



The state of biodiversity in Kuwait

Zuhair S. Amr



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Table of contents

List of tables	VI
List of figures	VIII
Foreword by the Environment Public Authority	X
Foreword by the IUCN Regional Office for West Asia	XI
Context	XII
Executive summary	XIII
Acknowledgments	XVI
1 Introduction	1
1.1 Location and topography	2
1.2 Natural environment context	2
2 Methodology	7
3 Terrestrial and marine vertebrates	11
3.1 Classes Amphibia and Reptilia	12
3.2 Class Mammalia	18
3.3 Class Aves	23
3.4 Classes Chondrichthyes and Osteichthyes	33
4 Arthropoda	47
4.1 Subphylum Chelicerata	48
4.1.1 Arachnida	48
4.1.1.1 Order Scorpiones	48
4.1.1.2 Order Araneae	49
4.1.1.3 Pseudoscorpiones	49
4.1.1.4 Order Solifugae	50
4.1. 2 Subclass Acari: Order Ixodida	50
4.1. 3 Order Trombidiformes	51
4.2 Subphylum Myriapoda	51
4.2.1 Class Chilopoda	51
4.3 Subphylum Crustacea	52
4.3.1 Class Malacostraca	52
4.3.1.1 Order Amphipoda	52
4.3.1.2 Order Decopoda: Suborder Senticaudata	55
4.3.1.3 Order Decopoda: Suborder Pleocyemata: Infraorder Caridea	60
4.3.1.4 Suborder Dendrobranchiata	61
4.3.1.5 Infraorders Achelata, Anomura and Thalassinidea	62
4.3.1.6 Order Isopoda	63
4.3.1.7 Order Cumacea	64
4.3.1.8 Order Mysida	64
4.3.2 Class Hexanauplia	65
4.3.3 Class Branchiopoda	67

4.4 Subphylum Hexapoda	68
4.4.1 Class Insecta	68
4.4.1.1 Order Odonata (Dragonflies).....	68
4.4.1.2 Order Orthoptera	70
4.4.1.3 Order Diptera	72
4.4.1.4 Order Coleoptera	78
4.4.1.5 Order Mantodea	79
4.4.1.6 Other minor groups	80
4.4.1.7 Order Siphonaptera	81
4.4.1.8 Order Neuroptera	82
4.4.1.9 Order Heimptera	83
4.4.1.10 Order Hymenoptera	85
4.4.1.11 Order Lepidoptera	86
4.4.1.12 Order Mallophaga	90
4.4.1.13 Order Anoplura	91
5 Phyla Bryozoa, Phoronida, Platyhelminthes and Acanthocephala	93
5.1 Phyla Bryozoa and Phoronida Monogenea	94
5.2 Phylum Platyhelminthes Digenea	94
5.2.1 Class Monogenea	94
5.2.2 Class Digenea	95
5.3 Phylum Acanthocephala	96
6 Phylum Cnidaria	99
6.1 Classes Hydrozoa and Scyphozoa	100
6.2 Class Anthozoa	101
7 Phyla Annelida, Sipuncula and Brachiopoda	107
7.1 Phylum Annelida	108
7.1.1 Class Polychaeta	108
7.2 Phylum Sipuncula	110
7.3 Phylum Brachiopoda	111
8 Phylum Mollusca	113
8.1 Class Polyplacophora	114
8.2 Class Gastropoda	115
8.3 Class Bivalvia	118
8.4 Class Scaphopoda	120
8.5 Class Cephalopoda	120
9 Phylum Echinodermata, Hemichordata and Chordata	123
9.1 Phylum Echinodermata	124
9.2 Phylum Hemichordata	125
9.2.1 Class Enteropneusta	125
9.3 Phylum (Classes: Ascidiacea and Leptocardii)	125

10 Marine Algae	127
10. 1 Marine macrolagae	128
10.1.1 Phylum Chlorophyta	128
10.1.2 Phylum Rhodophyta	129
10.1.3 Phylum Heterokontophyta	130
10.1.4 Phylum Tracheophyta	131
10.1.5.1 Phylum Pyrrophyta	133
10.1.5.2 Phylum Bacillariophyta	133
10.1.5.3 Other marine phytoplankton	134
10.1.6 Marine Zooplanktons	135
11 Flora	139
11.1 Phylum Bryophyta	140
11.2 Angiospermae	141
11.3 Gymnospermae	144
11.4 Vegetation of Kuwait	149
11.5 Distribution of the vegetation	149
11.6 Changes to plant communities	151
12 Recommendations	155
Annexes	
Annex 1: Birds of Kuwait (source: Birdlife International & http://www.kuwaitbirds.org/birds)...	160
Annex 2: List of fishes recorded from Kuwait (Based on Bishop, 2003).....	175
Annex 3: Coleopteran reported from Kuwait.	186
Annex 4: Species of suborder Heteroptera reported from Kuwait.	194
Annex 5: Hymenoptera reported from Kuwait.	197
Annex 6: Polychaeta species reported from Kuwait.	201
Annex 7: Marine gastropods reported from Kuwait.	207
Annex 8: Bivalevs reported from Kuwait.	218
Annex 9: Dinoflagellates reported from Kuwait.	225
Annex 10: Diatoms reported from Kuwait.	228
Annex 11: Dicotyledoneae recorded from Kuwait.	236
Annex 12 Monocotyledoneae recorded from Kuwait.....	245

List of tables

Table 1: Number of species recorded from Kuwait per taxonomic group.....	XIII
Table 2: Micro and macro algae reported from Kuwait.....	XIV
Table 3: Plants reported from Kuwait.....	XIV
Table 4: List of animal species described from Kuwait.....	XV
Table 5: Species of marine ciliates described from Kuwait.....	XVI
Table 6: List of amphibians and reptiles of Kuwait.....	14
Table 7: IUCN status of reptiles of Kuwait.....	15
Table 8: List of surviving mammals of Kuwait.....	18
Table 9: Extinct mammals of Kuwait and their IUCN conservation status.....	20
Table 10: Marine mammals reported from Kuwait and their IUCN conservation status.....	21
Table 11: Books on the birds of Kuwait in Arabic.....	26
Table 12: IUCN Conservation status of Kuwaiti birds.....	27
Table 13: IUCN Conservation status of sharks in Kuwait and the Arabian Gulf.....	35
Table 14: IUCN Conservation status of rays and guitarfishes in Kuwait and the Arabian Gulf.....	36
Table 15: Regionally threatened marine bony fishes in the Gulf.....	40
Table 16: Scorpions reported from Kuwait.....	48
Table 17: Spiders reported from Kuwait.....	49
Table 18: Ticks reported from Kuwait.....	51
Table 19: Amphipods reported from Kuwait (* = described from Kuwait).....	52
Table 20: Decapoda reported from Kuwait.....	56
Table 21: Caridea reported from Kuwait.....	60
Table 22: Caridea reported from Kuwait.....	61
Table 23: Achelata, Anomura and Thalassinidea reported from Kuwait.....	62
Table 24: Isopods reported from Kuwait.....	63
Table 25: Comma shrimp reported from Kuwait.....	64
Table 26: Hexanauplia reported from Kuwait.....	65
Table 27: Odonata of Kuwait.....	68
Table 28: Orthopteran species recorded from Kuwait.....	70
Table 29: Mosquitoes recorded from Kuwait.....	72
Table 30: Sandflies reported from Kuwait.....	73
Table 31: Chironomids reported from Kuwait.....	73
Table 32: Robber flies reported from Kuwait.....	74
Table 33: Bee flies reported from Kuwait.....	74
Table 34: Other families of order Diptera reported from Kuwait.....	75
Table 35: Diptera of medical importance reported from Kuwait.....	76
Table 36: Mantodea reported from Kuwait.....	79
Table 37: Other minor orders of insects reported from Kuwait.....	80
Table 38: Fleas reported from Kuwait.....	81
Table 39: Neuroptera reported from Kuwait.....	82
Table 40: Species of Aphididae and Diaspididae reported from Kuwait.....	83
Table 41: Species of Cicadellidae and Delphacidae reported from Kuwait.....	84
Table 42: Butterflies recorded from Kuwait.....	86
Table 43: Moths of Kuwait.....	88
Table 44: Mallophaga reported from Kuwait.....	90

Table 45: Anoplura reported from Kuwait.....	91
Table 46: Monogeneans recoverd from fishes from Kuwait.....	94
Table 47: Digeneans recoverd from fishes from Kuwait.....	95
Table 48: Acanthocephalan worms recoverd from fishes from Kuwait.....	96
Table 49: Hydrozoans and scyphozoans reported from Kuwait.....	100
Table 50: Corals recorded from Kuwaiti waters.....	103
Table 51: IUCN conservation status for corals in Kuwait.....	104
Table 52: Polychaeta species described from Kuwait by Mohammad (1970a & b; 1971 &1980).....	109
Table 53: Sipunculids reported from Kuwait.....	110
Table 54: Chitons reported from Kuwait.....	114
Table 55: Scaphopods reported from Kuwait.....	120
Table 56: Cephalopods reported from Kuwait.....	120
Table 57: Echinoderms reported from Kuwait.....	124
Table 58: marine chorateds reported from Kuwait.....	125
Table 59: Marine macroalage (Phylum Chlorophyta) reported from Kuwait.....	128
Table 60: Marine macroalage (Phylum Rhodophyta) reported from Kuwait.....	129
Table 61: Marine macroalage (Phylum Heterokontophyta) reported from Kuwait.....	130
Table 62: Marine macroalage (Phylum Tracheophyta) reported from Kuwait.....	131
Table 63: Marine algae major groups.....	132
Table 64: Other marine phytoplanktons.....	134
Table 65: List of species of Order Tintinnida (Phylum Ciliophora) of the Arabian Gulf.....	135
Table 66: List of mosses reported from Kuwait.....	140
Table 67: Floristic analysis of native and natuarlized plants of Kuwait.....	141

List of figures

Figure 1: Map showing location of the State of Kuwait (Source: http://acc.teachmideast.org).....	2
Figure 2: Habitat of Jal Az Zour ridge (Photo from Abdulrahman Al-Sirhan).....	3
Figure 3: Al Jaharah Nature Reserve (Photo from Faisal Al Nomas).....	3
Figure 4: Arial photo from Al Jaharah Nature Reserve (Photo from Faisal Al Nomas).....	4
Figure 5: Arial photo from Failka island (Photo from Faisal Al Nomas).....	4
Figure 6: Habitat of Wadi Al Batin (Photo from Abdulrahman Al-Sirhan).....	5
Figure 7: Some reptiles from Kuwait. <i>Stenodactylus affinis</i> (Photo from Abdulrahman Al-Sirhan).....	12
Figure 8: Some reptiles from Kuwait. <i>Trapelus agnetae</i> (Photo from Abdulrahman Al-Sirhan).....	13
Figure 9: Some reptiles from Kuwait. <i>Trapelus persicus</i> (Photo from Abdul Aziz Al Yousef).....	15
Figure 10: Some mammals from Kuwait. Long-eared Hedgehog, <i>Hemiechinus auritus</i> . (Photos from Abdul Al-Azizi Al Yousef).....	19
Figure 11: Some mammals from Kuwait. Lesser Jerboa, <i>Jaculus jaculus</i> . (Photos from Abdul Al-Azizi Al Yousef).....	19
Figure 12: Some mammals from Kuwait. The Red Fox, <i>Vulpes vulpes</i> . (Photo from Faisal Al Nomas).....	20
Figure 13: Some mammals from Kuwait. Cheesman's Gerbil, <i>Gerbillus cheesmani</i> . (photos from Abdul Al-Azizi Al Yousef).....	21
Figure 14: Books on the birds of Kuwait.	23
Figure 15: Birds of Kuwait. A female feeding its chicks (Photos from Abdul Al-Azizi Al Yousef).....	26
Figure 16: Some birds from Kuwait. A. The Asian desert warbler, <i>Sylvia nana</i> . B. Barred Warbler, <i>Sylvia nisoria</i> . C. Black-eared Wheatear, <i>Oenanthe hispanica</i> . D. Blue-cheeked Bee-eater, <i>Merops persicus</i> . E. Common Kingfisher, <i>Alcedo atthis</i> . F. Temminck's Horned Lark, <i>Eremophila bilopha</i> . G. Goldfinch, <i>Carduelis carduelis</i> . H. White-throated Kingfisher, <i>Halcyon smyrnensis</i> . (All photos from Abdul Al-Aziz Al Yousef).....	26
Figure 17: Some aquatic birds from Kuwait. A. Greater Flamingo, <i>Phoenicopterus roseus</i> . B. Little Egret, <i>Egretta garzetta</i> . C. Grey-headed Swamphen, <i>Porphyrio poliocephalus</i> . D. Great Snipe, <i>Gallinago media</i> . E. Red-wattled lapwing, <i>Vanellus indicus</i> . (All photos from Abdul Al-Aziz Al Yousef).....	29
Figure 18: Some raptors from Kuwait. A. Lilith Owl, <i>Athene noctua lilith</i> . B. Griffon Vulture, <i>Gyps fulvus</i> . C. Sparrowhawk, <i>Accipiter nisus</i> . D. Long-eared Owl, <i>Asio otus</i> . (All photos from Abdul Al-Aziz Al Yousef).....	30
Figure 19: Some intertidal birds from Kuwait.	31
Figure 20: Main books on the fishes of Kuwait.	33
Figure 21: Books on sharks of the Arabian Gulf.	34
Figure 22: Some cartilaginous fish of Kuwait.	34
Figure 23: Coral fishes from the Arabian Gulf. A. <i>Acanthurus sohal</i> . B. <i>Abudefduf vaigiensis</i> . C. <i>Chaetodon melapterus</i> . D. <i>Chlorurus sordidus</i> . E. <i>Apogon cyanosoma</i> . F. <i>Chaetodon nigropunctatus</i> . (All photos from F. Krupp).....	37
Figure 24: Some boney fishes from Kuwait.	41
Figure 25: A camel spider of Order Solifugae.....	50

Figure 26: Cover for the field guide of Amphipods of Kuwait.....	52
Figure 27: Books published on the crabs of Kuwait and the Arabian Gulf.	55
Figure 28: The rounded ghost crab, <i>Ocypode rotundata</i> (Photo from F. Krupp).....	55
Figure 29: Intertidal crabs from Kuwait.....	58
Figure 30: Books in Arabic on the insects of Kuwait.....	68
Figure 31: Dargonflies from Kuwait, <i>Crocothemis erythrea</i> (Photos from Mohammad El Marefi).....	69
Figure 32: Dargonflies from Kuwait, <i>Crocothemis servilia</i> (Photos from Mohammad El Marefi).....	69
Figure 33: A grasshopper of family Acrididae (Photos from Abdul Al-Aziz Al Yousef).....	71
Figure 34: The praying mantis, <i>Blepharopsis mendica</i> (Photos from Abdul Al-Aziz Al Yousef).....	79
Figure 35: The plain tiger butterfly, <i>Danaus chrysippus</i> (Photos from Mohammad El Marefi).....	87
Figure 36: Corals from the Arabian Gulf. <i>Acropora clathrate</i> (Photos from F. Krupp).....	101
Figure 37: Corals from the Arabian Gulf. <i>Platygyra daedalea</i> (Photos from F. Krupp).....	102
Figure 38: Corals from the Arabian Gulf. <i>Tubastrea coccinea</i> (Photos from F. Krupp).....	102
Figure 39: Books on the corals of Kuwait.	104
Figure 40: Books on marine invertebrates of Kuwait.	108
Figure 41: Nudibranch from Kuwait. A. <i>Chromodoris annulata</i> (Photo from A. Alhafez). B. <i>Chromodoris annulata</i> non spectacle (Photo from I. Basuny). C. <i>Chromodoris obsoleta</i> (Photo from R. Pelczynski). D. <i>Glossodoris</i> cf. <i>pallida</i> (Photo from S. J. Howlett). E. <i>Plocamopherus ocellatus</i> (Photo from A. Wilson). F. <i>Phyllidia</i> (<i>Fryeria</i>) <i>rueppelii</i> (Photo from N. Papatanasapoulou).....	115
Figure 42: Some common gastropods in the intertidal waters of Kuwait.....	117
Figure 43: Some intertidal bivalves from Kuwait.	119
Figure 44: The main source for the macroalgae of Kuwait.	128
Figure 45: Books on the phytoplanktons and diatoms of Kuwait.....	133
Figure 46: Books on the flora of Kuwait.....	141
Figure 47: Cover of the historical book of the wild flowers of Kuwait and Bahrain by Dickson (1955).	142
Figure 48: Bushes of Kuwait. A. <i>Rhanterium epapposum</i> . B. <i>Lycium shawii</i> . C. <i>Haloxylon salicornicum</i> . D. <i>Salsola imbricata</i> (All photos from Abdul Rahman Al-Sirhan).	142
Figure 49: Some flowering plants from Kuwait. A. <i>Gagea reticulata</i> . B. <i>Senecio glaucus</i> . C. <i>Rhanterium epapposum</i> . (All photos from M. Al-Dosari).....	143
Figure 50: Some flowering plants from Kuwait. A. <i>Cakile arabica</i> . B. <i>Echium rauwolfii</i> . C. <i>Haloxylon salicornicum</i> . D. <i>Mathiola longipetala</i> . E. <i>Rumex vesicarius</i> . F. <i>Calligonum comosum</i> . (All photos from M. Al-Dosari).....	144
Figure 51: A poster showing some flowering plants from Kuwait.	145
Figure 52: Vegetation map of Kuwait showing five plant communities (Source: Halwagy and Halwagy, 1974).	150
Figure 53: Current vegetation map of Kuwait (source: Omar et al., 2001).	151

Foreword by the Environment Public Authority

It is with great pleasure to present *The status of biodiversity in Kuwait* report which is an outcome conducted between the various local Kuwaiti scientists, and experts from both governmental and non-governmental authorities, under the guidance and collaboration of IUCN “International Union for Conservation of Nature”. Publications in relation to Kuwait’s Biodiversity are scarce. Such report was long awaited to be accomplished and finalized to focus on the various biological components and threats facing the environment of Kuwait.

The negative anthropogenic impacts on biodiversity leading to their population reduction and in some cases species extinction are threats that are well known and recognized globally. As a result, the protection of biodiversity is an important component for the survival of our environment.

As a decision maker, having the role of the Director General of Environment Public Authority, I am committed to improve the status of the environment locally, regionally and internationally to preserve and protect the diversity of environments and their biological components through implementing environmental laws, regulations and international treaties to reach a healthier and better environment which leads to natural resource sustainability, and a better health for our current and future generations.

Furthermore, this report will be a guideline for scientific research that promotes filling the missing gaps in Kuwait’s biodiversity and raising awareness of the importance of biodiversity. I hope that readers of this report will find motivation and take the necessary action to conserve Kuwait’s environment with its various marine and desert Flora and Fauna.

It would be a great achievement if one could go to the desert and witness a gazelle chased by a cheetah or find a massive area covered with al Arfaj after the rainfall season. This could be done by spreading awareness and establishing rehabilitation centers supporting, research through the collaboration and cooperation between both regional and international organizations.

His Excellency Sheikh / Abdullah Al-Ahmad Al- Hamoud Al-Sabah
Director General of the Environment Public Authority and Chairman of the Board of Directors

Foreword by the IUCN Regional Office for West Asia

I am pleased to present this important report which was one of the significant deliverables of the project “Monitoring and documentation of biodiversity in Kuwait”. This project, which was executed by IUCN’s Regional Office for West Asia and funded by the Environment Public Authority (EPA) of Kuwait, is only a start of promising collaboration between IUCN and the State of Kuwait for enhancing biodiversity knowledge base and related decision-making process on the national level.

As you read this report, you will see extensive literature search to reveal the elements of biodiversity in the State of Kuwait. Hundreds of published scientific papers and reference books were reviewed to amass all species, fauna and flora that were reported from Kuwait. Conservation status for several key groups according to the IUCN listing is also included. This report represents the first attempt to summarize and identify the elements of animal and plant biodiversity, and point out missing information on other little-known groups. This will stimulate researchers to explore the biodiversity of such minor groups (e.g. Scorpions, spiders, land and freshwater snails and sponges). Further studies are urgently needed to identify invasive species (fauna and flora). Update of the status of mammals, including marine and terrestrial (Population size, distribution and trends; life history and ecology; research and monitoring to support a conservation strategy) is among the priority list for research. Further studies on reptiles in eastern and southern Kuwait should be conducted. With current changes in nomenclature, the molluscan fauna of Kuwait will also requires an update.

We are looking forward for further collaboration in the future with the Environment Public Authority EPA of Kuwait to develop a robust system for documenting the biodiversity of Kuwait, addressing the remaining knowledge gaps like developing the National Red Lists for Kuwait in addition to understanding the direct and indirect benefits of biodiversity in the State of Kuwait. There is also a growing need for large-scale research to guide management of coral reefs and their stressors, as these operate at much larger scales than the national borders within which most research currently occurs.

I would finally like to thank the author of the report, and all national and regional experts who have had important contributions in providing data, access to publications and reviewed the publication. I would also like to thank the project implementation teams at both IUCN ROWA and the EPA of Kuwait for their hard work which has resulted in the production of this important publication.

Dr. Hany El Shaer, Regional Director
IUCN Regional Office for West Asia

Context

The Government of Kuwait's Environment Public Authority (EPA) and the International Union for Conservation of Nature (Regional Office for West Asia, IUCN-ROWA) are collaborating on the project entitled "*Monitoring and Documentation of Biodiversity in Kuwait*". Its primary aim is to document all of the biodiversity elements in the State of Kuwait based on collecting previous records and updating the biodiversity components through fieldwork. The project will also provide training to the Environment Public Authority staff and facilitate further study of the biodiversity of Kuwait, using both modern and standard procedures. Within this larger project, the following component of this report is considered vital:

"Extract all published data on the various groups of animal, plants and other groups of living organisms that are present in the State of Kuwait and describe the status of the species with emphasis on those that are in threat of extinction".

A good number of different sectors of the State have an interest in biodiversity, presenting opportunity for enhanced collaboration and partnerships; the General Authority for Environment, the General Authority for Agriculture and Fisheries Affairs, Kuwait University, and the Kuwait Institute for Scientific Research (KISR). The latter is responsible for the management, conservation and research of biodiversity in the State of Kuwait. Non-governmental organisations (NGOs), such as The Environmental Protection Society and the Voluntary Action Center in Kuwait also seek to conserve and manage biodiversity. This report and the recommended follow-up activities will therefore be of interest to such organisations and institutes.

Executive summary

This report is based on extensive literature search to reveal the elements of biodiversity in the State of Kuwait. Hundreds of published scientific papers and reference books were reviewed to amass all species, fauna and flora, that were reported from Kuwait. Conservation status for several groups according to the IUCN listing are included. Despite its small area, Kuwait enjoys a rich fauna, given its desert and marine habitats. For the vertebrate's fauna, one amphibians, 39 species of reptiles, 30 mammalian species, 415 species of birds, 305 species of bony fishes and 42 cartilaginous fishes were documented (Table 1).

Table 1: Number of species recorded from Kuwait per taxonomic group.

Taxonomic group	No. of species	Taxonomic group	No. of species
Amphibians	1	Other minor Order	18
Reptiles	45	Order Siphonaptera	8
Mammals	30	Order Neuroptera	13
Birds	407	Order Heimptera	99
Boney fishes	305	Order Hymenoptera	122
Cartilaginous fishes	42	Order Lepidoptera	87
Arthropoda		Order Mallophaga	4
Class Arachnida		Order Anoplura	3
Order Scorpiones	5	Phylum Bryozoa	2
Order Araneae	3	Phylum Phoronida	1
Order Pseudoscorpiones	1	Phylum Platyhelminthes	
Order Solifugae	1	Class Monogenea	10
Order Ixodida	5	Class Digenea	17
Order Trombidiformes	2	Phylum Acanthocephala	3
Class Chilopoda	1	Phylum Cnidaria	
Class Malacostraca		Class Hydrozoa	13
Order Amphipoda	73	Class Scyphozoa	1
Order Decapoda	56	Class Anthozoa	35
Caridea	12	Phylum Annelida	
Dendrobranchiata	13	Class Polychaeta	116
Achelata	1	Phylum Sipuncula	3
Anomura	6	Phylum Brachiopoda	1
Thalassinidea	1	Phylum Mollusca	
Order Isopoda	13	Class Polyplacophora	6
Cumacea	10	Class Gastropoda	About 300

Taxonomic group	No. of species	Taxonomic group	No. of species
Order Mysida	2	Class Bivalvia	110
Class Hexanauplia	60	Class Scaphopoda	6
Class Insecta		Class Cephalopoda	4
Order Odonata	12	Phylum Echinodermata	16
Order Orthoptera	31	Phylum Hemichordata	1
Order Diptera	77	Phylum Chordata	3
Order Coleoptera	225		
Order Mantodea	5		

Macro and micro algae are represented in eight phyla with a total of 402 species (Table 2).

Table 2: Micro and macro algae reported from Kuwait

Phylum	No. of species
Chlorophyta	30
Rhodophyta	30
Heterokontophyta	27
Tracheophyta	2
Pyrrophyta	105
Bacillariophyta	202
Chromophyta	4
Cyanophyta	2

As for terrestrial plants, a total of 378 native species (Omar et al., 2007) belonging to 57 families (44 Dicotyledoneae, 11 Monocotyledoneae, 1 Gymnospermae and 1 Pteridophyta) (Table 3).

Table 3: Plants reported from Kuwait

Phylum	No. of species
Angiospermae	376
Gymnospermae	1
Pteridophyta	1

About 54 species of animals, mostly marine, were described as new to science from Kuwait. This includes 30 species of arthropods, four species of Platyhelminthes, 17 species of marine Polychaeta and others (Table 4).

Table 4: List of animal species described from Kuwait

Phylum	Class/order	Species
Arthropoda	Trombidiformes	<i>Actacarus arabius</i> (Bartsch, 2004)
		<i>Scaptognathides delicatulus</i> (Bartsch, 2004)
	Amphipoda	<i>Protohyale arabica</i> Myers & Nithyanandan, 2016
		<i>Bemlos acuticoxa</i> Myers & Nithyanandan, 2016
		<i>Laticorophium bifurcatum</i> Myers & Nithyanandan, 2016
		<i>Podocerus mamalahensis</i> Myers & Nithyanandan, 2016
		<i>Latigammaropsis pseudojassa</i> Myers & Nithyanandan, 2016
		<i>Ceradocus alama</i> Myers & Nithyanandan, 2016
		<i>Maera irregularis</i> Myers & Nithyanandan, 2016
		Decopoda
	<i>Manningis arabicum</i> (Jones & Clayton, 1983)	
	<i>Alpheus lutosus</i> Anker & De Grave, 2009	
	Isopoda	<i>Anilocra monoma</i> Bowman & Tareen, 1983
		<i>Catoessa gruneri</i> Bowman & Tareen, 1983
		<i>Joryma sawayah</i> Bowman & Tareen, 1983
		<i>Nerocila arres</i> Bowman & Tareen, 1983
		<i>Nerocila kisra</i> Bowman & Tareen, 1983
		<i>Nerocila sigani</i> Bowman & Tareen, 1983
		Siphonostomatoida
	Cyclopoida	<i>Bereacanthus clava</i> (Ho & Sey, 1997)
		<i>Irodes kuwaitensis</i> Ho et al. (1999)
	Calanoida	<i>Labidocera kuwaitiana</i> Prusova & Al-Yamani, 2014
		<i>Hatschekia seyi</i> Ho & Kim, 2001
		<i>Hatschekia nodosa</i> Ho & Kim, 2001
	Coleoptera	<i>Pentodon kuwaitense</i> Endrödi & Al-Houty, 1985
	Heteroptera	<i>Xylocoris etawahii</i> Ghauri, 1985
		<i>Xylocoris wasmiai</i> Ghauri, 1985
	Hymenoptera	<i>Monomorium subcomae</i> Lush, 2008
		<i>Monomorium hemame</i> Collingwood & Agosti, 1996
		<i>Monomorium buettikeri</i> Collingwood & Agosti, 1996
Platyhelminthes	Trematoda	<i>Lepidotrema kuwaitense</i> Kritsky et al. 2000
		<i>Lamellodiscus furcillatus</i> Kritsky et al. 2000
		<i>Protolamellodiscus senilobatus</i> Kritsky et al. 2000
		<i>Bookhoutia oligognatha</i> Mohammad, 1973

Phylum	Class/order	Species
		<i>Imajimaea zonata</i> (Mohammad, 1973)
		<i>Proctotrematoides kuwaiti</i> Sey & Nahhas, 1997
Annelida	Polychaeta	<i>Isolda albula</i> Mohammad, 1971
		<i>Kuwaita magna</i> Mohammad, 1973
		<i>Leiochone annulata</i> (Mohammad, 1980)
		<i>Magelona pulchella</i> Mohammad, 1980
		<i>Mesopotholepus macrothoracicus</i> (Mohammad, 1980)
		<i>Neanthes deplanata</i> (Mohammad, 1971)
		<i>Neoleprea clavata</i> Mohammad, 1973
		<i>Nereis (Nereis) neogracilis</i> Mohammad, 1970
		<i>Paucibranchia gemmata</i> (Mohammad, 1973)
		<i>Phylo kubbarensis</i> Mohammad, 1980
		<i>Phylo kuwaitica</i> Mohammad, 1970
		<i>Polydora spondylana</i> Mohammad, 1973
		<i>Prionospio rotalis</i> Mohammad, 1970
		<i>Pseudostreblosoma longum</i> (Mohammad, 1973)
		<i>Scyphoproctus aciculatus</i> Mohammad, 1980
Mollusca	Polyplacophora	<i>Notoplax arabica</i> Kaas & Van Belle, 1988

Seven species of marine ciliates were described from Kuwait (Table 5)

Table 5: Species of marine ciliates described from Kuwait

Species
<i>Luminella kuwaitensis</i> Skryabin and Al-Yamani, 2007
<i>Leprotintinnus bubyanicus</i> Skryabin and Al-Yamani, 2007
<i>Metacylis pithos</i> Skryabin and Al-Yamani, 2006
<i>Eutintinnus conicus</i> Skryabin & Al-Yamani, 2007
<i>Eutintinnus contractus</i> Skryabin & Al-Yamani, 2007
<i>Tintinnopsis failakkaensis</i> Skryabin & Al-Yamani, 2007

Recommendations include conducting further studies on the following groups due to limited data (Scorpions, spiders, land and freshwater snails and sponges). Studies are needed to identify invasive species (fauna and flora). Update the status of mammals, including marine and terrestrial (Population size, distribution and trends; life history and ecology; research and monitoring to support a conservation strategy). Further studies on reptiles in eastern and southern Kuwait should be conducted. Further entomological research especially arthropods that can transmit diseases should be carried out. With current changes in nomenclature, the molluscan fauna of Kuwait requires an update. Herpetology book for Kuwait reptiles should be published. The publications of Kuronuma and Abe (1972; 1986) should be updated, considering adding additional records on fishes of Kuwait. Other recommendations are included in the recommendation section.

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Environmental Public Authority of Kuwait (Photo from EPA website)



His Excellency Sheikh Abdullah Al-Ahmad Al-Hamoud Al-Sabah, Director General of the Environment Public Authority and Chairman of the Board of Directors, launching the project on 10 February 2019 (Photo by Ola Malah).



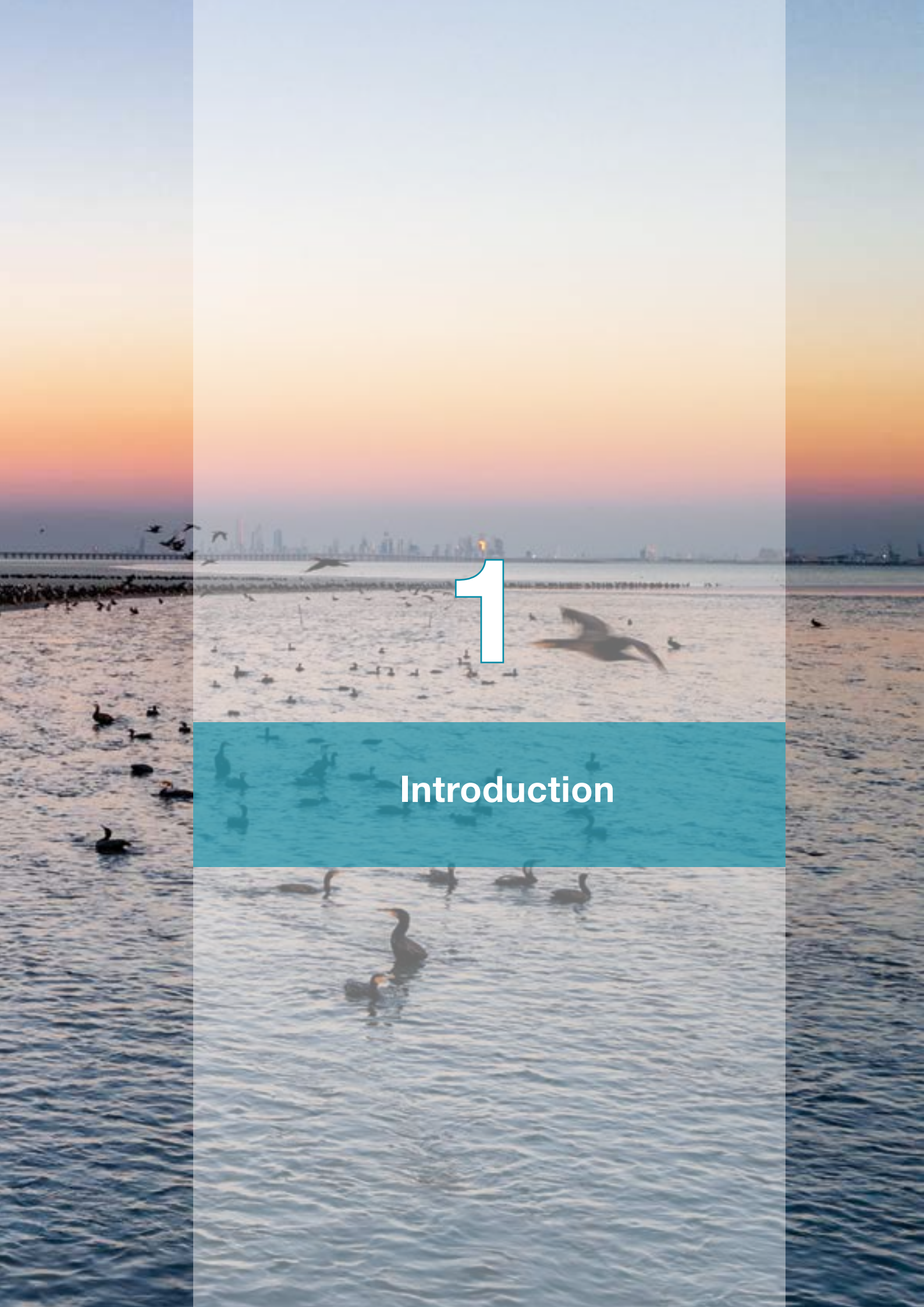
Participants during the project launching (Photo by Ola Malah).



Invitation logo for the project launching (Photo by Ola Malah).



(Photo from Faisal Al Nomas)



1

Introduction

1

Introduction

1.1 Location and topography

The total area of the State Kuwait is 17,818 km² of land and about 1,000 km² of off-shore islands. It is situated in the most northwestern corner of the Arabian Gulf (Figure 1). Kuwait is an arid country and consists mainly of desert land. It is bordered by Saudi Arabia to the south and southwest and with Iraq to the north and northwest. The landscape is relatively flat, broken only by occasional low sand dunes and shallow depressions. The surface elevates gently from east to west reaching about

300 m above sea level at Al-Shigaya and Al-salmi. The eastern part of the state, including all of the inhabited area, is overlooking the Arabian Gulf with coastline that extends about 195 km.

1.2 Natural environment context

Geographic setting

Located within the northeastern part of the Arabian Desert, Kuwait is characterized by flat to gently rolling open desert with very few minor elevations, wadis, depressions, some low dunes,



Figure 1: Map showing location of the State of Kuwait (Source: <http://acc.teachmideast.org>).



Figure 2: Habitat of Jal Az Zour ridge (Photo from Abdulrahman Al-Sirhan).



Figure 3: Al Jaharah Nature Reserve (Photo from Faisal Al Nomas).

coastal salt marshes and small off-shore islands (Halwagy et al., 1982; Halwagy & El-Saadawi, 1992).

From a geological point of view, the Gulf is a very recent sea. Resulting from the eastward migration of the Arabian plate, the Gulf basin was probably formed during the Late Pliocene Era, only three

or four million years ago. The Gulf is one of the youngest bodies of water in the world and also one of the shallowest. The average depth is 36 meters, with a maximum depth of 90-100 meters along the Iranian coast. Due to the high evaporation (about ten times greater than the input from rainfalls and rivers), salinity of the water in the northern Gulf



Figure 4: Aerial photo from Al Jaharah Nature Reserve (Photo from Faisal Al Nomas).



Figure 5: Aerial photo from Failaka island (Photo from Faisal Al Nomas).

is quite high. The water along the coast of Kuwait shows salinities of around 40 ppt, and along the Saudi Arabian coast between 35-40 ppt. However, in shallow water the salinity can become much higher. A salinity as high as 70 ppt has been reported in the Gulf of Salwah and in the inner parts of the Kuwait Bay. Tides in the area are basically semi-diurnal and vary from 2 to 3 meters along the Saudi Arabian and Kuwaiti coasts (Lindén et al., 2004; Omar et al., 2007).

Physical parameters

The physical factors mainly in the form of extreme temperature fluctuations and elevated salinity exert considerable natural stress on the marine and coastal ecosystems of the Gulf. As a consequence, the biodiversity is significantly lower compared with the Indian Ocean. Because of the relative shallowness, the Gulf supports highly productive coastal habitats, such as the extensive intertidal mud-flats and seagrass beds. Along parts of the coast there are also areas of dwarf mangrove and coral reefs. However, the coral reefs show relatively very low biodiversity. Many species of corals as well as other species of animals and several plants in the area live close to their tolerance thresholds. In the northern Gulf, most of the subtidal areas are soft sediment bottoms. Extensive seagrass beds mostly



cover these sediments, which supports a number of commercially important species such as the prawn. Algae mats associated with the tidal flats are also highly productive as they are covered

with blue-green nitrogen-fixating algae during part of the year. These tidal flats are a key feeding area for wintering and migrating waders (Lindén et al, 2004).



Figure 6: Habitat of Wadi Al Batin (Photo from Abdulrahman Al-Sirhan).

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(Photo from M. Al-Dosari)



2

Methodology

2 Methodology

Extensive literature review was conducted through all databases, including google scholar, biological abstract and others.

Birds:

BirdLife International
Kuwait Birds and Kuwait bird official site (www.kuwaitbirds.org/birds).

Mammals:

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Reptiles:

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Sindaco, R., Venchi, A. and Grieco, C. (2013). *The Reptiles of the Western Palearctic*, Volume 2: *Annotated Checklist and Distributional Atlas of the Snakes of Europe, North Africa, Middle*



(Photo from Faisal Al Nomas)

East and Central Asia, with an Update to Volume 1. Edizioni Belvedere, Latina, Italy.

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Bishop, J.M. (2003). 'History and current checklist of Kuwait's ichthyofauna'. *Journal of Arid Environments* 54: 237–256. doi.org/10.1006/jare.2001.0874

Carpenter, K.E., Krupp, F., Jones D.A. and Zazonz, U. (1997). *The living marine resources of Kuwait, Eastern Saudi Arabia, Bahrain, Qatar, and the United Arab Emirates*. FAO Species Identification Field Guide for Fishery Purposes, Rome. <http://www.fao.org/3/v8729e/v8729e00.htm>

Marine invertebrates:

Al-Yamani, F.Y., Skryabin, V., Boltachova, N., Revkov, N., Makarov, M., Grinstov, V. and Kolesnikova, E. (2012). *Illustrated Atlas on the Zoobenthos of Kuwait*. Kuwait Institute for Scientific Research. https://www.researchgate.net/publication/266021661_Illustrated_Atlas_on_the_Zoobenthos_of_Kuwait_Kuwait_Institute_for_Scientific_Research_Publisher

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(Photo from Faisal Al Nomas)



3

**Terrestrial and
marine
vertebrates**

3

Terrestrial and marine vertebrates

3.1 Classes Amphibia and Reptilia



A single species of amphibians occurs in Kuwait, while 45 species of reptiles have been recorded to the herpetofauna of Kuwait. They are represented by species in 14 families (Table 6, Figure 7-9). The first work on the reptiles of Kuwait was published by Eissa & El Assy (1975). They reported 28 species, however, two species may represent misidentification (*Uromastyx thomasi* and *Agama jayakari*). Both species are known from Oman and eastern Arabia. Five species of lizards were recorded from Al Wafra area (Al-Khalifa et al., 2012). An illustrated guide to the horned viper of Kuwait was published by Al-Fares & Al-Metairie (2014) with a series of photographs.

Recent studies added and the melanistic whip snake, *Dolichophis jugularis* (Al-Mohanna et al., 2007) with doubts on the presence of both the Arabian Cobra and the Black Desert Snake, three species of Geckos; Murray's Comb-fingered Gecko, *Stenodactylus affinis*, and Gulf Sand Gecko, *Stenodactylus khobarensis* (Al-Sirhan, 2009; Metallinou et al., 2012) and the Web-footed Sand Gecko, *Stenodactylus arabicus* (Delima & Al-Nasser, 2007), the Small-spotted Desert Lizard, *Mesalina guttulata* (Al-Sirhan, 2008). Al-Sirhan & Brown (2010) gave an account on the distribution of two species of the genus *Phrynocephalus* in Kuwait. Clayton & Pilcher (1983) reported



Figure 7: Some reptiles from Kuwait. *Stenodactylus affinis* (Photo from Abdulrahman Al-Sirhan).



Figure 8: Some reptiles from Kuwait. *Trapelus persicus* (Photo from Abdul Aziz Al Yousef).

Ablepharus pannonicus from Kuwait. Al-Houty et al. (2015) reported *Bufo viridis* (= *Bufoetes boulengeri*) from ephemeral pools in Kuwait.

The Spiny-tailed Lizard, *Uromastix aegyptius*, was the focus of several studies. Food plants consumed by this species were studied by Robinson (1995). Wilms & Böhme (2007) revised the distribution and systematics of lizards of the genus *Uromastix* in Arabia, including Kuwait. Al-Sayegh (2017) conducted a study on its eco-physiological implications of conservation. A recent account on sea snakes of the Arabian Gulf with an illustrated key was published by Rezaie-Atagholipour et al. (2016).

In total, five species of marine turtles have been recorded from Kuwait (*Caretta caretta*, *Chelonia mydas*, *Eretmochelys*, *Lepidochelys olivacea* and *imbricata* *Lepidochelys olivacea*). The marine turtles of Kuwait received a good attention, with several studies on their taxonomy and biology (Gasperetti et al., 1993; Al-Merghani et al., 1996; Al-Mohanna & Meakins, 1998 & 2000a & b;

Meakins & Al-Mohanna, 2000 & 2003; Bishop et al., 2007; Bishop & Alsaffar, 2008; Al-Mohanna & George, 2010; Al-Mohanna et al., 2013; Rees et al., 2013). Conservation status of the marine turtles and other reptiles is presented in Table (7).

Other studies focused on the biology of some desert species (*Agama persica* = *Trapelus persicus* and *Diplometopon zarudnyi*) (Cloudsley-Thompson, 1979). Sey & Al-Ghaith (2000) examined the helminths of the green toad and spiny tailed lizard in Kuwait. Several papers on the hematology of Kuwait lizards were published including localities for the studied material (Abdel-Fattah et al., 1974; Al-Badry, 1975; Al-Badry et al., 1975; Al-Badry & Al-Sdirawi, 1976; Al-Balool, 1976).

The impact of oil pollution on body size, weight, timing of morning emergence, basking and foraging behaviors and substrate preferences of *Acanthodactylus scutellatus* in Kuwait was investigated (Al-Hashem et al., 2008; Al-Hashem & Brain, 2009a & b).

Table 6: List of amphibians and reptiles of Kuwait.

Class	Family	Species	
Amphibia	Bufonidae	<i>Bufoes boulengeri</i> (Lataste, 1879)	
Reptelia	Cheloniidae	<i>Eretmochelys imbricata</i> (Linnaeus, 1766)	
		<i>Chelonia mydas</i> (Linnaeus, 1758)	
		<i>Caretta caretta</i> (Linnaeus, 1758)	
		<i>Lepidochelys olivacea</i> (Eschscholtz, 1829)	
	Dermochelyidae	<i>Dermochelys coriacea</i> (Vandelli, 1761)	
	Agamidae	<i>Phrynocephalus arabicus</i> Anderson, 1984	
		<i>Phrynocephalus maculatus</i> Anderson, 1872	
		<i>Trapelus agnetae</i> (Werner, 1929)	
		<i>Trapelus flavimaculatus</i> Rüppell, 1835	
		<i>Trapelus persicus</i> (Blanford, 1804)	
		<i>Uromastix aegyptia</i> (Forsskål, 1775)	
		Gekkonidae	<i>Bunopus tuberculatus</i> Blanford, 1874
			<i>Cyrtopodion scabrum</i> (Heyden, 1827)
			<i>Hemidactylus turcicus</i> Linnaeus, 1758
			<i>Hemidactylus flaviviridis</i> Rüppell, 1835
	<i>Hemidactylus persicus</i> Anderson, 1872		
	<i>Pseudoceramodactylus khobarensis</i> Haas, 1957		
	<i>Stenodactylus doriae</i> (Blanford, 1874)		
	<i>Stenodactylus affinis</i> (Murray, 1884)		
	<i>Stenodactylus slevini</i> Haas, 1957		
	<i>Trigonodactylus arabicus</i> (Haas, 1957)		
	Lacertidae	<i>Acanthodactylus boskianus</i> (Daudin, 1802)	
		<i>Acanthodactylus opheodurus</i> Arnold, 1980	
		<i>Acanthodactylus schmidtii</i> Haas, 1957	
		<i>Acanthodactylus scutellatus</i> (Audouin, 1827)	
		<i>Mesalina brevirostris</i> Blanford, 1874	
		<i>Mesalina guttulata</i> (Lichtenstein, 1823)	
	Scincidae	<i>Ablepharus pannonicus</i> (Fitzinger, 1824)	
		<i>Scincus mitranus</i> Anderson, 1871	
		<i>Scincus scincus</i> (Linnaeus, 1758)	
	Trogonophidae	<i>Diplometopon zarudnyi</i> Nikolsky, 1907	
	Varanidae	<i>Varanus griseus</i> (Daudin, 1803)	
Boidae	<i>Eryx jayakari</i> Boulenger, 1888		
Colubridae	<i>Dolichophis jugularis</i> (Linnaeus, 1758)		
	<i>Lytorhynchus diadema</i> (Duméril et al. 1854)		
	<i>Platyceps ventromaculatus</i> (Gray, 1834)		
	<i>Spalerosophis diadema cliffordii</i> (Schlegel, 1837)		
	<i>Hydrophis cyanocinctus</i> Daudin, 1803		
	<i>Hydrophis gracilis</i> (Shaw, 1802)		
Elapidae	<i>Hydrophis platurus</i> (Linnaeus, 1766)		
	<i>Hydrophis viperinus</i> (Schmidt, 1852)		
	Typhlopidae	<i>Indotyphlops braminus</i> (Daudin, 1803)	
	Psammophiidae	<i>Psammophis schokari</i> (Forsskål, 1775)	
<i>Rhagerhis moilensis</i> (Reuss, 1834)			
Viperidae	<i>Cerastes gasperetti</i> Leviton & Anderson, 1967		



Figure 9: Some reptiles from Kuwait. *Trapelus agnetae* (Photo from Abdulrahman Al-Sirhan).

