmidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	265	0.0		0.0
Ptereleotris evides	4		0.0	0.0	0.0	84	336.0	0.3	0.2		0.0	0.0	0.0	174	696.0	0.4	0.4	258	1032.0	0.3	0.2
Ptereleotris microlepis	4		0.0	0.0	0.0	4	16.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	4	16.0	0.0	0.0
Ptereleotris zebra	4		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	3	12.0	0.0	0.0	3	12.0	0.0	0.0
Acanthuridae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	13044	0.0		0.0
Acanthurus mata	8	181	1448.0	0.9	1.1		0.0	0.0	0.0	33	264.0	0.6	0.9		0.0	0.0	0.0	214	1712.0	0.2	0.3
Acanthurus nigricans	8		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	302	2416.0	0.7	1.2	302	2416.0	0.3	0.5
Acanthurus sohal	10	676	6760.0	3.2	5.0	1164	11640.0	3.7	7.6	127	1270.0	2.5	4.1	1646	16460.0	3.9	8.3	3613	36130.0	3.6	7.0
Ctenochaetus striatus	6	198	1188.0	0.9	0.9		0.0	0.0	0.0	32	192.0	0.6	0.6		0.0	0.0	0.0	230	1380.0	0.2	0.3
Naso brevirostris	10		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	228	2280.0	0.5	1.1	228	2280.0	0.2	0.4
Naso hexacanthus	10		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	335	3350.0	0.8	1.7	335	3350.0	0.3	0.6
Naso lituratus	8	293	2344.0	1.4	1.7	722	5776.0	2.3	3.8	101	808.0	2.0	2.6	1531	12248.0	3.7	6.2	2647	21176.0	2.7	4.1
Naso unicornis	10	11	110.0	0.1	0.1		0.0	0.0	0.0	31	310.0	0.6	1.0	50	500.0	0.1	0.3	92	920.0	0.1	0.2
Zebrasoma veliferum	6	658	3948.0	3.1	2.9	866	5196.0	2.8	3.4	135	810.0	2.6	2.6	645	3870.0	1.5	1.9	2304	13824.0	2.3	2.7
Zebrasoma xanthurum	12	649	7788.0	3.1	5.8	979	11748.0	3.1	7.6	167	2004.0	3.2	6.5	1284	15408.0	3.1	7.8	3079	36948.0	3.1	7.1
Siganidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	36	0.0		0.0
Siganus stellatus	4		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	36	144.0	0.1	0.1	36	144.0	0.0	0.0
Balistidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	2681	0.0		0.0
Balistoides viridescens	8		0.0	0.0	0.0	8	64.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	8	64.0	0.0	0.0
Balistapus undulatus	8	51	408.0	0.2	0.3		0.0	0.0	0.0	13	104.0	0.3	0.3	145	1160.0	0.3	0.6	209	1672.0	0.2	0.3
Odonus niger	10	305	3050.0	1.4	2.3	241	2410.0	0.8	1.6	71	710.0	1.4	2.3	299	2990.0	0.7	1.5	916	9160.0	0.9	1.8
Pseudobalistes fuscus	10	43	430.0	0.2	0.3	54	540.0	0.2	0.4	4	40.0	0.1	0.1		0.0	0.0	0.0	101	1010.0	0.1	0.2
Rhinecanthus assasi	8	372	2976.0	1.8	2.2	490	3920.0	1.6	2.5	96	768.0	1.9	2.5	260	2080.0	0.6	1.0	1218	9744.0	1.2	1.9
Suflamen albicaudatus	8		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	229	1832.0	0.5	0.9	229	1832.0	0.2	0.4
Monacanthidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	15	0.0		0.0
Cantherhines pardalis	10		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	15	150.0	0.0	0.1	15	150.0	0.0	0.0
Oxymonacanthus halli	10		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0	0.0	0.0	0.0
Ostraciidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	305	0.0		0.0
Ostracion cubicus	6	100	600.0	0.5	0.4	80	480.0	0.3	0.3	36	216.0	0.7	0.7		0.0	0.0	0.0	216	1296.0	0.2	0.2
Ostracion cyanurus	6	89	534.0	0.4	0.4		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	89	534.0	0.1	0.1
Tetraodontidae			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	1085	0.0		0.0
Arothron diadematus	6	373	2238.0	1.8	1.7	2	12.0	0.0	0.0	131	786.0	2.5	2.5	129	774.0	0.3	0.4	635	3810.0	0.6	0.7
Arothron immaculatus	6	12	72.0	0.1	0.1		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	12	72.0	0.0	0.0
Arothron nigropunctatus	6		36.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	6	36.0	0.0	0.0
Canthigaster coronata	3	41	123.0	0.2	0.1		0.0	0.0	0.0	42	126.0	0.8	0.4		0.0	0.0	0.0	83	249.0	0.1	0.0
Canthigaster margaritata	3		0.0	0.0	0.0	12	36.0	0.0	0.0		0.0	0.0	0.0	18	54.0	0.0	0.0	30	90.0	0.0	0.0
Arothron puffer	6		0.0	0.0	0.0	319	1914.0	1.0	1.2		0.0	0.0	0.0		0.0	0.0	0.0	319	1914.0	0.3	0.4
Total		**21050**	**135101.5**	**100.0**	**100.0**	**31198**	**153979.5**	**100.0**	**100.0**	**5150**	**30828.5**	**100.0**	**100.0**	**41678**	**198699.5**	**100.0**	**100.0**	**99076**	**518609.0**	**100.0**	**100.0**