Table 7: IUCN status of reptiles of Kuwait.

Family	species	Common name	IUCN Global Status
Agamidae	<i>Uromastix aegyptia</i>	Egyptian Spiny-tailed Lizard	VU
Cheloniidae	<i>Caretta caretta</i>	Loggerhead Turtle	VU
	<i>Chelonia mydas</i>	Green Turtle	EN
	<i>Eretmochelys imbricata</i>	Hawksbill Turtle	CR
	<i>Lepidochelys olivacea</i>	Olive Ridley Turtle	VU
Dermochelyidae	<i>Dermochelys coriacea</i>	Leatherback Sea Turtle	VU

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3.2 Class Mammalia



The mammals of Kuwait include some 29 species in six orders (Carnivora, Cetacea Chiroptera, Eulipotyphla, Lagomorpha and Rodentia) (Table 8, Figure 10-13). Species of order Rodentia constitutes the highest number. Cowan (2013) gave the most comprehensive review on the

mammals of Kuwait. He listed 25 species of confirmed presence, four are uncommon or rare visitors, seven used to occur and are considered by now extinct (Table 9), and two are of doubtful provenance.

Table 8: List of surviving mammals of Kuwait.

Order	Common name	Species
Eulipotyphla	Long-eared hedgehog	<i>Hemiechinus auritus</i> (Gmelin 1770)
	Ethiopian hedgehog	<i>Paraechinus aethiopicus</i> (Ehrenberg 1833)
Chiroptera	Naked-rumped tomb bat	<i>Taphozous nudiventris</i> Cretzschmar 1830
	Trident leaf-nosed bat	<i>Asellia tridens</i> (E. Geoffroy 1813)
	Kuhl's pipistrelle	<i>Pipistrellus kuhlii</i> (Kuhl 1819)
Carnivora	Red fox	<i>Vulpes vulpes</i> (Linnaeus 1758)
	Honey badger	<i>Mellivora capensis</i> (Schreber 1776)
	Indian grey mongoose	<i>Herpestes edwardsi</i> (E. Geoffroy 1818)
	Wildcat	<i>Felis silvestris</i> (Schreber 1777)
	Sand cat	<i>Felis margarita</i> (Loche 1858)
Cetacea	Sei whale	<i>Balaenoptera borealis</i> Lesson 1828
	Blue whale	<i>Balaenoptera musculus</i> (Linnaeus 1758)
	False killer whale	<i>Pseudorca crassidens</i> (Owen 1846)
	Indo-Pacific humpback dolphin	<i>Sousa chinensis</i> (Osbeck 1765)
	Indo-Pacific bottlenose dolphin	<i>Tursiops aduncus</i> (Ehrenberg 1833)
	Finless porpoise	<i>Neophocaena phocaenoides</i> (G. Cuvier 1829)
Lagomorpha	Cape hare	<i>Lepus capensis</i> (Linnaeus 1758)
Rodentia	Indian crested porcupine	<i>Hystrix indica</i> Kerr 1792
	Euphrates jerboa	<i>Allactaga euphratica</i> Thomas 1881
	Lesser jerboa	<i>Jaculus jaculus</i> (Linnaeus 1758)
	Black rat	<i>Rattus rattus</i> (Linnaeus 1758)
	Brown rat	<i>Rattus norvegicus</i> (Berkenhout 1769)
	House mouse	<i>Mus musculus</i> Linnaeus 1758
	Baluchistan gerbil	<i>Gerbillus nanus</i> Blanford 1875
	Wagner's gerbil	<i>Gerbillus dasyurus</i> (Wagner 1842)
	Cheesman's gerbil	<i>Gerbillus cheesmani</i> Thomas 1919
	Indian gerbil	<i>Tatera indica</i> (Hardwicke 1807)
	Libyan jird	<i>Meriones libycus</i> Lichtenstein 1823
	Sundevall's jird	<i>Meriones crassus</i> Sundevall 1842

Clayton & Pilcher (1983) and Clayton & Wells (1987) reported on several mammalian species in Kuwait. Bishop & Alsaffar (2008) made sightings of the Indo-Pacific Humpback Dolphins (*Sousa chinensis*) in the immediate vicinity of Boubyan

Island. Dugong was reported before the 1950's from Kuwait. It is still present in the Arabian Gulf (Preen, 2004; Al-Abdulrazzak. & Pauly, 2017). The conservation status of marine mammals in the Arabian Gulf is summarized in Table (5).



Figure 10: Some mammals from Kuwait. Long-eared Hedgehog, *Hemiechinus auritus* (Photos from Abdul Al-Azizi Al Yousef).



Figure 11: Some mammals from Kuwait. Lesser Jerboa, *Jaculus jaculus* (Photos from Abdul Al-Azizi Al Yousef).

Table 9: Extinct mammals of Kuwait and their IUCN conservation status.

Common name	Species	IUCN Global Status	IUCN Regional Status
Wolf	<i>Canis lupus</i> Linnaeus 1758	LC	LC
Caracal	<i>Caracal caracal</i> (Schreber 1776)	LC	NT
Cheetah	<i>Acinonyx jubatus</i> (Schreber 1776)	VU	EN
Arabian oryx	<i>Oryx leucoryx</i> (Pallas 1777)	VU	EN
Saudi gazelle	<i>Gazella saudiya</i> (Carruthers and Schwarz 1935)	EX	
Fennec fox	<i>Vulpes zerda</i> (Zimmermann 1780)	LC	LC
Dugong	<i>Dugong dugon</i> (Müller, 1776)	VU	

The ecology of the Lesser Jerboa, *Jaculus jaculus*, was studied in Al-Jalia area (Eissa et al., 1975) and Kabd (Al-Mutairi et al., 2012). Harrison & Bates (1991) mentioned records of *Pipistrellus kuhlii* based on specimens at the British Museum of Natural History (BMNH). Cheesman (1921) described the subspecies *Felis silvestris iraki* from

northern Kuwait. Dickson (1949) reported the Caracal from Kuwait. Clayton (1991) recovered *Meriones libycus*, *Jaculus jaculus* and *Gerbillus cheesmani* from the Little Owl pellets in Kuwait. Al-Khalifa et al. (2012) reported the Red Fox, *vulpes vulpes*, Al Wafra area. Vesey-Fitzgerald (1953) reported on the rodents of Kuwait.



Figure 12: Some mammals from Kuwait. The Red Fox, *Vulpes vulpes* (Photo from Faisal Al Nomas).



Figure 13: Cheesman's Gerbil, *Gerbillus cheesmani* (Photos from Abdul Al-Azizi Al Yousef).

Table 5: Threatened marine mammals reported from Kuwait and their IUCN conservation status.

Common name	Species	IUCN Global Status
Sei whale	<i>Balaenoptera borealis</i>	EN
Blue whale	<i>Balaenoptera musculus</i>	EN
False killer whale	<i>Pseudorca crassidens</i>	NT
Indo-Pacific humpback dolphin	<i>Sousa chinensis</i>	VU
Indo-Pacific bottlenose dolphin	<i>Tursiops aduncus</i>	DD
Finless porpoise	<i>Neophocaena phocaenoides</i>	VU
Dugong	<i>Dugong dugon</i>	VU

Other studies on the ectoparasites of rodents included distributional data (Al-Taqi et al., 1983) and endoparasites, whereas the nematode, *Abbreviata kuwaitensis*, was described from *Gerbillus cheesmani* and *Meriones crassus* (Damian & Behbahani, 1982). Al-Karmi & Behbahani (1980) found *Meriones crassus* in Kuwait infected with *Toxoplasma gondii*. Khalil & Abdul-Salam (1985)

described new species of nematodes (*Seuratum kuwaitensis* and *Spirura auriti*) from the Long-eared Hedgehog, *Hemiechinus auritus*, from Kuwait. Zaghloul et al. (1986) studied the biology and parasites of the Indian Gerbil, *Tatera indica*. Salit et al. (1986) studied in details the morphology and ecology of *Tatera indica*.

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3.3 Class Aves

Perhaps the birds of Kuwait were the most investigated group. This is mostly due to interest of local and foreign birdwatchers in Kuwait. Several papers included data on the Kuwait birds (Haynes, 1979; Pilcher, 1992, 1994 & 1996; Cleere et al., 2000; Cowan & Pilcher, 2003; Ramadan et al., 2004). The birds of Al Jahara Protected area was

studied with details on migrant and resident birds (Al-Saqer, 2003). A comprehensive study on four species of desert larks in Kuwait was published by Brown (2009). Cowan (1990) and Bom & al-Nasrallah (2015) and studied the biology the Crab Plovers on Bubiyan Islands.



Figure 14: Books on the birds of Kuwait.



(Photo from Faisal Al Nomas)



So far, 412 species, including 18 subspecies of birds in 65 families (Figures 15-19) have been recorded from Kuwait according to observations published by BirdLife International and Kuwait Birds (www.kuwaitbirds.org/birds) (**Annex 1**). Only 33 species are considered resident. In 2013, Al Sareea' *et al* (2013) listed 384 species of birds in Kuwait. Pope & Zogaris (2012) listed 390 species and 17 subspecies in Kuwait. The most recent book on the birds of Kuwait was published by Daunicht (2018). It includes accounts and details

on the conservation status for each species (Figure 14).

Several books were published on the birds of Kuwait. Local books were published on the birds of Kuwait (Table 11). The first book in Arabic and English was published by Alfadhel (2005). Gregory (2005) published at the same time his book on the birds of the State of Kuwait. Al Nasrallah (2011) published a book of birds of the Sabah Al-Ahmad Natural Reserve.

Table 11: Books on the birds of Kuwait in Arabic.

Year	Title in Arabic	Authors	Publisher
1987	طيور الكويت الربيعية	بدر الفايز	مطابع الرسالة، الكويت
1999	طيور الكويت	مشعل الجريوي	مطابع الشروق
2002	طيور الكويت-سجل مصور	عبد الله صادق الحداد و فوزية عبد العزيز السديراوي	مركز البحوث والدراسات الكويتية
2008	طيور الكويت	أمل الغانم , رسوم وإخراج فاطمة السنان	مركز البحوث والدراسات الكويتية

Of the 415 bird species reported from Kuwait, 27 have IUCN conservation status (Figures 15-19). The Sociable Lapwing is listed as critically endangered, Egyptian Vulture, the Saker Falcon

and Basra Reed Warbler are listed as endangered, 14 are considered as near threatened while nine are vulnerable (Table 12). For regional assessment see (Symes *et al.*, 2015).



Figure 15: Birds of Kuwait. A female feeding its chicks (Photos from Abdul Al-Azizi Al Youssef).

Table 12: Threatened and Near Threaten of birds species of Kuwait according to the IUCN Red List .

Common name	Scientific name	Arabic name	IUCN status
Ferruginous Duck	<i>Aythya nyroca</i>	البط الكستائي	NT
Marbled Duck	<i>Marmaronetta angustirostris</i>	الحذف الرخامي	VU
Long-tailed Duck	<i>Clangula hyemalis</i>	البط طويل الذيل	VU
Sooty Shearwater	<i>Puffinus griseus</i>	جلم الماء الفاحم	NT
Lesser Flamingo	<i>Phoeniconaias minor</i>	النحام الصغير	NT
Egyptian Vulture	<i>Neophron percnopterus</i>	الرخمة المصرية	EN
Cinereous Vulture	<i>Aegypius monachus</i>	النسر الأسود	NT
Pallid Harrier	<i>Circus macrourus</i>	المرزة الباهتة	NT
Red-footed Falcon	<i>Falco vespertinus</i>	البزيق الشائع	NT
Sooty Falcon	<i>Falco concolor</i>	الصقر الأسخم	NT
Saker Falcon	<i>Falco cherrug</i>	الصقر الحر	EN
Sociable Lapwing	<i>Vanellus gregarius</i>	الزقزاق الإجتماعي	CE
Great Snipe	<i>Gallinago media</i>	الشنقب الكبير	NT
Black-tailed Godwit	<i>Limosa limosa</i>	بقويقة سلطانية	NT
Eurasian Curlew	<i>Numenius arquata</i>	كروان الماء الكبير	NT
Black-winged Pratincole	<i>Glareola nordmanni</i>	أبو اليسر أسود الجناح	NT
European Roller	<i>Coracias garrulus</i>	الشقراق الأوربي	NT
Basra Reed Warbler	<i>Acrocephalus griseldis</i>	دخلة القصب البصرية	EN
Semi-collared Flycatcher	<i>Ficedula semitorquata</i>	خاطف الذباب شبه المطوق	NT
Eastern Cinereous Bunting	<i>Emberiza cinerea semenowi</i>	بلبل الشعير السوري الشرقي	NT
Dalmatian Pelican	<i>Pelecanus crispus</i>	البجعة الكدراء	VU
Lappet-faced Vulture	<i>Torgos tracheliotos</i>	نسر الأذون	VU
Greater Spotted Eagle	<i>Aquila clanga</i>	العقاب المنقطة الكبيرة	VU
Macqueen's Bustard	<i>Chlamydotis macqueenii</i>	الحبارى الآسيوية (حبارى ماكويني)	VU
Great Knot	<i>Calidris tenuirostris</i>	الطيوطى الكبيرة	VU
Socotra Cormorant	<i>Phalacrocorax nigrogularis</i>	غاق سقطري	VU

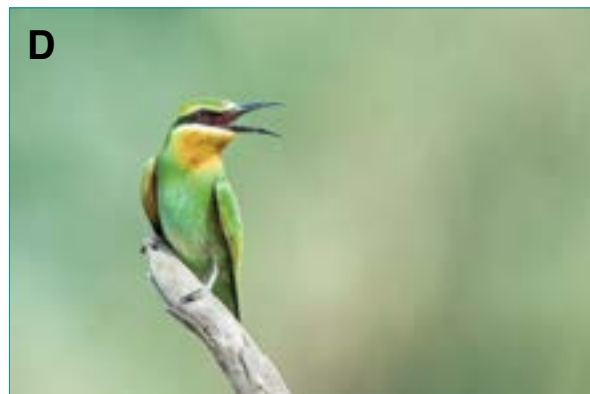


Figure 16: Some birds from Kuwait. A. The Asian desert warbler, *Sylvia nana*. B. Barred Warbler, *Sylvia nisoria*. C. Black-eared Wheatear, *Oenanthe hispanica*. D. Blue-cheeked Bee-eater, *Merops persicus*. E. Common Kingfisher, *Alcedo atthis*. F. Temminck's Horned Lark, *Eremophila bilopha*. G. Goldfinch, *Carduelis carduelis*. H. White-throated Kingfisher, *Halcyon smyrnensis*. (All photos from Abdul Al-Aziz Al Yousef).



Figure 17: Some aquatic birds from Kuwait. A. Greater Flamingo, *Phoenicopterus roseus*. B. Little Egret, *Egretta garzetta*. C. Grey-headed Swamphen, *Porphyrio poliocephalus*. D. Great Snipe, *Gallinago media*. E. Red-wattled lapwing, *Vanellus indicus*. (All photos from Abdul Al-Aziz Al Yousef).



Figure 18: Some raptors from Kuwait. A. Lilith Owl, *Athene noctua lilith*. B. Griffon Vulture, *Gyps fulvus*. C. Sparrowhawk, *Accipiter nisus*. D. Long-eared Owl, *Asio otus*. (All photos from Abdul Al-Aziz Al Yousef).



Figure 19: Some intertidal birds from Kuwait.

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3.4 Classes Chondrichthyes and Osteichthyes

The first study to investigate the marine fishes of Kuwait was published by Kuronuma & Abe (1972) (Figure 20). They listed 130 species of marine fishes. This was followed by a number of books and papers (Al-Hassan et al., 1988; Bishop & Abdul-Ghaffar, 1993; Al-Baz et al., 1999); including the illustrated books of Carpenter et al. (1997a & b),

Other papers discussed commercial fishing in Kuwait (Hussain & Abdullah, 1977; Mathews & Samuel, 1985; Morgan 1985a & b; Samuel & Bawazeer, 1985; Mathews & Samuel, 1987; Samuel et al., 1987; Bawazeer, 1987a & b, 1989; Abou-Seedo, 1992; Chen et al., 2012a & b; Moore et al., 2012; Ye et al., 2000), reproductive biology and ecology (Abu-Hakima, 1987; Baddar, 1987; Mathews & Samuel 1987; Samuel & Mathews, 1985; Samuel & Mathews, 1987; Wright, 1988, 1989a, b & c, 1990; Ismail & Clayton, 1990; Randall, 1994; Randall et al., 1994; Al-Baz & Grove, 1995; Dadzie et al., 1998, 2000a, b & c; Ismail et al., 1998; Al-Yamani et al., 1999; Almatar et al., 2000; Al-Husaini et al., 2001; Bishop et al., 2016); and the biology of mudskippers (Clayton, 1987; Clayton & Vaughan, 1982, 1986 & 1988, Clayton & Wright, 1989; Wright et al., 1990 & 1996; Al-Behbehani & Ebrahim, 2010). The coral reef fishes of Kuwait were studied extensively along with the corals of Kuwait (Harrison et al., 1997; Downing, 1989a, b, c & d; Downing et al., 1989; Literathy et al., 1989).

Based on Bishop (2003) and Moore et al. (2010), the Kuwait ichthyofaunal checklist includes 348 species belonging to 95 families (**Annex 2**). Sharks and rays are represented by 30 27 species respectively (including three unidentified species of rays, while bony fishes (Actinopterygii) accounts for 305 species. Thirty-five families are represented by a single species only, and 20 families are represented by just two species. The most common fish families is the Carangidae with 32 species, followed by family Gobidae with 26 species. Clupeids are represented by 11 species and include the seasonally popular anadromous Hilshashad (*Tenualosa ilisha*). Kuwait's seabreams (Sparidae family) number 10 species and include the popular species sobaity (*Sparidentex hasta*) and sheim (*Acanthopagrus latus*). Wrasses (Family: Labridae) are also represented by 10 species. Kuwait's snappers (Family: Lutjanidae), of which the hamra is a member, number nine, and the number of blennies (Family: Blennidae) and grunts (Family: Haemulidae) stands at eight species each. The grouper family (Serranidae), of which the hamour is a member, has seven species in Kuwait. Zobaidy (*Pampus argenteus*) is Kuwait's sole representative of the Stromiteidae family (Bishop, 2003). The sharks of Kuwait and the Arabian Gulf were studied extensively (Goubanov & Shleib, 1980; Randall, 1986; Moore et al. 2007; Almojil et al. 2015, Jabado & Ebert, 2015, Almojil, 2016; Almojil et al. 2018).



Figure 20: Main books on the fishes of Kuwait.

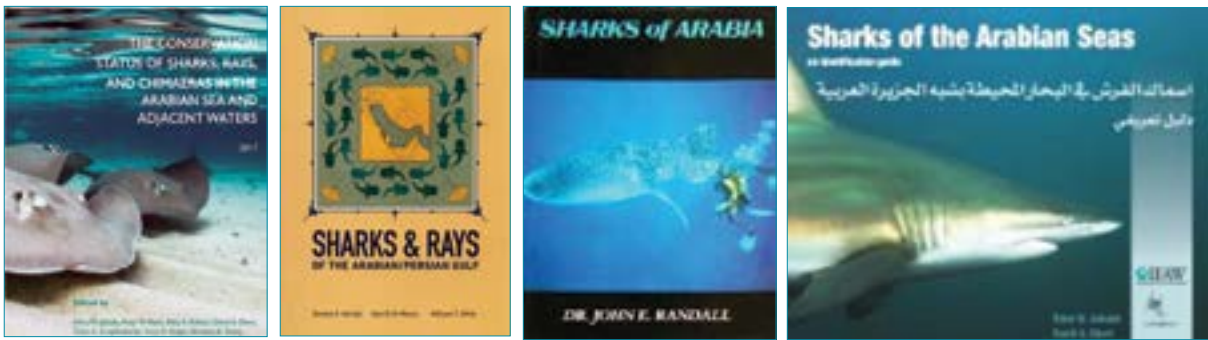


Figure 21: Books on sharks of the Arabian Gulf.

Jabado et al. (2017) gave an outstanding account on the conservation status of sharks, rays, and chimaeras in the Arabian Sea (Figure 21). It includes both the global and regional

assessment for these taxa (Table 13-14). Moore (2017) discussed the extinction risk and the need for urgent conservation action guitarfishes.



Figure 22: Coral fishes from the Arabian Gulf. A. *Acanthurus sohal*. B. *Abudedefduf vaigiensis*. C. *Chaetodon melapterus*. D. *Chlorurus sordidus*. E. *Apogon cyanosoma*. F. *Chaetodon nigropunctatus*. (All photos from F. Krupp)

Table 13: IUCN Conservation status of sharks in Kuwait and the Arabian Gulf.

Family	Species	Common name	IUCN		Trend (Global)
			Global Status	Regional Status	
Carcharhinidae	<i>Carcharhinus amblyrhynchoides</i>	Graceful Shark	NT	VU	unknown
	<i>Carcharhinus amblyrhynchos</i>	Grey Reef Shark	NT	EN	unknown
	<i>Carcharhinus amboinensis</i>	Pigeeye Shark	DD	VU	unknown
	<i>Carcharhinus brevipinna</i>	Spinner Shark	NT	VU	unknown
	<i>Carcharhinus dussumieri</i>	Whitecheek Shark	NT	EN	decreasing
	<i>Carcharhinus falciformis</i>	Silky Shark	NT	NT	decreasing
	<i>Carcharhinus humani</i>	Human's Whaler Shark	NE	DD	unknown
	<i>Carcharhinus leiodon</i>	Smoothtooth Blacktip Shark	EN		decreasing
	<i>Carcharhinus limbatus</i>	Blacktip Shark	NT	VU	unknown
	<i>Carcharhinus leucas</i>	Bull Shark	NT	EN	unknown
	<i>Carcharhinus macloti</i>	Hardnose Shark	NT	NT	unknown
	<i>Carcharhinus melanopterus</i>	Blacktip Reef Shark	NT	VU	decreasing
	<i>Carcharhinus plumbeus</i>	Sandbar Shark	VU	EN	decreasing
	<i>Carcharhinus sorrah</i>	Spottail Shark	NT	VU	unknown
	<i>Galeocerdo cuvier</i>	Tiger Shark	NT	VU	decreasing
	<i>Loxodon macrorhinus</i>	Sliteye Shark	LC	NT	unknown
	<i>Negaprion acutidens</i>	Sicklefin Lemon Shark	VU	EN	decreasing
	<i>Rhizoprionodon acutus</i>	Milk Shark	LC	NT	unknown
	<i>Rhizoprionodon oligolinx</i>	Grey Sharpnose Shark	LC	NT	unknown
Hemigaleidae	<i>Chaenogaleus macrostoma</i>	Hooktooth Shark	VU	VU	unknown
	<i>Hemipristis elongata</i>	Snaggletooth Shark	VU	VU	decreasing
	<i>Paragaleus randalli</i>	Slender Weasel Shark	NT	VU	unknown
Sphyrnidae	<i>Sphyrna lewini</i>	Scalloped Hammerhead	EN	EN	unknown
	<i>Sphyrna mokarran</i>	Great Hammerhead	EN	EN	decreasing
Ginglymostomatidae	<i>Nebrius ferrugineus</i>	Tawny Nurse Shark	VU	NT	decreasing
Hemiscylliidae	<i>Chiloscyllium arabicum</i>	Arabian Carpetshark	NT		decreasing
Odontaspidae	<i>Carcharias taurus</i>	Sandtiger Shark	VU	CR	unknown
Rhincodontidae	<i>Rhincodon typus</i>	Whale Shark	EN	EN	decreasing
Stegostomidae	<i>Stegostoma fasciatum</i>	Zebra Shark	EN	VU	decreasing
Triakidae	<i>Mustelus mosis</i>	Arabian Smoothhound	DD	LC	unknown

Table 14: IUCN Conservation status of rays and guitarfishes in Kuwait and the Arabian Gulf.

Family	Species	Common name	IUCN		Trend ((Global
			Global Status	Regional Status	
Aetobatidae	<i>Aetobatus flagellum</i>	Eagle Ray	EN	EN	decreasing
	<i>Aetobatus ocellatus</i>	Spotted Eagle Ray	VU	VU	decreasing
Dasyatidae	<i>Brevitrygon walga</i>	Scaly Whipray	NT		decreasing
	<i>Megatrygon microps</i>	Smalleye Stingray	DD	VU	unknown
	<i>Maculabatis randalli</i>	Arabian Banded Whipray	LC		stable
	<i>Himantura uarnak</i>	Reticulate Whipray	VU	VU	decreasing
	<i>Pastinachus sephen</i>	Cowtail Ray	NT		decreasing
	<i>Taeniurops meyeri</i>	Blotched Fantail Ray	VU	NT	decreasing
Gymnuridae	<i>Gymnura poecilura</i>	Longtail Butterfly Ray	NT	NT	decreasing
Myliobatidae	<i>Aetomylaeus nichofi</i>	Banded Eagle Ray	VU	VU	decreasing
	<i>Aetomylaeus milvus</i>	Ocellate Eagle Ray	EN		decreasing
Mobulidae	<i>Mobula eregoodootenkee</i>	Longhorned Pygmy Devil Ray	NT	NT	unknown
	<i>Mobula kuhlii</i>	Shortfin Devilray	DD	NT	decreasing
	<i>Glaucostegus granulatus</i>	Sharpnose Guitarfish	CR	EN	decreasing
	<i>Glaucostegus halavi</i>	Halavi Guitarfish	CR		decreasing
Rhinidae	<i>Rhina ancylostoma</i>	Bowmouth Guitarfish	CR	VU	decreasing
	<i>Rhynchobatus djiddensis</i>	Whitespotted Wedgefish	CR	EN	decreasing
	<i>Rhynchobatus laevis</i>	Smoothnose Wedgefish	CR	EN	decreasing
Rhinobatidae	<i>Rhinobatos punctifer</i>	Spotted Guitarfish	NT		decreasing
	<i>Rhinoptera jayakari</i>	Oman Cownose Ray	NE	EN	
Pristidae	<i>Pristis zijsron</i>	Green Sawfish	CR	CR	decreasing
	<i>Anoxypristis cuspidata</i>	Narrow Sawfish	ED	CR	decreasing
Torpedinidae	<i>Torpedo panthera</i>	Panther Torpedo	DD	DD	unknown
	<i>Torpedo sinuspersici</i>	Marbled Electric Ray	DD	DD	unknown

Buchanan et al. (2016) identified fishes that are coral-dependent in the Arabian Gulf; including their regional distribution, population status, life history characteristics, and major threats that affects their likelihood of extinction (Figure 23). Recently, Buchanan et al. (2019) evaluated the

regional conservation status of 471 species of bony marine fishes in the Arabian Gulf. Major threats are related to coral dependent and coral associated species, fisheries and restricted range (Table 15).



(Photo from Dr. Dareen Almojil)



Table 15: Regionally threatened marine bony fishes in the Gulf.

Family	Species	IUCN status	Cause of threat
Acanthuridae	<i>Acanthurus sohal</i>	VU	Coral dependent
	<i>Zebrasoma xanthurum</i>	VU	Coral dependent
Blenniidae	<i>Alticus kirkii</i>	VU	Restricted range
	<i>Omobranchus mekranensis</i>	VU	Restricted range
Caesionidae	<i>Caesio lunaris</i>	VU	Coral associated
	<i>Caesio varilineata</i>	VU	Coral associated
Chaetodontidae	<i>Chaetodon melapterus</i>	VU	Coral dependent
	<i>Chaetodon nigropunctatus</i>	VU	Coral dependent
	<i>Heniochus acuminatus</i>	VU	Coral dependent
Gobiidae	<i>Gobiodon citrinus</i>	EN	Coral dependent
	<i>Gobiodon reticulatus</i>	VU	Coral dependent
Labridae	<i>Scarus ghobban</i>	EN	Coral dependent
	<i>Chlorurus sordidus</i>	VU	Coral dependent
	<i>Halichoeres marginatus</i>	VU	Coral dependent
	<i>Scarus ferrugineus</i>	VU	Coral dependent
	<i>Scarus persicus</i>	VU	Coral dependent
Mugilidae	<i>Liza klunzingeri</i>	VU	Fisheries
Polynemidae	<i>Eleutheronema tetradactylum</i>	EN	Fisheries
Pomacentridae	<i>Abudefduf vaigiensis</i>	VU	Coral dependent
	<i>Amphiprion clarkii</i>	EN	Coral dependent
	<i>Chromis flavaxilla</i>	VU	Coral dependent
	<i>Chromis xanthopterygia</i>	EN	Coral dependent
	<i>Dascyllus trimaculatus</i>	VU	Coral dependent
	<i>Neopomacentrus cyanomos</i>	VU	Coral dependent
	<i>Pomacentrus aquilus</i>	EN	Coral dependent
Sciaenidae	<i>Otolithes ruber</i>	VU	Fisheries
	<i>Scomberomorus commerson</i>	VU	Fisheries
	<i>Pampus argenteus</i>	VU	Fisheries

Grabe et al. (1992) identified 50 larval fish taxa from Kuwait's waters. They found dominant families to be Sparidae-type larvae, in addition to larvae of clupeids and gobies. The predominant families of fish larvae in the western Arabian Gulf according to Houde et al. (1986) were Engraulidae, Gobiidae and Clupeidae, which accounted collectively for about 42.5% of all fish

larvae collected. A total of 53 families of fish larvae were identified, including 41 genera, 24 species and 84 specific types of larvae. Houde et al. (1986) described the spatial and temporal distribution of larval fish in Kuwait's waters. They found a distinct seasonal abundance in the occurrence of larval fish. Most fishes were found to spawn in Kuwait's waters during warm months from late

spring to early fall. Most of the spawning was by the abundant Engraulidae (anchovies), Gobiidae (gobies) and Clupeidae (herrings). The number of fish larvae taxa and total larval abundance in

Kuwait Bay peaked during late spring and were lowest in winter (Grabe *et al.*, 1992). Important winter spawners included Haemulidae (grunts), Mugilidae (mullet) and Soleidae (flatfish).



Figure 24: Some boney fishes from Kuwait.

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(Photo from Mohammad El Marefi)

A collage of various flowers in different colors, including yellow, pink, and red. The background is a soft-focus mix of these colors. In the center, there is a teal banner with the number 4 and the word Arthropoda.

4

Arthropoda

4 Arthropoda

Phylum Arthropoda includes all insects, arachnids and crustaceans. It is considered the largest group of animals with over eight million described species. In Kuwait, this group is represented by terrestrial and marine species. The following account reveals the detailed biodiversity of the arthropods of Kuwait.

4.1 Subphylum Chelicerata

4.1.1 Arachnida

4.1.1.1 Order Scorpiones



Scorpions are venomous animals. Only few records are available for Kuwait representing five species (Table 11) (Kettel, 1982; Hendrixson, 2006). Clayton & Pilcher (1983) showed images for some scorpions collected from Kuwait. Al-Khalifa et al. (2012) mentioned two species of

scorpions from Al-Wafra, however, the record of the Lesser yellow scorpion, *Uroplectes alstoni*, is doubtful. The record of *Compsobuthus arabicus* by Clayton & Pilcher (1983) is erroneous, and it represents *Compsobuthus pallidus*.

Table 16: Scorpions reported from Kuwait.

Species	Reference
<i>Androctonus crassicauda</i> (Olivier, 1807)	Clayton & Pilcher (1983), Hendrixson (2006) Al-Khalifa et al. (2012)
<i>Compsobuthus pallidus</i> Hendrixson, 2006	Hendrixson (2006)
<i>Apistobuthus pterygocercus</i>	Lourenço (1998)
<i>Scorpio maurus</i>	
<i>Leiurus hebraeus</i>	Clayton & Pilcher (1983),

References

- Kettel, J. (1982). 'Scorpions of Kuwait'. *Ahmadi Natural History and Field Studies Group Newsletter* 21: 6-8.
- Hendrixson, B. E. (2006). 'Buthid scorpions of Saudi Arabia, with notes on other families (Scorpiones: Buthidae, Liochelidae, Scorpionidae)'. *Fauna of Arabia* 21: 33-120.
- Clayton, D. and Pilcher, C. (1983). *Kuwait's Natural History: An Introduction*. Kuwait, Oil Co. Ltd., Kuwait.
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- Lourenço, W.R. (1998). 'A new species of *Apistobuthus* Finnegan, 1932 (Chelicerata, Scorpiones, Buthidae) from Iran'. *Entomol. Mitt. zool. Mus., Hamburg* 12: 237-244.



4.1.1.2 Order Araneae

Very little is known about the spiders of Kuwait. Two species of *Latrodectus* (Knoflach & Van Harten, 2002a & b), and one crab spiders (Muster, 2009) were reported (Table 17). Unidentified spiders representing jumping spider (Salticidae),

long-legged spider (Pholcidae), orb-weaver spider (Araneidae) and wolf spider (Lycosidae) were reported from Wafra (Al-Khalifa et al., 2012). Clayton & Pilcher (1983) depicted several images for unidentified spiders in Kuwait.

Table 17: Spiders reported from Kuwait.

Species	Reference
<i>Latrodectus cinctus</i> Blackwall, 1865	(Knoflach & Van Harten (2002 & b
<i>Latrodectus renivulvatus</i>	(Knoflach & Van Harten (2002a & b
<i>Halodromus patellidens</i>	(Muster (2009

References

- Al-Khalifa, H., Al-Nasser, A., Abbas, M.S. and Dashti, J. (2012). 'Biodiversity and conservation of Wild-life at the Wafra area in Kuwait'. *Biodiversity Journal* 3: 179-188.
- Clayton, D. and Pilcher, C. (1983). *Kuwait's Natural History: An Introduction*. Kuwait, Oil Co. Ltd., Kuwait.
- Knoflach, B. and Van Harten, A. (2002a). 'The genus *Latrodectus* (Araneae: Theridiidae) from mainland Yemen, the Socotra Archipelago and Adjacent countries'. *Fauna of Arabia* 19: 321-361.
- Knoflach, B. and Van Harten, A. (2002b). 'Die Schwarzen Witwen von Arabia Felix (Araneae: Theridiidae)'. *Österreichische Entomologische Gesellschaft* 6:10-12.
- Muster, C. (2009). 'The Ebo-like running crab spiders in the Old World (Araneae, Philodromidae)'. In: Stoev P, Dunlop J, Lazarov S (eds). 'A life caught in a spider's web. Papers in arachnology in honour of Christo Deltchev'. *ZooKeys* 16: 47-73.



4.1.1.3 Order Pseudoscorpiones

One species of pseudoscorpions, *Minniza persica*, was reported from Kuwait (Nassirkhani & Shoushtari, 2014).

Referenes

- Nassirkhani, M. and Shoushtari, R.V. (2014). 'Redescription and remarks on the species *Minniza persica* (Pseudoscorpiones: Olpiidae) from Iran'. *Zoology in the Middle East* 60: 272-277.doi.org/10.1080/09397140.2014.939814



4.1.1.4 Order Solifugae

Very little is known about camel spiders in Kuwait. Only a single species, *Galeodis arabs* (Koch, 1842), was reported from Wafra area (Al-Khalifa et al., 2012). Also, Clayton & Pilcher (1983) showed an image for one camel spider.



Figure 25: A camel spider of Order Solifugae (Photo from Zuhair Amr).

Reference

- Al-Khalifa, H., Al-Nasser, A., Abbas, M.S. and Dashti, J. (2012). 'Biodiversity and conservation of Wildlife at the Wafra area in Kuwait'. *Biodiversity Journal* 3: 179-188.
- Clayton, D. and Pilcher, C. 1983. *Kuwait's Natural History: An Introduction*. Kuwait, Oil Co. Ltd., Kuwait.



4.1. 2 Subclass Acari: Order Ixodida

Tick are ectoparasites feeding on blood of some terrestrial vertebrates. Still very little is known about this order. Ticks associated with rodents and camels were reported (Converse & Moussa,

1982; Al-Taqi & Al-Ziady, 1983; Zemtsova et al., 2016). Five species of both soft and hard ticks were reported from Kuwait (Table 18).

Table 18: Ticks reported from Kuwait.

Family	Species	Host
Ixodidae	<i>Rhipicephalus leporis</i>	<i>Lepus capensis</i>
	<i>Rhipicephalus sanguineus</i>	<i>Jaculus jaculus</i>
	<i>Hyalomma dromedarii</i>	<i>Jaculus jaculus</i> , <i>Gerbillus cheesmani</i> , <i>Meriones crassus</i> , camels
	<i>Hyalomma anatolicum excavatum</i>	<i>Gerbillus cheesmani</i> , <i>Meriones crassus</i>
Argasidae	<i>Ornithodoros erraticus</i>	<i>Mus musculus</i>

References

- Al-Taqi, M. and Al-Ziady, S. (1983). 'Ectoparasites of rodents in Kuwait'. *Proceedings of the 1st Symposium on Recent Advances in Rodent Control* 107-114.
- Converse, J.D. and Moussa, M.I. (1982). 'Quaranfil virus from *Hyalomma dromedarii* (Acari: Ixodoidea) collected in Kuwait, Iraq, and Yemen'. *Journal of Medical Entomology* 19: 209–210. doi.org/10.1093/jmedent/19.2.209
- Zemtsova, G.E., Apanaskevich, D.A., Reeves, W.K., Hahn, M., Snellgrove, A. and Levin, M.L. (2016). 'Phylogeography of *Rhipicephalus sanguineus sensu lato* and its relationships with climatic factors'. *Experimental & Applied Acarology* 69:191-203. doi.org/10.1007/s10493-016-0035-4

4.1.3 Order Trombidiformes

Two species of acarines were described from the shores of southern Kuwait; *Actacarus arabius* and *Scaptognathides delicatulus* (Bartsch, 2004).

References

- Bartsch, I. (2004). 'Psammophilous Halacarid mites From Kuwait: Description of species of the Genera *Actacarus* and *Scaptognathides* (Acari: Halacaridae)'. *Zootaxa* 755: 1-8. doi.org/10.11646/zootaxa.755.1.1

4.2 Subphylum Myriapoda

4.2.1 Class Chilopoda

Only one record of chilopod, *Scolopendra valida*, was reported from Kuwait (Reeves, 2016).

References

- Reeves, W.K. (2016). 'First national records for *Scolopendra valida* (Chilopoda: Scolopendromorpha: Scolopendridae) from Kuwait'. *Entomological News* 126:150-151. doi.org/10.3157/021.126.0212

4.3 Subphylum Crustacea

4.3.1 Class Malacostraca



4.3.1.1 Order Amphipoda

A total of 73 species of the order Amphipoda were identified and included in the guidebook. Of these, 60 species are considered to be new records for Kuwait and 55 species are recorded for the first time for the Arabian Gulf, whereas 19 species are considered as the first description of the new for science species Al-Yamani et al. (2019). Al-Yamani et al. (2012) listed several species of amphipods from Kuwait along with high quality illustrations. Seven new species of Amphipoda were described from Kuwait (Myers & Nithyanandan, 2016).

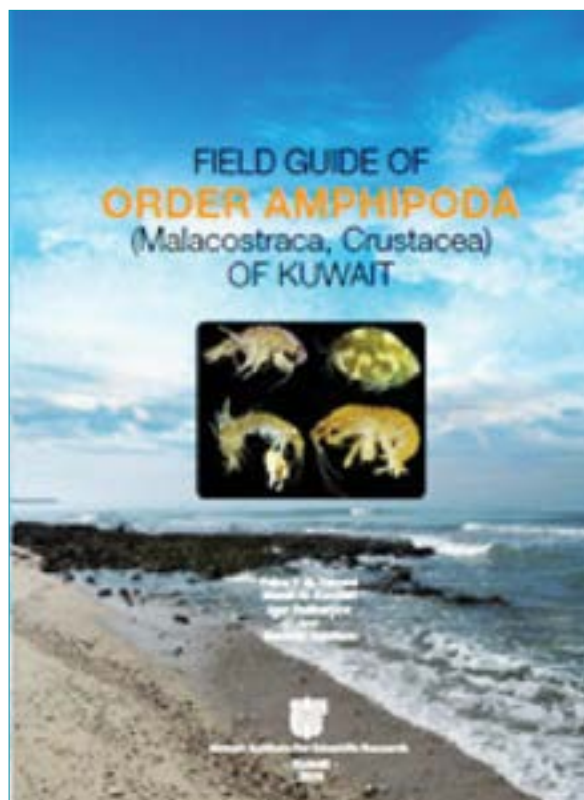


Figure 26: Cover for the field guide of Amphipods of Kuwait.

Table 19: Amphipods reported from Kuwait (* = described from Kuwait)

Family	Species
Ampeliscidae	<i>Ampelisca euroa</i> Lowry & Poore, 1985
	<i>Ampelisca</i> sp. 1
	<i>Ampelisca</i> sp. 2 cf. <i>brevicornis</i>
	<i>Ampelisca</i> sp. 3 cf. <i>misakiensis</i>
	<i>Ampelisca</i> sp. 4 cf. <i>rubella</i>
	<i>Ampelisca</i> sp. 5 cf. <i>taynamensis</i>
	<i>Ampelisca</i> sp. 6 cf. <i>tulearensis</i> 7
	<i>Byblis</i> sp.
Amphilochidae	<i>Apolochus</i> sp. 1 cf. <i>kailua</i>
	<i>Apolochus</i> sp. 2 cf. <i>menehune</i>

Family	Species
Ampithoidae	<i>Ampithoe ramondi</i> Audouin, 1826
	<i>Ampithoe</i> sp. 1
	<i>Ampithoe</i> sp. 2 cf. <i>kava</i>
	<i>Cymadusa setosa</i> (Haswell, 1879)
	<i>Biancolina</i> sp.
Aoridae	<i>Bemlos acuticoxa</i> Myers & Nithyanandan, 2016*
	<i>Globosolembos indicus</i> (Ledoyer, 1967)
	<i>Grandidierella gilesi</i> Chilton, 1921
	<i>Grandidierella</i> sp.
Caprellidae	<i>Deutella</i> sp.
	<i>Metaprotella macoranicus</i> Momtazi & Sari, 2013
Cheirocratidae	<i>Cheirocratus</i> sp.
Colomastigidae	<i>Colomastix</i> sp. 1
	<i>Colomastix</i> sp. 2
Corophiidae	<i>Laticorophium bifurcatum</i> Myers & Nithyanandan, 2016*
	<i>Cheiriphotis megacheles</i> (Giles, 1885)
	<i>Cheiriphotis</i> sp. cf. <i>walkeri</i>
Cyproideidae	<i>Cyproidea</i> sp. cf. <i>serratipalma</i>
Dexaminiidae	<i>Paradexamine</i> sp. 1 cf. <i>latifolia</i>
	<i>Paradexamine</i> sp. 2 cf. <i>orientalis</i>
Eriopisidae	<i>Eriopisa</i> sp. cf. <i>elongata</i>
	<i>Eriopisella</i> sp.
Hyalidae	<i>Parhyale basrensis</i> Salman, 1986
	<i>Protohyale arabica</i> Myers & Nithyanandan, 2016*
Ischyroceridae	<i>Ericthonius</i> sp. cf. <i>forbesii</i>
	<i>Ischyrocerus</i> sp.
	<i>Orientoecetes arabicus</i> (Barnard & Thomas, 1984)
Leucothoidae	<i>Leucothoe gracilis</i> (Haswell, 1879)
	<i>Leucothoe</i> sp. cf. <i>richiardii</i>
	<i>Paranamixis</i> sp. cf. <i>ledoyeri</i>
Liljeborgiidae	<i>Idunella demersalis</i> (Sivaprakasam, 1972)
Lysianassidae	<i>Socarnoides</i> sp.
Maeridae	<i>Ceradocus</i> (<i>Denticeradocus</i>) <i>alama</i> Myers & Nithyanandan, 2016*
	<i>Elasmopus alkhiranensis</i> Myers & Momtazi, 2015
	<i>Maera irregularis</i> Myers & Nithyanandan, 2016*

Family	Species
Maxillipiidae	<i>Maxillipius rectitelson</i> Ledoyer, 1973
Megaluropidae	<i>Megaluropus excavatus</i> Ledoyer, 1979
	<i>Megaluropus</i> sp. cf. <i>monasteriensis</i>
Melitidae	<i>Dulichella fresnelii</i> (Audouin, 1826)
	<i>Melita persia</i> Momtazi & Sari, 2014
Melphidippidae	<i>Melphisana madagascarensis</i> Ledoyer, 1984
Neomegamphopidae	<i>Neomegamphopus</i> sp.
Oedicerotidae	<i>Perioculodes</i> sp. 1
	<i>Perioculodes</i> sp. 2 cf. <i>megapleon</i>
	<i>Perioculodes</i> sp. 3 cf. <i>serra</i>
	<i>Pontocrates</i> sp. cf. <i>arenarius</i>
Photidae	<i>Latigammaropsis pseudojassa</i> Myers & Nithyanandan, 2016*
	<i>Latigammaropsis</i> sp. 1 308
	<i>Latigammaropsis</i> sp. 2 cf. <i>atlantica</i>
	<i>Photis hawaiiensis</i> J.L. Barnard, 1955
	<i>Photis</i> sp. 1
	<i>Photis</i> sp. 2 cf. <i>bifurcata</i>
	<i>Photis</i> sp. 3 cf. <i>viuda</i>
Phoxocephalidae	<i>Brolgus</i> sp. cf. <i>mamak</i>
Platyischnopidae	<i>Indischnopus herdmani</i> (Walker, 1904)
Podoceridae	<i>Laetmatophilus</i> sp.
	<i>Podocerus mamlahensis</i> Myers & Nithyanandan, 2016*
Pontogeneiidae	<i>Abdia latipalpus</i> (Walker & Scott, 1903)
Tryphosidae	<i>Orchomenella</i> sp.
Stenothoidae	<i>Stenothoe gallensis</i> Walker, 1904
	<i>Stenothoe</i> sp. cf. <i>aucklandicus</i>
Urothoidae	<i>Urothoe</i> sp. 1
	<i>Urothoe</i> sp. 2 cf. <i>intermedia</i>

References

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- Al-Yamani F.Y., Al-Kandari, M., Polikarpov, I. and Grintsov, V. (2019). *Field guide of order Amphipoda (Malacostraca, Crustacea) of Kuwait*. Kuwait: Kuwait Institute for Scientific Research. p 390. ISBN 978-99966-37-19-3
- Myers, A.A. and Nithyanandan, M. (2016). 'The Amphipoda of Sea City, Kuwait.—The Senticaudata (Crustacea)'. *Zootaxa* 4072: 401–429. doi.org/10.11646/zootaxa.4072.4.1

4.3.1.2 Order Decapoda Suborder Senticaudata



Fifty-two species in 20 families of marine crabs were reported from Kuwait (Table 20, Figures 28 & 29). Several papers were published in which

two species was described as new to science, *Leptochryseus kuwaitensis* and *Manningis arabicum* (Jones & Clayton, 1983; Collins et al.,

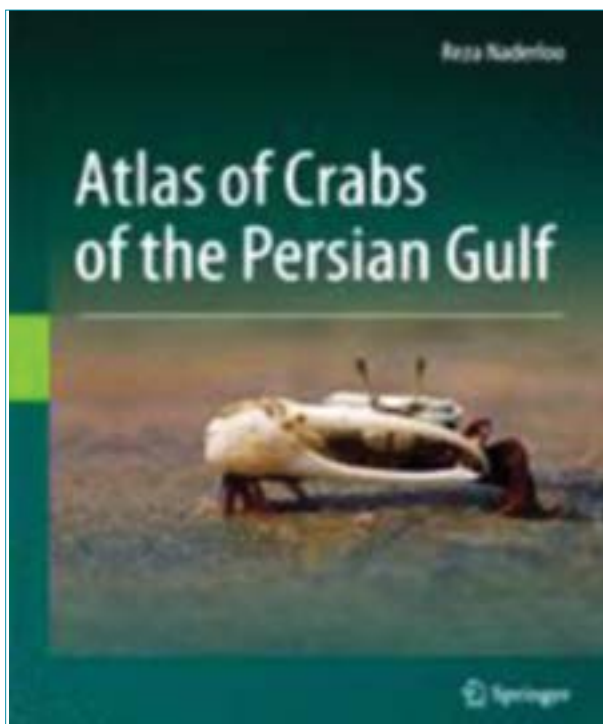


Figure 27: Books published on the crabs of Kuwait and the Arabian Gulf.

1984; Jones, 1986a & b; Snowden et al., 1991, 1994 & 1995; Carpenter et al., 1997; Apel & Spiridonov, 1998; Apel, 2001 Al-Yamani et al., 2012; Al-Wazzan et al., 2018). The main reference

on the crabs of the Arabian Gulf was published by Naderloo (2017) with full colored illustration and distribution maps (Figure 27).



Figure 28: The rounded ghost crab, *Ocypode rotundata* (Photo from F. Krupp).

Table 20: Decapoda reported from Kuwait.

Family	Species	
Matutidae	<i>Matuta planipes</i> Fabricius, 1798	
	<i>Matuta victor</i> (Fabricius, 1781)	
Dorippidae	<i>Dorippe quadridens</i> (Fabricius, 1793)	
	<i>Dorippoides nudipes</i> Manning & Holthuis, 1986	
Oziidae	<i>Epixanthus frontalis</i> (H. Milne Edwards, 1834)	
Euryplacidae	<i>Eucrate crenata</i> (De Haan, 1835)	
Leucosiidae	<i>Arcania erinacea</i> (Fabricius, 1787)	
	<i>Hiplyra sagitta</i> Galil, 2009	
	<i>Hiplyra variegata</i> (Rüppell, 1830)	
	<i>Ixa holthuisi</i> Tirmizi, 1970	
	<i>Lyphira perplexa</i> Galil, 2009	
	<i>Nursia plicata</i> (Herbst, 1803)	
	<i>Ryphila cancellus</i> (Herbst, 1783)	
	<i>Philyra</i> sp.	
	<i>Seulocia anahita</i> Galil, 2005	
	<i>Urnalana hilaris</i> (Nobili, 1905)	
	Epiplatidae	<i>Menaethius monoceros</i> (Latreille, 1825)
		<i>Hyastenus hilgendorfi</i> de Man, 1887
		<i>Cyphocarcinus capreolus</i> (Paul'son, 1875)
Parthenopidae	<i>Enoplolambrus carenatus</i> (H. Milne Edwards, 1834)	
Portunidae	<i>Charybdis (Charybdis) hellerii</i> (A. Milne-Edwards, 1867)	
	<i>Charybdis (Charybdis) natator</i> (Herbst, 1794)	
	<i>Charybdis (Goniohellenus) longicollis</i> Leene, 1938	
	<i>Portunus segnis</i> (Forskål, 1775)	
Xanthidae	<i>Xiphonectes hastatoides</i> (Fabricius, 1798)	
	<i>Actaea jacquelineae</i> Guinot, 1976	
	<i>Leptodius exaratus</i> (H. Milne Edwards, 1834)	
Galenidae	<i>Halimede tyche</i> (Herbst, 1801)	
Pilumnidae	<i>Eurycarcinus orientalis</i> A. Milne-Edwards, 1867	
	<i>Pilumnus longicornis</i> Hilgendorf, 1878	
	<i>Pilumnus vespertilio</i> (Fabricius, 1793)	
Grapsidae	<i>Grapsus granulosus</i> H. Milne Edwards, 1853	
	<i>Grapsus albolineatus</i> Latreille, in Milbert, 1812	
	<i>Metopograpsus messor</i> (Forskål, 1775)	

Family	Species
Sesarmidae	<i>Chiromantes boulengeri</i> (Calman, 1920)
	<i>Nanosesarma sarii</i> Naderloo & Türkay, 2009
	<i>Parasesarma persicum</i> Naderloo & Schubart, 2010
Varunidae	<i>Eriocheir hepuensis</i> Dai, 1991
	<i>Metaplax indica</i> H. Milne Edwards, 1852
Camptandriidae	<i>Leptochryseus kuwaitense</i> (D.A. Jones & Clayton, 1983)
	<i>Manningis arabicum</i> (Jones & Clayton, 1983)
	<i>Nasima dotilliformis</i> (Alcock, 1900)
	<i>Opusia indica</i> (Alcock, 1900)
Dotillidae	<i>Tylodiplax</i> sp.
	<i>Dotilla blanfordi</i> Alcock, 1900
	<i>Ilyoplax frater</i> (Kemp, 1919)
	<i>Ilyoplax</i> sp.
	<i>Scopimera crabicauda</i> Alcock, 1900
Macrophthalmidae	<i>Ilyograpsus rhizophorae</i> Barnard, 1955
	<i>Chaenostoma sinuspersici</i> (Naderloo & Türkay, 2011)
	<i>Macrophthalmus (Macrophthalmus) sulcatus</i> H. Milne Edwards, 1852
	<i>Venitus dentipes</i> (Lucas, 1836)
Ocypodidae	<i>Ocypode rotundata</i> Miers, 1882
	<i>Austruca iranica</i> (Pretzmann, 1971)
	<i>Austruca sindensis</i> (Alcock, 1900)
Sesarmidae	<i>Nanosesarma minutum</i> (DeMann, 1887)

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4.3.1.3 Suborder Pleocyemata Infraorder Caridea



The Caridea, commonly known as caridean shrimp are represented by 12 species and two unidentified species in four families (Table 21). Anker & De Grave (2009) described a new species from

Kuwait, *Alpheus lutosus*. Several papers included records from Kuwait (Motoh, 1975; Jones, 1986; Grabe & Lees, 1995; De Grave & Ashelby, 2011).

Table 21: Caridea reported from Kuwait.

Infraorder	Superfamily	Family	Species
Caridea	Alpheoidea	Alpheidae	<i>Alpheus</i> sp.
			<i>Alpheus djeddensis</i> (Coutie`re, 1897)
			<i>Alpheus lutosus</i> Anker & De Grave. 2009
			<i>Athanas</i> sp
			<i>Athanas dimorphus</i> (Ortmann, 1894)
			<i>Athanas rhothionastes</i> (Banner & Banner, 1960)
			<i>Synalpheus</i> sp.
		Palaemonidae	<i>Periclimenes obscurus</i> (Kemp, 1922)
		Hippolytidae	<i>Latreutes anoplonyx</i> Kemp, 1914
			<i>Saron marmoratus</i> (Olivier, 1811)
		Lysmatidae	<i>Lysmata vittata</i> (Stimpson, 1860)
		Ogyrididae	<i>Ogyrides orientalis</i> (Stimpson, 1860)

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4.3.1.4 Suborder Dendrobranchiata

Dendrobranchiata is a suborder of decapod shrimps, commonly known as prawns. Thirteen species in two families have been recorded (Table 22) from Kuwait (Motoh, 1975; Al-Yamani & Khvorov, 2007; Bishop et al., 2008; Al-Yamani et al., 2012).

Table 22: Dendrobranchiata reported from Kuwait.

Family	Species
	<i>Acetes japonicus</i>
Sergestidae	<i>Sergestis</i> sp.
Penaeidae	<i>Ganjampenaeopsis uncata</i>
	<i>Megokris pescadorensis</i>
	<i>Metapenaeopsis stridulans</i>
	<i>Metapenaeus affinis</i>
	<i>Metapenaeus stebbingi</i>
	<i>Parapenaeopsis stylifera</i>
	<i>Penaeus japonicus</i>
	<i>Penaeus latisulcatus</i>
	<i>Penaeus semisulcatus</i>
	<i>Solenocera crassicornis</i>
	<i>Trachysalambria curvirostris</i>

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4.3.1.5 Infraorders Achelata, Anomura and Thalassinidea

These are the Sand Crabs, Left-handed Hermit Crabs, Porcelain Crabs, Slipper Lobsters and Ghost shrimp. They are represented by at least eight species (Table 23) (Motoh, 1975; Carpenter et al., 1997a; Al-Yamani et al., 2012).

Table 23: Achelata, Anomura and Thalassinidea reported from Kuwait.

Infraorder	Family	Species
Achelata	Scyllaridae	<i>Thenus orientalis</i> (Lund, 1793)
Anomura	Hippidae	<i>Emerita holthuisi</i> Sankolli, 1965
	Diogenidae	<i>Diogenes</i> sp.
		<i>Paguristes</i> sp.
	Porcellanidae	<i>Petrolisthes carinipes</i> (Heller, 1861)
		<i>Petrolisthes rufescens</i> (Heller, 1861)
		<i>Raphidopus</i> sp.
Thalassinidea	Callianassidae	<i>Callianassa</i> sp.

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4.3.1.6 Order Isopoda

In total, 13 species of isopods were reported from Kuwait (Bowman & Tareen, 1983; Mathews & Samuel, 1987; Al-Yamani et al., 2012) (Table 24). Bowman & Tareen (1981 & 1983) described seven

new species of parasitic isopods parasitizing fishes in Kuwait. Mathews & Samuel (1987) reported on *Livoneca* sp. recovered from *Helotes sexlineatus*.

Table 24: Isopods reported from Kuwait.

Family	Parasite	Fish host
Cymothoidae	<i>Anilocra monoma</i> Bowman & Tareen, 1983	<i>Acanthopagrus s latus</i> , <i>Hilsa ilisha</i> , <i>Nematalosus nasus</i> , <i>Johnius aneus</i>
	<i>Nerocila (Nerocila) phaiopleura</i> Bleeker, 1857	<i>Chirocentrus darab</i> , <i>Dussumieria acuta</i>
	<i>Nerocila (Emphyllia) kisra</i> Bowman & Tareen, 1983	<i>Therapon puta</i> , <i>Scomberomorus</i> sp., <i>Polydactylus</i> sp., <i>Ilisha indica</i> , <i>Helotes sexlineatus</i> , <i>Acanthopagrus cuvieri</i> , <i>Pelates quadrilineatus</i> , <i>Kathala axillaris</i>
	<i>Nerocila (Nerocila) sigani</i> Bowman & Tareen, 1983	<i>Siganus oramin</i>
	<i>Nerocila (Nerocila) arres</i> Bowman & Tareen, 1983	<i>Epinephalus tauvina</i> , <i>Acanthopagrus latus</i> , <i>Nemipterus japonicus</i> , <i>Nemipterus tolu</i>
	<i>Catoessa gruneri</i> Bowman & Tareen, 1983	<i>Leiognathus fasciatus</i> , <i>Ilisha indica</i> , <i>Therapon puta</i> , <i>Leiognathus daura</i>
	<i>Joryma sawayah</i> Bowman & Tareen, 1983	<i>Ilisha indica</i> , <i>Therapon puta</i>
	<i>Mothocya</i> sp.	<i>Strongylura strongylura</i>
	<i>Cymothoa eremita?</i> (Brunnich, 1783)	<i>Pampus argenteus</i> , <i>Sphyaena obtusata</i>
	<i>Livoneca</i> sp.	<i>Helotes sexlineatus</i>
Anthuridae	<i>Apanthura sandalensis</i> Stebbing, 1900	
Gnathiidae	<i>Gnathia</i> sp.	
Lernaeopodidae	<i>Thysanote alternans</i> Kabata & Tareen, 1981	<i>Polynemus sextarius</i>

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4.3.1.7 Order Cumacea



Species of this order are known as hooded shrimp or comma shrimp. Only three identified species and seven unidentified species (Table 25)

have been recorded from Kuwait (Al-Yamani et al., 2012).

Table 25: comma shrimp reported from Kuwait.

Family	Species
Bodotriidae	<i>Bodotria</i> sp.
	<i>Cumopsis</i> sp.
	<i>Cyclaspis</i> sp.
	<i>Eocuma affine</i> Calman, 1904
	<i>Eocuma rosae</i> Corbera and Galil, 2007
	<i>Eocuma</i> sp.
	<i>Iphinoe maeotica</i> Sowinskyi, 1893
	<i>Iphinoe</i> sp.
Nannastacidae	<i>Campylaspis</i> sp.
	<i>Cumella</i> sp.

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4.3.1.8 Order Mysida



This order is represented by one species *Rhopalophthalmus tattersallae* (Grabe, 1989) and one unidentified species of the genus *Gastrosaccus* (Al-Yamani et al., 2012).

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4.3.2 Class Hexanauplia

The Hexanauplia is a class of crustaceans that includes Copepoda, Tantulocarida, acorn barnacle and the Thecostraca. Many species of copepoda are external parasites on fishes. Fifty nine species of copepods were reported from Kuwait (Table 26). Twenty-three species of parasitic Copepoda were reported on marine fishes in Kuwait (Ho &

Sey 1996) and by Al-Yamani & Prusova (2003). Ho & Kim (1997 & 2001) and Ho et al. (1999) described several new species of copepods parasitizing fishes in Kuwait. Kabata & Tareen (1984) also described new species for Kuwait including, *Caligus kuwaitensis*.

Table 26: Hexanauplia reported from Kuwait.

Order	Family	Species	Fish host	Reference
Siphonostomatoida	Caligidae	<i>Caligus kuwaitensis</i>	<i>Plotossus anguillaris</i>	Kabata & Tareen (1984)
	Hatschekidae	<i>Hatschekia seyi</i>	<i>Heniochus acuminatus</i>	Ho & Kim (2001)
		<i>Hatschekia nodosa</i>	<i>Lutjanus coccineus</i>	Ho & Kim (2001)
		<i>Hatschekia tanysona</i>	<i>Lutjanus fulviflamma</i>	Ho & Kim (2001)
	Lernanthropidae	<i>Lernanthropus cadenati</i>	<i>Acanthopagrus berda</i>	Ho & Sey (1996)
		<i>Anuretes anomalus</i>	<i>Plectorhynchus cinctus</i>	Ho & Sey (1996)
	Lernaepodidae	<i>Sparidicola lithognathi</i>	<i>Acanthopagrus latus</i>	Kabata & Tareen (1987)
<i>Thysanote alternans</i>		<i>Polynemus sextarius</i>		
Cyclopoida	Bomolochidae	<i>Nothobomolochus tricerus</i> (Bassett-Smith, 1898)	<i>Pampus argenteus</i>	Ho et al. (2000)
		<i>Orbitacolax hapalogenyos</i> (Yamaguti & Yamasu, 1959)	<i>Hemirhamphus marginatus</i>	Ho et al. (2000)
	Taeniacanthidae	<i>Irodes kuwaitensis</i>	<i>Upeneus sulphureus</i>	Ho et al. (1999)
	Chondracanthidae	<i>Berea clava</i>	<i>Pseudorhombus arsius</i>	Ho & Sey (1997)
	Oithonidae	<i>Oithona fallax</i>		Michel & Herring (1984)
		<i>Oithona hamata</i>		Michel & Herring (1984)
	Clausidiidae	<i>Saphirella</i> sp.		Michel & Herring (1984)
	Oncaeidae	<i>Triconia conifera</i>		Michel & Herring (1984)
		<i>Conaea</i> sp.		Michel & Herring (1984)
	Corycaeidae	<i>Corycaeus</i> sp.		Michel & Herring (1984)
Sapphirinidae	<i>Sapphirina</i> sp.		Michel & Herring (1984)	
	<i>Copilia</i> sp.		Michel & Herring (1984)	
Calanoida	Calanidae	<i>Canthocalanus pauper</i>		Michel & Herring (1984)
	Eucalanidae	<i>Subeucalanus monachus</i>		Michel & Herring (1984)
		<i>Subeucalanus flemingeri</i>		Prusova et al. (2001)
	Paracalanidae	<i>Acrocalanus gibber</i>		Michel & Herring (1984)

Order	Family	Species	Fish host	Reference
		<i>Paracalanus aculeatus</i>		Michel & Herring (1984)
		<i>Parvocalanus crassirostris</i>		Michel & Herring (1984)
		<i>Bestiolina arabica</i>		Ali et al. (2007)
	Centropagidae	<i>Centropages furcatus</i>		Michel & Herring (1984)
		<i>Centropages orsinii</i>		Michel & Herring (1984)
		<i>Centropages tenuiremis</i>		Michel & Herring (1984)
	Pseudodiaptomidae	<i>Pseudodiaptomus marinus</i>		Michel & Herring (1984)
	Temoridae	<i>Temora discaudata</i>		Michel & Herring (1984)
		<i>Temora turbinata</i>		Michel & Herring (1984)
	Candaciidae	<i>Candacia bradyi</i>		Michel & Herring (1984)
	Pontellidae	<i>Calanopia elliptica</i>		Michel & Herring (1984)
		<i>Calanopia minor</i>		Michel & Herring (1984)
		<i>Labidocera acutifrons</i>		Michel & Herring (1984)
		<i>Labidocera kroyeri</i>		Michel & Herring (1984)
		<i>Labidocera acuta</i>		Michel & Herring (1984)
		<i>Labidocera minuta</i>		Michel & Herring (1984)
		<i>Labidocera kuwaitiana</i>		Prusova & Al-Yamani, 2014
		<i>Pontella</i> sp.		Michel & Herring (1984)
		<i>Pontellina</i> sp.		Michel & Herring (1984)
		<i>Pontellopsis herdmani</i>		Michel & Herring (1984)
	Acartiidae	<i>Acartia bispinosa</i>		Michel & Herring (1984)
		<i>Acartia pacifica</i>		Michel & Herring (1984)
		<i>Acartia (Acanthacartia) pietschmani</i>		Michel & Herring (1984)
		<i>Acartia faoensis</i>		Ali et al. 2009
	Tortanidae	<i>Tortanus forcipatus</i>		Michel & Herring (1984)
		<i>Tortanus (Atortus) recticaudus</i>		Michel & Herring (1984)
Canuelloida	Longipediidae	<i>Longipedia</i> sp.		Michel & Herring (1984)
	Ectinosomatidae	<i>Microsetella rosea</i>		Michel & Herring (1984)
		<i>Macrosetella gracilis</i>		Michel & Herring (1984)
	Tachidiidae	<i>Euterpina acutifrons</i>		Michel & Herring (1984)
	Peltidiidae	<i>Clytemnestra scutellata</i>		Michel & Herring (1984)
Monstrilloida	Monstrillidae	<i>Cymbasoma longispinosum</i>		Michel & Herring (1984)
		<i>Pleopis polyphemoides</i>		
	Sididae	<i>Penilia avirostris</i>		
Sessilia	Balanidae	<i>Amphibalanus amphitrite</i>		



4.3.3 Class Branchiopoda

A single species of class Branchiopoda (Order Onychopoda, Family Podonidae), *Pseudevadne tergestina* has been reported from Kuwait.

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4.4 Subphylum Hexapoda

4.4.1 Class Insecta

Several publications dealt with the insect fauna of Kuwait were published over the past 80 years. (Uvarov, 1930; Abushama & Cloudsley-Thompson, 1978; Clayton & Pilcher, 1983; Al-Houty, 1989, 1997 & 2011; Horváth & Zeil, 1996).

Al-Houty (2009) summarized the known species of insects in Kuwait until 2008. Later, Al-Houty (2011) updated the list of recorded insects in Kuwait reaching 684 species.

A series of educational books on the insects of Kuwait were published with good quality illustrations, covering the coleopterans, wasps and ants, butterflies and moths, grasshoppers and amphids (Figure 30).



Figure 30: Books in Arabic on the insects of Kuwait



4.4.1.1 Order Odonata (Dragonflies)

The Odonata (Dragonflies) of Kuwait were studied by Al-Houty (1985). So far, a total of 12 species have been recorded (Table 27). More data on

the distribution of the dragonflies of Kuwait are included in Waterston & Pittaway (1991).

Table 27: Odonata of Kuwait

Suborder	Family	Species
Anisoptera	Aeshnidae	<i>Anax parthenope</i> (Selys 1839)
		<i>Hemianax ephippiger</i> (Bur-meister 1839)
	Gomphidae	<i>Lindenia tetraphylla</i> (Vander Linden 1825)
	Libellulidae	<i>Crocothemis chaldaeorum</i> Morton, 1920
		<i>Crocothemis erythraea</i> (Brulle 1832)
		<i>Crocothemis servilia</i> (Drury 1770)
		<i>Orthetrum sabina</i> (Drury 1773)
		<i>Orthetrum taeniolatum</i> (Schneider 1845)
		<i>Selysiothemis nigra</i> (Vander Linden 1825)
		<i>Trithemis annulata</i> (Beauvais 1807)
	<i>Trithemis arteriosa</i> (Bur-meister 1839)	
Zygoptera	Coenagrionidae	<i>Ischnura evansi</i> Morton 1919



Figure 31: Dargonflies from Kuwait, *Crocothemis erythrea* (Photo from Mohammad El Marefi).



Figure 32: Dargonflies from Kuwait, *Crocothemis servilia* (Photo from Mohammad El Marefi).

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4.4.1.2 Order Orthoptera



The grasshopper of Kuwait consists of 31 species records of Uvarov (1930), Al-Houty (1997, 2009 & in five families (Table 28). Our data were based on 2011) and Gorochov (1993)

Table 28: Orthopteran species recorded from Kuwait

Family	Species
Acrididae	<i>Acrotylus insubricus inficifus</i> Walker 1870
	<i>Aiolopus simulatrix</i> (Walker 1870)
	<i>Aiolopus thalassinus</i> (Fabricius 1781)
	<i>Anacridium aegypticum</i> (Linnaeus 1764)
	<i>Anacridium melanorhodon</i> Dirsh 1953
	<i>Cyclopternacris (Heteracris) muscatensis</i> Popov, 1981
	<i>Duroniella lucasii</i> (Bolívar, 1881)
	<i>Heteracris annulosus</i> (Walker 1870)
	<i>Hedotettix alienus</i> Uvarov, 1936
	<i>Locusta migratoria</i> (Linnaeus 1758)
	<i>Mioscirtus wagneri</i> (Kittary 1849)
	<i>Morphacris fasciata</i> (Thunberg 1815)
	<i>Ochrilidia geniculata</i> (I. Bouvar 1913
	<i>Pseudosphingonotus paradoxus</i> (Bey-Bienko 1948)
	<i>Pseudosphingonotus savignyi</i> (Saussure 1884)
	<i>Pyrgomorpha cognata</i> (Uvarov 1943)
	<i>Pyrgomorpha conica-bispinosa</i> Hsiung-Kevan 1975
	<i>Schistocerca gregaria</i> (Forskol 1775)
	<i>Sphingonotus octofaciatus</i> (Serville 1838)
	<i>Sphingonotus rubescens</i> (Walker 1870)
<i>Truxalis grandis</i> Klug 1830	
<i>Truxalis mesopotamic</i> (Dirsh 1956)	
<i>Truxalis procera</i> Klug 1830	
<i>Utubius syriacus</i> Bolívar, 1893	
Tettigoniidae	<i>Euconocephalus incertus</i> (Walker 1869)
Pamphagidae	<i>Eremotmethis carinatus</i> (Fabricius, 1775)
	<i>Thrinicus campanulatus</i> Fischer von Waldheim, 1833.
Gryllidae	<i>Acheta domestica</i> Linnaeus 1758
	<i>Gryllodinus kerkennensis</i> (Finot 1893)
	<i>Gryllus bimaculatus</i> De Geer, 1773
	<i>Gryllodes sigillatus</i> (Walker, F., 1869)
Gryllotalpid	<i>Gryllotalpa gryllotalpa</i> (Linnaeus 1758)

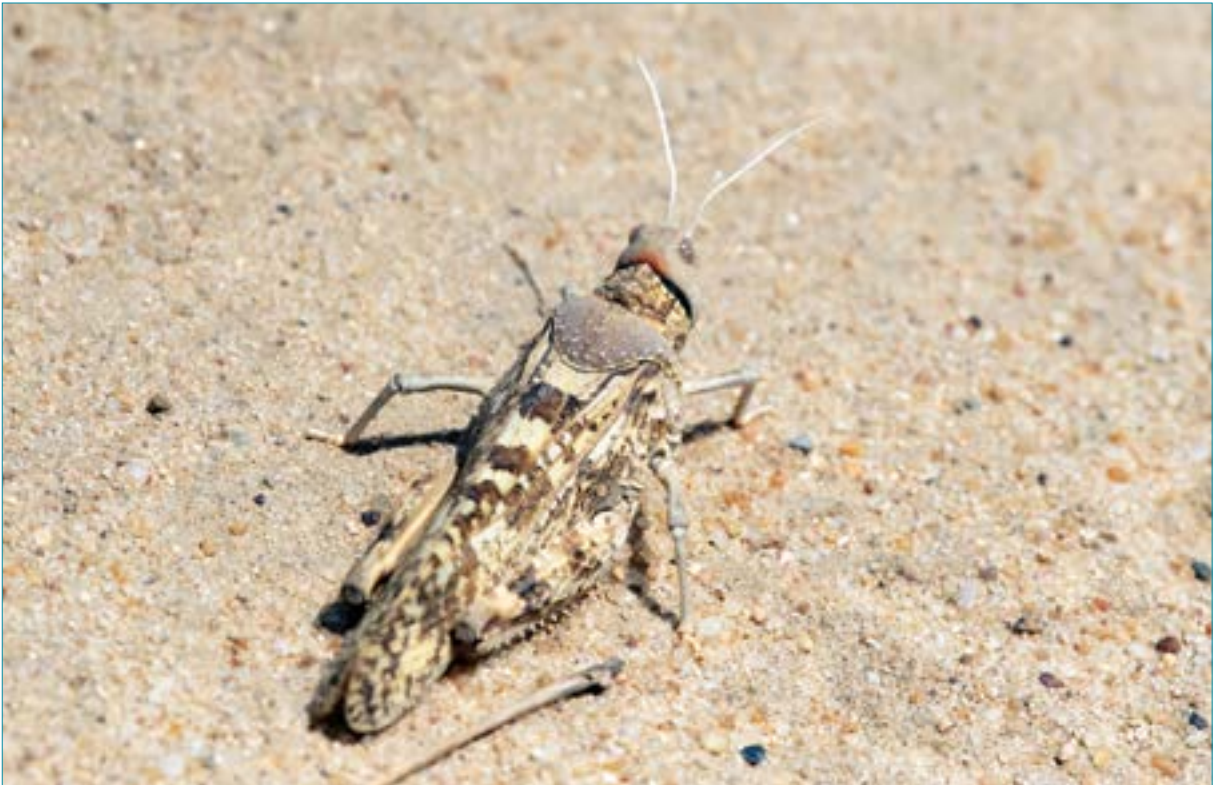


Figure 33: A grasshopper of family Acrididae (Photo from Abdul Al-Aziz Al Yousef).

Reference

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4.4.1.3 Order Diptera Family Culicidae



The mosquitoes of Kuwait were studied by Salit et al. (1994 & 1996). Recently, two additional species were added to the list of the mosquitoes of

Kuwait (Reeves et al., 2016; Colton et al., 2019). It consists of 13 species belonging to four genera (Table 29).

Table 29: Mosquitoes recorded from Kuwait.

Subfamily	Species
Anophelinae	<i>Anopheles pulcherrimus</i> Theobald (1902)
	<i>Anopheles pharoensis</i> Theobald 1901
	<i>Anopheles stephensi</i> Liston, 1901
Culicinae	<i>Culex pipiens molestus</i> Linnaeus, 1758
	<i>Culex perexiguus</i> Theobald, 1903
	<i>Culex pusillus</i> Macquart, 1850
	<i>Culex quinquefasciatus</i> Say, 1823
	<i>Culex theileri</i> Theobald 1903
	<i>Culex tritaeniorhynchus</i> Giles, 1901
	<i>Culex univittatus</i> Theobald 1901
	<i>Culiseta annulata</i> (Schrank, 1776)
	<i>Culiseta longiareolata</i> Macquart, 1838
	<i>Aedes caspius</i> (Pallas, 1771)

Reference

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Family Psychodidae

Six species of sandflies were reported from Kuwait (Hussien & Behbahan, 1976; Lane & Al-Taqi, 1983) (Table 30). Sandflies are important vectors for leishmaniasis. The disease is known from Jahra district in Kuwait, whereas the disease is caused by *L. major*.

Table 30: Sandflies reported from Kuwait.

Species
<i>Phlebotomus papatasi</i> (Scopoli 1786)
<i>Phlebotomus alexandri</i> Sinton 1928
<i>Sergentomyia antennata</i> (Newstead 1912)
<i>Sergentomyia squamipleuris</i>
<i>Sergentomyia clydei</i> (Sinton 1928)
<i>Tinearia alternata</i> (Say 1824)

Reference

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Family Chironomidae

Species of this family were reported by Crans-ton & Judd (1989), Al-Houty (1997), Andersen & Mendes (2010), and Reeves & Eple (2016), with a total of nine species (Table 31)

Table 31: Chironomids reported from Kuwait.

Species
<i>Ablabesmyia</i> sp.
<i>Chironomus attenuates</i> Walker, 1848
<i>Chironomus calipterus</i> Kieffer, 1908
<i>Chironomus pulcher</i> Wiedemann, 1930
<i>Limnophyes natalensis</i> (Kieffer, 1914)
<i>Polypedilum (Polypedilum) nubifer</i>
<i>Polypedilum nubeculosum</i> (Meigen 1804)
<i>Procladius brevipetiolatus</i> (Goetghebuer 1935)
<i>Chironomus dorsalis</i> Meigen, 1818

References

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Family Asilidae

The robber flies of Kuwait consists of six species (Al-Houty, 1997) (Table 32).

Table 32: Robber flies reported from Kuwait.

Species
<i>Apoclea algira</i> (Linnaeus 1767)
<i>Apoclea femoralis</i> (Wiedemann 1828)
<i>Dasypogonjugulum</i> (Loew 1847)
<i>Habropogon appendiculatus</i> Schiner 1867
<i>Laphystia erberi</i> Schiner 1865
<i>Machimus cingulatus</i> (Fabricius 1781)

References

- Al-Houty, W. (1997). 'Checklist of the insect fauna of Kuwait'. *Kuwait Journal of Science & Engineering* 24: 145-162.

Family Bombyliidae

A total of 12 species of bee flies (Table 33) were reported from Kuwait by Al-Houty (1997).

Table 33: Bee flies reported from Kuwait.

Species
<i>Anastoechus exalbidus</i> (Wiedemann 1820)
<i>Anastoechus miscens</i> Walker, 1871
<i>Anastoechus niveus</i> Hermann 1909
<i>Anastoechus trisignatus</i> Portschnikii 1881
<i>Bombylius medius</i> (Linnaeus 1758)
<i>Bombylius megacephalus</i> Portschnikii 1887
<i>Cytherea nucleorum</i> (Becker 1902)
<i>Heteralonia mucorea</i> (Klug 1832)
<i>Parachistus pulchellus</i> Greathead 1980
<i>Spogostylum ocyale</i> (Wiedemann 1828)
<i>Usia aurata</i> (Fabricius 1794)
<i>Villa bivirgata</i> Austen 1937

References

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Other families of order Diptera

Other minor families of order Diptera include 14 families (Table 34) with a total of 25 species (Al-Houty, 1997 & 2011).

Table 34: Other families of order Diptera reported from Kuwait.

Family	Common name	Species
Agromyzidae	leaf-miner flies	<i>Chromatomyia horticola</i> Goureau 1851
Anthomyidae	Flower flies	<i>Anthomyia tempestatum</i> Wiedemann 1818
Chloropidae	Frit flies	<i>Aphanotrigonum subfasciella</i> Collin 1949
		<i>Metopostigma tenuiseta</i> (Loew 1860)
		<i>Ophiomyia beckeri</i> Hendel 1923
Ephydriidae	Shore flies	<i>Actocetor margaritatus</i> (Wiedemann 1830)
		<i>Ephydra flavipes</i> (Macquart 1843)
Gasterophilidae	Botflies	<i>Oestrus intestinalis</i> (DeGeer 1776)
Hippoboscidae	Louse flies	<i>Hippobosca camelina</i> Leach 1817
Ulidiidae	Picture-winged flies	<i>Ceraxys urticae</i> Linnaeus 1758
		<i>Melierio omissa</i> Meigen 1826
		<i>Physiphora olceae</i> Preyessler 1791
Pipunculidae	Big-headed flies	<i>Tomosvaryella subvirescens</i> (Loew 1872)
Piophilidae	Cheese flies	<i>Piophila casei</i> (Linnaeus 1758)
Phoridae	Hump-backed flies	<i>Megaselia scalaris</i> Loew, 1866.
Syrphidae	Hoverflies	<i>Conops aneus</i> (Scopoli 1763)
		<i>Episyrphus balteatus</i> (De Geer, 1776)
		<i>Eristalinus taeniops</i> (Wiedemann 1819)
		<i>Eristalinus aeneus</i> (Scopoli 1763)
		<i>Eristalinus megacephalus</i> (Rossi, 1794)
		<i>Eristalis tabanoides</i> (Jaennicke 1867)
		<i>Eumerus turkmenorum</i> Paramanov 1927
		<i>Ischiodon aegypticus</i> (Wiedemann 1830)
		<i>Metasyrphus luniger</i> (Meigen 1822)
		<i>Syrphus corollae</i> (Fabricius 1794)
		<i>Sphaerophoria turkmenica</i> Bankowska 1964
Tachinidae	Tachina flies	<i>Drino latigena</i> Mesnil, 1944
Therevidae	Stiletto flies	<i>Hoplosathe frauenfeldi</i> (Loew 1856)
Coelopidae		<i>Microprosopa hoberlandti</i> Sifner, 1981
Drosophilidae		<i>Drosophila melanogaster</i> (Meigen, 1830)
		<i>Zaprionus idiana</i> Gupta. 1970

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Diptera of medical importance

These species have medical importance where they may cause different forms of myiasis (Table 35). The list is based on Al-Houty (1997 & 2011), Hira et al. (1997 & 2004) and Al-Mesbah et al. (2011 & 2012).

Table 35: Diptera of medical importance reported from Kuwait.

Family	Common name	Species
Calliphoridae	Blow flies	<i>Calliphora erythrocephala</i> Meigen 1826
		<i>Calliphora vicina</i> Robineau-Desvoidy 1830
		<i>Chrysomya albiceps</i> Wiedemann 1819
		<i>Chrysomya marginalis</i> (Wiedemann, 1830)
		<i>Chrysomya megacephala</i>
		<i>Lucilia cuprina</i> (Wiedemann 1830)
		<i>Lucilia sericata</i> (Meigen 1826)
Muscidae	House flies	<i>Antherigona iota</i> Pont 1981
		<i>Coenosia attenuata</i> Steinin Becker 1903
		<i>Limnophora tigrina</i> (Amstein 1860)
		<i>Lipse pygmaea</i> Fallen 1825
		<i>Musca domestica</i> Linnaeus 1758
		<i>Musca lucidula</i> (Loew 1856)
		<i>Muscina stabulans</i> (Fallen 1817)
		<i>Stomoxys</i> sp.
Oestridae	Warble flies	<i>Cephalopina titillator</i> (Clark 1816)
		<i>Oestrus ovis</i> Linnaeus 1758
Sarcophagidae	Flesh flies	<i>Sarcophaga carnaria</i> Linnaeus 1758
		<i>Sarcophaga haemorrhoidalis</i> Fallen 1817
		<i>Parasarcophaga ruficornis</i> Fabricius 1794
		<i>Wohlfahrtia nuba</i> (Wiedemann 1830)
Tephritidae	Fruit flies	<i>Musca helianthi</i> (Rossi 1794)
		<i>Musca oleae</i> Gmelin 1790
		<i>Musca stellata</i> Fuessly 1775

Family	Common name	Species
		<i>Tephritis capitata</i> (Wiedemann 1824)
		<i>Trypeta amoena</i> (Frauenfeld 1857)
		<i>Trypeta augur</i> Frauenfeld 1857
		<i>Trupanea stellata</i> (Fuesslin, 1775)
Fanniidae	Lesser house flies	<i>Fannia canicularis</i> (Linnaeus, 1761)
Tabanidae	Horse flies	<i>Tabanus taeniola</i> Poliset De Beavois 1806
		<i>Tabanus arabicus</i> Macquart, 1839

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4.4.1.4 Order Coleoptera

The coleopteran fauna of Kuwait consists of 225 species belonging to 28 families (**Annex 3**). Al-Houty (1984) published the first list of Tenebrionidae from Kuwait. Other publications included records for beetles from Kuwait (Abushama & Cloudsley-Thompson, 1978; Al-Houty, 1997, 2004 & 2011; Al-Houty & Angus, 1999; Penati & Vienna, 2006; Al-Khalifa et al., 2012). Species of family

Tenebrionidae were the most dominant with 69 species, followed by species in families Meloidae (20 species) and Scarabaeidae (24 species). Endrödi & Al-Houty (1985) described *Pentodon kuwaitense* from Kuwait. Edmonds et al. (2019) added new records to the aquatic coleopteran of Kuwait.

Reference

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4.4.1.5 Order Mantodea

Five species in three families (Table 36) of praying mantises have been recorded from Kuwait (Al-Houty, 1997 & 2011).

Table 36: Mantodea reported from Kuwait.

Family	Species
Mantidae	<i>Ameles spallanzania</i> (Rossi, 1792)
	<i>Mantis religiosa</i> Linnaeus 1758
Empusidae	<i>Blepharopsis mendica</i> Giglio-Tos 1917
	<i>Hypsicorypha gracilis</i> (Bur-meister 1838)
Eremiaphilidae	<i>Eremiaphila braueri</i> Krauss, 1902

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Figure 34: The praying mantis, *Blepharopsis mendica* (Photo from Abdul Al-Aziz Al Yousef).



4.4.1.6 Other minor groups

Embiidina Other orders with few number of species including Embiidina (web-spinners), Ephemeroptera (Mayflies), Thysanura (silverfish), Blattodea Dermaptera (Earwigs), Strepsiptera (twisted-winged parasites), Zygentoma (Silverfish) and Trichoptera (caddisflies) have been recorded from Kuwait (Al-Houty, 1997, 2009 & 2011) (Table 37).

Table 37: Other minor orders of insects reported from Kuwait.

Order	Family	Species
Embiidina	Embiidae	<i>Embia major</i> Imms, 1913
Ephemeroptera	Polymitarciidae	<i>Polymitarciys savignyi</i> Eaton, 1883
	Baetidae	<i>Cloeon dipterum</i> (Linnaeus, 1761)
Thysanura	Lepismatidae	<i>Lepisma saccharina</i> Linnaeus, 1758
		<i>Thermobia domestica</i> Packard, 1873
Thysanoptera	Thripidae	<i>Thrips tabacci</i> Lindeman 1888
Blattodea	Hodotermitidae	<i>Anacanthotermes vagans</i> (Hagen, 1858)
	Rhinotermitidae	<i>Psammotermes hybostoma</i> Desneux 1902
	Blattidae	<i>Blatta lateralis</i> Walker, 1868
		<i>Blatta mellea</i> Krauss 1902
		<i>Periplaneta americana</i> (Linnaeus 1758)
	Ectobiidae	<i>Blattella germanica</i> (Linnaeus 1767)
<i>Blattella biligata</i> (Walker 1868)		
Dermaptera	Labiduridae	<i>Labidura riparia</i> (Pallas 1773)
	Labiidae	<i>Libia minor</i> (Linnaeus 1758)
Strepsiptera	Menegillidae	<i>Menegilla arabica</i> Kinzelbach 1979
Trichoptera	Leptoceridae	<i>Ylodes reuteri zarudnyi</i> McLachlan 1880
Zygentoma	Lepismatidae	<i>Thermobia domestica</i> Packard, 1873

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4.4.1.7 Order Siphonaptera

Fleas are bloodsucking insects that feed primarily on mammals and birds. Al-Taqi & Al-Ziady (1982) studied the fleas associated with rodents in Kuwait. Zaghloul et al. (1985) reported on fleas

parasitizing the Indian Gerbil, *Tatera indica*. eight species have been recorded parasitizing different species of rodents (Table 38).

Table 38: Fleas reported from Kuwait.

Family	Species
Pulicidae	<i>Ctenocephalides canis</i> (Curtis, 1826)
	<i>Ctenocephalides felis</i> (Bouché, 1835)
	<i>Pulex irritans</i> Linnaeus, 1758
	<i>Synosternus pallidus</i> (Taschenberg 1880)
	<i>Xenopsylla astia</i> Rothschild 1911
	<i>Xenopsylla cheopis</i> (Rothschild, 1903)
	<i>Xenopsylla conformis</i> (Wagner 1903)
	<i>Xenopsylla nubica</i> (Rothschild 1903)

Reference

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4.4.1.8 Order Neuroptera



Order Neuroptera known as the net-winged insects, includes lacewings, mantidflies, antlions, and their relatives, with about 6,000 described species worldwide. Records from Kuwait were

extracted from Meinander (1980), Al-Houty (1997 & 2011) and Canard & Thierry (2014), with a total of 13 species (Table 39).

Table 39: Neuroptera reported from Kuwait.

Family	Species
Chrysopidae	<i>Chrysopa carnea</i> (Stephens, 1836)
	<i>Chrysoperla concinna</i> (Holze,l 1974)
	<i>Chrysoperla mutata</i> (Mclachlan, 1898)
Myrmeleontidae	<i>Creoleon aegyptiacus</i> (Rambur, 1842)
	<i>Creoleon cervinus</i> Holzel, 1983
	<i>Creoleon pullus</i> Holzel, 1983
	<i>Creoleon ultimus</i> Holzel, 1983
	<i>Creoleon cinereus</i> Kimmins, 1943
	<i>Gepella modesta</i> Holzel, 1968
	<i>Myrmeleon hyalinus</i> Olivier, 1811
	<i>Nophis teillardii</i> Navas, 1912
	<i>Quinemurus cinereus</i> Kimmins 1943
	<i>Halter halteratus</i> (Forskål, 1775)
Nemopteridae	

References

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4.4.1.9 Order Hemiptera Suborder Sternorrhyncha



This suborder includes aphids, whiteflies, and scale insects. They were previously included in order Homoptera. This suborder is represented by two families; Aphididae and Diaspididae, with a total of eight species (Table 40). All records were extracted from Al-Houty (1997).

Table 40: Species of Aphididae and Diaspididae reported from Kuwait.

Family	Species
Aphididae	<i>Aphis fabae</i> Scopoli, 1763
	<i>Aphis nerii</i> Fonscolombe, 1841
	<i>Brevicoryne brassicae</i> (Linnaeus, 1758)
	<i>Myzus persicae</i> (Sulzer, 1776)
	<i>Rhopalosiphum maidis</i> (Fitch, 1856)
Diaspididae	<i>Aonidiella orientalis</i> (Newstead, 1894)
	<i>Parlatoria blanchardii</i> (Targioni-Tozzetti, 1892)
	<i>Phoenicococcus marlatti</i> Cockerell, 1899

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(Photo from Mohammad El Marefi)



Suborder Auchenorrhyncha

This suborder includes two families with nine species known from Kuwait (Table 41); the leafhoppers (Cicadellidae) and plant hoppers

(Delphacidae). All records were extracted from Al-Houty (1997).

Table 41: Species of Cicadellidae and Delphacidae reported from Kuwait.

Family	Species
Cicadellidae	<i>Cicadella viridis</i> (Linnaeus, 1758)
	<i>Cicadetta musiva</i> (Germar, 1830)
	<i>Empoasca fabae</i> (Harris 1841)
	<i>Hecalus glaucescens</i> (Fieber, 1866)
	<i>Neolimniscus aegyptiacus</i> (Matsumura, 1908)
	<i>Neolimniscus tenellus</i> (Baker, 1896)
	<i>Paralimniscus inexpectatus</i> Dlabola, 1961
	<i>Platypleura arabica</i> Myers, 1928
Delphacidae	<i>Toya propinqua</i> (Fieber, 1866)

References

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Suborder Heteroptera

This suborder includes a wide range of bugs; minute pirate bugs, bed bugs, milkweed bugs, damsel bugs, red bugs stink bugs and scentless plant bugs. It includes 19 families and 82 species (**Annex 4**). Two species (*Xylocoris etawahii* and *Xylocoris wasmiai*) of family Anthocoridae were described from Kuwait (Ghauri, 1985). All other records are based on Al-Houty & Dolling (1999) and Al-Houty (1997 & 2011). In 1988, an outbreak

of bites among human by *Leptodemus minutus* was reported (Selim et al., 1990). Al-Houty (1990) reported cases of *Nysius* feeding on human blood in Kuwait. Also, an outbreak of bed bugs infestations was reported in Kuwait (El-Azazy et al., 2013). A specimen of *Bemisia tabaci* (Gennadius, 1889) was found in the British museum specimen (NHMUK010134838), collected by W. Al-Houty in 1976 from Kuwait.

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4.4.1.10 Order Hymenoptera



The Hymenoptera of Kuwait includes 122 species in 17 families (**Annex 5**). The list is based on Al-Houty (1997 & 2011), Collingwood & Agosti (1996) and Luch (2008). A detailed study on the Sphecid wasps of Kuwait was published by Al-Houty (1978).

Three species of ants (Family Formicidae) were described from Kuwait; *Monomorium subcomae* (Lush, 2008), *Monomorium hemame* from Umm al-Hemam (Collingwood & Agosti, 1996), and *Monomorium buettikeri* from Anwha Island (Collingwood & Agosti, 1996).

Reference

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4.4.1.11 Order Lepidoptera

The butterflies and moths of Kuwait were extensively studied (Brown, 1970; Al-Houty, 1983, 1995, 1997 & 2011). Butterflies of Kuwait consists of 22 species in five families (Table 42). Additional

record of *Brephidium exilis* was reported from Sabah Al Ahmad Sea City (Pope & Nithyanandan, 2014).

Table 42: Butterflies recorded from Kuwait.