Appendix 6(e). Yemen - Al-Bousi Company catch of ornamental fish during April, May, June and July 2002.

Month	Apr-02	May-02	Jun-02	Jul-02
Method of catch	Not recorded	Net	Net	Net
Number of divers	Not recorded	99	99	30
Number of boats	Not recorded	34	34	10
Depth	Not recorded	1-4m	1-4m	2-5m
Number of fishing days	26	28	25	10

Common name	Catch				RA/catch
	May-02	Jun-02	Jul-02	Total	
Arabian Butterflyfish					
Racoon Butterflyfish					
Red back Butterflyfish					
Orange face Butterflyfish					
Pale face Butterflyfish	55	112	2	169	4.87
Lined Butterflyfish					0.00
Threadfin Butterflyfish					0.00
Chevron Butterflyfish					0.00
Exquisite Butterflyfish					0.00
Masked Butterflyfish	971	900	243	2114	60.87
Longfin Bannerfish					0.00
Whitebelly Damselfish					0.00
Two-band Anemonefish	1	5		6	0.17
Platax teira					0.00
Picasso Triggerfish					0.00
Arabian Angelfish	248	172	134	554	15.95
Emperor Angelfish					0.00
Yellowbar Angelfish	23	52		75	2.16
Regal Angelfish					0.00
Sohal Surgeonfish	127	154		281	8.09
Yellowtail Surgeonfish	19			19	0.55
Sailfin Surgeonfish	154	89		243	7.00
Orangespine Unicornfish					0.00
Pennant fish	6	6		12	0.35
Others					0.00
Total catch	**1604**	**1490**	**379**	**3473**	**100.00**

Apr-02	
Item	**Catch**
Malak	617
Farash	983
Jarah	207
Keisy	
Muharej	
Blenny	
Meilak	
Others	11
Total	**1818**

Month	Collection Sites
May-02	Hatban, Al-Sawabi, North Al-Saleef, North of Kamaran, East of Shukran, East of Kamaran, East of Ras Saleef, Ras Isa
Jun-02	Hatban, East of Kamaran, North of Saleef, Uqban, East of Ras Saleef, Ras Isa, Al-Sawabi
Jul-02	Hatban, East of Kamaran, East of Ras Saleef, Ras Isa

Appendix 6(f). Monthly export/catch of different ornamental fish, their annual export, monthly average catch (AA), and monthly relative abundance (mRA) of Saif Company, Yemen during years 2000 – 2002.

2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
n	8	1	5	1	4	3	4	7	7	6	2	3	**Total catch**	**mAA**	**mRA**
Malak	170	19	102	27	119	79	130	227	193	128	60	95	1349	26.5	25.2
Farash	143	17	87	18	87	74	97	181	205	153	60	92	1214	23.8	22.7
Jarah	158	21	75	20	71	76	103	148	187	152	50	59	1120	22.0	21.0
Keisy	14	9	45	7	20		14	147	3	21			280	5.5	5.2
Muharej	23	15	27	9	9			30	7	21		8	149	2.9	2.8
Blenny	66		36		10			32	27	14		7	192	3.8	3.6
Meilak	23		41	7	25		20	73	53	44	10	4	300	5.9	5.6
Others	115	15	83	15	55	38	108	122	115	101	27	26	820	16.1	15.3
Total	**712**	**15**	**496**	**103**	**396**	**267**	**472**	**960**	**790**	**634**	**207**	**291**	**5343**	**104.8**	**100.0**