Family	Common name	Species	
Danaidae	The Plain Tiger	<i>Danaus chrysippus</i> (Linnaeus 1758)	
Pieridae	Pioneer White	<i>Anaphaeis aurota</i> (Fabricius, 1793)	
	Small White Butterfly	<i>Artogeia rapae</i> Schawerda, 1905	
	The Clouded Yellow	<i>Colias croceus</i> Pieridae Geofroy, 1785	
	The eastern pale clouded yellow	<i>Colias erate marnoana</i> Rogenhofer, 1883	
	The Green-striped White	<i>Euchloe belemia</i> (Esper, 1799)	
	Salmon Arab	<i>Madais fausta</i> (Oliver, 1804).	
	African Clouded Yellow	<i>Colias electo</i> (Linnaeus, 1763)	
	Desert White	<i>Pontia glauconome</i> (Klug, 1829)	
	Common Brimstone	<i>Gonepteryx rhamni</i>	
	Nymphalidae	Blue Pansy	<i>Junonia orithya</i> (Riley, 1925)
The Red Admiral		<i>Vanessa atalanta</i> (Linnaeus, 1758)	
Common Evening Brown		<i>Melanitis leda</i> Linnaeus, 1758	
Painted Lady		<i>Vanessa cardui</i> Linnaeus, 1758	
Danaid Eggfly		<i>Hypolimnas misippus</i> (Linnaeus, 1764)	
Lycaenidae		Long-tailed Blue	<i>Lampides boeticus</i> (Linnaeus, 1767)
		Little Tiger Blue	<i>Tarucus ballkanicus</i> (Freyer, 1844)
	The Mediterranean Pierrot	<i>Tarucus rosaceus</i> (Austaut, 1885)	
	Dark Grass Blue	<i>Zizeeria karsandra</i> (Moore, 1865)	
	the Western Pygmy Blue Butterfly	<i>Brephidium exilis</i> (Boisduval, 1852)	
Papilionidae	The Lime Swallowtail	<i>Papilio demoleus</i> (Linnaeus, 1764)	
	The Citrus Swallowtail	<i>Papilio demodocus</i> Esper, 1798	

A total of 68 species of moths belonging to eight families have been recorded from Kuwait (Table 43). Family Noctuidae has the highest number of

species with 43 species (Al-Houty, 1983, 1995 1997 & 2011).



Figure 35: The plain tiger butterfly, *Danaus chrysippus* (Photo from Mohammad El Marefi).

Table 43: Moths of Kuwait.

Family	Species
Erebidae	<i>Utetheisa pulchella</i> (Linnaeus, 1758)
	<i>Plutella xylostella</i> (Linnaeus, 1758)
Geometridae	<i>Cyclophora rufistrigata</i> (Hampson, 1896)
	<i>Idaea macraria</i> (Staudinger, 1892)
	<i>Lithostege notata</i> Bang-Haas, 1907
	<i>Lithostege palaestinensis</i> Wiltshire, 1941
	<i>Rhodometra sacraria</i> (Linnaeus, 1767)
	<i>Tephрина disputaria</i> (Guenee, 1858)
	<i>Eupithecia ultimaria</i> Boisduval, 1840
Lasiocampidae	<i>Autosphylla henkei</i> Staudinger, 1879
	<i>Chilena laristana</i> Daniel, 1949
	<i>Streblote siva</i> (Lefebvre, 1827)
Noctuidae	<i>Acontia biskrensis orientalis</i> Brandt, 1939
	<i>Acontia lucida</i> (Hufnagel, 1766)
	<i>Agrotis biconica</i> Kollar, 1844
	<i>Agrotis exclamationis</i> Linnaeus, 1758
	<i>Agrotis epsilon</i> (Hufnagel, 1766)
	<i>Agrotis hoggari</i> Rothschild, 1920
	<i>Agrotis sardzeana</i> Brandt, 1941
	<i>Agrotis segetum</i> (Denis & Schiffermuller, 1775)
	<i>Agrotis spinifera</i> (Hübner, 1808)
	<i>Anua tirhaca</i> (Cramer, 1777)
	<i>Anumeta arabiae</i> Wiltshire, 1961
	<i>Armada maritima</i> Brandt, 1939
	<i>Armada panaceorum</i> (Menetries, 1849)
	<i>Autographa gamma</i> (Linnaeus, 1758)
	<i>Autophila cerealis</i> Draudt, 1936
	<i>Calphasia kraussi</i> (Rebel, 1895)
	<i>Ceracala sana</i> Staudinger & Rebel, 1901
	<i>Cleonymia chabordis</i> Oberthur, 1876
	<i>Chrysodeixis acuta</i> (Walker, 1858)

Family	Species
	<i>Clytie benenotata</i> (Warren, 1888)
	<i>Chazaia incarnata</i> (Freyer, 1838)
	<i>Chlorissa discessa</i> Walker, 1861
	<i>Cornutiplusia circumflexa</i> (Linnaeus, 1767)
	<i>Ctenoplusia limbirena</i> (Guenée, 1852)
	<i>Earias insulana</i> Boisduval, 1833
	<i>Euxoa excellens</i> Grote, 1875
	<i>Helicoverpa armigera</i> (Hubner, 1827)
	<i>Helicoverpa zea</i> (Boddie, 1850)
	<i>Heliiothis nubigera</i> Herrich-Schaffer, 1851
	<i>Heliiothis peltigera</i> (Denis & Schiffermuller, 1775)
	<i>Leucania loreyi</i> (Duponchel, 1827)
	<i>Metopoceras delicata</i> (Staudinger, 1897)
	<i>Metopoceras omar</i> (Oberthur, 1887)
	<i>Ozarba algaini</i> Wiltshire, 1983
	<i>Paradrina clavipalpis</i> (Scopoli, 1763)
	<i>Rhabinopteryx subtilis</i> (Mabille, 1888)
	<i>Spodoptera cilium</i> Guenee, 1852
	<i>Spodoptera exigua</i> (Hugner, 1808)
	<i>Spodoptera littoralis</i> (Boisduval, 1833)
	<i>Spodoptera litura</i> (Fabricius, 1775)
	<i>Thiacidas postica</i> Walker, 1855
	<i>Thria robusta</i> Walker, 1857
	<i>Trichoplusia daubei</i> (Boisduval, 1840)
	<i>Trichoplusia ni</i> (Hubner, 1802)
Pyralidae	<i>Epeestia kuehniella</i> Zeller, 1879
Sphingidae	<i>Acherontia atropos</i> (Linnaeus, 1758)
	<i>Agrius convolvuli</i> (Linnaeus, 1758)
	<i>Daphnis nerii</i> (Linnaeus, 1758)
	<i>Hippotion celerio</i> (Linnaeus, 1758)
	<i>Hyles lineata livornica</i> (Esper, 1780)

Family	Species
	<i>Macroglossum stel/atarum</i> (Linnaeus, 1758)
Tinidae	<i>Trichophaga tapetzella</i> (Linnaeus, 1758)
Crambidae	<i>Cornifrons ulceratalis</i> Lederer, 1858
	<i>Nomophila noctuella</i> (Denis & Schiffermüller, 1775)
	<i>Chrysoteuchia culmella</i> (Linnaeus, 1758)
Gelechiidae	<i>Pectinophora gossypiella</i>

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4.4.1.12 Order Mallophaga

Four species of chewing lice were reported by Al-Houty (1983).

Table 44: Mallophaga reported from Kuwait.

Family	Species
Menoponidae	<i>Menacanthus stramineus</i> (Nitzsch 1818)
Philopteridae	<i>Columbicola columbae</i> (Linnaeus 1758)
	<i>Goniodes numidae</i> Mjoberg 1910
Trichodectidae	<i>Damalina ovis</i> (Schrank 1781)



4.4.1.13 Order Anoplura

Three species of sucking lice were reported by Al-Houty (1983).

Table 45: Anoplura reported from Kuwait.

Family	Species
Polyplacidae	<i>Polyplax spinulosa</i> (Burmeister 1839)
Pediculidae	<i>Pediculus humanus humanus</i> Linnaeus 1758
	<i>Pediculus humanus capitis</i> DeGeer 1778



(Photo from Yousif Bouhadi)



5

**Phyla Bryozoa,
Phoronida
Platyhelminthes
and Acanthocephala**

5

Phyla Bryozoa and Phoronida



5.1 Phyla Bryozoa and Phoronida

Bryozoans are also known as moss animals. This phylum is represented by two species (*Bugula neritina* (Linnaeus, 1758) and *Schizoporella errata* (Waters, 1878)) and one single unidentified cyphonautes larvae. Phoronida are commonly known as horseshoe worms, with one *Actinotrocha* larvae (Jones, 1986; Al-Yamani et al., 2011).

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5.2 Phylum Platyhelminthes

5.2.1 Class Monogenea

Two species of monogeneans were described from the Yellowfin seabream, *Acanthopagrus latus*, by Hussey (1986). Kritsky et al. (2000) described three species of monogeneans parasitizing

fishes from Kuwait (*Lepidotrema kuwaitensis*, *Lamellodiscus furcillatus* and *Protolamellodiscus senilobatus*). In total, 10 species were reported from fishes collected from Kuwait (Table 46).

Table 46: Monogeneans recovered from fishes from Kuwait.

Parasite	Host	Reference
<i>Lepidotrema kuwaitensis</i>	<i>Terapon puta</i>	Kritsky et al. (2000)
<i>Lamellodiscus furcillatus</i>	<i>Diplodus noct</i>	Kritsky et al. (2000)
<i>Protolamellodiscus senilobatus</i>	<i>Argyrops spinifer</i> , <i>Argyrops filamentosus</i>	Kritsky et al. (2000)
<i>Diplectanum cazauxi</i>	<i>Sphyraena jello</i> , <i>Sphyraena obtusata</i>	Kritsky et al. (2000)
<i>Diplectanum sillagonum</i>	<i>Sillago sihama</i>	Kritsky et al. (2000)
<i>Pseudolamellodiscus sphyraenae</i>	<i>Sphyraena chrysoaenia</i>	Kritsky et al. (2000)
<i>Calydiscoides flexuosus</i>	<i>Nemipterus peronii</i> , <i>Nemipterus bipunctatus</i>	Kritsky et al. (2000)
<i>Tareenia acanthopagri</i>	<i>Acanthopagrus latus</i>	Hussey (1986)
<i>Polylabris angifer</i>	<i>Acanthopagrus latus</i>	Hussey (1986)
<i>Megalocotyloides epinepheli</i>	<i>Epinephelus tauvina</i>	Hussey (1986)

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5.2.2 Class Digenea

Seventeen species of digentic worms (Table 47) were recovered from marine fishes of Kuwait (Al-Yamani, 1979; Al Kawari et al., 1996; Sey & Nahhas, 1997; Nahhas & Sey, 2002; Sey et al., 2003). *Proctotrematoides kuwaiti* was described as a new species (Sey & Nahhas, 1997).

Table 47: Digeneans recovered from fishes from Kuwait.

Parasite	Host fish	Reference
<i>Lintonium vibex</i> (Linton, 1900)	<i>Lagocephalus lunaris</i>	Sey et al. (2003)
<i>Complexobursa vjetnamensis</i> Oshmarin & Mamaev, 1963	<i>Terapon theraps</i>	Sey et al. (2003)
<i>Monascus filiformis</i> (Rudolphi, 1819)	<i>Selaroides leptolepis</i>	Sey et al. (2003)
<i>Tergestia pauca</i> Freitas & Kohn, 1965	<i>Alepes djedaba</i>	Sey et al. (2003)
<i>Transverstotrema licinum</i> Manter, 1970	<i>Diplodus noct</i> , <i>Treptodermus latus</i> , <i>Hemiramphus marginatus</i>	Sey et al. (2003)
<i>Prosogonotrema bilabiatum</i> Pérez Viguera, 1940	<i>Epinephelus areolatus</i> , <i>Hexangium sigani</i> , <i>Siganus canaliculatus</i>	Sey et al. (2003)
<i>Diphtherostomum brusinae</i> (Stossich, 1899)	<i>Argyrops spinifer</i>	Sey et al. (2003)
<i>Allostomachicola secundus</i> (Srivastava, 1937)	<i>Chirocentrus nudus</i>	
<i>Ectenurus trachuri</i> Nikolaeva & Kovaleva, 1966	<i>Trachurus trachurus</i> , <i>Caranx kalla</i> , <i>Scomberoides commersonianus</i> , <i>Rachycentron canadum</i>	Nahhas & Sey, (2002)
<i>Erilepturus hamate</i> (Yamaguti, 1934)	<i>Lutjanus russelli</i> , <i>Otolithes ruber</i> , <i>Pseudorhombus arsius</i> , <i>Scomberoides commersonianus</i> , <i>Therapon</i> sp.	Nahhas & Sey, (2002)
<i>Lecithocladium angustiovum</i> Yamaguti, 1953	<i>Caranx kalla</i>	Nahhas & Sey (2002)
<i>Lecithochirium acutum</i> , Chauhan, 1945	<i>Trichiurus lepturus</i>	Nahhas & Sey (2002)
<i>Aponurus laguncula</i> Looss, 1907	<i>Siganus oramin</i>	Nahhas & Sey (2002)
<i>Lecithaster indicus</i> Srivastava, 1935	<i>Otolithes ruber</i>	Nahhas & Sey (2002)
<i>Aphanurus stossichii</i> (Monticelli, 1891)	<i>Sardinella perforata</i> , <i>Ilisha elongate</i> , <i>Thryssa whiteheadi</i> , <i>Mulloidichthys auriflamma</i> ,	Nahhas & Sey (2002)
<i>Proctotrematoides kuwaiti</i>	<i>Synaptura orientalis</i> , <i>Pseudorhombus arsius</i>	Sey & Nahhas (1997)
<i>Opisthodioplomonorchis elongatus</i> Madhavi, 1974	<i>Polydactylus sextarius</i> , <i>Plectorhynchus</i> sp.	Sey & Nahhas (1997)

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5.3 Phylum Acanthocephala

Three species of acanthocephal worms (Table 48) were found to infest marine fishes of Kuwait (Amin et al., 1984).

Table 48: Acanthocephalan worms recovered from fishes from Kuwait.

Parasite	Host
<i>Sclerocollum rubrimaris</i> Schmidt and Paperna, 1978	<i>Siganus oramin</i> ,
<i>Serrasentis sagittifer</i> (Linton, 1889)	<i>Bothus</i> sp., <i>Lutjanus coccineus</i> , <i>Lutjanus fulviflamma</i> , <i>Nemipterus japonicus</i> , <i>Nemipterus tolu</i> (Nemipteridae), <i>Otolithus argenteus</i>
<i>Neoechinorhynchus</i> sp.	<i>Lisa macrolepis</i> , <i>Pseudorhombus arsius</i>

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(Photo from F. Krupp)



6

**Phylum
Cnidaria**

6 Phylum Cnidaria



6.1 Classes Hydrozoa and Scyphozoa

Class Scyphozoa includes true jellyfish species, while Hydrozoa includes some solitary and some colonial species. Our knowledge on this group is based on Al-Yamani et al. (2011). Scyphozoa is

represented by one species, while hydrozoans are represented by 13 species in six families (Table 49).

Table 49: Hydrozoans and scyphozoans reported from Kuwait.

Class	Order	Family	Species	
Hydrozoa	Anthoathecata	Pandeidae	<i>Amphinema rugosum</i> (Mayer, 1910)	
	Leptothecata	Eirenidae	<i>Eirene viridula</i> (Peron and Lesueur, 1810)	
				<i>Eutima gegenbauri</i> Haeckel
			Malagazziidae	<i>Octophialucium funerarium</i> (Quoy & Gaimard, 1827)
			Hydractiniidae	<i>Podocoryna</i> sp.
			Campanulariidae	<i>Clytia discoida</i> (Mayer, 1900)
				<i>Obelia dichotoma</i> (Linnaeus, 1758)
		Narcomedusae	Solmundaeginidae	<i>Solmundella bitentaculata</i> (Quoy & Gaimard, 1833)
			Cuninidae	<i>Cunina octonaria</i> McCrady, 1859
		Trachymedusae	Rhopalonematidae	<i>Aglaura hemistoma</i> Peron & Lesueur, 1810
			Geryoniidae	<i>Liriope tetraphylla</i> (Chamisso & Eysenhardt, 1821)
		Semaeostomeae	Pelagiidae	<i>Sanderia malayensis</i> Goette, 1886
		Siphonophorae	Diphyidae	<i>Diphyes chamissonis</i> (Huxley, 1859)
Scyphozoa	Rhizostomeae	Catostylidae	<i>Catostylus mosaicus</i> (Quoy and Gaimard, 1824)	

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6.2 Class Anthozoa



This class includes corals (soft and hard). A total of 35 species in 11 families of hard corals have been reported from the Kuwaiti waters (Table 50) (Hodgson & Carpenter, 1995; Papathanasopoulou & Zogaris, 2015). In this paper, detailed information on the taxonomy and distribution of Kuwait's corals was given, along with a description of a new species, *Acropora arabensis* Hodgson & Carpenter, 1995. An illustrated book with 35 species of corals along with fish species associated with corals was published by Carpenter et al. (1997) and one by Papathanasopoulou & Zogaris (2015) (Figure 39). There are about 124 fish species, mostly damselfish, hawkbill (*Eretmochelys imbr-*

cata) and green turtles (*Chelonia mydas*) nest on the coral cays (Pilcher et al., 2000). Other useful publications include McCain et al. (1984), Downing (1985a & b, 1989a & b), Downing et al. (1985), Alhazeem et al. (2017), Gholoum et al. (2019).

In Kuwait, coral reefs are confined to the southern part of the country and include a range of offshore platform and smaller patch reefs, and near-shore patch and fringing reef assemblages along the southern coastline (Figure 36-38). All are in shallow water (Pilcher et al., 2000). The conservation status for the corals of Kuwait are summarized in Table (50).



Figure 36: Corals from the Arabian Gulf. *Acropora clathrate* (Photo from F. Krupp).



Figure 37: Corals from the Arabian Gulf. *Platygyra daedalea* (Photo from F. Krupp).



Figure 38: Corals from the Arabian Gulf. *Tubastrea coccinea* (Photo from F. Krupp).

Table 50: Corals recorded from Kuwaiti waters.

Family	Species
Pocilloporidae	<i>Stylophora pistillata</i> (Esper, 1797)
	<i>Madracis kirbyi</i> Veron & Pichon, 1976
Acroporidae	<i>Acropora clathrata</i> (Brook, 1891)
	<i>Acropora arabensis</i> Hodgson & Carpenter, 1995
Poritidae	<i>Porites lutea</i> Edwards & Haime, 1860
	<i>Porites compressa</i> Dana, 1846
	<i>Goniopora lobata</i> Edwards & Haime, 1860
Siderastreidae	<i>Siderastrea savignyana</i> Milne-Edwards & Haime, 1850
	<i>Anomastrea irregularis</i> Marenzeller, 1901
	<i>Psammocora superficialis</i> Gardiner, 1898
	<i>Psammocora contigua</i> (Esper, 1797)
Agariciidae	<i>Coscinaraea columna</i> (Dana, 1846)
	<i>Pavona explanulata</i> (Lamarck, 1816)
	<i>Pavona decussata</i> (Dana, 1846)
Rhizangiidae	<i>Culicia tenella</i> (Dana, 1846)
	<i>Polycyathus marigondoni</i> Verheij & Best, 1987
	<i>Paracyathus stokesi</i> Milne Edwards & Haime, 1848
Mussidae	<i>Acanthastrea echinata</i> (Dana, 1846)
	<i>Acanthastrea maxima</i> Sheppard & Sa1m, 1988
Merulinidae	<i>Hydnophora exesa</i> (Pallas, 1766)
Favllidae	<i>Favia pallida</i> (Dana, 1846)
	<i>Favia speciosa</i> (Dana, 1846)
	<i>Cyphastrea microphthalma</i> (Lamarck, 1816)
	<i>Cyphastrea serailia</i> (Forsskal, 1775)
	<i>Favia speciose</i> (Dana, 1846)
	<i>Leptastrea transversa</i> Klunzinger, 1879
	<i>Platygyra daedalea</i> (Ellis & Solander, 1786)
	<i>Plesiastrea versipora</i> (Lamarck, 1816)
Caryophylliidae	<i>Heterocyathus aequicostatus</i> Edwards & Haime, 1848
Dendrophylliidae	<i>Dendrophyllia gracilis</i> Edwards & Haime, 1948
	<i>Heteropsammia cochlea</i> (Spengler, 1781)
	<i>Tubastraea coccinea</i> Lesson, 1829
	<i>Tubastraea tagusensis</i> Wells, 1982
	<i>Turbinaria peltata</i> (Esper, 1794)
	<i>Turbinaria reniformis</i> Bernard, 1896

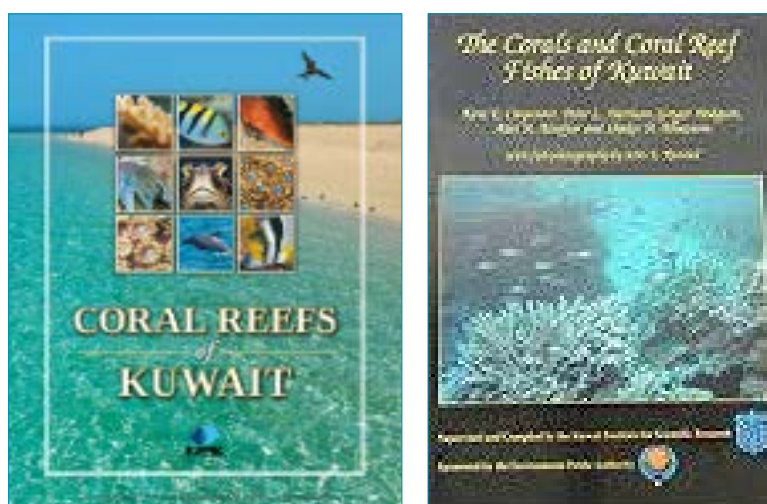


Figure 39: Books on the corals of Kuwait.

Table 51: IUCN conservation status for corals in Kuwait.

Family	Species	Status
Acroporidae	<i>Acropora arabensis</i>	NT
	<i>Acropora clathrata</i>	LC
Agariciidae	<i>Pavona decussata</i>	VU
	<i>Pavona explanulata</i>	LC
Caryophylliidae	<i>Heterocyathus aequicostatus</i>	LC
Dendrophylliidae	<i>Heteropsammia cochlea</i>	LC
	<i>Turbinaria peltata</i>	VU
	<i>Turbinaria reniformis</i>	VU
Favllidae	<i>Cyphastrea microphthalma</i>	LC
	<i>Cyphastrea serailia</i>	LC
	<i>Favia pallida</i>	LC
	<i>Favia speciosa</i>	LC
	<i>Leptastrea transversa</i>	LC
	<i>Platygyra daedalea</i>	LC
	<i>Plesiastrea versipora</i>	LC
Merulinidae	<i>Hydnophora exesa</i>	NT
Mussidae	<i>Acanthastrea echinata</i>	LC
	<i>Acanthastrea maxima</i>	NT
Pocilloporidae	<i>Stylophora pistillata</i>	NT
	<i>Madracis kirbyi</i>	LC
Poritidae	<i>Goniopora lobata</i>	NT
	<i>Porites compressa</i>	LC
	<i>Porites lutea</i>	LC
Siderastreidae	<i>Anomastrea irregularis</i>	VU
	<i>Coscinaraea columna</i>	LC
	<i>Psammocora contigua</i>	NT
	<i>Psammocora superficialis</i>	LC
	<i>Siderastrea savigniana</i>	LC

Surveys that were conducted in 1992 on the offshore and nearshore reefs in Kuwait and Saudi Arabia showed that a small inshore platform reef located near sources of oil spill during the Gulf

War has been partially impacted and the corals recovered and continued to support a healthy fish community (Downing & Roberts, 1993).



(Photo from Dr. Dareen Almojil)

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(Photo from Dr. Dareen Almojil)

A coastal scene with waves breaking on a rocky shore under a clear sky. The image is split into three vertical panels. The central panel is a light blue gradient. The left and right panels show the ocean and rocks. The bottom panel is a dark teal gradient.

7

Phyla Annelida, Sipuncula and Brachiopoda

7

Phylum Annelida

7.1 Phylum Annelida

7.1.1 Class Polychaeta



The annelids of Kuwait were studied extensively with a total of 172 species within 46 families, 19 species are new records to the Arabian Gulf and 17 to the Arabian Region. The most abundant species belonged to the family Spionidae, followed by Nereididae, and Serpulidae. (Figure 40) (Al-Yamani et al., 2009 & 2012; Jones, 1986; El-Sammak et al., 2011; Sun et al., 2017; Al-Kandari et al., 2019) (**Annex 6**). Mohammad (1970a & b;

1980 & 1983) described 18 new species of polychaetes from the waters of Kuwait (Table 52). Other papers discussed malformation of polychaetes (Mohammad, 1981). The genus *Kuwaita* was revised by Carrera-Parra & Orensanz, (2002). Species of phylum Echiura are now included in phylum Annelida based on recent molecular studies (Struck et al., 2007).

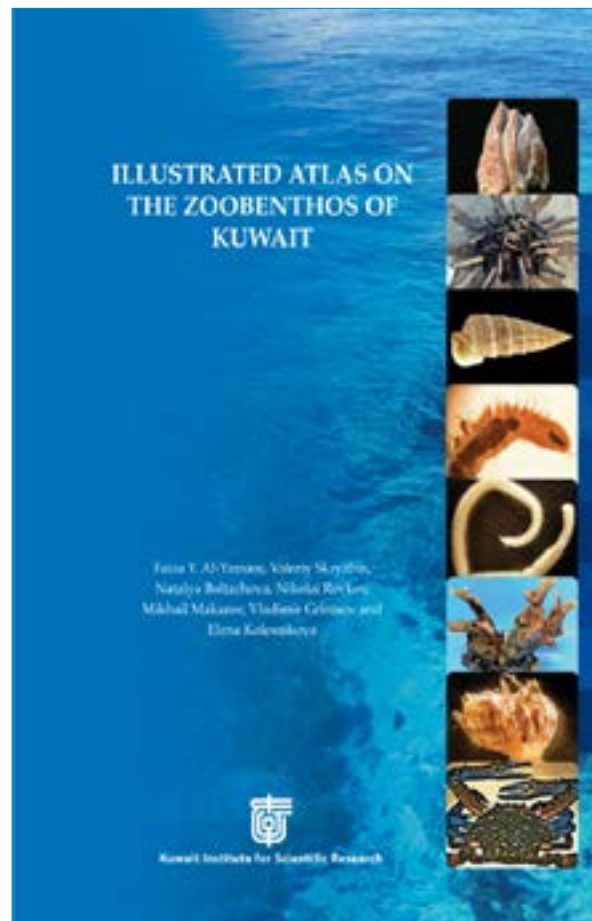
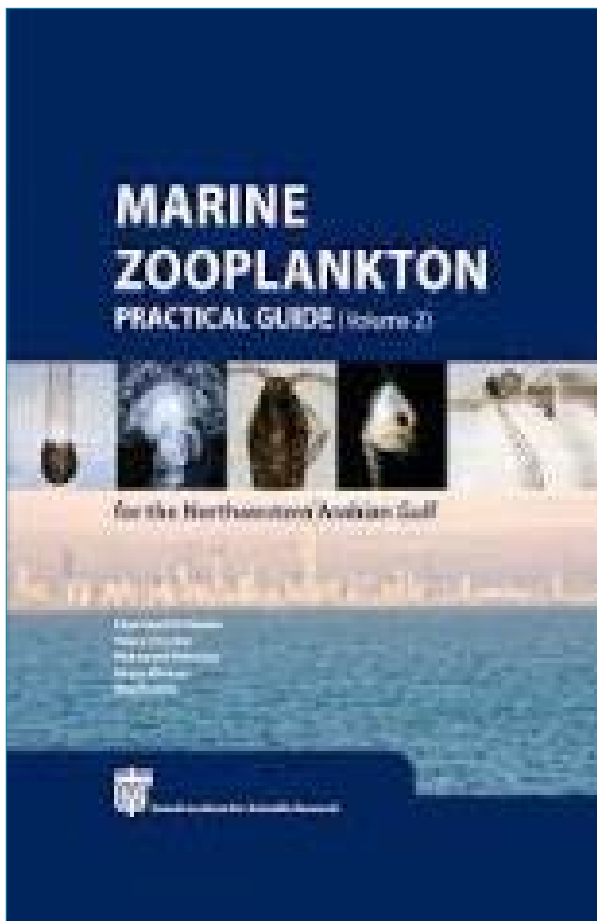


Figure 40: Books on marine invertebrates of Kuwait.

Table 52: Polychaeta species described from Kuwait by Mohammad (1970a & b; 1971 & 1980).

Family	Species
Ampharetidae	<i>Isolda albula</i> Mohammad, 1971
Capitellidae	<i>Scyphoproctus aciculatus</i> Mohammad, 1980
Spionidae	<i>Prionospio rotalis</i> Mohammad, 1970
	<i>Polydora spondylana</i> Mohammad, 1973
Nereididae	<i>Nereis (Nereis) neogracilis</i> Mohammad, 1970
	<i>Neanthes deplanata</i> (Mohammad, 1971)
	<i>Nereis (Nereis) neogracilis</i> Mohammad, 1970
Syllidae	<i>Imajimaea zonata</i> (Mohammad, 1973)
Goniadidae	<i>Bookhoutia oligognatha</i> Mohammad, 1973
Eunicidae	<i>Paucibranchia gemmata</i> (Mohammad, 1973)
Lumbrineridae	<i>Kuwaita magna</i> Mohammad, 1973
Terebellidae	<i>Pseudostreblosoma longa</i> (Mohammad, 1973)
	<i>Neoleprea clavata</i> Mohammad, 1973
	<i>Telothelepous macrothoracicus</i> Mohammad, 1980
Magelonidae	<i>Magelona pulchella</i> Mohammad, 1980
Orbiniidae	<i>Phylo kubbarensis</i> Mohammad, 1980
	<i>Phylo kuwaitica</i> Mohammad, 1970
Maldanidae	<i>Leiochone annulata</i> (Mohammad, 1980)

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7.2 Phylum Sipuncula

This phylum includes sipunculid worms or *peanut worms*. Two species and one unidentified species (Table 53) were reported from Kuwait (Al-Yamani et al., 2012).

Table 53: Sipunculids reported from Kuwait.

Class	Order	Family	Species
Sipunculidea	Golfingiida	Phascolionidae	<i>Phascolion convestitum</i> Sluiter, 1902
Phascolosomatidea	Phascolosomatida	Phascolosomatidae	<i>Phascolion</i> sp.
			<i>Apionsoma trichocephalus</i> Sluiter, 1902

References

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7.3 Phylum Brachiopoda



One example, *Lingula* sp. (Family Lingulidae) is known to occur in Kuwaiti waters (Al-Yamani et al., 2012).

References

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(Photo from Dr. Dareen Almojil)

A nudibranch with striking zebra-like patterns of black and white stripes is shown against a background of light-colored, porous rocks. The nudibranch's body is elongated and tapers towards the tail, which is curled. The patterns are consistent across its body, including its head and tail. The background is a soft-focus, light-colored rock surface.

8

**Phylum
Mollusca**

8

Phylum Mollusca



8.1 Class Polyplacophora

A total of five species and one unidentified species of chitons were reported from Kuwait (Table 54). All records are based on Glayzer et al. (1984) and (Al-Yamani et al., 2012). *Notoplax*

arabica, was described from Kuwait (Kaas & Van Belle, 1988) and a specimen is at the possession of the British Museum of Natural History.

Table 54: Chitons reported from Kuwait.

Family	Species
Callistoplacidae	<i>Callistochiton barnardi</i> Leloup, 1981
Schizochitonidae	<i>Schizochiton jousseamei</i> Dupuis, 1917
	<i>Schizochiton</i> sp.
Chitonidae	<i>Chiton peregrinus</i> Thiele, 1909
Ischnochitonidae	<i>Ischnochiton yerburyi</i> (E. A. Smith, 1891)
Acanthochitonidae	<i>Notoplax arabica</i> Kaas & Van Belle, 1988

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8.2 Class Gastropoda

This class includes marine, freshwater and terrestrial snails. In Kuwait, a total of 137 species in 10 orders and 60 families have been recorded from the marine environment (Glazyer et al., 1984; Jones, 1986; Carpenter et al., 1997; Al-Yamani et

al., 2009 & 2012; Nithyanandan, 2012) (**Annex 7**). The taxonomic position of several families is still unresolved. Some rare Nudibranch are shown in Figure (41), while most common intertidal species are illustrated in Figure (42).

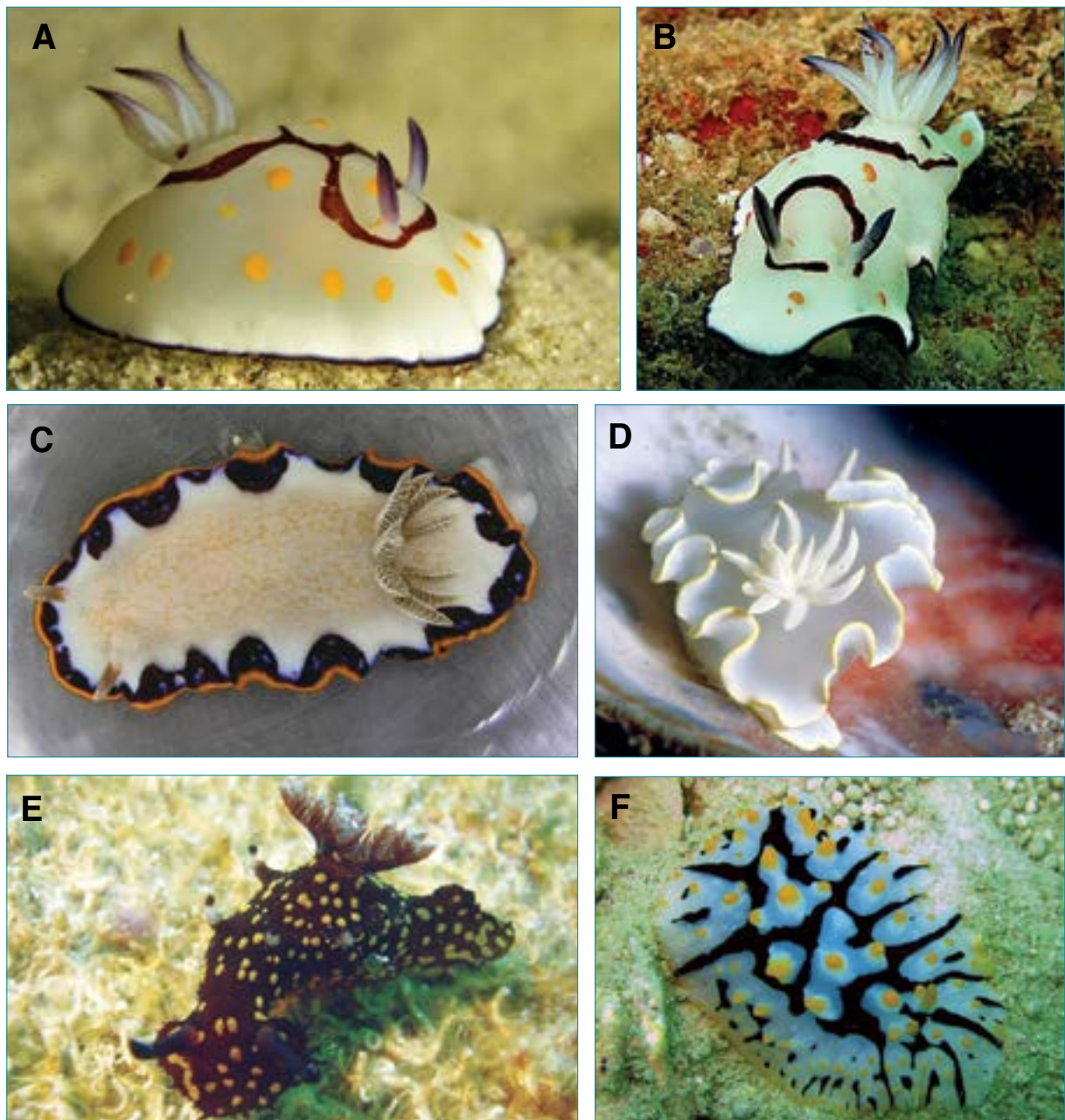


Figure 41: Nudibranch from Kuwait. A. *Chromodoris annulata* (Photo from A. Alhafez). B. *Chromodoris annulata* non spectacle (Photo from I. Basuny). C. *Chromodoris obsolete* (Photo from R. Pelczynski). D. *Glossodoris* cf. *pallida* (Photo from S. J. Howlett). E. *Plocamopherus ocellatus* (Photo from A. Wilson). F. *Phyllidia* (*Fryeria*) *rueppelii* (Photo from N. Papathanasapoulou).

References

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INTERTIDAL GASTROPODS of KUWAIT

بطنيات القدم في مناطق المد والجزر في الكويت

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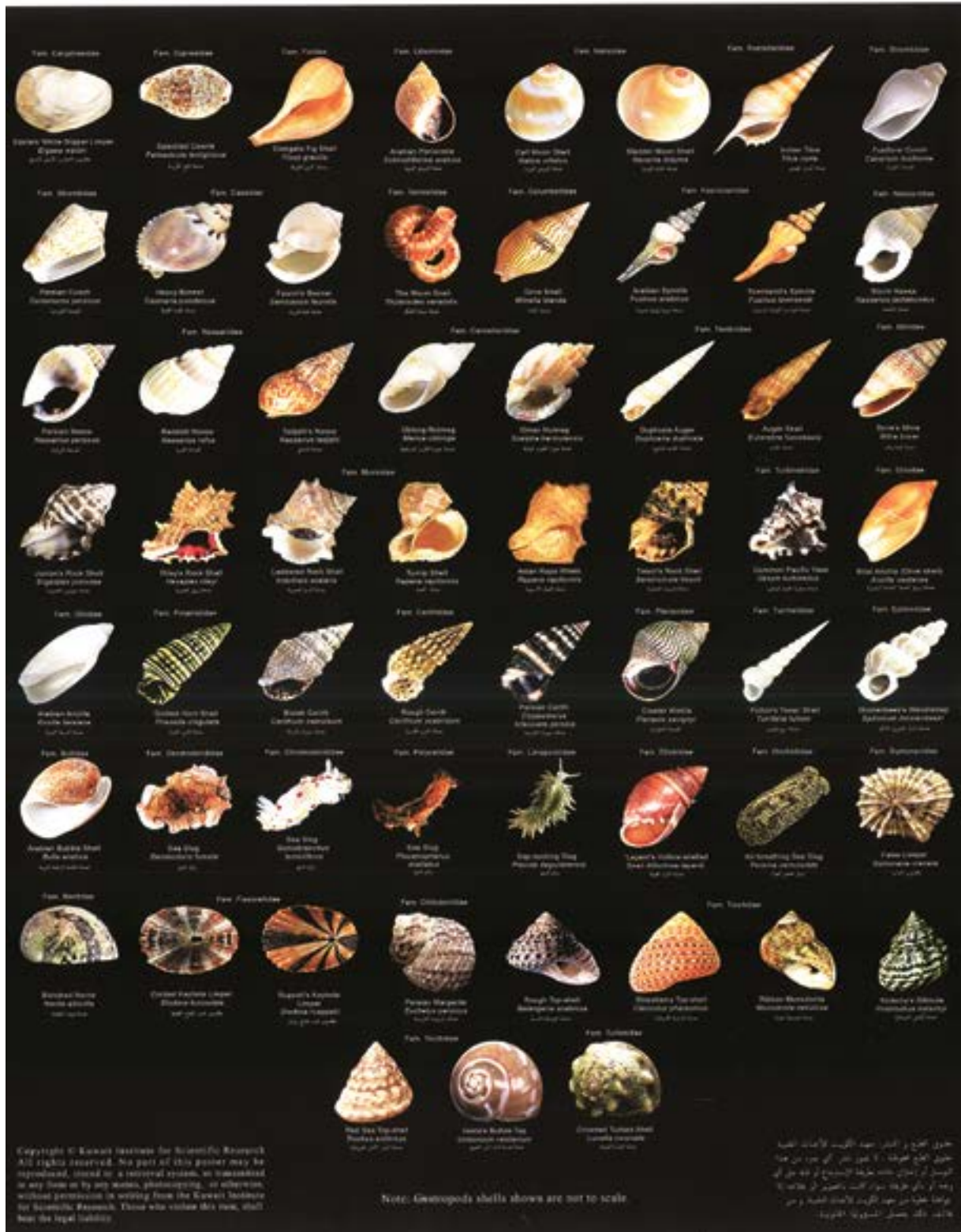


Figure 42: Some common gastropods in the intertidal waters of Kuwait.

8.3 Class Bivalvia



This class includes marine and freshwater species that have laterally compressed bodies enclosed by a shell consisting of two hinged parts. They include the clams, oysters, cockles, mussels, and scallops (Figure 43). So far, 225 species within six orders and 30 families have been identified from Kuwait (Glazer et al., 1984;

Jones, 1986; Carpenter et al., 1997; Al-Yamani et al., 2009 & 2012) (**Annex 8**). A new genus, *Larissamya*, and a new species, *Larissamya comta*, were described from Kuwait (Oliver et al., 2017). Recently, Al Kandari et al. (2020) added new records to the bivalves of Kuwait.

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Figure 43: Some intertidal bivalves from Kuwait.



8.4 Class Scaphopoda

Class Scaphopoda is commonly known as the tusk shells since their shells are conical and slightly curved to the dorsal side. Five species have

been recorded from Kuwait (Glazyer et al., 1984; Al-Yamani et al., 2012) (Table 55).

Table 55: Scaphopods reported from Kuwait.

Order	Family	Species
Gadilida	Gadilidae	<i>Cadulus euloides</i> Melvill and Standen, 1901
Dentaliida	Dentaliidae	<i>Antalis longitrossa</i> (Reeve, 1842)
		<i>Dentalium octangulatum</i> Donovan, 1803
		<i>Dentalium tomlini</i> Melvill, 1918
		<i>Tesseracme quadrapicalis</i> (Sowerby, 1869)
	Laevidentaliidae	<i>Laevidentalium eburneum</i> (Linnaeus, 1767)

References

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8.5 Class Cephalopoda

This class includes cuttlefishes, octopuses and squids. In total, four species have been reported, two cuttlefishes, one octopus and one squid

(Glazyer et al., 1984; Al-Behbehani, 2006; Al-Yamani et al. 2012) (Table 56).

Table 56: Cephalopods reported from Kuwait.

Family	Species
Sepiidae	<i>Sepia pharaonis</i> Ehrenberg, 1831ore
	<i>Sepiella inermis</i> (Van Hasselt, 1835)
Octopodidae	<i>Octopus cyanea</i> Gray, 1849
Loliginidae	<i>Uroteuthis (Photololigo) duvaucelii</i> (d'Orbigny, 1835)

References

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(Photo from Dr. Dareen Almojil)



(Photo from Dr. Dareen Almojil)



9

**Phyla
Echinodermata,
Hemichordata and
Chordata
(Classes:
Ascidiacea and
Leptocardii)**

9 Phyla Echinodermata, Hemichordata and Chordata



9.1 Phylum Echinodermata

This phylum includes the starfish, sea urchins, sand dollars, sea cucumbers and sea lilies. In Kuwait, 16 species of echinoderms belonging to four classes and 12 families (Alsaffar & Lone,

2000; Al-Yamani et al., 2009 & 2012) (Table 57). The reproductive cycles of *Diadema setosum* and *Echinometra mathaei* were studied in Kuwaiti water (Alsaffar & Lone, 2000).

Table 57: Echinoderms reported from Kuwait.

Class	Order	Family	Species
Ophiuroidea	Amphilepidida	Amphiuridae	<i>Amphipholis squamata</i> (Delle Chiaje, 1828)
			<i>Amphioplus (Lymanella) hastatus</i> (Ljungman, 1867)
			<i>Amphioplus (Lymanella) sp.</i>
		<i>Amphiura aff. fasciata</i> Mortensen, 1940	
		Ophiotrichidae	<i>Macrophiothrix sp.</i>
Echinoidea	Diadematidae	Diadematidae	<i>Diadema setosum</i> (Leske, 1778)
	Camarodonta	Echinometridae	<i>Echinometra mathaei</i> (de Blainville, 1825)
	Spatangoida	Brissidae	<i>Metalia persica</i> (Mortensen, 1940)
	Camarodonta	Temnopleuridae	<i>Temnopleurus toreumaticus</i> (Leske, 1778)
	Cidaroida	Cidaridae	Cidaridae gen. sp.
	Clypeasteroida	Clypeasteridae	<i>Clypeaster humilis</i> (Leske, 1778)
		Astriclypeidae	<i>Echinodiscus auritus</i> Leske, 1778
Holothuroidea	Aspidochirotida	Holothuriidae	<i>Holothuria (Halodeima) atra</i> Jaeger, 1833
			<i>Holothuria (Thymiosycia) arenicola</i> Semper, 1868.
	Dendrochirotida	Sclerodactylidae	<i>Ohshimella ehrenbergii</i> (Selenka, 1868)
Asteroidea	Valvatida	Asterinidae	<i>Aquilonastra burtoni</i> (Gray, 1840)

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waters, Arabian Gulf. In: Neubert, E., Amr, Z., Taiti, S. & Gümüs, B (eds.), Animal Biodiversity in the Middle East. Proceedings of the First Middle Eastern Biodiversity Congress, Aqaba, Jordan, 20–23 October 2008. *ZooKeys* 31: 17–38. doi org/10.3897/zookeys.31.74

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9.2 Phylum Hemichordata

9.2.1 Class Enteropneusta

Order Enteropneusta

A single unidentified species within the family Harrimaniidae, *Saccoglossus* sp., was reported from the Kuwaiti waters (Al-Yamani et al., 2012).

References

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9.3 Phylum Chordata (Classes: Ascidiacea and Leptocardii)

Two identified and one unidentified species were reported from Kuwait marine habitats (Al-Yamani et al., 2012) (Table 58).

Table 58: marine chorateds reported from Kuwait.

Class	Order	Family	Species
Ascidiacea	Aplousobranchia	Polyclinidae	<i>Polyclinum constellatum</i> Savigny, 1816
	Phlebobranchia	Ascidiidae	<i>Phallusia nigra</i> Savigny, 1816
Leptocardii	phioxiformes	Branchiostomidae	<i>Branchiostoma</i> sp.

References

Al-Yamani, F.Y., Skryabin, V., Boltachova, N., Revkov, N., Makarov, M., Grintsov, V. and Kolesnikova, E. (2012). *Illustrated Atlas on the Zoobenthos of Kuwait*. Kuwait Institute for Scientific Research, Kuwait.



(Photo from Yousif Bouhadi)

The background of the page is a photograph of a rocky coastline. The rocks are covered in vibrant green algae, likely sea purslane. The scene is captured from a low angle, showing the texture of the rocks and the dense growth of the algae. A semi-transparent teal banner is positioned horizontally across the middle of the image, containing the page number and the title.

10

Marine Algae

10 Marine Algae

10.1 Marine Macroalgae

Macroalgae describes seaweeds and other benthic marine algae that are visible to the eye. In Kuwait, macroalgae are represented by several phyla (Chlorophyta, Rhodophyta, Heterokontophyta and Tracheophyta), with a total of 85 species. Marine macroalgae were extensively studied and illustrated atlas was published (Al-Yamani et al., 2014) (Figure 44). Previous studies on the macroalage of Kuwait include Newton (1955), Jones (1986) and Al-Hasan & Jones (1989).