2001

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total catch	mAA
n	5	5		7	5	4	6	7	2	1	42		84.0	4.7
Malak	167	152	146	209	153	89	191	215	115	37	1474	27	2974.9	35.1
Farash	143	202	114	181	122	73	153	192	105	28	1313	24	2649.9	31.3
Jarah	132	100	123	149	83	85	122	123	109	25	1051	19	2121.2	25.0
Keisy	8	57	18	75	25	23	54	36		5	301	5	607.5	7.2
Muharej	5	22	11	41	41	26	35	23		7	211	4	425.8	5.0
Blenny	6	24	8	42	28	28	31	56			223	4	450.1	5.3
Meilak	20		1	36	32	37	30	54			210	4	423.8	5.0
Others	101	11	50	119	83	64	108	124	28	12	700	13	1412.8	16.7
Total	**582**	**568**	**471**	**852**	**567**	**425**	**724**	**823**	**357**	**114**	**5483**	**100**	**11066.0**	**130.5**

2002

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total catch	RA	mAA
n	5	2	5	4	1			2	7				26		
Malak	90	60	135	135	60			136	353				969	24.3	37.3
Farash	100	60	135	122	30			99	394				940	23.6	36.2
Jarah	100	60	125	105	30			212	350				982	24.6	37.8
Keisy	80	70	115	135				10					410	10.3	15.8
Muharej	41	10	50	75									176	4.4	6.8
Blenny	50		20	15									85	2.1	3.3
Meilak	18			35									53	1.3	2.0
Others	61		125	160				27					373	9.4	14.3
Total	**540**	**260**	**705**	**782**	**120**			**484**	**1097**				**3988**	**100.0**	

n = number of collection days

Appendix 6(g). Total numbers of ornamental fish, and their relative abundance (RA), as counted by the surveying team during visits to commercial companies' holding facilities in 2002.

	Egypt	Yemen		Saudi Arabia					
Scientific Name	**Al-Tour**	**Al-Bousi**	**Saif Company**	**Isham**	**Red Sea Secrets**	**Thoal Red Sea**	**Kamal Imad Softa**	**Total**	**RA**
Ginglymostomatidae	0	0	0	1	0	0	0	1	0.01
Nebrius sp.				1				1	0.01
Carcharhinidae				1				1	0.01
Carcharhinus longimanus				1				1	0.01
Dasyatidae	0	0	0	0	0	1	0	1	0.01
Taeniura lymma						1		1	0.01
Muraenidae	0	0	0	2	0	0	0	2	0.02
Echidna zebra				1				1	0.01
Gymnothorax sp.				1				1	0.01
Cyprinodontidae	0	0	0	0	2	0	0	2	0.02
Aphanius dispar					2			2	0.02
Holocentridae	0	0	0	42	0	0	0	42	0.41
Neoniphon summara				9				9	0.09
Sargocentron caudimaculatum				3				3	0.03
Sargocentron diadema				30				30	0.30
Scorpaenidae	0	0	0	5	11	6	4	26	0.26
Pterois miles				2	3	2	3	10	0.10
Pterois radiata				3	8	4	1	16	0.16
Serranidae	5	0	0	171	116	155	30	477	4.70
Cephalopholis argus							1	1	0.01
Cephalopholis hemistiktos				3	1		1	5	0.05
Cephalopholis miniata				3				3	0.03
Epinephelus summana				2				2	0.02
Variola louti				3				3	0.03
Pseudanthias squamipinnis	5			160	115	155	28	463	4.56
Pseudochromidae	0	0	0	1	26	130	76	233	2.30
Pseudochromis flavivertex					9	80	18	107	1.05
Pseudochromis fridmani					15	50	58	123	1.21
Pseudochromis olivaceus				1	2			3	0.03
Malacanthidae	0	0	0	2	26	130	76	234	0.02
Brachiostegus sawakinesis				1				1	0.01
Malacanthus brevirostris				1				1	0.01
Carangidae	0	0	0	0	0	0	1	1	0.01
Decapterus sp.							1	1	0.01
Lutjanidae	0	0	0	28	0	0	2	30	0.30
Lutjanus bohar				3				3	0.03
Lutjanus ehrenbergii				3				3	0.03
Lutjanus fulfuflamma				22				22	0.22
Lutjanus kasmira							2	2	0.02
Haemulidae	2	0	0	4	1	0	5	12	0.12
Diagramma pictum					1			1	0.01
Plectorhinchus gaterinus	2			4			5	11	0.11
Mullidae	0	0	0	31	5	0	8	44	0.43
Parupeneus cyclostomus				24	3		3	30	0.30
Parupeneus forsskali				5	2		5	12	0.12
Parupeneus macronema				2				2	0.02
Ephippidae	0	0	3	0	0	0	0	3	0.03
Platax orbicularis			1					1	0.01
Platax teira			2					2	0.02
Chaetodontidae	88	44	97	203	92	36	210	770	7.59
Chaetodon auriga	1			18	12	5		36	0.35
Chaetodon austriacus	1		7		7		15	30	0.30
Chaetodon fasciatus	8		2	102	12	12	79	215	2.12
Chaetodon lineolatus				2		3	7	12	0.12
Chaetodon larvatus	14	35	1		9	1	25	85	0.84