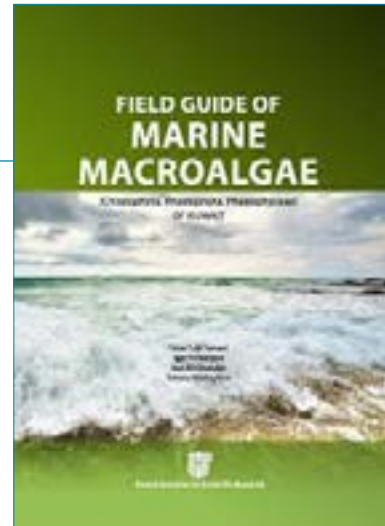


Figure 44: The main source for the macroalgae of Kuwait.

At the regional level, the marine alage of the Arabian Gulf, especially around the Saudi Arabian cosats, Oman, and the around the Iranian islands were exentsively studied in the past (Nizamuddin & Gessner, 1970; Basson, 1979a, 1979b & 1990; Sohrabipour & Rabii, 1999; Subba-Rao & Al-

Yamani, 1998; Wynne, 2001). The Chemical composition of Arabian Gulf seaweeds was investigated by Kamel (1981) and their potential as a source of minrals was studied by Mohammadi & Asbchin (2011).

10.1.1 Phylum Chlorophyta



This phylum includes the green algae; both the unicellular and multicellular organism. Large marine algae of Kuwait were studied by Al-Yamani

et al. (2014). This phylum is represented by Class Ulvophyceae, with a total of 25 species of microalgae (Table 59).

Table 59: Marine macroalage (Phylum Chlorophyta) reported from Kuwait.

Order	Family	Species
Bryopsidales	Bryopsidaceae	<i>Bryopsis hypnoides</i> J.V. Lamouroux 1809
		<i>Bryopsis plumosa</i> (Hudson 1778)
	Caulerpanceae	<i>Caulerpa sertularioides</i> (S.G. Gmelin 1768)
	Dichotomosiphonaceae	<i>Avrainvillea amadelpha</i> (Montagne 1857)

Order	Family	Species
Cladophorales	Cladophoraceae	<i>Chaetomorpha aerea</i> (Dillwyn 1806)
		<i>Chaetomorpha crassa</i> (C. Agardh 1824)
		<i>Chaetomorpha indica</i> (Kützing 1843)
		<i>Chaetomorpha linum</i> (O.F. Müller 1778)
		<i>Cladophora coelothrix</i> Kützing 1843
		<i>Cladophora colabensis</i> Børgesen 1935
		<i>Cladophora herpestica</i> (Montagne 1842)
		<i>Cladophora koeiei</i> Børgesen 1939
		<i>Cladophora nitellopsis</i> Børgesen 1939
		<i>Cladophora sericioides</i> Børgesen 1939
		<i>Rhizoclonium riparium</i> (Roth 1806)
		<i>Rhizoclonium tortuosum</i> (Dillwyn 1805)
Dasycladales	Polyphysaceae	<i>Acetabularia caliculus</i> J.V. Lamouroux in Quoy & Gaimard 1924
Ulvales	Kornmanniaceae	<i>Blidingia minima</i> (Nägeli ex Kützing 1849)
	Ulvaceae	<i>Ulva clathrata</i> (Roth 1806)
		<i>Ulva flexuosa</i> Wulfen 1803
		<i>Ulva intestinalis</i> Linnaeus 1753
		<i>Ulva lactuca</i> Linnaeus 1753
		<i>Ulva prolifera</i> O.F. Müller 1778
		<i>Ulva reticulata</i> Forsskål 177

10.1.2 Phylum Rhodophyta



Red marine macroalgae are represented by four classes and 30 species (Table 60) (Al-Yamani et al., 2014).

Table 60: Marine macroalgae (Phylum Rhodophyta) reported from Kuwait.

Class	Order	Family	Species
Stylonematophyceae	Stylonematales	Stylonemataceae	<i>Chroodactylon ornatum</i> (C. Agardh 1824)
Compsopogonophyceae	Erythropeltiales	Erythrotrichiaceae	<i>Sahlingia subintegra</i> (Rosenvinge 1909)
			<i>Erythrotrichia carnea</i> (Dillwyn 1807)
Bangiophyceae	Bangiales	Bangiaceae	<i>Bangia atropurpurea</i> (Mertens ex Roth 1806)
Florideophyceae	Acrochaetiales	Acrochaetiaceae	<i>Acrochaetium savianum</i> (Meneghini 1840)
			<i>Acrochaetium bahreinii</i> Børgesen 1939

Class	Order	Family	Species
	Corallinales	Corallinaceae	<i>Jania pumila</i> J.V. Lamouroux 1816
			<i>Hydrolithon farinosum</i> (J.V. Lamouroux 1816)
			<i>Pneophyllum fragile</i> Kützing 1843
	Gelidiales	Gelidiaceae	<i>Gelidium crinale</i> (Hare ex Turner 1815)
			<i>Gelidium pusillum</i> (Stackhouse 1795)
	Halymeniales	Halymeniaceae	<i>Grateloupia filicina</i> (J.V. Lamouroux 1813)
	Gigartinales	Cystocloniaceae	<i>Hypnea cornuta</i> (Kützing 1849)
			<i>Hypnea valentiae</i> (Turner 1809)
	Peyssonneliales	Peyssonneliaceae	<i>Peyssonnelia simulans</i> Weber-van Bosse 1916
	Rhodymeniales	Champiaceae	<i>Champia parvula</i> (C. Agardh 1824)
	Ceramiales	Ceramiaceae	<i>Centroceras clavulatum</i> (C. Agardh 1822)
			<i>Ceramium luetzelburgii</i> O.C Schmidt 1924
			<i>Gayliella flaccida</i> (Harvey ex Kützing 1862)
		Dasyaceae	<i>Heterosiphonia crispella</i> (C. Agardh 1828)
		Rhodomelaceae	<i>Herposiphonia dendroidea</i> Hollenberg 1968
			<i>Chondria dasyphylla</i> (Woodward 1794)
			<i>Palisada perforata</i> (Bory de Saint-Vincent 1803)
			<i>Palisada thuyoides</i> (Kützing 1865)
			<i>Polysiphonia brodiei</i> (Dillwyn 1809)
			<i>Polysiphonia coacta</i> C.K. Tseng 1944
			<i>Polysiphonia denudata</i> (Dillwyn 1809)
			<i>Polysiphonia kampsaxii</i> Børgesen 1934
			<i>Polysiphonia platycarpa</i> Børgesen 1934
		Spyridiaceae	<i>Spyridia filamentosa</i> (Wulfen 1803)

10.1.3 Phylum Heterokontophyta



Abdel-Kareem (2009) studied species of the genus *Sargassum* in the Arabian Gulf, especially around the coast of Saudi Arabia. This phylum is

represented by 27 species (Table 61) in two classes (Al-Yamani et al., 2014).

Table 61: Marine macroalgae (Phylum Heterokontophyta) reported from Kuwait.

Class	Order	Family	Species
Phaeophyceae	Ectocarpales	Acinetosporaceae	<i>Feldmannia irregularis</i> (Kützing 1845)
			<i>Feldmannia mitchelliae</i> (Harvey 1852)
	Chordariaceae		<i>Cladosiphon occidentalis</i> Kylin 1940
			<i>Myriactula arabica</i> (Kützing 1858)

Class	Order	Family	Species
			<i>Myrionema orbiculare</i> J. Agardh 1848
			<i>Nemacystus decipiens</i> (Suringar 1872)
		Scytosiphonaceae	<i>Colpomenia sinuosa</i> (Mertens ex Roth 1806)
			<i>Iyengaria stellata</i> (Børgesen 1928)
	Sphacelariales	Sphacelariaceae	<i>Sphacelaria novae-hollandiae</i> Sonder 1845
			<i>Sphacelaria rigidula</i> Kützinger 1843
			<i>Sphacelaria tribuloides</i> Meneghini 1840
	Dictyotales	Dictyotaceae	<i>Canistrocarpus cervicornis</i> (Kützinger 1859)
			<i>Dictyota implexa</i> (Desfontaines 1799)
			<i>Padina boryana</i> Thivy 1966
			<i>Padina gymnospora</i> (Kützinger 1859)
			<i>Padina tetrastromatica</i> Hauck 1887
	Fucales	Sargassaceae	<i>Hormophysa cuneiformis</i> (J.F. Gmelin 1792)
			<i>Polycladia myrica</i> (S.G. Gmelin 1768)
			<i>Sargassopsis decurrens</i> (R. Brown ex Turner 1811)
			<i>Sargassum angustifolium</i> C. Agardh 1820
			<i>Sargassum aquifolium</i> (Turner 1807)
			<i>Sargassum asperifolium</i> Hering & G.Martens ex J. Agardh 1848
			<i>Sargassum boveanum</i> J. Agardh 1848
			<i>Sargassum fluitans</i> (Børgesen 1914)
			<i>Sargassum oligocystum</i> Montagne 1845
			<i>Sirophysalis trinodis</i> (Forsskål 1775)
Xanthophyceae	Vaucheriales	Vaucheriaceae	<i>Vaucheria piloboloides</i> Thuret 1854

10.1.4 Phylum Tracheophyta

Species of this phylum are similar to bryophytes. Two species were recorded from Kuwait (Table 62 (Al-Yamani et al., 2014)).

Table 62: Marine macroalgae (Phylum Tracheophyta) reported from Kuwait.

Class	Order	Family	Species
Monocots	Alismatales	Cymodoceaceae	<i>Halodule uninervis</i> (Forsskål 1775)
		Hydrocharitaceae	<i>Halophila ovalis</i> (R. Brown 1810)

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10.1.5 Marine Macroalgae

Table 63: Marine algae major groups.

Pyrrophyta	dinoflagellates	246
	flagellates	32
	Cyanobacteria	2
	photosynthetic ciliate	1
Bacillariophyta	diatoms	246



10.1.5.1 Phylum Pyrrophyta

The dinoflagellates of Kuwait consists of about 105 species (**Annex 9**), in two class, 5 orders, 17 families and 37 genera (Al-Kandari et al., 2009) (Figure 45). Several other papers dealt with algal bloom and harm affecting fish (Heil et al., 2001; Al- Yamani et al., 2002 & 2012; Gilbert et al., 2002).



Figure 45: Books on the phytoplanktons and diatoms of Kuwait.

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10.1.5.2 Phylum Bacillariophyta



A total of 202 species of diatoms representing three classes, 28 orders, 44 families and 75 genera (**Annex 10**) were reported from the Kuwaiti waters (Hendey, 1970; Dorgham et al., 1987; Jacob & Al-Muzaini, 1990; Basson, 1992; Subba Rao & Al-Yamani, 1998; Subba Rao et al., 2003; Al-Kandari et al., 2009). Al-Yamani & Saburova (2011 & 2019) published the most comprehensive list of the diatoms of Kuwait, which were fully illustrated.

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10.1.5.3 Other marine phytoplankton

Al-Kandari et al. (2009) and Subba Rao & Al-Yamani (1998) have summarized available knowledge of phytoplankton from the northern Arabian Gulf and described the region as a distinct biotope, with a north-south gradient in phytoplankton diversity and abundance. Other published reports include Jacob et al. (1979), Al-Hasan et al. (1983 & 1989) and Jones (1986).

Table 64: Other marine phytoplanktons.

Phylum	Class	Order	Family	Species
Chromophyta	Cryptophyceae	Cryptononadales	Cryptononadaceae	<i>Plagioselmis</i> sp. 1
	Raphidophyceae		Chattonellaceae	<i>Heterosigma akashiwo</i> (Hada) Hara et Chihara 1987
	Dictyochophyceae	Dictyochalis	Dictyochaceae	<i>Dictyocha fibula</i> Ehrenberg 1839
				<i>Dictyocha speculum</i> Ehrenberg 1839
	Prymnesiophyceae	Prymnesiales	Phaeocystaceae	<i>Phaeocystis</i> sp. 1

Phylum	Class	Order	Family	Species
Chlorophyta	Euglenophyceae	Euglenales	Eutreptiaceae	<i>Eutreptiella</i> sp. 1
	Prasinophyceae	Chlorodendrales	Halosphaeraceae	<i>Pterosperma undulatum</i> Ostenfeld in Ostenfeld et Schmidt 1902
				<i>Pyramimonas</i> sp.
	Chlorophyceae	Volvocales	Dunaliellaceae	<i>Dunaliella salina</i> (Dunal) Teodoresco 1905
Cyanophyta	Cyanophyceae	Oscillatoriales	Phormidiaceae	<i>Trichodesmium erythraeum</i> Ehrenberg 1830
				<i>Spirulina</i> sp. 1

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10.1.6 Marine Zooplanktons

Phylum Ciliophora

Al-Yamani et al. (2011) listed 73 species of ciliates from the Arabian Gulf, where as seven species were described from Kuwait (Skryabin & Al-Yamani, 2006 & 2007a). Composition, distribution and seasonal changes of tintinnids around Bubiyan Island was studied (Skryabin & Al-Yamani, 2007b).

Table 65: List of species of Order Tintinnida (Phylum Ciliophora) of the Arabian Gulf.

Family	Species
Tintinnidiidae	<i>Leprotintinnus bubianicus</i> Skryabin & Al-Yamani, 2007
	<i>Leprotintinnus elongatus</i> Skryabin & Al-Yamani, 2007
	<i>Leprotintinnus nordqvisti</i> (Brandt, 1906)
Codnellidae	<i>Tintinnopsis acuminata</i> Daday, 1887
	<i>Tintinnopsis ampla</i> Hada, 1937
	<i>Tintinnopsis angusta</i> Meunier, 1910
	<i>Tintinnopsis baltica</i> Brandt, 1986
	<i>Tintinnopsis beroidea</i> Stein, 1867
	<i>Tintinnopsis compressa</i> Daday, 1887

Family	Species
	<i>Tintinnopsis dadayi</i> Kofoid, 1905
	<i>Tintinnopsis directa</i> Hada, 1932
	<i>Tintinnopsis failakkaensis</i> Skryabin & Al-Yamani, 2007
	<i>Tintinnopsis gracilis</i> Kofoid & Campbell, 1929
	<i>Tintinnopsis karajacensis</i> Brandt, 1896
	<i>Tintinnopsis lobiancoi</i> Daday, 1887
	<i>Tintinnopsis lohmannii</i> Laackmann, 1906
	<i>Tintinnopsis mortensenii</i> Schmidt, 1901
	<i>Tintinnopsis nana</i> Lohmann, 1908
	<i>Tintinnopsis orientalis</i> Kofoid & Campbell, 1929
	<i>Tintinnopsis parva</i> Merkle, 1909
	<i>Tintinnopsis parvula</i> Jörgensen, 1912
	<i>Tintinnopsis radix</i> Imhof, 1886
	<i>Tintinnopsis rotundata</i> Jörgensen, 1899
	<i>Tintinnopsis sacculus</i> Brandt, 1896
	<i>Tintinnopsis schotti</i> Brandt, 1906
	<i>Tintinnopsis tocantinensis</i> Kofoid & Campbell, 1929
	<i>Tintinnopsis turbo</i> Meunier, 1919
	<i>Tintinnopsis undella</i> Meunier, 1910
	<i>Tintinnopsis urnula</i> Meunier, 1910
Codonellopsidae	<i>Codonellopsis lusitanica</i> Jörgensen, 1924
	<i>Codonellopsis morchella</i> (Cleve, 1900)
	<i>Codonellopsis ostenfeldi</i> (Schmidt, 1901)
Dictyocystidae	<i>Dyctiocysta duplex</i> Brandt, 1906
	<i>Luminella kuwaitensis</i> Skryabin & Al-Yamani, 2007
Metacyliidae	<i>Coxiella annulata</i> (Daday, 1886)
	<i>Helicostomella longa</i> Kofoid & Campbell, 1929
	<i>Metacylis jorgenseni</i> (Cleve, 1902)
	<i>Metacylis lucasensis</i> Kofoid & Campbell, 1929
	<i>Metacylis pithos</i> Skryabin & Al-Yamani, 2007
	<i>Metacylis tropica</i> Duran, 1957
	<i>Metacylis</i> sp.
Ascampbelliellidae	<i>Ascampbelliella obscura</i> (Brandt, 1906)
Petalotrichidae	<i>Petalotricha ampulla</i> (Fol, 1881)
Rhabdonellidae	<i>Protorhabdonella curta</i> (Cleve, 1901).
	<i>Protorhabdonella simplex</i> (Cleve, 1900)
	<i>Rhabdonella conica</i> Kofoid & Campbell, 1929
	<i>Rhabdonella striata</i> (Biedermann, 1893)

Family	Species
	<i>Rhabdonella</i> sp.
Xystonellidae	<i>Parundella lohmanni</i> Jörgensen, 1924
	<i>Xystonella treforti</i> (Daday, 1887)
	<i>Xystonellopsis gaussi</i> (Laackmann, 1909)
	<i>Favella adriatica</i> (Imhof, 1886)
	<i>Favella campanula</i> (Schmidt) Jörgensen, 1924
	<i>Favella ehrenbergi</i> (Claparede & Lachmann)
	<i>Favella panamensis</i> Kofoid & Campbell, 1929
Undellidae	<i>Undella dilatata</i> Kofoid and Campbell, 1929
Tintinnidae	<i>Amphorellopsis acuta</i> (Schmidt) Kofoid & Campbell, 1929
	<i>Amphorides amphora</i> (Claparede & Lachmann, 1858)
	<i>Amphorides quadrilineata</i> Jörgensen, 1924
	<i>Dadayiella cuspis</i> Kofoid & Campbell, 1929
	<i>Dadayiella ganymedes</i> (Entz, 1884)
	<i>Eutintinnus apertus</i> (Kofoid & Campbell, 1929)
	<i>Eutintinnus conicus</i> Skryabin & Al-Yamani, 2007
	<i>Eutintinnus contractus</i> Skryabin & Al-Yamani, 2007
	<i>Eutintinnus fraknoi</i> (Daday, 1887)
	<i>Eutintinnus lusus-undae</i> (Entz, 1885)
	<i>Eutintinnus macilentus</i> (Jörgensen, 1924)
	<i>Eutintinnus tenue</i> Kofoid and Campbell, 1929
	<i>Eutintinnus turgescens</i> (Kofoid and Campbell, 1929)
	<i>Eutintinnus</i> sp.
	<i>Salpingella attenuata</i> Jörgensen, 1924
	<i>Salpingella rotundata</i> Jörgensen, 1924
	<i>Salpingacantha unguiculata</i> Brandt, 1906

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(Photo from M. Al-Dosari)



11

Flora

11

Flora



11.1 Phylum Bryophyta

The mosses of Kuwait received much attention that revealed the presence of at least 15 species (El-Saadawi, 1976 & 1979; Halwagy & El-Saadawi, 1992). An elaborate key for the mosses of Kuwait

was given by El-Saadawi (1979) with details on their distribution. Other studies indicated some records (Rechinger, 1964; Townsend & Guest, 1966; Migahid & Hammouda, 1974).

Table 66: List of mosses reported from Kuwait.

Family	Species
Pottiaceae	<i>Aloina rigida</i> (Hedw.)
	<i>Barbula</i> sp
	<i>Barbula vinealis</i> Brid
	<i>Crossidium chloronotos</i> (Brid.)
	<i>Crossidium squamigerum</i> (Viv.)
	<i>Gymnostomum calcareum</i>
	<i>Pottia davalliana</i> (Sm.)
	<i>Pterygoneurum ovatum</i> (Hedw.)
	<i>Timmia anomala</i>
	<i>Tortula atrovirens</i> (Sm.)
	<i>Trichostomopsis haussknechtii</i> (Jur. & Milde)
Bryaceae	<i>Bryum</i> sp.
	<i>Leptobryum pyriforme</i> (Hedw.)
Funariaceae	<i>Funaria hygrometrica</i> Hedw
	<i>Physcomitrium pyriforme</i> (Hedw.)

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11.2 Angiospermae, Gymnospermae and Pteridophyta

These are the flowering plants. They include two main divisions; Dicotyledoneae and Monocotyledoneae (**Annex 11 & 12**). A total of 376 native species belonging to 55 families (44 Dicotyledoneae and 11 Monocotyledoneae) of flowering plants were reported from Kuwait (Omar et al. (2007). Family names are mostly those recommended by the Angiosperm Phylogeny Group (2003), with the modern names being used for Apiaceae, Asteraceae, Brassicaceae, Fabaceae, Lamiaceae and others. List of species mentioned in Omar et al. (2007) was distributed as per the new family names. Twenty-five species

are naturalized either by cultivation or naturally (Abdullah, 2017). For the updated list, including introduced and cultivated plant, see Abdullah, (2017).

Species wise, family Poaceae includes 70 species, Asteraceae with 46 species, Brassicaceae with 34 and Fabaceae includes 28 species, while Amaranthaceae and Chenopodiaceae together have 30 species (Omar et al., 2007) (Figures 48-51).

This checklist is mostly based on Boulos (1988), Boulos & Al-Dosari (1994), Omar et al. (2007) and Mathew et al. (2012). Other major sources on the

Table 67: Floristic analysis of Angiosperms (native plants) of Kuwait (Omar et al., 2007)

Group	Families	Genera	Species
Angiospermae	55	234	376
Monocots	11	54	86
Dicots	44	184	290



Figure 46: Books on the flora of Kuwait.

flora of Kuwait include (Brutt & Lewis, 1949, 1952 & 1954; Dickson, 1955; Halwagy & Macksad, 1972; Daoud & Al-Rawi, 1985; Boulos & Al-Hasan, 1986; Al-Rawi, 1987; Boulos, 1987; Boulos & Armer, 1988; Boulos & Al-Yahya, 1991; Abdullah, 2017). Several books illustrated the flora of Kuwait (Figure 46-47).

The flora of some Kuwaiti islands was also studied (Al-Abbadi, 2008; Al-Abbadi, & El-Sheikh, 2017) and National parks (El-Sheikh & El-Abbadi, 2004; Al-Shehabi & Murphy, 2017). Other studies on the ecology of the vegetation in Kuwait were published (Brown & Porembski, 1998; Brown & Schoknecht, 2001; Brown, 2003a & b; El-Sheikh et al., 2006 & 2010). A series of outstanding contributions on the ecology and vegetation types were published by Halwagy & Halwagy (1974a & b), Halwagy et al. (1982), El-Shora & Jasim (1996), Omar (1990) and Omar et al. (2000, 2001; 2005; 2008), management of range land Omar & Zaman, 1995 & 1998). Traditional use of plants in Kuwait was studied by Middleditch & Amer (2009).

Acacia pachyceras O. Schwartz. is the only native tree species of the Kuwaiti desert ecosystem, with only one surviving specimen remaining in Kuwait. It is famously termed "the Lonely Tree" and is located at the Sabah Al-Ahmad Natural Reserve. Taxonomic identification of the lonely tree was controversial. Dickson (1955), Boulos & Al-Dosari, (1994), Boulos (1995), Chaudhary, (1999) and Dannin (2000) identified that as *A. pachyceras* while Shuhaib claimed it to be *A. gerrardii*. A recent breakthrough research finding

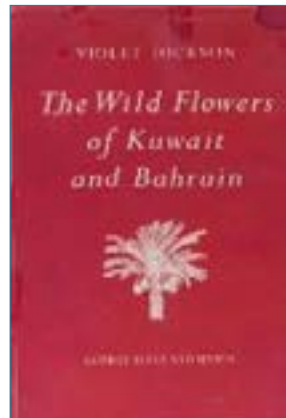


Figure 47: Cover of the historical book of the wild flowers of Kuwait and Bahrain by Violet Dickson (1955)

has confirmed that lonely tree species as *Vachellia pachyceras* (= *A. pachyceras*) using multilocus plastid gene sequence (Suleiman et al. (2017). Exceptional research contributions to understand and create a basic database on native plant seed storage, mass propagation, salinity tolerance, symbiotic relationships, microbial diversity in soil, revegetation measures for increasing the biodiversity were published by Zaman et al. (1997, 2006a, 2006b, 2009a, 2009b, 2009c Al-Houty, (1993), Suleiman et al. (2008, 2009a, 2009 b, 2010, 2011a, 2011b, 2011c, 2011d, 2017, 2018, 2019a, 2019b), Taha et al. (2016), Bhatt et al. (2018), Laila et al. (2017), Quoreshi et al. (2019),

Limonium failachicum was described from Failaka Island and is considered as the only endemic species to Kuwait (Erben & Mucina, 2006).

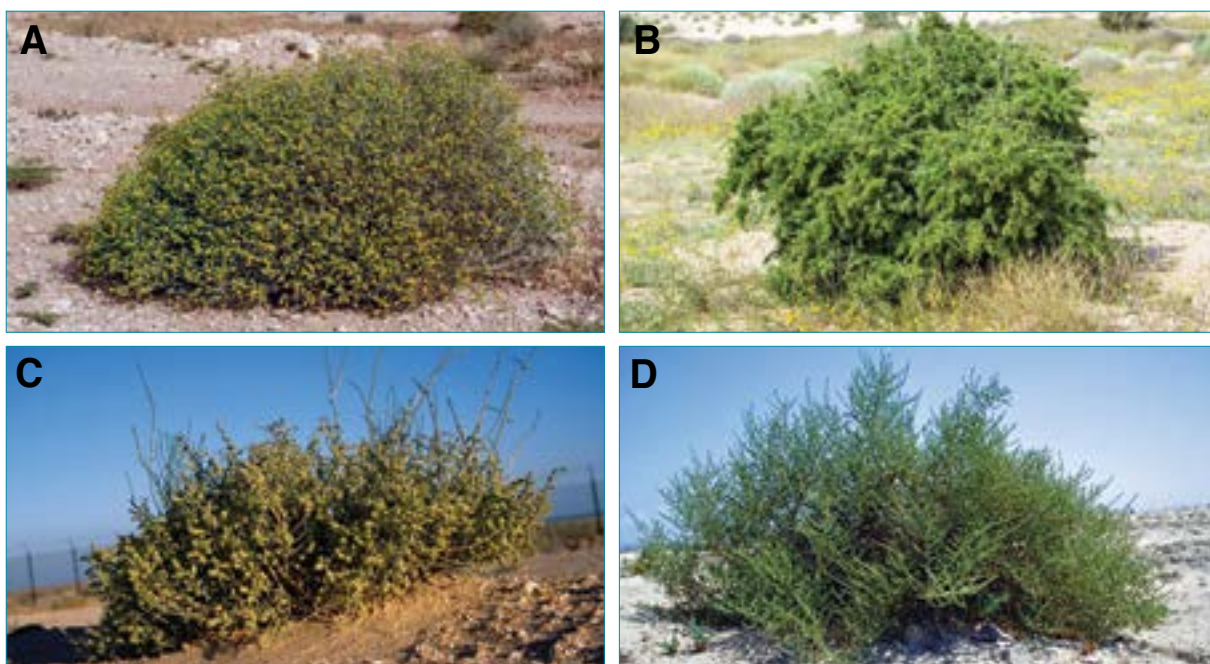


Figure 48: Bushes of Kuwait. A. *Rhanterium epapposum*. B. *Lycium shawii*. C. *Haloxylon salicornicum*. D. *Salsola imbricata* (All photos from Abdul Rahman Al-Sirhan).

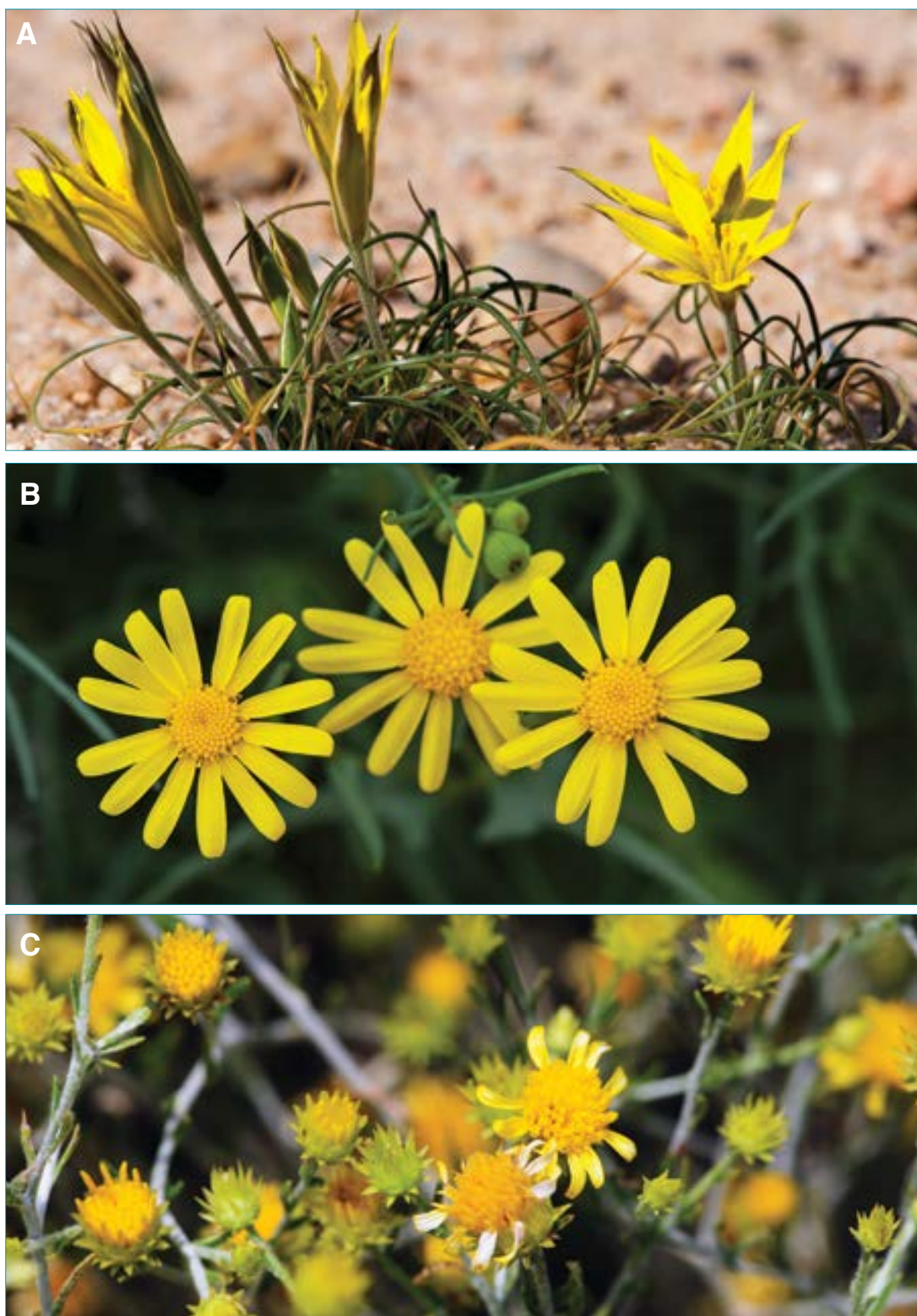


Figure 49: Some flowering plants from Kuwait. A. *Gagea reticulata*. B. *Senecio glaucus*. C. *Rhanterium epapposum*. (All photos from M. Al-Dosari).



Figure 50: Some flowering plants from Kuwait. A. *Cakile arabica*. B. *Echium rauwolfii*. C. *Haloxylon salicornicum*. D. *Mathiola longipetala*. E. *Rumex vesicarius*. F. *Calligonum comosum*. (All photos from M. Al-Dosari).

11.3 Gymnospermae and Pteridophyta



One species of gymnosperms; *Ephedra foliata* Boiss (Ephedraceae), and one species of Pteridophyta, *Ophioglossum aitchisonii* d'Almeida,

have been listed in the flora of Kuwait (Boulos & Al-Dosari, 1994).



Figure 51: A poster showing some flowering plants from Kuwait.

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11.4 Vegetation of Kuwait

The native vegetation of Kuwait is of high values as it represents semi-arid and arid vegetation of the region and contains highly adaptable genes to the harsh environment, extreme drought, poor soil and organic matter and tolerates high salinity (Zaman et al., 2009). The vegetation types of Kuwait are mainly defined by geomorphological changes, soil types and climatic conditions. Four main vegetation types are recognised in Kuwait according to Halwagy & Halwagy (1974):

- Sand dunes vegetation: comprises a series of low coastal dunes which extends along the southern to northern coastal strips. The soil is composed of loose coarse sand. It is usually dominated by *Zygophyllum qatarense* and/or *Seidlitzia rosmarinus*, with occasional by *Atriplex leucoclada* and *Nitraria retusa*. Common associates are *Lycium shawii* and *Pennisetum divisum*.
 - Salt marshes 'sabkha' and saline vegetation: The marshes are influenced by tidal action and the shallow saline water table. Soil ranges from loamy sand to sandy clay. This vegetation type dominates in areas of Kuwait bay coasts and Khor Al-Sabiyah. It is also found in Bubiyan and Warba Islands. *Chenopodiaceae* dominates the vegetation with *Halocnemum strobilaceum* common near the shore and *Nitraria retusa* and *Zygophyllum qatarense* further inland.
 - Desert plains vegetation: this type dominates most of the desert land area (west of the coastal region) and is represented by a number of communities:
 - a. *Cyperus* steppe: dominated by *Cyperus conglomeratus* and common to the south and south-west of Kuwait City. Commonly associated with *Panicum turgidum*. The soil is of deep, moderately loose, coarse sand.
 - b. *Rhanterium* steppe: dominated by *Rhanterium epapposum* and found in the central and north-east of Kuwait. Common associates are *Convolvulus oxyphyllus*, *Moltkiopsis ciliata* and *Stipagrostis plumosa*. Found on shallow to moderately deep soils with a calcareous hardpan.
 - c. *Haloxylon* steppe: dominated by *Haloxylon salicornicum* found mainly in northern areas of Kuwait. Found on shallow soils with a hardpan.
- The desert plateau vegetation: Found mainly in the extreme west of Kuwait; dominated by *Haloxylon salicornicum* with *Citrullus colocynthis* also occurring frequently. Annual plants densely cover areas where perennial plants are absent. These include *Arnebia* spp. *Helianthemum* spp. *Astragalus* spp. and *Schismus barbatus*. *Zilla spinosa* dominates Wadi Al-Batin area. Found on thin soils consisting of generally of few inches of coarse or soft loamy sand, often mixed with pebbles and gravel, over a hardpan.

11.5 Distribution of the vegetation

Abdullah (2017) gave a comprehensive review on the distribution of vegetation in Kuwait. The following is a summary based on Abdullah, (2017). The first attempt to define the vegetation cover of Kuwait goes back to the mid fifties; where in her book "Wild Flowers of Kuwait and Bahrain", Dickson (1955) included a map showing four plant communities;

Rhanterium epapposum, *Haloxylon salicornicum*, *Panicum turgidum* and *Cyperus conglomeratus*. Later, Kernick (1963) modified the later map by adding a fifth vegetation type, *Zygophyllum qatarense*. Kernick (1966) modified the map, and included *Anabasis* vegetation community within the *Haloxylon* community to the west of Kuwait.

Halwagy (1973) studied the ecology of the desert vegetation of Kuwait, with emphasis on salt marshes vegetation. Halwagy & Halwagy (1974a) identified the physical environment along with the geology of the State of Kuwait. In general, the country is a flat to moderately rolling desert with very limited elevations, wadis, with some low sand dunes and salt marshes. They also included some details on the soil types and the climate of Kuwait.

Halwagy & Halwagy (1974b) recognized the five different plant communities. Their proposed map showed that the Haloxylon plant community was the most widely distributed across Kuwait,

followed by the Rhanterium community, while the Panicum plant community decreased and the Zygophyllum community decreased around coastal areas (Figure 52).

Omar et al. (2001) employed modern Geographical Information system (GIS), based on soil types and vegetation data. This comprehensive study covered all Kuwait (Figure 53). The final map showed eight different vegetation types: Centropodietum, Cyperetum, Halophyllum, Haloxyletum, Panicetum, Rhanterietum, Stipagrostietum, and Zygophylletum (Omar et al., 2007).

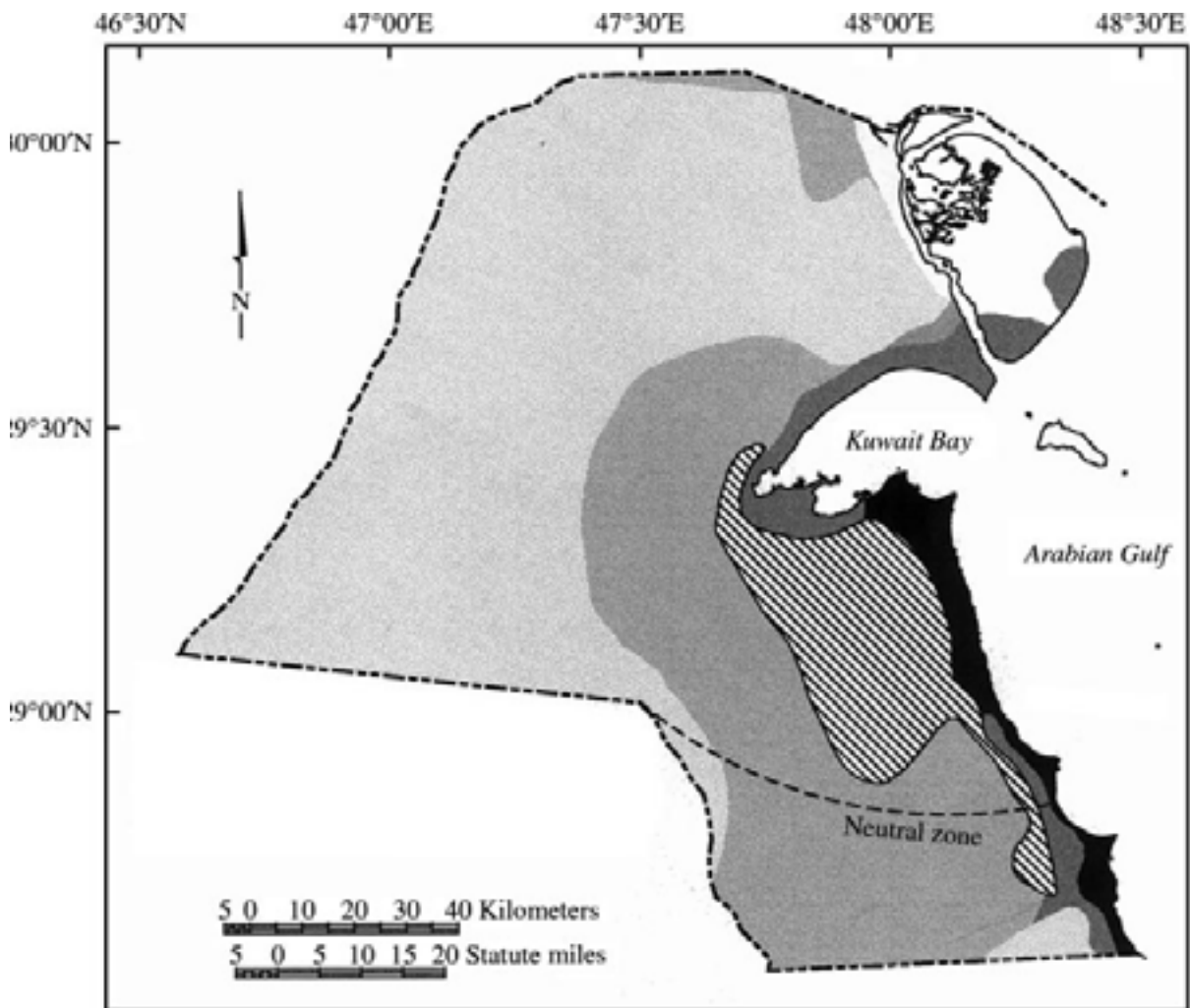


Figure 52: Vegetation map of Kuwait showing five plant communities (Source: Halwagy & Halwagy, 1974).

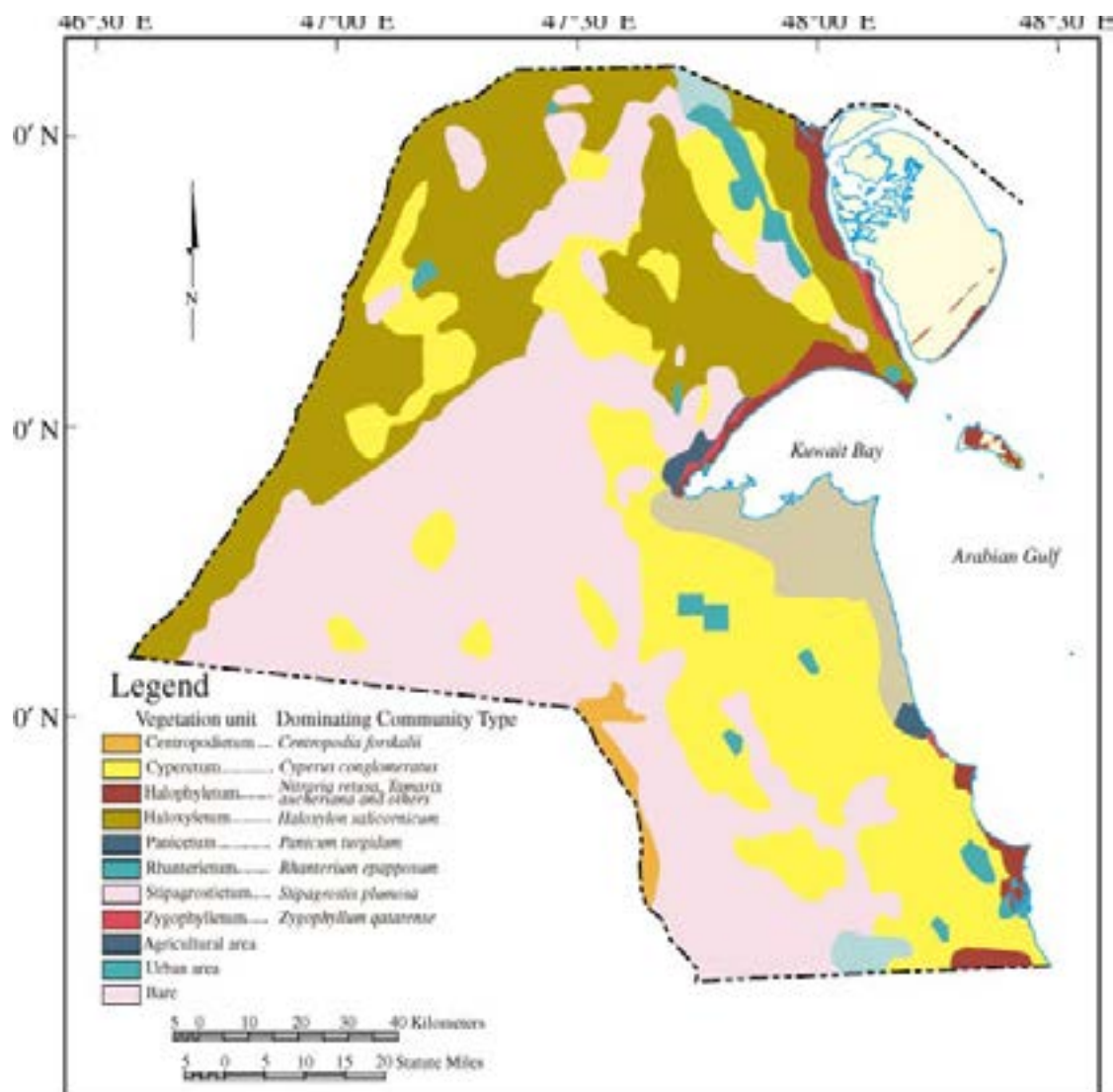


Figure 53: Current vegetation map of Kuwait (Source: Omar et al., 2001).

11.6 Changes to plant communities

Over a period of 25 years (1974-2001), Omar et al. (2001) compared vegetation communities of Kuwait based on Halwagy and Halwagy (1974b) and recent studies showed significant changes to the vegetation cover. It was concluded that some plant communities decreased while others had increased. Perennial shrubs accounted for about 27% of the studied area while perennial grass and sedge represented 67.9% (Omar et al., 2001). The main causes of land degradation in northern Kuwait

were addressed by Brown (2003). He showed that *Rhanterium epapposum* community in northern Kuwait was replaced by *Haloxylon salicornicum*, due to over grazing of livestock on the edible and preferred *Rhanterium*.

Al-Awadhi et al. (2001) gave a comprehensive account on land degradation in Kuwait, thus affecting the vegetation cover. These changes were attributed to environmental factors; including

climate change and human activities (e.g. over-grazing, uprooting of shrubs, soil compaction, military activities, and soil oil pollution).

Uddin et al. (2010) addressed the micro-climatic variations as a result of land-cover changes. They stated that the environmental catastrophes that emerged during the Gulf war (e.g. oil lakes and spills over land) left permanent damages. Additionally, Kuwait exhibited large scale of urban

expansion. All these accounted for changes in the vegetation cover country wide.

Abdullah (2017) stated that the current status of vegetation communities in Kuwait underwent intensive land deterioration and reduction of plant communities such as *Rhanterium* spp. and *Haloxylon* spp., while on the other hand, grasses and sedges communities increased (e.g. *Stipagrostis* spp. and *Cyperus* spp.).

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(Photo from M. Al-Dosari)



(Photo from Faisal Al Nomas)



12

Recommendations

12

Recommendations

Gaps that should be addressed:

1. Scorpions
1. Spiders
2. Land and freshwater snails
3. Sponges
4. Invasive species
5. Status of mammals: marine and terrestrial (Population size, distribution and trends; life history and ecology; actions. Research and monitoring to support a conservation strategy)
6. Further studies on reptiles in eastern and southern Kuwait
7. Update in entomological research specially arthropods that can transmit diseases
8. Update the molluscan fauna of Kuwait.
9. Need for herpetology book for Kuwait.
10. Identification of threats for both terrestrial and marine fauna and flora
11. Gaps in knowledge of IUCN Red List species. The focus is on native, wild, threatened species, as defined in the IUCN Red List.
12. Kuronuma & Abe (1972, 1986) books should be updated considering additional records for the fishes of Kuwait.
13. There is a growing need for large-scale research to guide management of reefs and their stressors, as these operate at much larger scales than the national borders within which most research currently occurs
14. Several monitoring and research needs are required to support conservation of sea turtles, including:
 - Population size, distribution and trends.
 - Life history and ecology.
- Threats and actions.
- Harvest and trade trends and management.
- Inventory and monitoring of populations.
- Monitoring of pelagic and near-shore fisheries operations.
15. Capacity building and training of EPA biologist in highly reputed centers and museums.
16. Application of modern methodologies in biodiversity studies (bat detectors, camera trapping, molecular systematics etc.)
17. There is a near total lack of research on the direct and indirect benefits of biodiversity, including studies on ecosystem services and valuing ecosystems.
18. Efforts should be made to conduct a new vegetation survey covering all parts of Kuwait and the changes in the last 15 years should be evaluated. These measures should be repeated every 15 years using modern techniques to have an updated data base.
19. Assess the positive impacts of recent revegetation and conservation measures on the plant biodiversity and revise the revegetation and conservation policies accordingly.
20. Digital documents of the database should be made available to all researchers.
21. A robust system of documenting Kuwait's biodiversity was not found, nor an inclusive means for teams of experts to undertake assessments of the country's species and ecosystems and develop integrated strategies and action plans to address species and ecosystems.
22. The immediate need to establish a natural history museum to document fauna, flora and geology of Kuwait.