	Egypt	Yemen		Saudi Arabia					
Scientific Name	**Al-Tour**	**Al-Bousi**	**Saif Company**	**Isham**	**Red Sea Secrets**	**Thoal Red Sea**	**Kamal Imad Softa**	**Total**	**RA**
Chaetodon melannotus						2		2	0.02
Chaetodon melapterus			1					1	0.01
Chaetodon mesoleucos			3	7	3	6	7	26	0.26
Chaetodon paucifasciatus	1			13	11			25	0.25
Chaetodon semilarvatus	62	1	51	28	32	4	57	235	2.32
Chaetodon trifascialis	1							1	0.01
Heniochus diphreutes			2					2	0.02
Heniochus intermedius		8	30	33	6	3	20	100	0.99
Pomacanthidae	20	100	200	112	62	62	148	704	6.94
Apolemichthys xanthotis			1					1	0.01
Genicanthus caudovittatus				1			2	3	0.03
Pomacanthus imperator			8	3	1	3	9	24	0.24
Pomacanthus asfur		100	106	30	40	53	118	447	4.41
Pomacanthus maculosus	18		75	5	3		16	117	1.15
Pygoplites diacanthus	2		10	73	18	6	3	112	1.10
Pomacentridae	68	0	109	4558	288	0	571	5594	55.20
Abudefduf sexfasciatus	3				20			23	0.23
Abudefduf vaigiensis					22			22	0.22
Amphiprion bicinctus				30	94		105	229	2.26
Chromis dimidiata							60	60	0.59
Chromis viridis	57		100	4000	97		400	4654	45.88
Chromis weberi							3	3	0.03
Dascyllus aruanus	5			200				205	2.02
Dascyllus marginatus	1		9	28	45			83	0.82
Dascyllus trimaculatus				280				280	2.76
Neoglyphidodon melas							3	3	0.03
Pomacentrus sulfureus				20	10			30	0.30
Pomacentrus trilineatus	1							1	0.01
Stegastes nigricans	1							1	0.01
Labridae	19	8	37	168	39	62	145	478	4.71
Anampses caeruleopunctatus		1						1	0.01
Anampses meleagrides						3		3	0.03
Anampses twistii				1		6		7	0.07
Bodianus anthioides				8	4	14	9	35	0.35
Bodianus axillaries, Bennett, 1832				1				1	0.01
Cheilinus abudjubee	1	3		1	3			8	0.08
Cheilinus diagrammus Lacepède,					6			6	0.06
Cheilinus fasciatus, Bloch, 1791				8	6	2		16	0.16
Cheilinus lunulatus, Forsskål, 1775				9	3	5	16	33	0.33
Cheilinus undulates, Rüppell, 1829				1		2		3	0.03
Coris africana				1				1	0.01
Coris aygula, Lacepède, 1801					1			1	0.01
Coris variegate, Rüppell, 1835	3		1	1				5	0.05
Epibulus insidiator, Pallas, 1770					1			1	0.01
Gomphosus caeruleus klunzingeri		4	1	44	3		30	82	0.81
Halichoeres hortulanus, Lacepède,			1	2		3	5	11	0.11
Halichoeres marginatus							21	21	0.21
Halichoeres scapularis				1	2		6	9	0.09
Hemigymnus fasciatus	3							3	0.03
Hemigymnus melapterus	2							2	0.02
Hologymnosus annulatus				2				2	0.02
Labroides dimidiatus					5		5	10	0.10
Larabicus quadrilineatus	1		33			3	20	57	0.56
Novaculichthys taeniourus				2				2	0.02
Paracheilinus octotaenia							18	18	0.18
Pseudodax molucanus				6				6	0.06
Stethojulis albovittata	2							2	0.02
Thalassoma purpureum						24		24	0.24