23. Intergrated and coordinated approach of all the government organization is necessary to conserve biodiversity.
24. It is recommended that additional efforts are needed for research and documentation of seed ecology, biology of the unexplored native species and to opt for intensive revegetation programs to increase the biodiversity and create a database for the future generations.
25. Measures should be taken increase the availability of seed materials for revegetation programs for improving the biodiversity. Availability of native seeds from local or from neighbouring countries is a constraint to the revegetation programs.
26. Seed banks should be one of the national sources for seeds for revegetation programmes. Seeds should not be stored till they lose their viability as it prevents the natural or assisted upsurge in plant biodiversity.
27. Conservation and revegetation should be considered as national priority as it is the national identity and unique in its own way.



(Photo from Abdul Rahman Al-Sirhan)



(Photo from Yousif Bouhadi)



Annexes

Annex 1

Birds of Kuwait (Source: Birdlife International & <http://www.kuwaitbirds.org/birds>).

Birds of Kuwait (source: & <http://www.kuwaitbirds.org/birds>) for the species recorded, whereas for scientific and English names are after (BirdLife nomenclature: del Hoyo & Collar, 2014; 2016).

Common name	Scientific name	Arabic name
Phasianidae		
Common Quail	<i>Coturnix coturnix</i>	السماني
Anatidae		
Eastern Greylag Goose	<i>Anser anser rubrirostris</i>	الإوز الرمادي الشرقي
Greater White-fronted Goose	<i>Anser albifrons</i>	الإوز الأغر الكبير
Mute Swan	<i>Cygnus olor</i>	التم الأخرس
Common Shelduck	<i>Tadorna tadorna</i>	الشهرمان الشائع
Ruddy Shelduck	<i>Tadorna ferruginea</i>	الشهرمان الأحمر
Gadwall	<i>Mareca strepera</i>	البط السماري
Eurasian Wigeon	<i>Mareca penelope</i>	البط الصواي
Mallard	<i>Anas platyrhynchos</i>	البركة
Northern Shoveler	<i>Spatula clypeata</i>	أبومجرف
Northern Pintail	<i>Anas acuta</i>	البلبول الشائع
Garganey	<i>Spatula querquedula</i>	الحذف الصيفي
Common Teal	<i>Anas crecca</i>	الحذف الشتوي
Marbled Duck	<i>Marmaronetta angustirostris</i>	الحذف الرخامي
Common Pochard	<i>Aythya ferina</i>	البط كستنائي الرأس
Red-crested Pochard	<i>Netta rufina</i>	البط أحمر العرف
Ferruginous Duck	<i>Aythya nyroca</i>	البط الكستنائي
Tufted Duck	<i>Aythya fuligula</i>	الحذف المقنزع
Long-tailed Duck	<i>Clangula hyemalis</i>	البط طويل الذيل
Red-breasted Merganser	<i>Mergus serrator</i>	البلقشة حمراء الصدر
Procellariidae		
Sooty Shearwater	<i>Puffinus griseus</i>	جلم الماء الفاحم
Arabian or Persian Shearwater	<i>Puffinus persicus</i>	جلم الماء الفارسي
Podicipedidae		
Little Grebe	<i>Tachybaptus ruficollis</i>	الغطاس الصغير

Common name	Scientific name	Arabic name
Red-necked Grebe	<i>Podiceps grisegena</i>	الغطاس أحمر الرقبة
Great Crested Grebe	<i>Podiceps cristatus</i>	الغطاس المتوج الكبير
Horned Grebe	<i>Podiceps auratus</i>	الغطاس المعرف
Black-necked Grebe	<i>Podiceps nigricollis</i>	الغطاس أسود الرقبة
Phoenicopteridae		
Greater Flamingo	<i>Phoenicopterus roseus</i>	النحام الكبير
Lesser Flamingo	<i>Phoeniconaias minor</i>	النحام الصغير
Phaethontidae		
Red-billed Tropicbird	<i>Phaethon aethereus</i>	رئيس البحر
Ciconiidae		
Black Stork	<i>Ciconia nigra</i>	القلق الأسود
Western White Stork	<i>Ciconia ciconia</i>	القلق الأبيض الغربي
Threskiornithidae		
African Sacred Ibis	<i>Threskiornis aethiopicus</i>	الأنوق المقدس
Glossy Ibis	<i>Plegadis falcinellus</i>	الأنوق اللامع
Eurasian Spoonbill	<i>Platalea leucorodia</i>	أبو ملعقة
Ardeidae		
Eurasian Bittern	<i>Botaurus stellaris</i>	الواق الكبير
Common Little Bittern	<i>Ixobrychus minutus</i>	الواق الصغير
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	الواق الأخضر الصغير
Green-backed Heron	<i>Butorides striata</i>	البليشون أخضر الظهر
Squacco Heron	<i>Ardeola ralloides</i>	البليشون الذهبي
Indian Pond Heron	<i>Ardeola grayii</i>	البليشون الذهبي الهندي
Western Cattle Egret	<i>Bubulcus ibis</i>	أبو قردان الغربي
Grey Heron	<i>Ardea cinerea</i>	البليشون الرمادي
Purple Heron	<i>Ardea purpurea</i>	البليشون الأرجواني
(Great) white Egret	<i>Ardea alba</i>	البليشون الأبيض الغربي
Little Egret	<i>Egretta garzetta</i>	الغرنوق الأبيض الصغير
Western Reef Egret	<i>Egretta gularis schistacea</i>	الغرنوق الأسود الهندي
Fregatidae		
Lesser Frigatebird	<i>Fregata ariel</i>	الفرقاط الصغير
Pelecanidae		
Great White Pelican	<i>Pelecanus onocrotalus</i>	البجعة البيضاء الكبيرة

Common name	Scientific name	Arabic name
Dalmatian Pelican	<i>Pelecanus crispus</i>	البجعة الكدراء
Phalacrocoracidae		
Pygmy Cormorant	<i>Microcarbo pygmeus</i>	الغاق القزم
Great Cormorant	<i>Phalacrocorax carbo</i>	الغاق الكبير
Socotra Cormorant	<i>Phalacrocorax nigrogularis</i>	الغاق السقطرى
Anhingidae		
African Darter	<i>Anhinga rufa</i>	الزقة
Pandionidae		
Osprey	<i>Pandion haliaetus haliaetus</i>	العقاب النساري
Accipitridae		
European Honey Buzzard	<i>Pernis apivorus</i>	عقاب العسل الحوامية
Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>	عقاب العسل المنزعة
Black-winged Kite	<i>Elanus caeruleus</i>	الزرق
Black Kite	<i>Milvus migrans</i>	الحدأة الشائعة
White-tailed Sea Eagle	<i>Haliaeetus albicilla</i>	العقاب بيضاء الذيل
Egyptian Vulture	<i>Neophron percnopterus</i>	الرخمة المصرية
Griffon Vulture	<i>Gyps fulvus</i>	النسر الأسمر (نسر جريفون)
Cinereous Vulture	<i>Aegypius monachus</i>	النسر الأسود
Lappet-faced Vulture	<i>Torgos tracheliotos</i>	نسر الأذن
Short-toed Snake-Eagle	<i>Circaetus gallicus</i>	عقاب الحيات
Western Marsh Harrier	<i>Circus aeruginosus</i>	مرزة البطائح الغربية
Hen Harrier	<i>Circus cyaneus</i>	مرزة الدجاج
Pallid Harrier	<i>Circus macrourus</i>	المرزة الباهتة
Montagu's Harrier	<i>Circus pygargus</i>	أبو شودة
Shikra	<i>Accipiter badius</i>	الببيدق
Levant Sparrowhawk	<i>Accipiter brevipes</i>	الباشق الشرقي
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	الباشق
Northern Goshawk	<i>Accipiter gentilis</i>	البازي
Eurasian Buzzard	<i>Buteo buteo vulpinus</i>	باز السهول
Long-legged Buzzard	<i>Buteo rufinus</i>	السقاوة (الباز طويل الساق)
Lesser Spotted Eagle	<i>Aquila pomarina</i>	العقاب المنقط الصغير
Greater Spotted Eagle	<i>Aquila clanga</i>	العقاب المنقط الكبير
Steppe Eagle	<i>Aquila nipalensis</i>	عقاب البادية

Common name	Scientific name	Arabic name
Eastern Imperial Eagle	<i>Aquila heliaca</i>	ملك العقبان الشرقي
Golden Eagle	<i>Aquila chrysaetos</i>	العقاب الذهبية
Bonelli's Eagle	<i>Aquila fasciatus</i>	عقاب بونلي
Booted Eagle	<i>Aquila pennata</i>	السبر
Falconidea		
Lesser Kestrel	<i>Falco naumanni</i>	العويسق
Common Kestrel	<i>Falco tinnunculus</i>	العوسق
Red-footed Falcon	<i>Falco vespertinus</i>	البزيق الشائع
Amur Falcon	<i>Falco amurensis</i>	البزيق الشرقي
Sooty Falcon	<i>Falco concolor</i>	الصقر الأسخم
Merlin	<i>Falco columbarius</i>	اليؤيؤ
Eurasian Hobby	<i>Falco subbuteo</i>	صقر الكويج
Lanner Falcon	<i>Falco biarmicus</i>	صقر وكري
Saker Falcon	<i>Falco cherrug</i>	الصقر الحر
Peregrine Falcon	<i>Falco peregrinus peregrinus</i>	شاهين بحري
Otididae		
Asian Bustard	<i>Chlamydotis macqueenii</i>	الحبارى الشرقية
Rallidae		
Western Water Rail	<i>Rallus aquaticus</i>	مرعة الماء
Corncrake	<i>Crex crex</i>	مرعة البر
Little Crake	<i>Porzana parva</i>	مرعة رمادية البطن
Baillon's Crake	<i>Porzana pusilla</i>	المرعة الصغيرة
Spotted Crake	<i>Porzana porzana</i>	المرعة الرقطاء
Purple Swamphen	<i>Porphyrio porphyrio</i>	دجاجة السلطان
Common Moorhen	<i>Gallinula chloropus</i>	دجاجة الماء
Eurasian Coot	<i>Fulica atra</i>	الغراء
Gruidae		
Demoiselle Crane	<i>Anthropoides virgo</i>	الرهو
Common Crane	<i>Grus grus</i>	الكركي
Burhinidae		
Eurasian Thick-knee	<i>Burhinus oediconemus</i>	الكروان
Haematopodidae		
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	آكل المحار

Common name	Scientific name	Arabic name
Dromadidae		
Crab-plover	<i>Dromas ardeola</i>	الحنكور زقراق السرطان
Recurvirostridae		
Black-winged Stilt	<i>Himantopus himantopus</i>	الكرسوع
Pied Avocet	<i>Recurvirostra avosetta</i>	النكات
Charadriidae		
Northern Lapwing	<i>Vanellus vanellus</i>	الزقراق الشامي
Spur-winged Lapwing	<i>Vanellus spinosus</i>	الزقراق ذو الجناح النابت
Red-wattled Lapwing	<i>Vanellus indicus</i>	الزقراق الهندي
Sociable Lapwing	<i>Vanellus gregarius</i>	الزقراق الأنيس
White-tailed Lapwing	<i>Vanellus leucurus</i>	الزقراق أبيض الذيل
Eurasian Golden Plover	<i>Pluvialis apricaria</i>	الزقراق الأوربي
Pacific Golden Plover	<i>Pluvialis fulva</i>	الزقراق الباسيفيكي
Grey Plover	<i>Pluvialis squatarola</i>	الزقراق الرمادي
Common Ringed Plover	<i>Charadrius hiaticula</i>	الزقراق المطوق الشائع
Little Ringed Plover	<i>Charadrius dubius</i>	الزقراق المطوق الصغير
Kentish Plover	<i>Charadrius alexandrinus</i>	الزقراق الاسكندراني
Lesser Sand Plover	<i>Charadrius atrifrons</i>	زقراق الرمل الصغير
Greater Sand Plover	<i>Charadrius leschenaultii</i>	زقراق الرمل الكبير
Caspian Plover	<i>Charadrius asiaticus</i>	الزقراق القزويني
Eurasian Dotterel	<i>Charadrius morinellus</i>	الزقراق الأغبر
Scolopacidae		
Eurasian Woodcock	<i>Scolopax rusticola</i>	دجاجة الأرض
Jack Snipe	<i>Lymnocyptes minimus</i>	الشنقب الصغير
Great Snipe	<i>Gallinago media</i>	الشنقب الكبير
Common Snipe	<i>Gallinago gallinago</i>	الشنقب الشائع
Black-tailed Godwit	<i>Limosa limosa</i>	بقويقة سلطانية
Bar-tailed Godwit	<i>Limosa lapponica</i>	بقويقة مخططة الذيل
Little Curlew	<i>Numenius minutus</i>	كروان الماء الصغير
Whimbrel	<i>Numenius phaeopus</i>	كروان الغيظ
Eurasian Curlew	<i>Numenius arquata</i>	كروان الماء الكبير
Spotted Redshank	<i>Tringa erythropus</i>	الطيوطى حمراء الساق الرقطاء
Common Redshank	<i>Tringa totanus</i>	الطيوطى حمراء الساق الشائعة

Common name	Scientific name	Arabic name
Marsh Sandpiper	<i>Tringa stagnatilis</i>	طيوطى البطاح
Common Greenshank	<i>Tringa nebularia</i>	الطيوطى خضراء الساق
Green Sandpiper	<i>Tringa ochropus</i>	النسناسة
Wood Sandpiper	<i>Tringa glareola</i>	طيوطى الغيظ
Terek Sandpiper	<i>Xenus cinereus</i>	طيوطى الرمل
Common Sandpiper	<i>Actitis hypoleucos</i>	الطيوطى الشائعة
Ruddy Turnstone	<i>Arenaria interpres</i>	قنبرة الماء
Great Knot	<i>Calidris tenuirostris</i>	الطيوطى الكبيرة
Red Knot	<i>Calidris canutus</i>	الطيوطى الشمالية
Sanderling	<i>Calidris alba</i>	المدروان
Little Stint	<i>Calidris minuta</i>	الطيوطى الصغيرة الشائعة
Temminck's Stint	<i>Calidris temminckii</i>	الطيوطى الصغيرة الرمادية
Pectoral Sandpiper	<i>Clalidris melanotos</i>	الطيوطى داكنة الصدر
Curlew Sandpiper	<i>Calidris ferruginea</i>	كروان الماء الأحمر
Dunlin	<i>Calidris alpina</i>	الطيوطى الداكنة
Broad-billed Sandpiper	<i>Limicola falcinellus</i>	الطيوطى عريضة المنقار
Ruff	<i>Philomachus pugnax</i>	النفاش المشاكس
Red-necked Phalarope	<i>Phalaropus lobatus</i>	الطيوطى حمراء الرقبة
Red Phalarope	<i>Phalaropus fulicarius</i>	الطيوطى الرمادية (ويعرف أيضاً
Glareolidae		
Cream-coloured Courser	<i>Cursorius cursor</i>	الدراج
Collared Pratincole	<i>Glareola pratincola</i>	أبو اليسر الشائع
Oriental Pratincole	<i>Glareola maldivarum</i>	أبو اليسر الشرقي
Black-winged Pratincole	<i>Glareola nordmanni</i>	أبو اليسر أسود الجناح
Laridae		
Black-legged Kittiwake	<i>Rissa tridactyla</i>	النورس أسود الرجلين
Little Gull	<i>Hydrocoloeus minutus</i>	النورس الصغير
Slender-billed Gull	<i>Larus genei</i>	النورس دقيق المنقار
Black-headed Gull	<i>Larus ridibundus</i>	النورس أسود الرأس
Mediterranean Gull	<i>Larus melanocephalus</i>	نورس البحر الأبيض المتوسط
Franklin's Gull	<i>Larus pipixcan</i>	نورس فرانكلين
Pallas's Gull	<i>Larus ichthyaetus</i>	نورس السمك
Mew Gull	<i>Larus canus</i>	النورس الشائع

Common name	Scientific name	Arabic name
Caspian Gull	<i>Larus cachinnans</i>	النورس القوقازي
Armenian Gull	<i>Larus armenicus</i>	النورس الأرميني
Lesser Black-headed Gull	<i>Larus fuscus</i>	النورس أسود الرأس
Common Gull-billed Tern	<i>Gelochelidon nilotica</i>	الخرشنة نورسية المنقار
Caspian Tern	<i>Hydroprogne caspia</i>	الخرشنة القزوينية
Swift Tern	<i>Thalasseus bergii</i>	الخرشنة المتوجة الكبيرة
Lesser Crested Tern	<i>Thalasseus bengalensis</i>	الخرشنة المتوجة الصغيرة
Sandwich Tern	<i>Thalasseus sandvicensis</i>	خرشنة الساندويش
Little Tern	<i>Sternula albifrons</i>	الخرشنة الصغيرة
Bridled Tern	<i>Onychoprion anaethetus</i>	الخرشنة الملجمة
Common Tern	<i>Sterna hirundo</i>	الخرشنة الشائعة
White-cheeked Tern	<i>Sterna repressa</i>	الخرشنة بيضاء الخد
Arctic Tern	<i>Sterna paradisaea</i>	الخرشنة القطبية
Whiskered Tern	<i>Chlidonias hybrida</i>	الخرشنة المشوربة
White-winged Tern	<i>Chlidonias leucopterus</i>	الخرشنة بيضاء الجناح
Black Tern	<i>Chlidonias niger</i>	الخرشنة السوداء
Stercorariidae		
Pomarine Jaeger	<i>Stercorarius pomarinus</i>	الكركر الشمالي
Arctic Jaeger	<i>Stercorarius parasiticus</i>	الكركر القطبي
Long-tailed Jaeger	<i>Stercorarius longicaudus</i>	الكركر طويل الذيل
Pteroclididae		
Pin-tailed Sandgrouse	<i>Pterocles alchata</i>	الغطاطة
Chestnut-bellied Sandgrouse	<i>Pterocles exustus</i>	الكدرية الشائعة
Spotted Sandgrouse	<i>Pterocles senegallus</i>	الكدرية غبراء الجناح
Black-bellied Sandgrouse	<i>Pterocles orientalis</i>	الكدرية بيضاء الجناح
Columbidae		
European Turtle Dove	<i>Streptopelia turtur</i>	القمري
Oriental Turtle Dove	<i>Streptopelia orientalis meena</i>	القمري الشرقي
Stock Dove	<i>Columba oenas</i>	حمام أخضر الرقبة
Common Wood Pigeon	<i>Columba palumbus</i>	الورشان
Rock Pigeon	<i>Columba livia (forma domestica)</i>	الحمام الدوري
African Collared Dove	<i>Streptopelia risoria</i>	الفاختة الأفريقية
Eurasian Collared Dove	<i>Streptopelia decaocto</i>	الفاختة الشائعة

Common name	Scientific name	Arabic name
Laughing Dove	<i>Spilopelia senegalensis</i>	الدبسي
Namaqua Dove	<i>Oena capensis</i>	الحمحم
Cuculidae		
Western (Asian) Koel	<i>Eudynamys scolopaceus</i>	الكول الآسيوي
Common Cuckoo	<i>Cuculus canorus</i>	الوقواق الشائع
Great Spotted Cuckoo	<i>Clamator glandarius</i>	الوقواق المنقط الكبير
Psittaculidae		
Rose-ringed Parakeet	<i>Psittacula krameria</i>	البراكيت الأخضر
Tytonidae		
Western Barn Owl	<i>Tyto alba</i>	الهامة
Strigidae		
Pallid Scops Owl	<i>Otus brucei</i>	الثجج الباهت
Eurasian Scops Owl	<i>Otus scops</i>	الثجج الأوربي
Pharaoh Eagle Owl	<i>Bubo ascalaphus</i>	البوهة
Lilith Owlet	<i>Athene noctua lilith</i>	البومة الصغيرة
Northern Long-eared Owl	<i>Asio otus</i>	البومة طويلة الأذنين
Short-eared Owl	<i>Asio flammeus</i>	البومة قصيرة الأذنين
Caprimulgidae		
Eurasian Nightjar	<i>Caprimulgus europaeus</i>	السبد الأوربي
Egyptian Nightjar	<i>Caprimulgus aegyptius</i>	السبد المصري
Apodidae		
Alpine Swift	<i>Tachymarptis melba</i>	سمامة الألب
Common Swift	<i>Apus apus</i>	السمامة الشائعة
Little Swift	<i>Apus affinis</i>	السمامة الصغيرة
Pallid Swift	<i>Apus pallidus</i>	السمامة الباهتة
Coraciidae		
Indian Roller	<i>Coracias benghalensis</i>	الشقراق الهندي
European Roller	<i>Coracias garrulus</i>	الشقراق الأوربي
Alcedinidae		
White-breasted Kingfisher	<i>Halcyon smyrnensis</i>	القرلي أبيض الصدر
Common Kingfisher	<i>Alcedo atthis</i>	القرلي الشائع
Pied Kingfisher	<i>Ceryle rudis</i>	خاطف ظله
Upupidae		
Common Hoopoe	<i>Upupa epops</i>	الهدهد

Common name	Scientific name	Arabic name
Meropidae		
Blue-cheeked Bee-eater	<i>Merops persicus</i>	القارية زرقاء الخدين
European Bee-eater	<i>Merops apiaster</i>	آكل النحل أو الوروار
Picidae		
Eurasian Wryneck	<i>Jynx torquilla</i>	اللواء
Laniidae		
Red-backed Shrike	<i>Lanius collurio</i>	الصدر احمر الظهر
Isabellone Shrike	<i>Lanius isabellinus</i>	الصدر أحمر الذيل
Red-tailed Shrike	<i>Lanius phoenicuroides</i>	صدر تركستان الأكل
Long-tailed Shrike	<i>Lanius schach</i>	الصدر طويل الذيل
Lesser Grey Shrike	<i>Lanius minor</i>	الصدر الرمادي الصغير
Great Grey Shrike	<i>Lanius excubitor</i>	صدر الوادي الجنوبي
Woodchat Shrike	<i>Lanius senator</i>	الدغناش الشامي
Masked Shrike	<i>Lanius nubicus</i>	الدغناش القطبي
Oriolidae		
Eurasian Golden Oriole	<i>Oriolus oriolus</i>	الصفاري
Dicruridae		
Ashy Drongo	<i>Dicrurus leucophaeus</i>	الدرونجو الرمادي
Corvidae		
House Crow	<i>Corvus splendens</i>	الغراب الدوري
Mesopotamian Crow	<i>Corvus (cornix) capellanus</i>	غراب البين العراقي
Rook	<i>Corvus frugilegus</i>	الغداد
Brown-necked Raven	<i>Corvus ruficollis</i>	الغراب بني الرقبة
Hypocoliidae		
Hypocolius	<i>Hypocolius ampelinus</i>	الجاثم المبرقع
Paridae		
Sombre Tit	<i>Poecile lugubris</i>	القرقف الحزين
Great Tit	<i>Parus major</i>	القرقف الكبير
Eurasian Penduline Tit	<i>Remiz pendulinus</i>	القرقف المقنع
Alaudidae		
Greater Hoopoe-Lark	<i>Alaemon alaudipes</i>	المكاء
Thick-billed Lark	<i>Rhamphocoris clotbey</i>	القبرة عريضة المنقار
Calandra Lark	<i>Melanocorypha calandra</i>	القبرة سوداء الصدر

Common name	Scientific name	Arabic name
Bimaculated Lark	<i>Melanocorypha bimaculata</i>	القبرة قصيرة الذيل
Desert Lark	<i>Ammomanes deserti</i>	القبرة الصحراوية
Bar-tailed Lark	<i>Ammomanes cinctura</i>	الحمرة سوداء الذيل
Greater Short-toed Lark	<i>Calandrella brachydactyla</i>	القبرة قصيرة الإصبع الكبيرة
Lesser Short-toed Lark	<i>Calandrella rufescens</i>	القبرة قصيرة الإصبع الصغيرة
Arabian Lark	<i>Eremalauda eremodites</i>	الحمرة عريضة المنقار
Crested Lark	<i>Galerida cristata</i>	القبرة الشائعة
Black-crowned Sparrow-Lark	<i>Eremopterix nigriceps</i>	القبرة سوداء التاج
Oriental Skylark	<i>Alauda gulgula</i>	قبرة الحقول الصغيرة
Eurasian Skylark	<i>Alauda arvensis</i>	قبرة الحقول الشائعة
Wood Lark	<i>Lullula arborea</i>	قبرة الغابات
Temminck's Lark	<i>Eremophila bilopha</i>	الحمرة المقرنة الشرقية
Pycnonotidae		
White-eared Bulbul	<i>Pycnonotus leucogenys leucotis</i>	الببلب أبيض الخدين
Red-vented Bulbul	<i>Pycnonotus cafer</i>	الببلب أحمر العجز
Hirundinidae		
Collared Sand Martin	<i>Riparia riparia</i>	خطاف الرمال
Barn Swallow	<i>Hirundo rustica</i>	الخطاف الشائع
Eurasian Crag Martin	<i>Ptyonoprogne rupestris</i>	خطاف الجبال
Pale Rock Martin	<i>Ptyonoprogne obsoleta</i>	خطاف الصخور
Northern House Martin	<i>Delichon urbicum</i>	خطاف المدن الشائع
Red-rumped Swallow	<i>Cecropis daurica</i>	الخطاف أحمر العجز
Scotocercidae		
Cetti's Warbler	<i>Cettia cetti</i>	الدخلة رمادية الأذن
Phylloscopidae		
Willow Warbler	<i>Phylloscopus trochilus</i>	دخلة الصفصاف
Common Chiffchaff	<i>Phylloscopus collybita</i>	الدخلة الشائعة
Mountain Chiffchaff	<i>Phylloscopus sindianus</i>	دخلة الجبال
Wood Warbler	<i>Phylloscopus sibilatrix</i>	دخلة الغابات
Eastern Bonelli's Warbler	<i>Phylloscopus orientalis</i>	دخلة بونلي الشرقية
Hume's Leaf Warbler	<i>Phylloscopus humei</i>	دخلة أوراق هيوم
Yellow-browed Warbler	<i>Phylloscopus inornatus</i>	الدخلة صفراء الحاجب
Dusky Warbler	<i>Phylloscopus fuscatus</i>	الدخلة القاتمة

Common name	Scientific name	Arabic name
Green Warbler	<i>Phylloscopus nitidus</i>	الدخلة الخضرا
Acrocephalidae		
Basra Reed Warbler	<i>Acrocephalus griseldis</i>	دخلة القصب البصرية
Great Reed Warbler	<i>Acrocephalus arundinaceus</i>	دخلة القصب الكبيرة
Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i>	دخلة القصب الهندية
Moustached Warbler	<i>Acrocephalus melanopogon</i>	الدخلة المشورية
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	دخلة البردي
Common Reed Warbler	<i>Acrocephalus scirpaceus</i>	دخلة القصب الأوربية
Marsh Warbler	<i>Acrocephalus palustris</i>	دخلة البطاح
Paddyfield Warbler	<i>Acrocephalus agricola</i>	دخلة حقول الأرز
Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	دخلة الشجر
Booted Warbler	<i>Iduna caligata</i>	الدخلة المستحذية
Sykes's Warbler	<i>Iduna rama</i>	دخلة سايكس
Olivaceous Warbler	<i>Iduna pallida</i>	دخلة الزيتون الشرقية
Olive-tree Warbler	<i>Hippolais olivetorum</i>	دخلة شجر الزيتون
Upcher's Warbler	<i>Hippolais languida</i>	دخلة الوديان
Icterine Warbler	<i>Hippolais icterina</i>	الدخلة الصفراء
Locustellidae		
Common Grasshopper Warbler	<i>Locustella naevia</i>	دخلة الجنادب
Savi's Warbler	<i>Locustella luscinioides</i>	دخلة الأنهار بيضاء الحنجرة
River Warbler	<i>Locustella fluviatilis</i>	دخلة الأنهار
Cisticolidae		
Zitting Cisticola	<i>Cisticola juncidis</i>	الدخلة مروحية الذيل
Graceful Prinia	<i>Prinia gracilis</i>	النمنمة
Leiothrichidae		
Common Babbler	<i>Argya caudata</i>	الثرثار الأفغاني
Sylviidae		
Eurasian Blackcap	<i>Sylvia atricapilla</i>	أبوقانسوة
Garden Warbler	<i>Sylvia borin</i>	دخلة الحدائق
Barred Warbler	<i>Sylvia nisoria</i>	الدخلة الموشاة
Lesser Whitethroat	<i>Sylvia curruca</i>	الدخلة بيضاء الحنجرة الصغيرة
Desert Whitethroat	<i>Sylvia minula</i>	الدخلة بيضاء الحنجرة الصحراوية
Lesser Whitethroat	<i>Sylvia althaea</i>	دخلة هيوم بيضاء الحنجرة

Common name	Scientific name	Arabic name
Eastern Orphean Warbler	<i>Sylvia crassirostris</i>	دخلة البساتين الشرقية
Asian Desert Warbler	<i>Sylvia nana</i>	دخلة الصحراء الآسيوية
Common Whitethroat	<i>Sylvia communis</i>	الدخلة بيضاء الحنجرة الشائعة
Ménétriés's Warbler	<i>Sylvia mystacea</i>	الدخلة الآسيوية
Regulidae		
Goldcrest	<i>Regulus regulus (Linnaeus, 1758)</i>	ذهبي التاج
Troglodytidae		
N Wren	<i>Troglodytes troglodytes</i>	العندليب قصير الذيل
Sturnidae		
Bank Myna	<i>Acridotheres ginginianus</i>	مينا الأنهار
Common Myna	<i>Acridotheres tristis</i>	المينا الشائعة
Rosy Starling	<i>Pastor roseus</i>	السمرم
Common Starling	<i>Sturnus vulgaris</i>	الزرزور الشائع
Turdidae		
Eurasian Blackbird	<i>Turdus merula</i>	الشحور الشائع
Black-throated Thrush	<i>Turdus atrogularis</i>	السمنة سوداء الحنجرة
Dusky Thrush	<i>Turdus eunomus</i>	السمنة القاتمة
Ring Ouzel	<i>Turdus torquatus</i>	الشحور أبيض الحنجرة
Redwing	<i>Turdus iliacus</i>	السمنة حمراء الجناح
Fieldfare	<i>Turdus pilaris</i>	سمنة الحقول
Song Thrush	<i>Turdus philomelos</i>	السمنة المغردة
Mistle Thrush	<i>Turdus viscivorus</i>	السمنة الرقشاء
Muscicapidae		
European Robin	<i>Erithacus rubecula</i>	أبو الحناء
Bluethroat	<i>Luscinia svecica</i>	أزرق الحلق ذو البقعة الحمراء
Thrush Nightingale	<i>Luscinia luscinia</i>	العندليب الشائع
Common Nightingale	<i>Luscinia megarhynchos</i>	الهزار الشائع
White-throated Robin	<i>Irania gutturalis</i>	أبو صبرة
Rufous-tailed Scrub Robin	<i>Cercotrichas galactotes</i>	الشوالة
Black Scrub Robin	<i>Cercotrichas podobe</i>	الفتاح
Eversmann's Redstart	<i>Phoenicurus erythronotus</i>	الحميراء بيضاء الكتف
Eastern Black Redstart	<i>Phoenicurus ochruros phoenicuroides</i>	الحميراء الدبساء الشرقية
Common Redstart	<i>Phoenicurus phoenicurus</i>	الحميراء الشائعة

Common name	Scientific name	Arabic name
Whinchat	<i>Saxicola rubetra</i>	البرقش الأحمر
European Stonechat	<i>Saxicola rubicola</i>	البرقش الأوربي
Byzantine Stonechat	<i>Saxicola maurus variegatus</i>	البرقش البيزنطي
Pied Stonechat	<i>Saxicola caprata</i>	البرقش الأبقع
Caspian Stonechat	<i>Saxicola maurus hemprichii</i>	البرقش القزويني
Isabelline Wheatear	<i>Oenanthe isabellina</i>	الأبلق الرملي
Northern Wheatear	<i>Oenanthe oenanthe</i>	أبو بليق
Kurdistan Wheatear	<i>Oenanthe xanthopyrna</i>	فقاقة كردستان
Red-tailed Wheatear	<i>Oenanthe chrysopygia</i>	الفقاقة حمراء الذيل
Pied Wheatear	<i>Oenanthe pleschanka</i>	الفقاقة البقعاء
Eastern Black-eared Wheatear	<i>Oenanthe hispanica melanoleuca</i>	الفقاقة سوداء الأذن الشرقية
Desert Wheatear	<i>Oenanthe deserti</i>	فقاقة البادية
White-crowned Wheatear	<i>Oenanthe leucopyga</i>	الفقاقة السوداء بيضاء التاج
Eastern Mourning Wheatear	<i>Oenanthe lugens</i>	الفقاقة الحزينة الشرقية
Finsch's Wheatear	<i>Oenanthe finschii</i>	الفقاقة العربية
Hume's Wheatear	<i>Oenanthe albonigra</i>	الفقاقة السوداء بيضاء البطن
Hooded Wheatear	<i>Oenanthe monacha</i>	الفقاقة المقلنسة
Rufous-tailed Rock Thrush	<i>Monticola saxatilis</i>	سمنة الصخور
Blue Rock Thrush	<i>Monticola solitarius</i>	السمنة الزرقاء
Spotted Flycatcher	<i>Muscicapa striata</i>	خاطف الذباب المرقط
Collared Flycatcher	<i>Ficedula albicollis</i>	خاطف الذباب المطوق
Semi-collared Flycatcher	<i>Ficedula semitorquata</i>	خاطف الذباب شبه المطوق
Red-breasted Flycatcher	<i>Ficedula parva</i>	خاطف الذباب أحمر الصدر
Taiga Flycatcher	<i>Ficedula albicilla</i>	خاطف الذباب التايغي
Nectariniidae		
Purple Sunbird	<i>Cinnyris asiaticus</i>	التمير الأرجواني
Passeridae		
House Sparrow	<i>Passer domesticus</i>	العصفور الدوري
Spanish Sparrow	<i>Passer hispaniolensis</i>	العصفور الأندلسي
Arabian Golden Sparrow	<i>Passer euchlorus</i>	العصفور العربي الذهبي
Dead Sea Sparrow	<i>Passer moabiticus</i>	عصفور البحر الميت
Pale Rockfinch	<i>Carpospiza brachydactyla</i>	عصفور الصخور الباهت
Yellow-throated Sparrow	<i>Gymnoris xanthocollis</i>	العصفور أصفر الحنجرة

Common name	Scientific name	Arabic name
Estrildidae		
Indian Silverbill	<i>Lonchura malabarica</i>	فضي المنقار الهندي
Prunellidae		
Radde's Accentor	<i>Prunella ocularis</i>	عصفور الشوك أبيض الصدر
Dunnock	<i>Prunella modularis</i>	عصفور الشوك الشائع
Black-throated Accentor	<i>Prunella atrogularis</i>	عصفور الشوك أسود الحنجرة
Motacillidae		
Forest Wagtail	<i>Dendronanthus indicus</i>	أصقع المروج
Blue-headed Wagtail	<i>Motacilla flava flava</i>	راعية الخيل زرقاء الرأس
White-headed Wagtail	<i>Motacilla flava leucocephala</i>	راعية الخيل بيضاء الرأس
Sykes's Wagtail	<i>Motacilla flava beema</i>	راعية خيل سايكس
Eastern Black-headed Wagtail	<i>Motacilla flava 'melanogrisea'</i>	راعية الخيل سوداء الرأس الشرقية
Black-headed Wagtail	<i>Motacilla flava feldegg</i>	راعية الخيل سوداء الرأس
Grey-headed Wagtail	<i>Motacilla flava thunbergi</i>	راعية الخيل رمادية الرأس
Yellow-headed Wagtail	<i>Motacilla flava lutea</i>	راعية الخيل صفراء الرأس
Citrine Wagtail	<i>Motacilla citreola</i>	الصقعاء
Grey Wagtail	<i>Motacilla cinerea</i>	راعية الخيل الرمادية
White Wagtail	<i>Motacilla alba</i>	الأصقع
Masked Wagtail	<i>Motacilla alba personata</i>	الأصقع المقنع
Richard's Pipit	<i>Anthus novaeseelandiae richardi</i>	الجشنة الكبيرة
Tawny Pipit	<i>Anthus campestris</i>	الجشنة الصفراء
Meadow Pipit	<i>Anthus pratensis</i>	جشنة المروج
Tree Pipit	<i>Anthus trivialis</i>	جشنة الشجر
Olive-backed Pipit	<i>Anthus hodgsoni</i>	الجشنة زيتونية الظهر
Red-throated Pipit	<i>Anthus cervinus</i>	الجشنة حمراء الصدر
Buff-bellied Pipit	<i>Anthus rubescens japonicus</i>	الجشنة كدراء الصدر
Water Pipit	<i>Anthus spinoletta</i>	جشنة الماء
Fringillidae		
Common Chaffinch	<i>Fringilla coelebs</i>	الحسون الظالم
Brambling	<i>Fringilla montifringilla</i>	الشرشور
European Greenfinch	<i>Carduelis chloris</i>	الحسون الاخضر الأوربي
Eurasian Siskin	<i>Carduelis spinus</i>	الحسون الشوكي
European Goldfinch	<i>Carduelis carduelis</i>	الحسون الذهبي

Common name	Scientific name	Arabic name
Eastern Goldfinch	<i>Carduelis carduelis caniceps</i>	الحسون الذهبي الشرقي
Common Linnet	<i>Carduelis cannabina</i>	التفاحي
Trumpeter Finch	<i>Bucanetes githagineus</i>	النغر الشائع
Mongolian Finch	<i>Bucanetes mongolicus</i>	النغر المنغولي
Desert Finch	<i>Rhodospiza obsoleta</i>	النغر الصحراوي
Emberizidae		
Common Rosefinch	<i>Carpodacus erythrinus</i>	الحسون الوردي
Corn Bunting	<i>Emberiza calandra</i>	درسة الذرة
Yellowhammer	<i>Emberiza citrinella</i>	الدرسة الصفراء
Rock Bunting	<i>Emberiza cia</i>	درسة الصخور
Grey-necked Bunting	<i>Emberiza buchanani</i>	بلبل الشعير رمادي الرقبة
Eastern Cinereous Bunting	<i>Emberiza cineracea semenowi</i>	بلبل الشعير السوري الشرقي
Oortolan Bunting	<i>Emberiza hortulana</i>	بلبل الشعير الشائع
Striolated Bunting	<i>Emberiza striolata</i>	درسة مخططة الرأس
Little Bunting	<i>Emberiza pusilla</i>	الدرسة الصغيرة
Rustic Bunting	<i>Emberiza rustica</i>	درسة الخمائل
Black-headed Bunting	<i>Emberiza melanocephala</i>	الدرسة سوداء الرأس
Red-headed Bunting	<i>Emberiza bruniceps</i>	الدرسة حمراء الرأس
Common Reed Bunting	<i>Emberiza schoeniclus</i>	درسة القصب

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Annex 2

List of fishes recorded from Kuwait (Based on Bishop, 2003).

Order	Family	Species	Common name		
Orectolobiformes	Hemiscylliidae	<i>Chiloscyllium arabicum</i> Gubanov, 19801	Arabian Carpetshark		
		<i>Chiloscyllium griseum</i> Müller & Henle, 1838	Grey Bambooshark		
	Ginglymostomatidae	<i>Nebrius ferrugineus</i> (Lesson, 1830)	Tawny Nurse Shark		
	Rhincodontidae	<i>Rhincodon typus</i> (Smith, 1828)	Whale Shark		
	Stegostomatidae	<i>Stegostoma fasciatum</i> (Hermann, 1783)	Zebra Shark		
Carcharhiniformes	Triakidae	<i>Mustelus mosis</i> Hemprich & Ehrenberg, 1899	Arabian Smoothhound		
	Hemigaleidae	<i>Chaenogaleus macrostoma</i> (Bleeker, 1852)	Hooktooth Shark		
		<i>Paragaleus randalli</i> Compagno, Krupp & Carpenter, 1966	Slender Weasel Shark		
	Carcharhinidae	<i>Carcharhinus albimarginatus</i> (Rüppell, 1837)	Silvertip Shark		
		<i>Carcharhinus brevipinna</i> (Müller & Henle, 1839)	Spinner Shark		
		<i>Carcharhinus dussumieri</i> (Valenciennes, 1839)	Whitecheek Shark		
		<i>Carcharhinus leucas</i> (Valenciennes, 1839)	Bull Shark		
		<i>Carcharhinus limbatus</i> (Valenciennes, 1839)	Blacktip Shark		
		<i>Carcharhinus melanopterus</i> (Quoy & Gaimard, 18247)	Blacktip Reef Shark		
		<i>Carcharhinus plumbeus</i> (Nardo, 1827)	Sandbar Shark		
		<i>Carcharhinus sorrah</i> (Valenciennes, 1839)	Spot-tail Shark		
		<i>Galeocerdo cuveri</i> (Peron & LeSueur, 1822)	Tiger Shark		
		<i>Rhizoprionodon acutus</i> (Rüppell, 1837)	Milk Shark		
		<i>Rhizoprionodon oligolinx</i> Springer, 1964	Grey Sharpnose Shark		
		<i>Scoliodon laticaudus</i> Müller & Henle, 1838	Spadenose Shark		
		Sphyrnidae	<i>Sphyrna mokarran</i> (Rüppell, 1837)	Great Hammerhead	
		Lamniformes	Odontaspidae	<i>Carcharias taurus</i> (Rafinesque, 1810)	Sand Tiger Shark
		Pristiformes	Pristidae	<i>Pristis zijsron</i> Bleeker, 1851	Green Sawfish
		Torpediniformes	Torpedinidae	<i>Torpedo panthera</i> Olfers, 1831	Panther Electric Ray
<i>Torpedo sinuspersici</i> Olfers, 1831				Marbled Electric Ray	
Rajiformes	Rhinobatidae	<i>Rhina ancylostoma</i> Bloch & Schneider, 1801	Bowmouth Guitarfish		
		<i>Rhinobatos granulatus</i> Cuvier, 1829	Sharpnose Guitarfish		

Annex 2

Order	Family	Species	Common name
		<i>Rhynchobatus djiddensis</i> (Forsskål, 1775)	Giant Guitarfish
	Dasyatidae	<i>Himantura bleekeri</i> (Blyth, 1800)	Bleeker's Whipray
		<i>Himantura imbricata</i> (Bloch & Schneider, 1801)	Scaly Whipray
		<i>Himantura uarnak</i> (Forsskål, 1775)	Reticulated Whipray
		<i>Himantura</i> sp.	Whipray
		<i>Pastinachus sephen</i> (Forsskål, 1775)	Cowtail Stingray
		<i>Taeniura meyeri</i> Müller & Henle, 1841	Blotched Fantail Ray
		Gymnuridae <i>Gymnura poecilura</i> (Shaw, 1804)	Longtail Butterfly Ray
	Myliobatidae	<i>Aetobatus narinari</i> (Euphrasen, 1790)	Spotted Eagle Ray
		<i>Aetomylaeus nichofii</i> (Bloch & Schneider, 1801)	Banded Eagle Ray
		<i>Aetomylaeus</i> sp.	Eagle Ray
		<i>Rhinoptera javanica</i> Müller & Henle, 1841	Javanese Cownose Ray
Anguilliformes	Muraenidae	<i>Echidna nebulosa</i> (Ahl, 1789)	Starry Moray
		<i>Gymnomuraena zebra</i> (Shaw, 1797)	Zebra Moray
		<i>Gymnothorax undulatus</i> (Lacepède, 1803)	Undulated Moray
	Muraenesocidae	<i>Muraenesox cinereus</i> (Forsskål, 1775)	Daggertooth Pike Conger
Clupeiformes	Clupeidae	<i>Anodontostoma chacunda</i> (Hamilton-Buchanan, 1822)	Chacunda Gizzard Shad
		<i>Dussumieria acuta</i> Valenciennes, 1847	Rainbow Sardine
		<i>Herklotsichthys quadrimaculatus</i> (Rüppell, 1837)	Bluestripe Herring
		<i>Hilsa kelee</i> (Cuvier, 1829)	Kelee Shad
		<i>Nematalosa nasus</i> (Bloch, 1795)	Bloch's Gizzard Shad
		<i>Sardinella albella</i> (Valenciennes, 1847)	White Sardinella
		<i>Sardinella gibbosa</i> (Bleeker, 1849)	Goldstripe Sardinella
		<i>Sardinella longiceps</i> Valenciennes, 1847	Indian Oil Sardinella
		<i>Sardinella melanura</i> (Cuvier, 1829)	Blacktip Sardinella
		<i>Sardinella sindensis</i> (Day, 1878)	Sind Sardinella
		<i>Tenualosa ilisha</i> (Hamilton-Buchanan, 1822)	Hilsha Shad
	Pristigasteridae	<i>Ilisha compressa</i> Randall, 1994	Compressed Ilisha
		<i>Ilisha melastoma</i> Bloch & Schneider, 1801	Indian Ilisha
	Engraulidae	<i>Encrasicholina devisi</i> Whitley, 1940	Devis' Anchovy
		<i>Encrasicholina punctifer</i> Fowler, 1938	Bucaneer Anchovy
		<i>Stolephorus indicus</i> (van Hasselt, 1823)	Indian Anchovy
		<i>Thryssa hamiltonii</i> (Gray, 1853)	Hamilton's Thryssa

Order	Family	Species	Common name
		<i>Thryssa vitirostris</i> (Gilchrist & Thompson, 1908)	Orangemouth Anchovy
		<i>Thryssa whiteheadi</i> Wongratana, 1983	Whitehead's Thryssa
Clupeiformes	Chirocentridae	<i>Chirocentrus dorab</i> (Forsskål, 1775)	Dorab Wolf-Herring
		<i>Chirocentrus nudus</i> Swainson, 1839	Whitfin Wolf-Herring
Gonorhynchiformes	Chanidae	<i>Chanos chanos</i> (Forsskål, 1775)	Milkfish
Siluriformes	Ariidae	<i>Arius bilineatus</i> (Valenciennes, 1840)	Roundsnout Sea Catfish
		<i>Arius dussumieri</i> Valenciennes, 1840	Blacktip Sea Catfish
		<i>Arius tenuispinis</i> Day, 1877	Thinspine Sea Catfish
		<i>Arius thalassinus</i> (Rüppell, 1837)	Giant Sea Catfish
	Plotosidae	<i>Plotosus lineatus</i> (Thunberg, 1787)	Striped Eel Catfish
Aulopiformes	Synodontidae	<i>Saurida undosquamis</i> (Richardson, 1848)	Brushtooth Lizardfish
		<i>Synodus variegatus</i> (Lacepède, 1803)	Variiegated Lizardfish
		<i>Trachinocephalus myops</i> (Forster, 1801)	Bluntnose Lizardfish
Batrachoidiformes	Batrachoididae	<i>Austrobatrachus dussumieri</i> (Valenciennes, 1837)	Flat Toadfish
Lophiiformes	Antennariidae	<i>Antennarius nummifer</i> (Cuvier, 1817)	Spotfin Frogfish
Atheriniformes	Atherinidae	<i>Atherinomorus lacunosus</i> (Forster, 1801)	Hardyhead Silverside
		<i>Hypoatherina temminckii</i> (Bleeker, 1853)	Samoan Silverside
Beloniformes	Belonidae	<i>Ablennes hians</i> (Valenciennes, 1846)	Flat Needlefish
		<i>Platybelone argalus platara</i> (Rüppell, 1837)	Keeltail Needlefish
		<i>Strongylura leiura</i> (Bleeker, 1850)	Banded Needlefish
		<i>Strongylura strongylura</i> (van Hasselt, 1823)	Spottail Needlefish
		<i>Tylesurus crocodilus crocodilus</i> (Péron & Lesueur, 1821)	Hound Needlefish
		<i>Exocoetidae Cypselurus oligolepis</i> (Bleeker, 1866)	Largescale Flyingfish
		<i>Parexocoetus mento</i> (Valenciennes, 1846)	African Sailfin Flyingfish
	Hemiramphidae	<i>Hyporhamphus sindensis</i> (Regan, 1905)	Sind Halfbeak
		<i>Hemiramphus marginatus</i> (Forsskål, 1775)	Yellowlip Halfbeak
Cyprinodontiformes	Cyprinodontidae	<i>Aphanius dispar</i> (Rüppell, 1828)	Arabian Pupfish
Syngnathiformes	Syngnathidae	<i>Hippocampus kuda</i> Bleeker, 1852	Spotted Seahorse
		<i>Doryrhamphus excisus excisus</i> Kaup, 1856	Bluestripe Pipefish
	Fistulariidae	<i>Fistularia petimba</i> La CepeHde, 1803	Red Cornetfish
Syngnathiformes	Centriscidae	<i>Centriscus scutatus</i> Linnaeus, 1758	Grooved Shrimpfish
Scorpaeniformes	Scorpaenidae	<i>Apistus carinatus</i> (Bloch & Schneider, 1801)	Ocellated Waspfish
		<i>Choridactylus multibarbus</i> Richardson, 1848	Orangebanded Stingfish