	Egypt	Yemen		Saudi Arabia					
Scientific Name	**Al-Tour**	**Al-Bousi**	**Saif Company**	**Isham**	**Red Sea Secrets**	**Thoal Red Sea**	**Kamal Imad Softa**	**Total**	**RA**
Thalassoma rueppellii	7			30	2		6	45	0.44
Thalassoma lunare			1	50	3		9	63	0.62
Scaridae	4	0	0	11	2	0	1	18	0.18
Cetoscarus bicolor				6			1	7	0.07
Chlorurus sordidus	1							1	0.01
Chlorurus gibbus	1			3	2			6	0.06
Scarus niger	1			2				3	0.03
Scarus psittacus	1							1	0.01
Pinguipedidae	0	0	0	0	2	0	0	2	0.02
Parapercis hexophtalma					2			2	0.02
Blennidae	0	0	0	5	2	0	20	27	0.27
Meiacanthus nigrolineatus					2		20	22	0.22
Salarias fasciatus				5				5	0.05
Gobiidae				12			72		0.83
Amblygobius albimaculatus				9			72	81	0.80
Cryptocentrus caeruleopunctatus				3				3	0.03
Acanthuridae	34	391	160	249	130	66	261	1291	12.70
Acanthurus gahham			3				4	7	0.07
Acanthurus nigrofuscus						5	10	15	0.15
Acanthurus sohal	1	170	25	25	36	3	87	347	3.42
Ctenochaetus striatus			5		4			9	0.09
Naso hexacanthus							8	8	0.08
Naso lituratus		1		85	16	10	1	113	1.11
Naso unicornis				9	12			21	0.21
Zebrasoma veliferum	10			95	40		91	236	2.33
Zebrasoma xanthurum	23	220	127	35	22	48	60	535	5.27
Siganidae	0	0	0	0	6	0	4	10	0.10
Siganus rivulatus							1	1	0.01
Siganus stellatus					6		3	9	0.09
Balistidae	0	0	0	98	31	0	82	211	2.08
Balistapus undulatus							5	5	0.05
Balistoides viridescens				2				2	0.02
Odonus niger				50	19		58	127	1.25
Pseudobalistes fuscus				3				3	0.03
Rhinecanthus assasi				43	12		19	74	0.73
Monacanthidae	1	0	0	28	0	0	0	29	0.29
Cantherhines pardalis				28				28	0.28
Oxymonacanthus halli	1							1	0.01
Ostraciidae	0	0	14	0	9	0	0	23	0.23
Ostracion cubicus			12		1			13	0.13
Ostracion cyanurus			2		8			10	0.10
Tetraodontidae	0	2	0	3	15	0	5	25	0.25
Arothron diadematus		2		1	14		5	22	0.22
Arothron immaculatus				1	1			2	0.02
Arothron stellatus				1				1	0.01
Chromis viridis, Cuvier, 1830	57	0	100	4000	97	0	400	4654	
Total Number of individuals	241	545	620	5735	839	518	1645	10143	
Number of individuals without *Chromis viridis*	184	545	520	1735	742	518	1245	5489	

RA = Relative Abundance

Collated results for the total numbers of fish and their relative abundance (RA) from Egypt, Yemen and Saudi Arabia calculated from data collected from commercial companies' holding facilties in 2002.