Order	Family	Species	Common name
		<i>Minous monodactylus</i> (Bloch & Schneider, 1801)	Grey Stingfish
		<i>Pseudosynanceia melanostigma</i> Day, 18751	Blackfin Stonefish
		<i>Pterois miles</i> (Bennett, 1828)	Military Turkeyfish
		<i>Pterois russellii</i> Bennett, 1831	Plaintail Turkeyfish
		<i>Scorpaenopsis barbatus</i> (Rüppell, 1838)	Bearded Scorpionfish
Perciformes	Platycephalidae	<i>Platycephalus indicus</i> (Linnaeus, 1758)	Bartail Flathead
		<i>Rogadius tuberculatus</i> (Cuvier, 1829)	Tuberculated Flathead
		<i>Thysanophrys celebicus</i> (Bleeker, 1854)	Sulawesi Flathead
	Serranidae	<i>Cephalopholis hemistiktos</i> (Rüppell, 1830)	Yellowfin Hind
		<i>Epinephelus areolatus</i> (Forsskål, 1775)	Areolate Grouper
		<i>Epinephelus caeruleopunctatus</i> (Bloch, 1790)	Whitespotted Grouper
		<i>Epinephelus coioides</i> (Hamilton, 1822)	Orangespotted Grouper
		<i>Epinephelus latifasciatus</i> (Temminck & Schlegel, 1842)	Striped Grouper
		<i>Epinephelus multinotatus</i> (Peters, 1876)	Whiteblotched Grouper
		<i>Epinephelus polylepis</i> Randall & Heemstra, 1991	Smallscale Grouper
	Pseudochromidae	<i>Pseudochromis aldabraensis</i> (Bauchot-Boutin, 1958)	Orange Dottyback
		<i>Pseudochromis persicus</i> Murry, 1887	Persian Dottyback
	Priacanthidae	<i>Priacanthus tayenus</i> Richardson, 1846	Purple Spotted Bigeye
	Teraponidae	<i>Pelates quadrilineatus</i> (Bloch, 1790)	Fourlined Terapon
		<i>Terapon jarbua</i> (Forsskål, 1775)	Jarbua Terapon
		<i>Terapon puta</i> (Cuvier & Valenciennes, 1829)	Smallscaled Terapon
		<i>Terapon theraps</i> (Cuvier & Valenciennes, 1829)	Largescaled Terapon
	Apogonidae	<i>Apogon coccineus</i> Rüppell, 1838	Ruby Cardinalfish
		<i>Apogon cyanosoma</i> Bleeker, 1853	Yellowstriped Cardinalfish
		<i>Apogon fasciatus</i> (Shaw, 1790)	Twostripe Cardinalfish
		<i>Apogon taeniatus</i> Cuvier, 1828	Striped Cardinalfish
		<i>Cheilodipterus persicus</i> Gon 1993	Persian Cardinalfish
	Sillaginidae	<i>Sillago sihama</i> (Forsskål, 1775)	Silver Sillago
	Lactariidae	<i>Lactarius lactarius</i> (Bloch & Schneider, 1801)	False Trevally
	Rachycentridae	<i>Rachycentron canadum</i> (Linnaeus, 1766)	Cobia
Perciformes	Echeneidae	<i>Echeneis naucrates</i> Linnaeus, 1758	Live Sharksucker
	Carangidae	<i>Alectis indicus</i> (Rüppell, 1830)	Indian Threadfish
		<i>Alepes Kleinii</i> (Bloch, 1793)	Sharpbelly Scad

Order	Family	Species	Common name
		<i>Alepes djedaba</i> (Forsskål, 1775)	Shrimp Scad
		<i>Alepes melanoptera</i> Swainson, 1839	Blackfin Scad
		<i>Alepes vari</i> (Cuvier, 1833)	Herring Scad
		<i>Atropus atropus</i> (Bloch & Schneider, 1801)	Cleftbelly Trevally
		<i>Atule mate</i> (Cuvier, 1833)	Yellowtail Scad
		<i>Carangoides bajad</i> (Forsskål, 1775)	Orangespotted Trevally
		<i>Carangoides caeruleopinnatus</i> (Rüppell, 1830)	Coastal Trevally
		<i>Carangoides chrysophrys</i> (Cuvier, 1833)	Longnose Trevally
		<i>Carangoides ferdau</i> (Forsskål, 1775)	Blue Trevally
		<i>Carangoides fulvoguttatus</i> (Forsskål, 1775)	Yellowspotted Trevally
		<i>Carangoides gymnostethus</i> (Cuvier, 1833)	Bludger
		<i>Carangoides malabaricus</i> (Bloch & Schneider, 1801)	Malabar Trevally
		<i>Carangoides praeustus</i> (Bennett, 1830)	Brownback Trevally
		<i>Caranx sexfasciatus</i> Quoy & Gaimard, 1825	Bigeye Trevally
		<i>Decapterus russelli</i> (Rüppell, 1830)	Indian Scad
		<i>Gnathanodon speciosus</i> (Forsskål, 1775)	Golden Trevally
		<i>Megalaspis cordyla</i> (Linnaeus, 1758)	Torpedo Scad
		<i>Naucrates ductor</i> (Linnaeus, 1758)	Pilotfish
		<i>Parastromateus niger</i> (Bloch, 1795)	Black Pomfret
		<i>Scomberoides commersonianus</i> Lacepede, 1801	Talang Queenfish
		<i>Scomberoides lysan</i> (Forsskål, 1775)	Doublespotted Queenfish
		<i>Scomberoides tol</i> (Cuvier, 1832)	Needlescaled Queenfish
		<i>Selar crumenophthalmus</i> (Bloch, 1793)	Bigeye Scad
		<i>Selaroides leptolepis</i> (Cuvier, 1833)	Yellowstripe Scad
		<i>Seriola dumerili</i> (Risso, 1810)	Greater Amberjack
		<i>Seriolina nigrofasciata</i> (Rüppell, 1829)	Blackbanded Trevally
		<i>Trachinotus blochii</i> (Lacepede, 1801)	Snubnose Pompano
		<i>Trachurus indicus</i> Nekrasov, 1966	Arabian Scad
	Carangidae	<i>Ulua mentalis</i> (Cuvier, 1833)	Longrakered Trevally
		<i>Uraspis helvola</i> (Foster, 1801)	Whitetongue Jack
	Coryphaenidae	<i>Coryphaena hippurus</i> Linnaeus, 1758	Common Dolphinfish
	Menidae	<i>Mene maculata</i> (Bloch & Schneider, 1801)	Moonfish
	Leiognathidae	<i>Leiognathus bindus</i> (Valenciennes, 1835)	Orangefin Ponyfish

Order	Family	Species	Common name
		<i>Leiognathus decorus</i> De Vis, 1884	Decorated Ponyfish
		<i>Leiognathus equulus</i> (Forsskal, 1775)	Common Ponyfish
		<i>Leiognathus oblongus</i> (Valenciennes, 1835)	Oblong Ponyfish
		<i>Secutor insidiator</i> (Bloch, 1787)	Pugnose Ponyfish
	Lutjanidae	<i>Lutjanus argentimaculatus</i> (Forsskål, 1775)	Mangrove Red Snapper
		<i>Lutjanus ehrenbergi</i> (Peters, 1869)	Ehrenberg's Snapper
		<i>Lutjanus fulviflamma</i> (Forsskål, 1775)	Blackspot Snapper
		<i>Lutjanus johnii</i> (Bloch, 1792)	John's Snapper
		<i>Lutjanus lutjanus</i> Bloch, 1790	Bigeye Snapper
		<i>Lutjanus malabaricus</i> Bloch & Schneider, 1801	Malabar Blood Snapper
		<i>Lutjanus quinquelineatus</i> Bloch, 1790	Fivelined Snapper
		<i>Lutjanus russelli</i> (Bleeker, 1849)	Russell's Snapper
		<i>Pinjalo pinjalo</i> (Bleeker, 1850)	Pinjalo
	Caesionidae	<i>Caesio lunaris</i> Cuvier, 1830	Lunar Fusilier
		<i>Caesio varilineata</i> Carpenter, 1987	Variablelined Fusilier
	Lobotidae	<i>Lobotes surinamensis</i> (Bloch, 1790)	Tripletail
	Gerreidae	<i>Gerres acinaces</i> Bleeker, 1854	Longtail Silver-biddy
		<i>Gerres filamentosus</i> Cuvier, 1829	Whipfin Silver-biddy
		<i>Gerres oyena</i> (Forsskål, 1775)	Common Silver-biddy
	Haemulidae	<i>Diagramma pictum</i> (Thunberg, 1792)	Painted Sweetlips
		<i>Plectorhinchus gaterinus</i> (Forsskål, 1775)	Blackspotted Rubberlip
		<i>Plectorhinchus pictus</i> (Tortonese, 1935)	Trout Sweetlips
		<i>Plectorhinchus sordidus</i> (Klunzinger, 1870)	Sordid Sweetlip
		<i>Pomadasys kaakan</i> (Cuvier, 1830)	Javelin Grunter
		<i>Pomadasys maculatum</i> (Bloch, 1797)	Saddle Grunt
		<i>Pomadasys stridens</i> (Forsskål, 1775)	Striped Piggy
		<i>Pomadasys taeniatus</i> McKay & Randall, 1995	Bronzestriped Grunter
	Sparidae	<i>Acanthopagrus berda</i> (Forsskål, 1775)	Picnic Seabream
		<i>Acanthopagrus bifasciatus</i> (Forsskål, 1775)	Two-bar Seabream
		<i>Acanthopagrus latus</i> (Houttuyn, 1782)	Yellowfin Seabream
		<i>Argyrops spinifer</i> (Forsskål, 1775)	King Soldier Bream
		<i>Cheimerius nufar</i> (Valenciennes, 1830)	Santer Seabream
		<i>Crenidens crenidens</i> (Forsskål, 1775)	Karanteen Seabream

Order	Family	Species	Common name
		<i>Diplodus sargus kotschy</i> (Steindachner, 1876)	Onespot Seabream
		<i>Rhabdosargus haffara</i> (Forsskål, 1775)	Haffara Seabream
		<i>Rhabdosargus sarba</i> (Forsskål, 1775)	Goldlined Seabream
		<i>Sparidentex hasta</i> (Valenciennes, 1830)	Sobaity Seabream
	Lethrinidae	<i>Lethrinus borbonicus</i> Valenciennes, 1830	Snubnose Emperor
		<i>Lethrinus lentjan</i> (Lacepe`de, 1802)	Pinkear Emperor
		<i>Lethrinus microdon</i> Valenciennes, 1830	Smalltooth Emperor
		<i>Lethrinus nebulosus</i> (Forsskål, 1775)	Spangled Emperor
	Nemipteridae	<i>Nemipterus bipunctatus</i> (Valenciennes, 1830)	Delagoa Threadfin Bream
		<i>Nemipterus japonicus</i> (Bloch, 1791)	Japanese Threadfin
		<i>Nemipterus peronii</i> (Valenciennes, 1830)	Notched Threadfin
		<i>Scolopsis bimaculatus</i> Rüppell, 1828	Thumbprint Monocle
		<i>Scolopsis ghanam</i> (Forsskål, 1775)	Arabian Monocle Bream
		<i>Scolopsis taeniatus</i> (Cuvier, 1830)	Blackstreaked Monocle Bream
		<i>Scolopsis vosmeri</i> (Bloch, 1792)	Whitecheek Monocle Bream
	Polynemidae	<i>Eleutheronema tetradactylum</i> (Shaw, 1804)	Fourfinger Threadfin
		<i>Polydactylus sextarius</i> (Bloch & Schneider, 1801)	Blackspot Threadfin
	Sciaenidae	<i>Johnius belangerii</i> (Cuvier, 1830)	Belanger's Croaker
		<i>Johnius sina</i> (Cuvier, 1830)	Sin Croaker
		<i>Otolithes ruber</i> (Bloch & Schneider, 1801)	Tigertooth Croaker
		<i>Pennahia anea</i> (Bloch, 1773)	Bigeye Croaker
		<i>Protonibea diacantha</i> (Lacepe`de, 1802)	Spotted Croaker
	Mullidae	<i>Mulloidichthys flavolineatus</i> (Lacepe`de, 1802)	Yellowstripe Goatfish
		<i>Parupeneus heptacanthus</i> (Lacepe`de, 1801)	Cinnabar Goatfish
		<i>Parupeneus margaritatus</i> Randall & Guézé, 1984	Pearly Goatfish
		<i>Upeneus doriae</i> (Günther, 1869)	Gilded Goatfish
		<i>Upeneus tragula</i> (Richardson, 1845)	Freckled Goatfish
		<i>Upeneus vittatus</i> (Forsskål, 1775)	Striped Goatfish
	Drepanidae	<i>Drepane punctata</i> (Linnaeus, 1758)	Spotted Sickleafish
	Chaetodontidae	<i>Chaetodon melapterus</i> Guichenot, 1862	Arabian Butterflyfish
		<i>Chaetodon nigropunctatus</i> Sauvage, 1880	Dark Butterflyfish
		<i>Heniochus acuminatus</i> (Linnaeus, 1758)	Longfin Bannerfish
	Pomacanthidae	<i>Pomacanthus maculosus</i> (Forsskål, 1775)	Yellowbar Angelfish

Order	Family	Species	Common name
	Pomacentridae	<i>Abudefduf vaigiensis</i> (Quoy & Gaimard, 1825)	Indo-Pacific Sergeant
		<i>Chromis flavaxilla</i> Randall, 1994	Arabian Chromis
		<i>Chromis xanthopterygia</i> Randall & McCarthy, 1988	Yellowfin Chromis
		<i>Dascyllus trimaculatus</i> (Rüppell, 1829)	Threespot Dascyllus
		<i>Neopomacentrus sindensis</i> (Day, 1873)	Arabian Demoiselle
		<i>Pomacentrus aquilus</i> Allen & Randall, 1980	Dark Damselfish
		<i>Pomacentrus leptus</i> Allen & Randall, 1980	Slender Damselfish
		<i>Pomacentrus trichourus</i> Playfair & Günther, 1867	Paletail Damselfish
	Labridae	<i>Halichoeres leptotaenia</i> Randall & Earle, 1994	Thinstriped Wrasse
		<i>Halichoeres marginatus</i> (Rüppell, 1835)	Dusky Wrasse
		<i>Halichoeres stigmaticus</i> Randall & Smith, 1982	U-Spot Wrasse
		<i>Labroides dimidiatus</i> (Valenciennes, 1839)	Black-and-Blue Cleaner Wrasse
		<i>Leptojulius cyanopleura</i> (Bleeker, 1853)	Shoulderspot Wrasse
		<i>Paracheilinus mccoskeri</i> Randall & Harmelin-Vivien, 1977	McCosker's Wrasse
		<i>Stethojulis interrupta</i> (Bleeker, 1851)	Cutribbon Wrasse
		<i>Suezichthys gracilis</i> (Steindachner & Döderlein, 1887)	Slender Wrasse
		<i>Thalassoma lunare</i> (Linnaeus, 1758)	Moon Wrasse
		<i>Xyrichtys bimaculatus</i> Rüppell, 1829	Twospot Razorfish
	Scaridae	<i>Chlorurus sordidus</i> (Forsskål, 1775)	Daisy Parrotfish
		<i>Scarus ghobban</i> (Forsskål, 1775)	Bluebarred Parrotfish
		<i>Scarus persicus</i> Randall & Bruce, 1983	Gulf Parrotfish
	Mugilidae	<i>Liza abu</i> (Heckel, 1846)	Abu Mullet
		<i>Liza klunzingeri</i> (Day, 1888)	Klunzinger's Mullet
		<i>Liza subviridis</i> (Valenciennes, 1836)	Greenback Mullet
		<i>Liza vaigiensis</i> (Quay & Gaimard, 1825)	Squaretail Mullet
		<i>Mugil cephalus</i> Linnaeus, 1758	Flathead Mullet
		<i>Valamugil seheli</i> (Forsskål, 1775)	Bluespot Mullet
	Opistognathidae	<i>Opistognathus nigromarginatus</i> (Rüppell, 1830)	Bridled Jawfish
	Cepolidae	<i>Acanthocephala abbreviata</i> (Valenciennes, 1834)	Yellowspotted Bandfish
	Pinguipedidae	<i>Parapercis nebulosa</i> Quay & Gaimard 1825	Barfaced Sandsmelt
		<i>Parapercis robinsoni</i> Fowler, 1932	Smallscale Sandperch
	Tripterygiidae	<i>Enneapterygius ventermaculus</i> Holleman, 1982	Blotched Triplefin
	Blenniidae	<i>Antennablennius adenensis</i> Fraser-Brunner, 1951	Aden Blenny

Order	Family	Species	Common name
		<i>Antennablennius variopunctatus</i> (Jatzow & Lenz, 1898)	Orangedotted Blenny
		<i>Escenius pulcher</i> (Murry, 1887)	Gulf Blenny
		<i>Mimoblennius cirrosus</i> Smith-Vaniz & Springer, 1971	Fringed Blenny
		<i>Omobranchus fasciolatus</i> (Valenciennes, 1836)	Barred Arab Blenny
		<i>Omobranchus punctatus</i> (Valenciennes, 1836)	Muzzled Blenny
		<i>Parablennius opercularis</i> (Murray, 1887)	Cheekspot Blenny
		<i>Petroscirtes ancyloдон</i> (Rüppell, 1838)	Arabian Fangblenny
	Callionymidae	<i>Callionymus filamentosus</i> Valenciennes, 1837	Filamentous Dragonet
		<i>Acentrogobius cyanomos</i> (Bleeker, 1849)	goby (no common name)
	Gobiidae	<i>Acentrogobius dayi</i> Koumans, 1944	Day's Goby
		<i>Amblyeleotris diagonalis</i> Polunin & Lubbock, 1979	Slantbar Shrimpgoby
		<i>Amblyeleotris downingi</i> Randall, 1994	Downing's Shrimpgoby
		<i>Amblyeleotris periphthalma</i> (Bleeker, 1853)	Blotchy Shrimpgoby
		<i>Amblygobius albimaculatus</i> (Rüppell, 1830)	Tailspot Goby
		<i>Amblygobius nocturnus</i> (Herre, 1945)	Orangestriped Goby
		<i>Apocryptodon madurensis</i> (Bleeker, 1849)	Minature Mudskipper
		<i>Asterropteryx semipunctatus</i> (Rüppell, 1830)	Halfspotted Goby
		<i>Bathygobius fuscus</i> (Rüppell, 1830)	Dusky Frillgoby
		<i>Boleophthalmus dussumieri</i> Valenciennes, 1837	Dussumier's Mudskipper
		<i>Coryogalops monospilus</i> Randall, 1994	Onespot Goby
		<i>Cryptocentrus filifer</i> (Valenciennes, 1837)	Gafftopsail Shrimpgoby
		<i>Cryptocentrus lutheri</i> (Klausewitz, 1960)	Luther's Prawngoby
		<i>Eviota pardalota</i> Lachner & Karnella, 1978	Leopard Dwarfgoby
		<i>Eviota sebreei</i> Jordan & Seale, 1906	Redstripe Dwarfgoby
		<i>Gnatholepis anjerensis</i> (Bleeker, 1850)	Anjer Goby
		<i>Gobiodon reticulatus</i> Playfair & Günther, 1867	Reticulated Coral Goby
		<i>Istigobius decoratus</i> (Herre, 1927)	Decorated Goby
		<i>Istigobius ornatus</i> (Rüppell, 1830)	Ornate Goby
		<i>Parachaeturichthys polynema</i> (Bleeker, 1853)	Taileyed Goby
		<i>Periophthalmus waltoni</i> Koumans, 1941	Walton's Mudskipper
		<i>Scartelaos tenuis</i> (Day, 1876)	Indian Ocean Slender Mudskipper
		<i>Trimma winterbottomi</i> Randall & Downing, 1994	Winterbottom's Goby
		<i>Valenciennesa persica</i> Hoese & Larson, 1994	Gulf Goby

Order	Family	Species	Common name
		<i>Valenciennea sexguttata</i> (Valenciennes, 1837)	Sixspot Goby
	Microdesmidae	<i>Ptereleotris arabica</i> Randall & Hoese, 1985	Arabian Dartfish
	Ephippidae	<i>Ephippus orbis</i> (Bloch, 1787)	Spadefish
		<i>Platax teira</i> (Forsskål, 1775)	Teira
	Scatophagidae	<i>Scatophagus argus</i> (Bloch, 1788)	Spotted Scat
	Acanthuridae	<i>Acanthurus sohal</i> (Forsskål, 1775)	Sohal
		<i>Zebrasoma xanthurum</i> (Blyth, 1852)	Yellowtail Surgeonfish
	Siganidae	<i>Siganus canaliculatus</i> (Park, 1797)	White-spotted Spinefoot
		<i>Siganus javus</i> (Linnaeus, 1766)	Streaked Spinefoot
	Sphyraenidae	<i>Sphyraena barracuda</i> (Walbaum, 1792)	Great Barracuda
		<i>Sphyraena flavicauda</i> Rüppell, 1838	Yellowtail Barracuda
		<i>Sphyraena fosteri</i> Cuvier, 1829	Bigeye Barracuda
		<i>Sphyraena jello</i> Cuvier, 1829	Pickhandle Barracuda
		<i>Sphyraena obtusata</i> Cuvier, 1829	Obtuse Barracuda
		<i>Sphyraena putnamiae</i> Jordan & Seale, 1905	Sawtooth Barracuda
		<i>Sphyraena qenie</i> Klunzinger, 1870	Blacktail Barracuda
	Trichiuridae	<i>Eupleurogrammus glossodon</i> (Bleeker, 1860)	Longtooth Hairtail
		<i>Eupleurogrammus muticus</i> (Gray, 1831)	Smallhead Hairtail
		<i>Trichiurus lepturus</i> Linnaeus, 1758	Largehead Hairtail
	Scombridae	<i>Euthynnus affinis</i> (Cantor, 1849)	Kawakawa
		<i>Rastrelliger kanagurta</i> (Cuvier, 1817)	Indian Mackerel
		<i>Scomberomorus commerson</i> (Lacepede, 1801)	Narrowbarred Spanish Mackerel
		<i>Scomberomorus guttatus</i> (Bloch & Schneider, 1801)	Indo-Pacific King Mackerel
		<i>Thunnus albacares</i> (Bonnaterre, 1788)	Yellowfin Tuna
	Stromateidae	<i>Pampus argenteus</i> (Euphrasen, 1788)	Silver Pomfret
Pleuronectiformes	Psettodidae	<i>Psettodes erumei</i> (Bloch & Schneider, 1801)	Indian Spiny Turbot
	Bothidae	<i>Bothus pantherinus</i> (Rüppell, 1828)	Leopard Flounder
	Paralichthyidae	<i>Pseudorhombus arsius</i> (Hamilton, 1822)	Largetooth Flounder
		<i>Pseudorhombus elevatus</i> Ogilby, 1912	Deep Flounder
		<i>Pseudorhombus javanicus</i> (Bleeker, 1853)	Javan Flounder
		<i>Pseudorhombus malayanus</i> Bleeker, 1866	Malayan Flounder
	Cynoglossidae	<i>Cynoglossus arel</i> (Bloch & Schneider, 1801)	Largescale Tonguesole
		<i>Cynoglossus carpentieri</i> Alcock, 1889	Hooked Tonguesole

Order	Family	Species	Common name
		<i>Pararplagusia bilineata</i> (Bloch, 1787)	Doublelined Tonguesole
	Soleidae	<i>Euryglossa orientalis</i> (Bloch & Schneider, 1801)	Oriental Sole
		<i>Pardachirus marmoratus</i> (Lacepe`de, 1802)	Finless Sole
		<i>Solea elongata</i> Day, 1877	Elongate Sole
		<i>Synaptura commersoniana</i> (Lacepe`de, 1802)	Commonson's Sole
		<i>Zebrias synapturoides</i> (Jenkins, 1910)	Indian Zebra Sole
Tetraodontiformes	Triacanthidae	<i>Pseudotriacanthus strigilifer</i> (Cantor, 1849)	Longspine Tripodfish
		<i>Triacanthus biaculeatus</i> (Bloch, 1786)	Shortnose Tripodfish
	Balistidae	<i>Abalistes stellatus</i> (La CepeHde, 1798)	Starry Triggerfish
		<i>Rhinecanthus assasi</i> (Forsskål, 1775)	Picasso Triggerfish
		<i>Sufflamen chrysopterus</i> (Bloch & Schneider, 1801)	Flagtail Triggerfish
	Monacanthidae	<i>Aluterus monoceros</i> (Linnaeus, 1758)	Unicorn Leathersocket
		<i>Stephanolepis diaspros</i> Fraser-Brunner, 1940	Reticulated Leathersocket
		<i>Ostracion cubicus</i> Linnaeus, 1758	Yellow Trunkfish
	Ostraciidae	<i>Ostracion cyanurus</i> Rüppell, 1828	Bluetail Trunkfish
	Tetraodontidae	<i>Arothron stellatus</i> (Bloch & Schneider, 1801)	Stellate Puffer
		<i>Chelonodon patoca</i> (Hamilton, 1822)	Milkspotted Puffer
		<i>Lagocephalus lunaris</i> (Bloch & Schneider, 1801)	Lunartail Puffer
		<i>Lagocephalus sceleratus</i> (Gmelin, 1788)	Elongate Puffer
	Molidae	<i>Mola mola</i> (Linnaeus, 1841)	Ocean Sunfish
		<i>Ranzania laevis</i> (Pennant, 1776)	Slender Sunfish

Annex 3

Coleopterans reported from Kuwait.

Family	Species
Anobiidae	<i>Lasioderma serricorne</i> (Fabricius, 1792)
	<i>Stegobium paniceum</i> (Linnaeus, 1758)
Anthicidae	<i>Anthicus formicarius</i> (Goeze, 1777)
	<i>Stricticomus goebeli</i> (Laferte, 1848) cited as <i>Anthicus goebeli</i> by Al-Houty (2011)
Bruchidae	<i>Bruchus lentis</i> Forlich, 1799
	<i>Callosobruchus maculatus</i> (Fabricius, 1775)
	<i>Callosobruchus phaseoli</i> (Gyllenhal, 1833)
	<i>Caryedon serratus</i> (Olivier, 1790)
Buprestidae	<i>Steraspis speciosa</i> Klug, 1829
	<i>Julodis distincta</i> Gory, 1840
Carabidae	<i>Acinopus megacephalus</i> (P. Rossi, 1794) cited as <i>Actinopus megacephalus</i> by Al-Houty (2011)
	<i>Anchomenus dorsalis</i> (Pontoppidan, 1763)
	<i>Amara glenni</i> (Baliani, 1934)
	<i>Amara rufescens</i> (Dejean, 1829)
	<i>Anthia duodecimguttata</i> Bonelli, 1813
	<i>Bembidion saxatile</i> Gyllenhal 1827
	<i>Calosoma (Caminara) imbricatum deserticola</i> Semenov, 1897
	<i>Calosoma olivieri</i> Dejean, 1831
	<i>Chlaenius koenigi</i> Semjonoff, 1888
	<i>Cymbionotum semelederi</i> (Chaudoir, 1861)
	<i>Cymindis andreae</i> Menetries, 1831
	<i>Cymindis suturalis</i> Dejean 1825
	<i>Daptus acutus</i> Reitter, 1893
	<i>Daptus vittatus</i> Fischer, 1824
	<i>Diodercarus arrowi</i> Lutshnik, 1931
	<i>Dyschirius beludscha</i> Tschitscherine, 1904
<i>Egaploa crenulata</i> (Dejean, 1829)	

Family	Species
	<i>Graphipterus minutus</i> Dejean, 1822
	<i>Heteracantha depressa</i> Brulle, 1834
	<i>Hypaetha singularis</i> (Chaudoir, 1876)
	<i>Megacephala euphratica</i> Dejean, 1822
	<i>Metabletus fuscomaculatus</i> (Motschulsky, 1844)
	<i>Poecilus (Ancholeus) wollastoni</i> (Wollaston, 1854)
	<i>Pogonus gilvipes</i> Dejean, 1828
	<i>Sphodrus leucophthalmus</i> (Linnaeus, 1758)
Chrysomalidae	<i>Colaphellus apicalis</i> Ménétriés, 1849
Cicindelidae	<i>Calomera alboguttata</i> (Klug 1832)
	<i>Calomera aulica</i> (Dejean 1831)
	<i>Cephalota zarudniana</i> (Tschitscherine, 1903)
	<i>Cicindela littoralis</i> Fabricius, 1787
	<i>Myriochole melancholica</i> Fabricius 1798
Cleridae	<i>Necrobia rufipes</i> (Degeer 1775)
Coccinellidae	<i>Coccinella undecimpunctata</i> Reiche 1977
	<i>Coccinella septemdentatus</i> Linnaeus, 1758
	<i>Henosepilachna elaterii orientalis</i> Zimmermann, 1934
Cryptophagidae	<i>Cryptophagus cellaris</i> Scopoli 1763
Cucujidae	<i>Oryzaephilus surinamensis</i> (Linnaeus 1758)
Curculionidae	<i>Ammocleonus aschabadensis</i> (Faust, 1884)
	<i>Ammocleonus hieroglyphicus</i> (Olivier, 1807)
	<i>Hypera brunnipennis</i> (Boheman, 1834)
	<i>Hypera isabellina</i> (Boheman, 1834)
	<i>Hypolixus nubilosus</i> (Boheman 1835)
	<i>Myllocerus arabicus</i> Boheman, 1843.
	<i>Rhynchophorus ferrugineus</i> (Olivier, 1790)
	<i>Sitophilus oryzae</i> (Linnaeus 1763)
	<i>Sitophilus granarius</i> (Linnaeus 1758)
Cybocephalidae	<i>Cybocephalus mesopotamicus</i> Endrody-Younga 1968
	<i>Cybocephalus rufifrons</i> Reitter 1874
	<i>Trachelus tabidus</i> (Fabricius, 1775)
Dytiscidae	<i>Agabus conspersus</i> (Marsham, 1802)

Family	Species
	<i>Agabus solieri</i> Aubé, 1837
	<i>Coelambus inscriptus</i> Sharp 1880
	<i>Colymbetes piceus</i> Klug, 1834
	<i>Cybister lateralimarginalis</i> (De Geer, 1774
	<i>Cybister tripunctatus</i> Castelnau 1835
	<i>Eretes sticticus</i> (Linnaeus, 1767)
	<i>Hydroglyphus signatellus</i> (Klug 1834)
	<i>Hydrovatus</i> sp.
	<i>Herophydrus musicus</i> (Klug, 1834)
	<i>Hygrotus confluens</i> (Fabricius, 1787)
	<i>Hygrotus enneagrammus</i> (Ahrens, 1833)
	<i>Hygrotus inscriptus</i> (Sharp, 1882)
	<i>Hygrotus lernaeus</i> (Schaum, 1857)
	<i>Hydroporus inscitus</i> Sharp, 1882
	<i>Hydroporus planus</i> (Fabricius, 1782)
	<i>Hyphoporus solieri</i> (Aubé, 1838)
	<i>Laccophilus poecilus</i> Klug, 1834
	<i>Lancetes lanceolatus</i> (Clark, 1863)
	<i>Nebrioporus lanceolatus</i> (Walker, 1871)
	<i>Rhantus suturalis</i> (Macleay, 1825)
Dermestidae	<i>Anthrenus coloratus</i> Reitter 1881
	<i>Anthrenus flavipes</i> Le conte, 1854
	<i>Attagenusfaeiatus</i> (Thunberg, 1795)
	<i>Attagenus lobatus</i> Rosenhauer, 1856
	<i>Dermestes frisehii</i> Kugelann, 1792
	<i>Dermestes vulpinus</i> Fabricius, 1781
	<i>Phradonoma nobile</i> (Reitter, 1881)
E1ateridae	<i>Aeoloides griseseens</i> Germar 1927
	<i>Lanelater notodonta</i> (Latreille, 1827)
	<i>Trogoderma granarium</i> Everts, 1898
Gyrinidae	<i>Dineutes grandis</i> Klug, 1834
	<i>Gyrinus distinctus</i> Aube, 1836
Histeridae	<i>Carcinops -14striata</i> (Stephens, 1835)

Family	Species
	<i>Geomysaprinus goffi</i> Ross, 1940
	<i>Saprinus ehaleites</i> (Illiger, 1807)
	<i>Saprinus ornatus</i> Erichson, 1834
	<i>Saprinus uvarovi</i> Muller, 1954
	<i>Saprinus (Saprinus) moyses</i> Marseul
	<i>Pholioxenus mesopotamicus</i> Olexa,
	<i>Paravolvulus syphax</i> (Reitter, 1904)
Helophoridae	<i>Helophorus angustatus</i> Motschulsky, 1890
Hydraenidae	<i>Ochthebius notabilis</i> Rosenhauer, 1856
	<i>Ochthebius punctatus</i> Stephens, 1829
	<i>Ochthebius zugmayeri</i> Kniz, 1909
Hydrophilidae	<i>Berosus asiaticus</i> Kuwert, 1888
	<i>Berosus bispina</i> Reiche & Saulcy, 1856
	<i>Berosus insolitus</i> d'Orchymont, 1937
	<i>Berosus spinosus</i> Steven 1808
	<i>Enochrus bicolor</i> Fabricius 1792
	<i>Enochrus ater</i> (Kuwert, 1888)
	<i>Enochrus segmentinotatus</i> (Kuwert, 1888)
	<i>Enochrus sinuatus</i> d'Orchymont, 1937
	<i>Enochrus (Lumetus) politus</i> (Küster, 1849)
	<i>Enochrus (Methydrus)</i> sp.:
	<i>Hydrochara flavipes</i> (Steven, 1808)
	<i>Hydroporus angustatus</i> Sturm, 1835
	<i>Hydrophilus aculeatus</i> Solier 1834
	<i>Paracymus relaxus</i> Rey, 1884
	<i>Paracymus aeneus</i> (Germar, 1824)
	<i>Sternolophus solieri</i> (Castelnau, 1840)
Meloidae	<i>Coryna dentieulata</i> Marse 1871
	<i>Croseheriehia litigiosa</i> (Chevrolat 1838)
	<i>Croseheriehia nigriplantis</i> (Klug 1845)
	<i>Croseheriehia sanguinolenta</i> (Olivier 1811)
	<i>Croseheriehia tigrinipennis</i> (Latreille 1823)
	<i>Cylindrothorax angustieollis</i> Kaszab 1955

Family	Species
	<i>Cylindrothorax buettikeri</i> Kaszab 1983
	<i>Cylindrothorax palastinus</i> (Kirsch 1870)
	<i>Decapotoma argentifera</i> Kaszab 1969
	<i>Diaphoroera hemprichi</i> Kaszab 1983
	<i>Diaphoroera johnsoni</i> Kaszab 1983
	<i>Lyttolydulus thiebaulti</i> Kaszab 1983
	<i>Lyttonyx bieolor</i> (Walker 1871)
	<i>Meloe omanicus</i> Kaszab 1983
	<i>Mylabris brunnipes</i> K1ug 1845
	<i>Mylabris calida</i> (Pallas 1782)
	<i>Mylabris elegans</i> Olivier 1811
	<i>My1abris semifasciata</i> Pic 1895
	<i>Mylabris talhouki</i> Kaszab 1983
	<i>Mylabris vigintipunctata</i> ?
Myceptophagidae	<i>Typhaea stereorea</i> (Linnaeus 1758)
Nitidulidae	<i>Carpophilus freemani</i> Dobson 1956
	<i>Carpophilus hemipterus</i> (Linnaeus 1758)
	<i>Nitidula ciliata</i> Erichson 1843
	<i>Urophorus humeralis</i> (Fabricius 1798)
Scarabaeidae	<i>Aphodius arabicus</i> Harold 1875
	<i>Aphodius assectators</i> Balthasar 1961
	<i>Aphodius klugi</i> Schm. 1910
	<i>Aphodius lividus</i> (Olivier 1789)
	<i>Aphodius luciolus</i> Klug 1845
	<i>Aphodius pruinosis</i> Reitter 1892
	<i>Aphodius wollastoni</i> Harold 1862
	<i>Eremazus unistriatus</i> Mulsant 1851
	<i>Hybosorus illigeri</i> Reiche 1853
	<i>Gymnopleurus mopsus</i> Pallas, 1781
	<i>Onthophagus tripolitanus</i> Heyden, 1890
	<i>Oryctes agamemnon</i> (Burmeister, 1847)
	<i>Pentodon kuwaitensis</i> Endrödi & Houty 1985
	<i>Pentodon algerium</i> Herbst

Family	Species
	<i>Rhyssemus granosus</i> Klug & Erichson 1842
	<i>Podalgus cuniculus</i> Burmeister, 1847
	<i>Phyllognathus excavates</i> (Forster, 1771)
	<i>Polyphylla fullo</i> (Linnaeus, 1758)
	<i>Mnematium silenus</i> (Gray 1832)
	<i>Mnematium rotundipenne</i> (Holdhaus, 1919)
	<i>Scarabaeus acuticollis</i> Motschulsky, 1849
	<i>Scarabaeus cristatus</i> Fabricius 1775
	<i>Scarabaeus irakensis</i> Stolfa 1938
	<i>Scarabaeus bannuensis</i> Janssens, 1940
	<i>Scarabaeus sacer</i> Motschulsky 1849
	<i>Tropinota squalida</i> (Scopoli, 1783)
Silvanidae	<i>Oryzaephilus surinamensis</i> (Linnaeus, 1758)
Spercheidae	<i>Spercheus belli babylonicus</i> (Hebauer, 1990)
Staphylinidae	<i>Bledius capra</i> Fauvel, 1875
	<i>Gabronthus maritimus</i> Motschulsky, 1858
	<i>Paederus fuscipes</i> Curtis 1826
	<i>Philonthus quinquilarius</i> (Gyllenhal 1810)
	<i>Philonthus irakoiraniens</i> ?
	<i>Scopaeus infirmus</i> Erichson, 1840
Tenebrionidae	<i>Adesmia aenescens</i> Kuhnelt 1951
	<i>Adesmia cancellata</i> (Klug 1830)
	<i>Adesmia carinata</i> Solier 1835
	<i>Adesmia cothurnata</i> Schatzmayer & Koch 1934.
	<i>Adesmia lacunosa</i> (Klug 1830)
	<i>Adesmia stockleini</i> Koch 1940
	<i>Akis elevata</i> Solier 1836
	<i>Alphitobius diaperinus</i> (Panzer 1797)
	<i>Ammogiton buettikeri</i> Kaszab 1979
	<i>Anemia asperula</i> Reitter 1884
	<i>Anemia bidentula</i> Fairmaire 1892
	<i>Anemia brevicollis</i> Wollaston 1864
	<i>Anemia chobauti</i> Reitter 1898

Family	Species
	<i>Anemia cornuta</i> Pic 1898
	<i>Apentanodes arabicus</i> (Kirchsberg 1877)
	<i>Apentanodes buettikeri</i> Kaszab 1979
	<i>Apentanodes globosus</i> (Reiche & Saulcy 1857)
	<i>Belopus csikii</i> Reitter 1920
	<i>Blaps batesi</i> Allard 1880
	<i>Blaps kollari</i> Seidlitz 1896
	<i>Blaps mortisaga</i> (Linnaeus 1758)
	<i>Blaps polychresta</i> Forskol 1775
	<i>Blaps taeniolata</i> Ménétrière, 1832
	<i>Blaps wiedemanni</i> Solier 1848
	<i>Clitobius oblongiusculus</i> (Fairmaire 1875)
	<i>Crypticus maculosus</i> Fairmaire 1870
	<i>Cyphostethe ferruginea</i> (Marseul 1867)
	<i>Erodium octocostatus</i> Peyerimhoff 1907
	<i>Erodium rubalkhalianus</i> Kaszab 1981
	<i>Erodium sauditus</i> Kaszab 1981
	<i>Erodium servillei</i> Solier 1834
	<i>Gedeon hierichonticus</i> Reiche & Saulcy 1857
	<i>Gonocephalum besnardi</i> Kaszab 1982
	<i>Gonocephalum prolixum</i> (Erichson 1843)
	<i>Gonocephalum setulosum</i> (Faldermann 1837)
	<i>Gonocephalum simplex</i> (Fabricius 1801)
	<i>Lobodera oblongopunctata</i> Reitter 1904
	<i>Mesostena arabica</i> (Gestro 1881)
	<i>Mesostena puncticollis</i> Solier 1835
	<i>Mesostena rathjensi</i> (Gebien 1938)
	<i>Micipsa arabica</i> Kaszab 1981
	<i>Microtelus careniceps</i> Kaszab 1982
	<i>Opatroides punctulatus</i> Brulle 1832
	<i>Oxycara buettikeri</i> Kaszab 1979
	<i>Oxycara ardoini</i> (Kaszab 1979)
	<i>Paraplatyope arabica</i> (Blair 1931)

Family	Species
	<i>Pimelia ardiani</i> Reitter 1915
	<i>Pimelia arabica</i> Klug 1830
	<i>Pimelia longula</i> Kwieton, 1981
	<i>Pimelia schusteri</i> Reitter 1915
	<i>Pimelia zhenzhurist</i> Bogatshev 1953
	<i>Prionotheca coronata ovalis</i> Ancey 1881
	<i>Scaurus puncticollis</i> Solier 1836
	<i>Scleron sulcatum</i> Baudi 1876
	<i>Sepidium mesopotamicum</i> Reitter, 1914
	<i>Storthocnemis saudita</i> Koch 1965
	<i>Tentyrina palmeri</i> (Crotch 1872)
	<i>Tentyrina deserta</i> Kaszab, 1981
	<i>Thriptera crinita</i> (Klug 1830)
	<i>Trachyderma hespida</i> (Forskoll775)
	<i>Trachyderma philistina</i> Reiche & Saulcy 1857
	<i>Trachyderma parvicollis</i> Baudi, 1875
	<i>Tribolium castaneum</i> (Herbst 1797)
	<i>Tribolium confusum</i> Jacquelin 1868
	<i>Tribolium destructor</i> Uyttenboogart 1933
	<i>Trichosphaena arabica</i> Kaszab 1961
	<i>Vieta tuberculata</i> Solier 1843
	<i>Zophosis complanata</i> Solier 1834
	<i>Zophosis punctata medicoris</i> Deyrolle 1867

Annex 4

Species of suborder Heteroptera reported from Kuwait.

Family	Common name	Species
Aleyrodoidea	Whiteflies	<i>Bemisia tabaci</i> (Gennadius, 1889)
Alydidae	broad-headed bugs	<i>Alydus calcaratus</i> Linnaeus 1758
		<i>Hypselopus gigas</i> Burmeister, 1835
Anthocoridae	Minute pirate bugs	<i>Xylocoris confusus</i> Carayon 1972
		<i>Xylocoris etawahii</i> Ghauri 1985
		<i>Xylocoris wasmiai</i> Ghauri 1985
Belostomatidae	Giant water bugs	<i>Lethocerus fakir</i> (= <i>Lethocerus cordofanus</i> (Mayr, 1852))
		<i>Lethocerus patruelis</i> (Stål, 1854)
Cimicidae	Bed bugs	<i>Cimex lectularius</i> Linnaeus 1758
Coreidae		<i>Arenocoris intermedius</i> (Jakovlev, 1883)
		<i>Anasa tristis</i> (De Geer, 1773)
		<i>Centrocoris volxemi</i> (Puton, 1878)
		<i>Coriomeris pallidus</i> Reuter, 1900
Corixidae	Water boatman	<i>Sigara lateralis</i> (Leach, 1817)
		<i>Heliocorisa vermiculata</i> (Puton, 1874)
Cydnidae	Burrower bugs	<i>Macroscytus brunneus</i> (Fabricius, 1803)
Lygaeidae	Milkweed bugs	<i>Camptocoris longicornis</i> (Puton, 1874)
		<i>Camptocera glaberrima</i> (Walker, 1872)
		<i>Cymophyes essabchana</i> Seidenstucker, 1953
		<i>Dieuches armipes</i> (Fabricius 1794)
		<i>Emblethis gracilicornis</i> Puton 1883
		<i>Engistus exsanguis</i> (Stål, 1872)
		<i>Geocoris acuticeps</i> Signoret 1881
		<i>Geocoris nigriceps</i> (= <i>Geocoris chloroticus</i> Puton, 1888)
<i>Geocoris phaeopterus</i> (= <i>Geocoris megacephalus</i> (Rossi, 1790))		
		<i>Ischnodemus caspius</i> (Jakovlev, 1871)
		<i>Lachnethus singalensis</i> (= <i>Lachnophorus singalensis</i> (Dohrn, 1860))

Family	Common name	Species
		<i>Lethaeus fulvovarius</i> Puton 1884
		<i>Nysius</i> sp.
		<i>Nysius cymoides</i> (Spinola, 1837)
		<i>Nysius senecionis</i> (Schilling, 1829)
		<i>Macropternella inermis</i> (Fieber, 1852)
		<i>Remaudiereana annulipes</i> (Baerensprung, 1859)
		<i>Spilostethus pandurus</i> (Scopoli 1763)
		<i>Spilostethus longulus</i> (Dallas & W.S., 1852)
Nabidae	Damsel bugs	<i>Nobis capsiformis</i> (Germar 1837)
		<i>Nabis viridulus</i> Spinola, 1837
Nebidae	Water scorpions	<i>Ranatra parvipes</i> (Signoret, 1861)
Notonectida	Backswimmers	<i>Anisops sardeus</i> Herrich-Schaeffer, 1849
		<i>Notonecta marmorea</i> Fabricius, 1803 spelled as “ <i>marmorata</i> ” by Al-Houty (2011)
Miridae	Capsid bugs	<i>Auchenocrepis alboscutellata</i> Puton, 1874 spelled as “ <i>Auchenocepis</i> ” by Al-Houty (2011).
		<i>Campylomma unicolor</i> Poppius, 1914.
		<i>Eurystylus bellevoeyi</i> (Reuter, 1879)
		<i>Reuterista desertorum</i> (Reuter, 1900)
		<i>Reuterista demeter</i> (Linnavuori, 1974)
		<i>Trigonotylus pallidicornis</i> Reuter, 1899
		<i>Tuponia concinna</i> (Reuter, 1875)
		<i>Tuponia ninlil</i> Linnavuori, 1984
Oxycarenidae		<i>Leptodemus minutus</i> (Jakovlev, 1876)
Pentatomidae	Stink bugs	<i>Acrosternum breviceps</i> (Jakovlev 1890.)
		<i>Acrosternum millierei</i> (Mulsant & Rey, 1866)
		<i>Carpocoris purpureipennis</i> DeGeer 1773
		<i>Chroantha ornatula</i> (Herrich-Schaeffer 1842)
		<i>Eurydema ornata</i> (Linnaeus 1758)
		<i>Eysarcoris incospicuus</i> (Herrich-Schaeffer 1844)
		<i>Mecidea pallidissima</i> Jensen-Haarup 1922
		<i>Nezara viridula</i> (Linnaeus 1758)
		<i>Tarisa subspinosa</i> (Germar, 1839)

Family	Common name	Species
		<i>Ventocoris martini</i> (Horvath 1880)
Pyrrhocoridae	Red bugs	<i>Pyrrhocoris apterus</i> (Linnaeus 1758)
		<i>Scantius aegyptius</i> (Linnaeus, 1758)
		<i>Scantius forsteri</i> (Fabricius 1781)
Reduviidae		<i>Coranus aegyptius</i> (Fabricius, 1775)
		<i>Coranus arenaceus</i> Walker, 1870
		<i>Oncocephalus asiranus</i> Miller, 1954
		<i>Lestomerus bicolor</i> Villiers, 1948
		<i>Ectomocoris chiragra</i> (Fabricius, 1803)
		<i>Ectomocoris ululans</i> (Rossi, 1790)
		<i>Oncocephalus asiranus</i> Miller, 1954
		<i>Reduvius annulipes</i> (Reuter, 1881)
		<i>Reduvius pallipes</i> Klug, 1830
		<i>Vachiria natolica</i> Stål, 1859
Rhopalidae	Scentless plant bugs	<i>Leptoceraea femoralis</i> (Horváth, 1897)
		<i>Liorhyssus hyalinus</i> (Fabricius 1794)
Stenocephalidae		<i>Dicranocephalus insularis</i> (Dallas, 1852)
		<i>Dicranocephalus marginatus</i> (Ferrari, 1874)
Saldidae		<i>Saldula palustris</i> (Douglas, 1874)
Tingidae		<i>Galeatus scrophicus</i> Saunders 1876
		<i>Monosteira alticarinata</i> Ghauri 1965
Tropiduchidae	Tropiduchid planthoppers	<i>Ommatissus binotatus</i> Fieber, 1875

Annex 5

Hymenoptera reported from Kuwait.