	Egypt		Yemen		Saudi Arabia		All Countries	
Scientific Name	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**
Ginglymostomatidae		0.00		0.00				0.01
Nebrius sp.		0.00		0.00	1	0.01	1	0.01
Carcharhinidae		0.00		0.00	1	0.01		0.01
Carcharhinus longimanus		0.00		0.00	1	0.01	1	0.01
Dasyatidae	0	0.00		0.00	0	1.43		0.01
Taeniura lymma		0.00		0.00	1	0.01	1	0.01
Muraenidae		0.00		0.00	2	0.02		0.02
Echidna zebra		0.00		0.00	1	0.01	1	0.01
Gymnothorax sp.		0.00		0.00	1	0.01	1	0.01
Cyprinodontidae		0.00		0.00	2	0.02		0.02
Aphanius dispar		0.00		0.00	2	0.02	2	0.02
Holocentridae	0	0.00		0.00	42	0.41		0.41
Neoniphon summara		0.00		0.00	9	0.09	9	0.09
Sargocentron caudimaculatum		0.00		0.00	3	0.03	3	0.03
Sargocentron diadema		0.00		0.00	30	0.30	30	0.30
Scorpaenidae	0	0.00		0.00	26	0.26		0.26
Pterois miles		0.00		0.00	10	0.10	10	0.10
Pterois radiata		0.00		0.00	16	0.16	16	0.16
Serranidae	5	2.07		0.00	472	4.65	477	4.70
Cephalopholis argus		0.00		0.00	1	0.01	1	0.01
Cephalopholis hemistiktos		0.00		0.00	5	0.05	5	0.05
Cephalopholis miniata		0.00		0.00	3	0.03	3	0.03
Epinephelus summana		0.00		0.00	2	0.02	2	0.02
Variola louti		0.00		0.00	3	0.03	3	0.03
Pseudanthias squamipinnis	5	2.07		0.00	458	4.52	463	4.56
Pseudochromidae				0.00	233	2.30	233	2.30
Pseudochromis flavivertex		0.00		0.00	107	1.05	107	1.05
Pseudochromis fridmani		0.00		0.00	123	1.21	123	1.21
Pseudochromis olivaceus		0.00		0.00	3	0.03	3	0.03
Malacanthidae		0.00		0.00	2	0.02	2	0.02
Brachiostegus sawakinesis		0.00		0.00	1	0.01	1	0.01
Malacanthus brevirostris		0.00		0.00	1	0.01	1	0.01
Carangidae		0.00		0.00	1	0.01	1	0.01
Decapterus sp.		0.00		0.00	1	0.01	1	0.01
Lutjanidae		0.00		0.00	30	0.30	30	0.30
Lutjanus bohar		0.00		0.00	3	0.03	3	0.03
Lutjanus ehrenbergii		0.00		0.00	3	0.03	3	0.03
Lutjanus fulfuflamma		0.00		0.00	22	0.22	22	0.22
Lutjanus kasmira		0.00		0.00	2	0.02	2	0.02
Haemulidae		0.83		0.00	10	0.10	12	0.12
Diagramma pictum		0.00		0.00	1	0.01	1	0.01
Plectorhinchus gaterinus	2	0.83		0.00	9	0.09	11	0.11
Mullidae		0.00		0.00	44	0.43	44	0.43
Parupeneus cyclostomus		0.00		0.00	30	0.30	30	0.30
Parupeneus forsskali		0.00		0.00	12	0.12	12	0.12
Parupeneus macronema		0.00		0.00	2	0.02	2	0.02
Ephippidae		0.00	3	0.26	0	0.00	3	0.03
Platax orbicularis		0.00	1	0.09	0	0.00	1	0.01
Platax teira		0.00	2	0.17	0	0.00	2	0.02
Chaetodontidae	88	36.51	141	12.10	541	5.33	770	7.59
Chaetodon auriga	1	0.41		0.00	35	0.35	36	0.35
Chaetodon austriacus	1	0.41	7	0.60	22	0.22	30	0.30
Chaetodon fasciatus	8	3.32	2	0.17	205	2.02	215	2.12
Chaetodon lineolatus		0.00		0.00	12	0.12	12	0.12

	Egypt		Yemen		Saudi Arabia		All Countries	
Scientific Name	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**
Chaetodon larvatus	14	5.81	36	3.09	35	0.35	85	0.84
Chaetodon melannotus		0.00		0.00	2	0.02	2	0.02
Chaetodon melapterus		0.00	1	0.09	0	0.00	1	0.01
Chaetodon mesoleucos		0.00	3	0.26	23	0.23	26	0.26
Chaetodon paucifasciatus	1	0.41		0.00	24	0.24	25	0.25
Chaetodon semilarvatus	62	25.73	52	4.46	121	1.19	235	2.32
Chaetodon trifascialis	1	0.41		0.00	0	0.00	1	0.01
Heniochus diphreutes		0.00	2	0.17	0	0.00	2	0.02
Heniochus intermedius		0.00	38	3.26	62	0.61	100	0.99
Pomacanthidae	20	8.30	300	25.75	384	3.79	704	6.94
Apolemichthys xanthotis		0.00	1	0.09	0	0.00	1	0.01
Genicanthus caudovittatus		0.00		0.00	3	0.03	3	0.03
Pomacanthus imperator		0.00	8	0.69	16	0.16	24	0.24
Pomacanthus asfur		0.00	206	17.68	241	2.38	447	4.41
Pomacanthus maculosus	18	7.47	75	6.44	24	0.24	117	1.15
Pygoplites diacanthus	2	0.83	10	0.86	100	0.99	112	1.10
Pomacentridae	68	28.22	100	8.58	5417	53.41	5594	55.20
Abudefduf sexfasciatus	3	1.24		0.00	20	0.20	23	0.23
Abudefduf vaigiensis		0.00		0.00	22	0.22	22	0.22
Amphiprion bicinctus		0.00		0.00	229	2.26	229	2.26
Chromis dimidiata		0.00		0.00	60	0.59	60	0.59
Chromis viridis	57	23.65	100	8.58	4497	44.34	4654	45.88
Chromis weberi		0.00		0.00	3	0.03	3	0.03
Dascyllus aruanus	5	2.07		0.00	200	1.97	205	2.02
Dascyllus marginatus	1	0.41	9	0.77	73	0.72	83	0.82
Dascyllus trimaculatus		0.00		0.00	280	2.76	280	2.76
Neoglyphidodon melas		0.00		0.00	3	0.03	3	0.03
Pomacentrus sulfureus		0.00		0.00	30	0.30	30	0.30
Pomacentrus trilineatus	1	0.41		0.00	0	0.00	1	0.01
Stegastes nigricans	1	0.41		0.00	0	0.00	1	0.01
Labridae	19	7.88	45	3.86	414	4.08	478	4.71
Anampses caeruleopunctatus		0.00	1	0.09	0	0.00	1	0.01
Anampses meleagrides		0.00		0.00	3	0.03	3	0.03
Anampses twistii		0.00		0.00	7	0.07	7	0.07
Bodianus anthioides		0.00		0.00	35	0.35	35	0.35
Bodianus axillaries, Bennett, 1832		0.00		0.00	1	0.01	1	0.01
Cheilinus abudjubee	1	0.41	3	0.26	4	0.04	8	0.08
Cheilinus diagrammus Lacepède,		0.00		0.00	6	0.06	6	0.06
Cheilinus fasciatus, Bloch, 1791		0.00		0.00	16	0.16	16	0.16
Cheilinus lunulatus, Forsskål, 1775		0.00		0.00	33	0.33	33	0.33
Cheilinus undulates, Rüppell, 1829		0.00		0.00	3	0.03	3	0.03
Coris africana		0.00		0.00	1	0.01	1	0.01
Coris aygula, Lacepède, 1801		0.00		0.00	1	0.01	1	0.01
Coris variegate, Rüppell, 1835	3	1.24	1	0.09	1	0.01	5	0.05
Epibulus insidiator, Pallas, 1770		0.00		0.00	1	0.01	1	0.01
Gomphosus caeruleus klunzingeri		0.00	5	0.43	77	0.76	82	0.81
Halichoeres hortulanus, Lacepède,		0.00	1	0.09	10	0.10	11	0.11
Halichoeres marginatus		0.00		0.00	21	0.21	21	0.21
Halichoeres scapularis		0.00		0.00	9	0.09	9	0.09
Hemigymnus fasciatus	3	1.24		0.00	0	0.00	3	0.03
Hemigymnus melapterus	2	0.83		0.00	0	0.00	2	0.02
Hologymnosus annulatus		0.00		0.00	2	0.02	2	0.02
Labroides dimidiatus		0.00		0.00	10	0.10	10	0.10
Larabicus quadrilineatus	1	0.41	33	2.83	23	0.23	57	0.56
Novaculichthys taeniourus		0.00		0.00	2	0.02	2	0.02
Paracheilinus octotaenia		0.00		0.00	18	0.18	18	0.18
Pseudodax molucanus		0.00		0.00	6	0.06	6	0.06
Stethojulis albovittata	2	0.83		0.00	0	0.00	2	0.02

	Egypt		Yemen		Saudi Arabia		All Countries	
Scientific Name	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**	**Total**	**RA**
Thalassoma purpureum		0.00		0.00	24	0.24	24	0.24
Thalassoma rueppellii	7	2.90		0.00	38	0.37	45	0.44
Thalassoma lunare		0.00	1	0.09	62	0.61	63	0.62
Scaridae	4	1.66		0.00	14	0.14	18	0.18
Cetoscarus bicolor		0.00		0.00	7	0.07	7	0.07
Chlorurus sordidus	1	0.41		0.00	0	0.00	1	0.01
Chlorurus gibbus	1	0.41		0.00	5	0.05	6	0.06
Scarus niger	1	0.41		0.00	2	0.02	3	0.03
Scarus psittacus	1	0.41		0.00	0	0.00	1	0.01
Pinguipedidae		0.00		0.00	2	0.02	2	0.02
Parapercis hexophtalma		0.00		0.00	2	0.02	2	0.02
Blennidae		0.00		0.00	27	0.27	27	0.27
Meiacanthus nigrolineatus		0.00		0.00	22	0.22	22	0.22
Salarias fasciatus		0.00		0.00	5	0.05	5	0.05
Gobiidae		0.00		0.00	84	0.83	84	0.83
Amblygobius albimaculatus		0.00		0.00	81	0.80	81	0.80
Cryptocentrus caeruleopunctatus		0.00		0.00	3	0.03	3	0.03
Acanthuridae	34	14.11	551	47.30	706	6.96	1291	12.70
Acanthurus gahham		0.00	3	0.26	4	0.04	7	0.07
Acanthurus nigrofuscus		0.00		0.00	15	0.15	15	0.15
Acanthurus sohal	1	0.41	195	16.74	151	1.49	347	3.42
Ctenochaetus striatus		0.00	5	0.43	4	0.04	9	0.09
Naso hexacanthus		0.00		0.00	8	0.08	8	0.08
Naso lituratus		0.00	1	0.09	112	1.10	113	1.11
Naso unicornis		0.00		0.00	21	0.21	21	0.21
Zebrasoma veliferum	10	4.15		0.00	226	2.23	236	2.33
Zebrasoma xanthurum	23	9.54	347	29.79	165	1.63	535	5.27
Siganidae		0.00		0.00	10	0.10	10	0.10
Siganus rivulatus		0.00		0.00	1	0.01	1	0.01
Siganus stellatus		0.00		0.00	9	0.09	9	0.09
Balistidae		0.00		0.00	211	2.08	211	2.08
Balistapus undulatus		0.00		0.00	5	0.05	5	0.05
Balistoides viridescens		0.00		0.00	2	0.02	2	0.02
Odonus niger		0.00		0.00	127	1.25	127	1.25
Pseudobalistes fuscus		0.00		0.00	3	0.03	3	0.03
Rhinecanthus assasi		0.00		0.00	74	0.73	74	0.73
Monacanthidae	1	0.41		0.00	28	0.28		0.29
Cantherhines pardalis		0.00		0.00	28	0.28	28	0.28
Oxymonacanthus halli	1	0.41		0.00	0	0.00	1	0.01
Ostraciidae		0.00	14	1.20	9	0.09	23	0.23
Ostracion cubicus		0.00	12	1.03	1	0.01	13	0.13
Ostracion cyanurus		0.00	2	0.17	8	0.08	10	0.10
Tetraodontidae		0.00	2	0.17	23	0.23	25	0.25
Arothron diadematus		0.00	2	0.17	20	0.20	22	0.22
Arothron immaculatus		0.00		0.00	2	0.02	2	0.02
Arothron stellatus		0.00		0.00	1	0.01	1	0.01
Total	**241**		**1165**		**8737**		**10143**	

Egypt - Egypt Company; Yemen - Al-Bousi and Saif companies; Saudi Arabia - Isham, Red Sea secrets, Thoal Red Sea and Al-Leith Imad Kamal Softa

Appendix 6(h). Percentage number of fishes being counted at holding facilities in different ornamental fish trade companies at countries along the Red Sea coast.

Company/Country	**Percentage**	
Al-Tour / Egypt	2.38	
Total Egypt		2.38
Al-Bousi / Yemen	5.37	
Saif / Yemen	6.11	
Total Yemen		11.48
Isham / Saudi Arabia	56.54	
Red Sea Secrets / Saudi Arabia	8.27	
Thoal Red Sea / Saudi Arabia	5.11	
Al-Leith Imad Softa / Saudi Arabia	16.22	
Total Saudi Arabia		86.14
Totals	100	100