Family	Common name	Species
Andrenidae	Mining bees	<i>Andrena savignyi</i> Spinola 1838
		<i>Panurgus dentatus</i> Friese, 1901
Anthophoridae	Digger bees	<i>Amegilla byssina</i> (Illeger 1806)
		<i>Anthophora angolensis</i> (Dalla Torre 1896)
		<i>Anthophora spinolana</i> Priesner 1957
		<i>Anthophora atriceps</i> Pérez, 1879
		<i>Anthophora extricata</i> Priesner, 1957
		<i>Eucera genovefae</i> Vachal, 1907
		<i>Heliophila fayomensis</i> (Priesner 1957)
		<i>Icteranthidium ferrugineum</i> (Fabricius, 1787)
		<i>Synhalonia pulmila</i> (Klug 1845)
		<i>Xylocopa aestuans</i> (Linnaeus 1758)
Apidae	Honeybees	<i>Apis mellifera</i> (Linnaeus 1758)
Braconidae	Braconid wasps	<i>Disophrys caesa</i> (Klug, 1835)
		<i>Microbracon brevicornis</i> (Wesmael)
		<i>Aphidius picipes</i> (Nees 1811)
Chrysididae	Cuckoo wasps	<i>Stilbum cyanurum</i> (Forster 1771)
		<i>Stilbum pici</i> Buysson 1891
		<i>Stilbum splendidum</i> (Fabricius, 1775)
Halictidae	Sweat bees	<i>Halictus variipes</i> Morowitz 1876
		<i>Nomioides variegata</i> (Olivier 1789)
		<i>Pseudapsis nilotica</i> (Smith 1875)
Eumenidae	Mason wasps	<i>Delta campaniforme</i> (Saussure 1852)
		<i>Delta dimidiatipenne</i> (Saussure 1852)
Evaniidae	Hatchet wasps	<i>Evania appendigaster</i> Linnaeus 1758
		<i>Pimpla raborator</i> ??
Formicidae	Ants	<i>Camponotus aegyptiacus</i> Emery, 1915
		<i>Camponotus fellah</i> Dalla Torre, 1893

Family	Common name	Species
		<i>Cataglyphis niger</i> (Andre 1882)
		<i>Camponotus xerxes</i> Forel 1904
		<i>Camponotus sericeus</i> (Fabricius, 1798)
		<i>Camponotus thoracicus</i> (Fabricius, 1804)
		<i>Cardiocondyla shuckardi</i> Forel, 1891
		<i>Cataglyphis diehli</i> (Forel, 1902)
		<i>Cataglyphis holgerseni</i> n. sp.
		<i>Cataglyphis lividus</i> (Andre, 1881)
		<i>Cataglyphis niger</i> (Andre, 1881)
		<i>Crematogaster antaris</i> Forel, 1894
		<i>Lepisiota karawajewi</i> (Agosti & Collingwood, 1987)
		<i>Messor aralocaspius</i> (Ruzsky, 1902)
		<i>Messor arenarius</i> (Fabricius, 1787)
		<i>Messor buettikeri</i> Collingwood, 1985
		<i>Messor ebeninus</i> Santschi, 1927
		<i>Messor medioruber</i> Santschi, 1910
		<i>Messor meridionalis</i> (Andre, 1883)
		<i>Messor minor</i> (André, 1883)
		<i>Messor picturatus</i> Santschi, 1927
		<i>Messor striaticeps</i> (Andre, 1883)
		<i>Monomorium abeillei</i> Andre, 1881
		<i>Monomorium areniphilum</i> Santschi, 1911
		<i>Monomorium buettikeri</i>
		<i>Monomorium buxtoni</i> Crawley, 1920
		<i>Monomorium destructor</i> (Jerdon, 1851)
		<i>Monomorium hemame</i> Collingwood & Agosti, 1996
		<i>Monomorium venustum</i> (Smith, 1858)
		<i>Monomorium nitidiventre</i> Emery, 1893
		<i>Monomorium salomonis</i> (Linnaeus, 1758)
		<i>Monomorium gracillimum</i> (Smith 1861)
		<i>Monomorium subdenticorne</i>
		<i>Monomorium pharaonsis</i> (Linnaeus 1758)
		<i>Monomorium subcomae</i> Lush, 2008

Family	Common name	Species
		<i>Pheidole teneriffana</i> Forel, 1893
		<i>Pheidole megacephala</i> (Fabricius, 1793)
		<i>Tetramorium biskrense</i> Forel, 1904
		<i>Tetramorium juba</i> Collingwood, 1985
		<i>Tetramorium sericeiventre</i> Emery, 1877
		<i>Tapinoma melanocephalum</i> (Fabricius, 1793)
		<i>Tapinoma simrothi</i> Krausse, 1911
Ichneumonidae	Ichneumon wasps	<i>Pimpla instigator</i> Fabricius 1793
		<i>Simophion calvus</i> Victorov, 1961
		<i>Tersilochus conotracheli</i> (Riley, 1871)
Mutillidae	Velvet ant	<i>Tricholabiodes semistra</i>
Pompilidae	Spider wasps	<i>Batazonellus lacerticida</i> (Pallas 1771)
		<i>Stolidia noscibilis</i> (Kohl, 1906)
Pteromalidae		<i>Pachyneuron aeneum</i> Masi, 1929
Scoliidae	Flower wasps	<i>Megascolia flavifrons</i> (Fabricius 1775)
		<i>Scolia flavifrons</i> Fabricius, 1775
		<i>Scolia erythrocephala</i> Fabricius, 1798
		<i>Campsomeriella thoracica</i> (Fabricius, 1787)
Sphecidae	Sphecid wasps	<i>Ammophila rubripes</i> Spinola 1838
		<i>Astata boops</i> Schrank 1781
		<i>Bembix dahlbomi</i> Handlirsch 1893
		<i>Bembix pallescens</i> Priesner 1958
		<i>Cerceris pulchella</i> Klug 1845
		<i>Cerceris straminea</i> Dufour, 1854
		<i>Chlorion regale</i> Smith 1873
		<i>Dienoplug formosus</i> Jurine 1807
		<i>Diodontus friesci</i> Kohl 1901
		<i>Diodontus minutus</i> (Fabricius 1795)
		<i>Diodontus oraniensis</i> (Lepeletier, 1845)
		<i>Dryudella bifasciata</i> (Schulthess 1926)
		<i>Dryudella tricolor</i> (Vander Linden 1829)
		<i>Gastrosericus waltlii</i> Spinola 1838
		<i>Laphragogus pictus</i> Kohl 1889

Family	Common name	Species
		<i>Larra analis</i> Fabricius 1804
		<i>Liris agilis</i> (Smith 1856)
		<i>Miscophus pardoii</i> Andrede 1945
		<i>Oxybelus collaris</i> Kohl 1884
		<i>Oxybelus curviscutis</i> Arnold 1917
		<i>Oxybelus lamellatus</i> Olivier 1811
		<i>Palarus laetus</i> Klug 1845
		<i>Palarus saundersi</i> Morice 1897
		<i>Parapiagetia mongolica</i> Morawitz 1889
		<i>Parapsammophila turanica</i> Morawitz 1890
		<i>Philanthus genalis</i> Kohl 1891
		<i>Philanthus triangulum</i> Fabricius 1775
		<i>Philanthus variegatus</i> Spinola 1838
		<i>Podalonia ebenina</i> (Spinola 1838)
		<i>Podalonia minax</i> (Kohl 1901)
		<i>Podalonia tydei</i> (Le Guillou 1841)
		<i>Prionyx crudelis</i> (Smith 1856)
		<i>Prionyx niveatus</i> (Dufour 1863)
		<i>Prionyx macula</i> (Fabricius, 1804)
		<i>Sphex argentatus</i> Fabricius 1785
		<i>Stizus marnonis</i> Handlirsch 1829
		<i>Stizus savignyi</i> Spinola 1838
		<i>Tachysphex grandissimus</i> Gussakovskij 1933
		<i>Tachysphex nitidus</i> Spinola 1805
Tiphiidae	Tiphiid wasps	<i>Iswara chobauti</i> (Andre 1898)
Vespidae	Hornets	<i>Pterocheilus fousti</i> (Morawitz 1873)
		<i>Vespa orientalis</i> Linnaeus 1771
		<i>Polistes wattii</i> Cameron, 1900

Annex 6

Polychaeta species reported from Kuwait (After Al Kandari et al., 2018).

Family	Species
Ampharetidae	<i>Isoldaalbula</i> (Mohammad, 1971)
	<i>Melinna cf. palmata</i> (Grube, 1870)
	<i>Linopherushirsuta</i> (Wesenberg-Lund, 1949)
	<i>Capitella cf. capitata</i> (Fabricius, 1780)
	<i>Dasybranchuscaducus</i> (Grube, 1846)
	<i>Heteromastussimilis</i> (Southern, 1921)
	<i>Notomastus cf. latericeus</i> (Sars, 1851)
	<i>Rashgua rubrocincta</i> (Wesenberg-Lund, 1949)
	<i>Scyphoproctus aciculatus</i> Mohammad, 1980
	<i>Spiochaetopterus</i> sp.
	<i>Bhawania goodei</i> (Webster, 1884)
	<i>Chrysopetalum debile</i> (Grube, 1855)
	<i>Aphelochaeta filiformis</i> (Keferstein, 1862)
	<i>Cautleriella typhlops</i> (Willey, 1905)
	<i>Cirratulus</i> sp.
	<i>Cirriformia</i> sp.
	<i>Dodecaceria</i> sp.
	<i>Monticellina</i> sp.
	<i>Tharyx</i> sp.
	<i>Cossura</i> sp.
	<i>Schistomeringo sincerta</i> (Schmarda, 1861)
	<i>Eunice</i> sp.
	<i>Lysidice collaris</i> (Grube, 1870)
	<i>Lysidice unicornis</i> (Grube, 1840)
	<i>Marphysas anguinea</i> (Montagu, 1813)
	<i>Marphysa</i> sp.
	<i>Paucibranchia gemmata</i> (Mohammad, 1973)
	<i>Palola siciliensis</i> (Grube, 1840)

Family	Species
	<i>Euphrosine foliosa</i> Audouin & H Milne (Edwards, 1833)
	<i>Fabricidae</i> g. sp.
	<i>Glycera tridactyla</i> (Schmarda, 1861)
	<i>Glycera</i> sp
	<i>Glycinde bonhourei</i> Gravier, 1904
	<i>Goniada</i> sp.
	<i>Goniadidae</i> g. sp.
	<i>Hesione ceylonica</i> Grube, 1874
	<i>Leocrates claparedii</i> (Costa, 1868)
	<i>Oxydromus angustifrons</i> (Grube, 1878)
	<i>Podarkeopsis</i> sp. New genus
	<i>Augeneria</i> sp. New genus
	<i>Lumbrineriopsis paradoxa</i> (Saint-Joseph, 1888)
	<i>Lumbrineris</i> sp.
	<i>Kuwaita magna</i> Mohammad, 1973
	<i>Ninoe pulchra</i> Wesenberg-Lund, 1949
	<i>Scoletoma impatiens</i> (Claparède, 1868)
	<i>Magelona cf. falcifera</i> Mortimer and Mackie, 2003
	<i>Magelona pulchella</i> Mohammad, 1970
	<i>Magelona obockensis</i> Gravier, 1905
	<i>Euclymene cf. lombricoides</i> (Quatrefages, 1866)
	<i>Euclymene cf. oerstedii</i> (Claparède, 1863)
	<i>Leiochone annulata</i> (Mohammad, 1980)
	<i>Petaloproctus terricolus</i> Quatrefages, 1866
	<i>Aglaophamus</i> sp.
	<i>Nephtystulearensis</i> Fauvel, 1919
	<i>Ceratonereismirabilis</i> Kinberg, 1865
	<i>Gymnonereis</i> sp. New genus
	<i>Leonnates decipiens</i> Fauvel, 1929
	<i>Leonnates indicus</i> Kinberg, 1865
	<i>Ceratonereis (Compositia)</i> sp.
	<i>Namalycastis abiuma</i> (Grube, 1872)
	<i>Neanthes deplanata</i> (Mohammad, 1971)

Family	Species
	<i>Neanthes unifasciata</i> (Willey, 1905)
	<i>Neanthes trifasciata</i> (Ehlers, 1901)
	<i>Nereis coutieri</i> Gravier, 1899
	<i>Nereis (Nereis) neogracilis</i> Mohammad, 1970
	<i>Nereis persica</i> Fauvel, 1911
	<i>Perinereis arabica</i> Mohammad, 1971
	<i>Perinereis cultrifera</i> (Grube, 1840)
	<i>Perinereis nigropunctata</i> (Horst, 1889)
	<i>Perinereis nuntia</i> (Lamarck, 1818)
	<i>Perinereis vancaurica</i> (Ehlers, 1868)
	<i>Perinereis</i> sp.
	<i>Platynereis</i> sp.
	<i>Pseudonereis</i> sp.
	<i>Pseudonereis anomala</i> Gravier, 1899
	<i>Simplisetia erythraeensis</i> (Fauvel, 1918)
	<i>Tylonereis bogoyawlenskyi</i> Fauvel, 1911
	<i>Nerilla</i> sp.
	<i>Arabella iricolor</i> (Montagu, 1804)
	<i>Drilonereis</i> sp.
	<i>Oenone fulgida</i> (Savigny in Lamarck, 1818)
	<i>Diopatra neapolitana</i> Delle Chiaje, 1841
	<i>Onuphis</i> sp.
	<i>Armandia</i> sp.
	<i>Polyophtalmus pictus</i> (Dujardin, 1839)
	<i>Leodamas chevalieri</i> (Fauvel, 1902)
	<i>Naineris laevigata</i> (Grube, 1855)
	<i>Phylo kuwaitica</i> Mohammad, 1970
	<i>Phylo kubbarensis</i> Mohammad, 1980
	<i>Scoloplos</i> sp.
	<i>Owenia persica</i> Dutrieux & Gil, 2006
	<i>Pholoe</i> sp.
	<i>Aricidea</i> sp
	<i>Paradoneis</i> sp

Family	Species
	<i>Pholoe</i> sp.
	<i>Eulalia</i> sp.
	<i>Nereiphylla castanea</i> (Marenzeller, 1879)
	<i>Phyllodoce</i> sp.
	<i>Sigambra</i> sp.
	<i>Synelmis albini</i> (Langerhans, 1881)
	<i>Pisione</i> sp
	<i>Poecilochaetus aff. serpens</i> Allen, 1904
	<i>Polygordius</i> sp
	<i>Harmothoe dictyophora</i> (Grube, 1878)
	<i>Harmothoe hirsuta</i> Johnson, 1897
	<i>Lepidonotus carinulatus</i> (Grube, 1870)
	<i>Lepidonotus tenuisetosus</i> (Gravier, 1902)
	<i>Malmgreniella murrayensis</i> Pettibone, 1993.
	<i>Parahalosydna</i> sp.
	<i>Parahalosydropsis tubicola</i> (Day, 1973)
	<i>Paralepidonotus ampulliferus</i> (Grube, 1879)
	<i>Protodrilus</i> sp
	<i>Sabellaria alcocki</i> Gravier, 1906
	<i>Amphiglena mediterranea</i> (Leydig, 1851)
	<i>Branchiomma cingulatum</i> (Grube, 1870)
	<i>Branchiomma</i> sp.
	<i>Dialychone collaris</i> (Langerhans, 1881)
	<i>Laonome</i> sp.
	<i>Notaulax phaeotaenia</i> (Schmarda, 1861)
	<i>Pseudopotamilla</i> sp.
	<i>Saccocirrus</i> sp.
	<i>Asclerocheilus</i> sp.
	<i>Oligobregma</i> sp.
	<i>Hydroides bulbosa</i> ten Hove, 1990
	<i>Hydroides elegans</i> (Haswell, 1883)
	<i>Hydroides heterocera</i> (Grube, 1868)
	<i>Hydroides homoceros</i> Pixell, 1913

Family	Species
	<i>Hydroides cf. operculata</i> (Treadwell, 1929)
	<i>Hydroides</i> sp.n.
	<i>Protula palliata</i> (Willey, 1905)
	<i>Serpula cf. concharum</i> Langerhans, 1880
	<i>Spirobranchus cf. kraussii</i> (Baird, 1865)
	<i>Spirobranchus cf. tetraceros</i> (Schmarda, 1861)
	<i>Vermiliopsis glandigera</i> Gravier, 1906
	<i>Sphaerodoridae</i> g. sp.
	<i>Euthalenes sadigitata</i> (McIntosh, 1885)
	<i>Sthenelais boa</i> (Johnston, 1833)
	<i>Aonides cf. oxycephala</i> (Sars, 1862)
	<i>Dipolydora cf. capensis</i> (Day, 1955).
	<i>Dipolydora cf. normalis</i> (Day, 1957).
	<i>Dipolydora</i> sp. C
	<i>Malacoceros indicus</i> (Fauvel, 1928)
	<i>Microspio</i> sp..
	<i>Paraprionospio</i> sp. A.
	<i>Paraprionospio cf. cordifolia</i> Yokoyama, 2007.
	<i>Polydora aff. hoplura</i> Claparède, 1868
	<i>Polydora</i> sp. A
	<i>Polydora cf. narica</i> Light, 1969.
	<i>Polydora cf. haswelli</i> Blake and Kudenov, 1978
	<i>Polydora</i> sp. C
	<i>Polydoraspondylana</i> Mohammad, 1973
	<i>Polydora vulgaris</i> Mohammad, 1972
	<i>Prionospio cf. krusadensis</i> Fauvel, 1929.
	<i>Prionospio rotalis</i> Mohammad, 1970
	<i>Prionospio</i> sp. 01
	<i>Prionospio</i> sp. 02
	<i>Prionospio</i> sp. 03
	<i>Prionospio</i> sp. 04
	<i>Prionospio</i> sp. 05
	<i>Prionospio</i> sp. 06

Family	Species
	<i>Pseudopolydora cf. corniculata</i> Radashevsky & Hsieh, 2000.
	<i>Pseudopolydora</i> sp. A
	<i>Pseudopolydora</i> sp. B
	<i>Pseudopolydora</i> sp. C
	<i>Rhynchospio</i> sp.
	<i>Scolelepis</i> sp. A
	<i>Scolelepis</i> sp. B
	<i>Scolelepis</i> sp. C
	<i>Scolelepis</i> sp. D
	<i>Spio</i> sp.
	<i>Spionidae</i> g. sp.
	<i>Sternaspis thorsoni</i> Sendall & Salazar-Vallejo, 2013
	<i>Syllidae</i> g. sp.
	<i>Loimia cf. medusa</i> (Savigny, 1822)
	<i>Mesopotholepus macrothoracicus</i> (Mohammad, 1980)
	<i>Neoleprea clavata</i> Mohammad, 1973
	<i>Nicoleagra cilibranchis</i> (Grube, 1878)
	<i>Polycirrus coccineus</i> (Grube, 1870)
	<i>Pseudostreblosoma longum</i> (Mohammad, 1973)
	<i>Streblosoma</i> sp.
	<i>Terebella</i> sp.
	<i>Thelepus japonicus</i> Marenzeller, 1884
	<i>Terebellides persiae</i> Parapar, Moreira, Gil & Martin, 2016

Annex 7

Marine gastropods reported from Kuwait.

Family	Species
Bursidae	<i>Bufonaria echinata</i> (Link, 1807)
Buccinidae	<i>Cantharus wagneri</i> (Anton, 1838)
Calyptraeidae	<i>Calyptraea pellucida</i> (Reeve, 1859)
	<i>Calyptraea</i> sp.
	<i>Ergaea walshi</i> (Reeve, 1859)
Caecidae	<i>Caecum</i> sp.
Cassidae	<i>Casmaria ponderosa</i> (Link, 1807)
	<i>Semicassis bisulcata</i> (Schubert & J. A. Wagner, 1829)
Conidae	<i>Conus</i> sp.
Cypraeidae	<i>Luria pulchra</i> (Gray, 1824)
	<i>Mauritia grayana</i> Schilder, 1930
	<i>Naria lamarckii</i> (J.E. Gray, 1825)
	<i>Naria turdus</i> (Lamarck, 1810)
	<i>Palmadusta lentiginosa</i> (J.E. Gray, 1825)
	<i>Purpuradusta gracilis</i> (Gaskoin, 1849)
Cystiscidae	<i>Gibberula mazagonica</i> (Melvill, 1892)
	<i>Gibberula sueziensis</i> (Issel, 1869)
	<i>Granulina oodes</i> (Melvill, 1898)
	<i>Cypraea turdus</i> (Lamarck, 1810)
	<i>Granulina isseli</i> (G. Nevill & H. Nevill, 1875)
Drilliidae	<i>Drillia booleyi</i> Melvill & Sykes, 1897
	<i>Splendrillia lucida</i> (G. Nevill & H. Nevill, 1875)
	<i>Splendrillia</i> sp.
Epitoniidae	<i>Epitonium</i> sp.
Eulimidae	<i>Hypermastus epiphanes</i> (Melvill, 1897)
	<i>Melanella cumingi</i> (A. Adams, 1854)
	<i>Melanella</i> sp.
Iravadiidae	<i>Pseudonoba alphesiboei</i> (Melvill, 1912)

Family	Species
	<i>Pseudonoba columen</i> (Melvill, 1904)
Littorinidae	<i>Echinolittorina arabica</i> (El Assal, 1990)
Mangeliidae	<i>Agathotoma</i> sp. 1#
	<i>Citharomangelia elevata</i> (E. A. Smith, 1884)
	<i>Citharomangelia townsendi</i> (G. B. Sowerby III, 1895)
	<i>Eucithara edithae</i> (Melvill & Standen, 1901)
	<i>Eucithara striatella</i> (E. A. Smith, 1884)
	<i>Gingicithara lyrica</i> (Reeve, 1846)
	<i>Mangelia albolabiata</i> (E. A. Smith, 1884)
	<i>Mangelia recta</i> Smith, E.A., 1888
	<i>Mangilia posidonia</i> Melvill, 1904
	<i>Pseudorhaphitoma phaea</i> (Melvill & Standen, 1901)
Muricidae	<i>Hexaplex kuesterianus</i> (Tapparone-Caniferi, 1875)
	<i>Hexaplex rileyi</i> (D'Attilio & Myers, 1984)
	<i>Homalocantha anatomica</i> (Perry, 1811)
	<i>Ergalatax contracta</i> (Reeve, 1846)
	<i>Ergalatax junionae</i> (Houart, 2008)
	<i>Murichorda fiscellum</i> (Gmelin, 1791)
	<i>Murex carbonneris</i> (Jousseume, 1881)
	<i>Murex scolopax</i> Dillwyn, L.W., 1817
	<i>Rapana rapiformis</i> (Born, 1778)
	<i>Rapana venosa</i> (Valenciennes, 1846)
	<i>Semiricinula konkanensis</i> (Melvill, 1893)
	<i>Semiricinula tissoti</i> (Petit de la Saussaye, 1852)
	<i>Tylothais savignyi</i> (Deshayes, 1844)
	<i>Indothais lacera</i> (Born, 1778)
	<i>Indothais scalaris</i> (Schub. & Wagr, 1829)
	<i>Semiricinula tissoti</i> (Petit de la Saussaye, 1852)
Naticidae	<i>Glossaulax didyma</i> (Röding, 1798)
	<i>Cellana rota</i> Gmelin, 1791
	<i>Eunaticina papilla</i> (Gmelin, 1791)
	<i>Polinices mammilla</i> (Linnaeus, 1758)
	<i>Polinices peselephanti</i> (Link, 1807)

Family	Species
	<i>Natica cincta</i> Récluz, 1850
	<i>Natica buriasiensis</i> Récluz, 1844
	<i>Neverita didyma</i> (Röding, 1798)
	<i>Sigatica pomatiella</i> (Melvill, 1893)
	<i>Sinum planulatum</i> (Récluz, 1843)
	<i>Tanea lineata</i> (Röding, 1798)
Ancillariidae	<i>Ancilla castanea</i> (Sowerby I, 1830)
	<i>Ancilla farsiana</i> (Kilburn, 1981)
	<i>Ancilla ovalis</i> (G. B. Sowerby II, 1859)
	<i>Crenavolva traillii</i> (A. Adams, 1855)
	<i>Diminovula concinna</i> (G. B. Sowerby II in A. Adams & Reeve, 1848)
	<i>Fusinus arabicus</i> (Melvill, 1898)
Ranellidae	<i>Cymatium</i> sp.
Anabathridae	<i>Amphithalamus alphesboei</i> Melvill, 1912
	<i>Amphithalamus microthyra</i> von Martens, 1880
Omalogyridae	<i>Omalogyra atomus</i> (Philippi, 1850)
Rissoidae	<i>Hyala vitrea</i> (Montagu, 1803)
	<i>Iraqirissoa xanthias</i> (Watson, 1886) ?
	<i>Phosinella clathrata</i> (A. Adams, 1853)
	<i>Pseudonoba aristaei</i> (Melvill, 1912)
	<i>Pyramidelloides mirandus</i> (A. Adams, 1861)
	<i>Rissoina</i> sp.
	<i>Rissoina distans</i> (Anton, 1838)
	<i>Stenothyra iraqensis</i> Dance & Eames, 1966
	<i>Stosicia annulata</i> (Dunker, 1859)
	<i>Voorwindia tiberiana</i> (Issel, 1869)
Rissoinidae	<i>Phosinella seguenziana</i> (Issel, 1869)
Strombidae	<i>Canarium fusiforme</i> (G. B. Sowerby II, 1842)
	<i>Conomurex persicus</i> (Swainson, 1821)
	<i>Tibia insulaechorab</i> Röding, 1798
	<i>Terebellum terebellum</i> (Linnaeus, 1758)
Tonnidae	Tonnidae gen. sp.
Terebridae	<i>Terebra</i> sp.

Family	Species
Vanikoridae	<i>Vanikoro cancellata</i> (Lamarck, 1822)
	<i>Vanikoro expansa</i> (G.B. I Sowerby, 1842)
	<i>Vanikoro quoyiana</i> A. Adams, 1854
	<i>Vanikoro</i> sp.
Vermetidae	<i>Serpulorbis variabilis</i> Hadfield & Kay, 1972
Xenophoridae	<i>Xenophora corrugata</i> (Reeve, 1842)
Borsoniidae	<i>Tomopleura nivea</i> (Philippi, 1851)
Cancellariidae	<i>Merica melanostoma</i> (G. B. Sowerby II, 1849)
	<i>Scalptia scalariformis</i> (Lamarck, 1822)
Cerithiidae	<i>Bittium</i> sp.
	<i>Cerithidium cerithinum</i> (Philippi, 1849)
	<i>Cerithium caeruleum</i> Sowerby, 1855
	<i>Cerithium scabridum</i> Philippi, 1848
	<i>Clypeomorus bifasciata</i> (G. B. Sowerby II, 1855)
	<i>Colina pinguis</i> A. Adams, 1855
	<i>Rhinoclavis kochi</i> (Philippi, 1848)
	<i>Mitrella blanda</i> (Sowerby, 1844)
Columbellidae	<i>Zafra selasphora</i> (Melvill and Standen, 1901)
	<i>Zafra atrata</i> (Gould, 1860)
	<i>Horologica semipicta</i> (Gould, 1861)
Cerithiopsidae	<i>Seila</i> sp.
	<i>Seila hinduorum</i> (Melvill, 1898)
	<i>Clathurella horneana</i> (E. A. Smith, 1884)
Clathurellidae	<i>Lienardia mighelsi</i> Iredale & Tomlin, 1917
	<i>Nannodiella acricula</i> (Hedley, 1922)
	<i>Paraclathurella koweitensis</i> (J.C. Melvill, 1904)
	<i>Orphanopusia osiridis</i> (Issel, 1869)
Costellariidae	<i>Vexillum malcolmense</i> (Melvill & Standen, 1901)
	<i>Costellaria</i> sp.
	<i>Vexillum (Costellaria) diaconalis</i> (Melvill & Standen, 1903)
	<i>Alaba virgata</i> (Philippi, 1849).
Dialidae	<i>Diala semistriata</i> (Philippi, 1849)
	<i>Diala sulcifera</i> (A. Adams, 1862)

Family	Species
Epitoniidae	<i>Epitonium robillardi</i> (Sowerby III, 1894)
	<i>Epitonium aculeatum</i> (G. B. Sowerby, 1844)
	<i>Epitonium alatum</i> (G. B. Sowerby II, 1844)
	<i>Epitonium deificum</i> (Melvill & Standen, 1903)
	<i>Epitonium simplex</i> (Sowerby III, 1894)
	<i>Epitonium replicatum</i> (G. B. Sowerby II, 1844)
Eulimidae	<i>Eulima gentilomiana</i> Issel, 1869
Ficidae	<i>Ficus subintermedia</i> (d'Orbigny, 1852)
Fascioliariidae	<i>Fusinus townsendi</i> (Melvill, 1899)
Horaiclavidae	<i>Epideira multiseriata</i> (E. A. Smith, 1877)
Littorinidae	<i>Echinolittorina millegrana</i> (Philippi, 1848)
	<i>Peasiella isseli</i> (Issel, 1869)
Mitridae	<i>Cancilla circula</i> (Kiener, 1838) ?
	<i>Neocancilla clathrus</i> (Gmelin, 1791)
	<i>Quasimitra bovei</i> (Kiener, 1838)
	<i>Scabricola desetangsii</i> (Kiener, 1838)
Nassariidae	<i>Bullia tranquebarica</i> (Röding, 1798)
	<i>Nassarius albescens</i> (Dunker, 1846)
	<i>Nassarius arcularia</i> (Linnaeus, 1758)
	<i>Nassarius concinnus</i> (Powys, 1835)
	<i>Nassarius emilyae</i> Moolenbeek and Dekker, 1994
	<i>Nassarius frederici</i> (Melvill and Standen, 1901)
	<i>Nassarius glans</i> (Linnaeus, 1758)
	<i>Nassarius marmoreus</i> (A. Adams, 1852)
	<i>Nassarius mammilliferus</i> (Melvill, 1897)
	<i>Nassarius persicus</i> (Martens, 1874)
	<i>Nassarius</i> sp.
Planaxidae	<i>Macromphalus thelacme</i> (Melvill, 1904)
	<i>Planaxis sulcatus</i> (Born, 1778)
Potamididae	<i>Pirenella cingulata</i> (Gmelin, 1791)
	<i>Pirenella conicus</i> (de Blainville, 1829)
Pseudomelatomidae	<i>Epidirona multiseriata</i> (EA Smith, 1877)

Family	Species
	<i>Inquisitor griffithi</i>
	<i>Inquisitor</i> sp.1
Raphitomidae	<i>Kermia foraminata</i> (Reeve, 1845)
	<i>Pseudodaphnella daedala</i> (Reeve, 1846)
	<i>Pseudodaphnella lemniscata</i> (G. Nevill & H Nevill, 1869)
	<i>Pseudodaphnella martensi</i> (G. Nevill & H. Nevill, 1875)
	<i>Pseudodaphnella</i> sp. 2-1
	<i>Veprecula sykesii</i> (Melvill & Standen, 1903)
Scaliolidae	<i>Finella pupoides</i> A. Adams, 1860
	<i>Finella purpureoapicata</i> Preston, 1905
	<i>Finella scabra</i> A. Adams, 1860
	<i>Scaliola arenosa</i> A. Adams, 1862
Terebridae	<i>Strioterebrum lividum</i> (Reeve, 1860)
	<i>Terebra cingulifera</i> Lamarck, 1822
Triphoridae	<i>Coriophora granosa</i> (Pease, 1871)
	<i>Latitriphora maxillaris</i> (Hinds, 1843)
	<i>Monophorus perversus</i> (Linnaeus, 1758)
	<i>Triphora acicula</i> Issel, 1869
	<i>Triphora acuta</i> (Kiener, 1841)
	<i>Triphora capensis</i> Bartsch, 1915
	<i>Triphora distincta</i> Deshayes, 1863
	<i>Triphora incolumis</i> Melvill, 1918
	<i>Triphora tristoma</i> (Blainville, 1824)
	<i>Viriola cingulata</i> (A. Adams, 1854)
	<i>Viriola corrugata</i> (Hinds, 1843)
Turritellidae	<i>Turritella fultoni</i> Melvill, 1897
	<i>Turritella aurocincta</i> Martens, 1882
	<i>Turritella torulosa</i> Kiener, 1843
Vermetidae	<i>Thylacodes arenarius</i> (Linnaeus, 1758)
	<i>Vermetus</i> sp.
Bullidae	<i>Bulla ampulla</i> Linnaeus, 1758
	<i>Bulla arabica</i> (Malaquias & Reid, 2008)
Cylichnidae	<i>Cylichna collyra</i> Melvill, 1906

Family	Species
	<i>Cylichna cylindracea</i> Pennant, 1777
	<i>Cylichna</i> sp.
Haminoeidae	<i>Atys pellyi</i> (Smith, 1872)
	<i>Atys</i> sp.
	<i>Aliculastrum cylindricum</i> (Helbling, 1779)
	<i>Haminoea vitrea</i> (A. Adams in Sowerby, 1850)
	<i>Haminoea</i> sp.2-1
Scaphandridae	<i>Tornatina inconspicua</i> H. Adams, 1872
	<i>Tornatina persiana</i> Smith, 1872
	<i>Tornatina</i> sp.
Neritidae	<i>Nerita albicilla</i> Linnaeus, 1758
	<i>Smaragdia souverbiana</i> (Montrouzier in Souverbie & Montrouzier, 1863)
Ellobiidae	<i>Allochroa brononii</i> (Philippi, 1846)
	<i>Allochroa layardi</i> (H. & A. Adams, 1855)
	<i>Ellobium</i> sp.
	<i>Laemodonta monilifera</i> (H. & A. Adams, 1854)
Fissurellidae	<i>Diodora funiculata</i> (Reeve, 1850)
	<i>Diodora rueppellii</i> (G.B. Sowerby I, 1835)
	<i>Diodora bombyana</i> (Swerby, 1862)
	<i>Diodora imbricate</i> (Swerby, 1862)
	<i>Emarginula dilecta</i> A. Adams, 1852
	<i>Emarginella incisura</i> (A. Adams, 1852)
	<i>Macroschisma elegans</i>
Chromodorididae	<i>Goniobranchus annulatus</i> (Eliot, 1904)
	<i>Chromodoris obsoleta</i> Rüppell & Leuckart, 1828
	<i>Glossodoris</i> cf. <i>pallida</i> (Rüppell & Leuckart, 1831)
	<i>Hypselodoris dollfusi</i> (Pruvot-Fol, 1933)
	<i>Hypselodoris maculosa</i> (Pease, 1871)
Discodorididae	<i>Discodoris</i> sp.
Dendrodorididae	<i>Dendrodoris maculosa</i>
	<i>Dendrodoris</i> cf. <i>nigra</i> (Stimpson, 1855)
	<i>Doriopsilla</i> cf. <i>miniata</i> (Alder & Hancock, 1864)
	<i>Dendrodoris fumata</i> (Rüppell & Leuckart, 1831)

Family	Species
	<i>Dendrodoris dollfusi</i>
Dorididae	<i>Sebadoris fragilis</i> (Alder & Hancock, 1864)
Dotidae	<i>Doto kya</i> Marcus, 1961
Eubranchidae	<i>Leostyletus misakiensis</i> (Baba, 1960)
Flabellinidae	<i>Flabellina amabilis</i> Hirano and Kuzirian, 1991
	<i>Flabellina bicolor</i> (Kelaart, 1858)
Phyllidiidae	<i>Phyllidia (Fryeria) rüppelii</i> Bergh, 1869
Polyceridae	<i>Plocamopherus ocellatus</i> Rüppell & Leuckart, 1831
Tergipedidae	<i>Cuthona albocrusta</i> (MacFarland, 1966)
Samlidae	<i>Samla bicolor</i> (Kelaart, 1858)
Siphonariidae	<i>Siphonaria asghar</i> (Biggs, 1958)
	<i>Siphonaria belcheri</i> Hanley, 1858
	<i>Siphonaria carbo</i> Hanley, 1858
	<i>Siphonaria crenata</i> (Blainville, 1827)
	<i>Siphonaria laciniosa</i> (Linnaeus, 1758)
	<i>Siphonaria savignui</i> Krauss, 1848
Onchidiidae	<i>Peronia peronii</i> (Cuvier, 1804)
	<i>Peronia verruculata</i> (Cuvier, 1830)
Phasianellidae	<i>Tricolia fordiana</i> (Pilsbry, 1888)
	<i>Phasianella solida</i> (Born, 1778)
Trochidae	<i>Clanculus pharaonius</i> (Linnaeus, 1758)
	<i>Clanculus tonnerrei</i> (G. Nevill & H. Nevill, 1874)
	<i>Conotalopia musiva</i> (Gould, 1861)
	<i>Ethalia carneolata</i> Melvill, 1897
	<i>Ethminolia degregorii</i> (Caramagna, 1888)
	<i>Euchelus asper</i> (Gmelin, 1791)
	<i>Gibbula declivis</i> (Forskål, 1775)
	<i>Monilea chiliarches</i> Melvill, 1910
	<i>Monilea solanderi</i> (Philippi, 1851)
	<i>Monodonta nebulosi</i> (Forskål in Niebuhr, 1775)
	<i>Monodonta vermiculata</i> (P. Fischer, 1874)
	<i>Pagodatrochus variabilis</i> (H. Adams, 1873)
	<i>Perrinia stellata</i> (A. Adams, 1864)

Family	Species
	<i>Priotrochus obscurus</i> (W. Wood, 1828)
	<i>Pseudominolia biangulosa</i> (A. Adams, 1854)
	<i>Pseudominolia gradata</i> (G. B. Sowerby III, 1895)
	<i>Stomatella auricula</i> Lamarck, 1816
	<i>Stomatella duplicata</i> (G. B. Sowerby I, 1823)
	<i>Stomatella planulata</i> (Lamarck, 1816)
	<i>Stomatia phymotis</i> Helbling, 1779
	<i>Trochus erithreus</i> Brocchi, 1823
	<i>Trochus fultoni</i> Melvill, 1898
	<i>Trochus scabrosus</i> Philippi, 1850
	<i>Umbonium vestiarum</i> Linnaeus, 1758
Turbinidae	<i>Lunella coronata</i> (Gmelin, 1791)
	<i>Leptothyra filifer</i> (Deshayes, 1863)
	<i>Turbo radiatus</i> Gmelin, 1791
Acteonidae	<i>Acteon</i> sp.
	<i>Pupa affinis</i> (A. Adams, 1855)
	<i>Acteon pulchrior</i> Melvill, 1904
Amaltheidae	<i>Amalthea tricostata</i> (Gmelin, 1791)
Amathinidae	<i>Amathina tricarinata</i> (Linnaeus, 1767)
	<i>Leucotina gratiosa</i> Melvill, 1898
Anatomidae	<i>Anatoma munieri</i> (P. Fischer, 1862)
	<i>Scissurella peilei</i>
Aplysiidae	<i>Aplysia cornigera</i> G. B. Sowerby I, 1869
Architectonicidae	<i>Architectonica</i> sp.
	<i>Heliacus</i> sp.
	<i>Pseudomalaxis zanclaeus</i> (Philippi, 1844)
Chilodontaidae	<i>Vaceuchelus foveolatus</i> (A. Adams, 1853)
	<i>Granata sulcifera</i> (Lamarck, 1822)
Limapontiidae	<i>Placida daguilarensis</i> Jensen, 1990
Liotiidae	<i>Circulus novemcarinatus</i> (Melvill, 1906)
	<i>Cyclostrema ocrinium</i> Melvill & Standen, 1901
	<i>Cyclostrema quadricarinatum</i> Melvill & Standen, 1901
	<i>Cyclostrema solariellum</i> Melvill, 1893

Family	Species
Phenacolepadidae	<i>Phenacolepas arabica</i> Thiele, 1909
	<i>Phenacolepas evansi</i> Biggs, 1973
	<i>Phenacolepas omanensis</i> Biggs, 1973
Pyramidellidae	<i>Chrysallida edgari</i> (Melvill, 1899)
	<i>Chrysallida</i> sp. 5-1
	<i>Egilina callista</i> (Melvill, 1893)
	<i>Kleinella amaena</i> A. Adams, 1853
	<i>Miralda</i> sp. 1
	<i>Odostomia eutropia</i> Melvill, 1899
	<i>Odostomia major</i> (Melvill & Standen, 1901)
	<i>Odostomia</i> sp. 1
	<i>Orinella</i> sp. 1
	<i>Oscilla faceta</i> Melvill, 1904
	<i>Oscilla</i> sp. 1
	<i>Pyramidella mitralis</i> A. Adams, 1855
	<i>Pyramidella</i> sp.
	<i>Rissosyrnola aclis</i> (A. Adams, 1853)
	<i>Syrnola aclys</i> (A. Adams, 1854)
	<i>Syrnola brunnea</i> (A. Adams, 1854)
	<i>Syrnola mekranica</i> Melvill & Standen, 1901
	<i>Syrnola</i> sp. 1
	<i>Turbonilla colpodes</i> Melvill, 1910
	<i>Turbonilla icela</i> Melvill, 1910
	<i>Turbonilla</i> sp. 2-1
	<i>Turbonilla linjaica</i> (Melvill & Standen, 1901)
	Pyramidellidae gen. sp.
Terebridae	<i>Duplicaria duplicata</i> (Linnaeus, 1758)
	<i>Duplicaria spectabilis</i> (Hinds, 1844)
	<i>Euterebra fuscobasis</i> (EA Smith, 1877)
	<i>Granuliterebra tricincta</i> (EA Smith, 1877)
Rissoellidae	<i>Rissoella</i> sp. 1
Omalogyridae	<i>Omalogyra japonica</i> (Habe, 1972)
	<i>Omalogyra</i> sp. 1

Family	Species
Ringiculidae	<i>Ringicula propinquans</i> Hinds, 1844
	<i>Ringicula cf. minuta</i> (H. Adams, 1872)
Retusidae	<i>Retusa</i> sp.
	<i>Retusa tarutana</i> Smythe, 1979
	<i>Retusa truncatula</i> (Bruguière, 1792)
Tornatinidae	<i>Tornatinidae incertae sedis inconspicua</i> (H. Adams, 1872)
	<i>Acteocina involuta</i> (G. Nevill & H. Nevill, 1871)
	<i>Tornatina persiana</i> Smith, 1872
Cylichnidae	<i>Cylichna pellyi</i>
	<i>Cylichna</i> sp. 1

Annex 8

Bivalevs reported from Kuwait.

Order	Family	Species
Adapedonta	Solenidae	<i>Solen dactylus</i> Cosel, 1989
	Hiatellidae	<i>Hiatella flaccida</i> (Gould, 1861)
Arcida	Arcidae	<i>Acar abdita</i> Oliver and Chesney, 1994
		<i>Acar plicata</i> (Dillwyn, 1817)
		<i>Anadara antiquata</i> (Linnaeus, 1758)
		<i>Anadara ehrenbergi</i> (Dunker, 1868)
		<i>Anadara secticostata</i> (Reeve, 1844)
		<i>Anadara uropigimelana</i> (Bory de Saint-Vincent, 1827)
		<i>Anadara</i> sp.
		<i>Arca</i> sp.
		<i>Barbatia trapezina</i> (Lamarck, 1819)
		<i>Barbatia amygdalumtostum</i> (Röding, 1798)
		<i>Barbatia candida</i> (Helbling, 1779)= <i>helblingii</i>
		<i>Barbatia foliata</i> (Forsskål in Niebuhr, 1775)
		<i>Barbatia fusca</i> (Bruguiere, 1789)
		<i>Barbatia lacerata</i> (Bruguière, 1789)
		<i>Barbatia setigera</i> (Reeve, 1844)
		<i>Barbatia trapezina</i> (Lamarck, 1819)
		<i>Barbatia</i> sp.
		<i>Mosambicarca erythraeonensis</i> (Jonas in Philippi, 1851)
		<i>Trisidos tortuosa</i> (Linnaeus, 1758)
	Cucullaeidae	<i>Cucullaea petita</i> Iredale, 1939
	Glycymerididae	<i>Glycymeris livida</i> (Reeve, 1843)
		<i>Glycymeris pectunculus</i> (Linnaeus, 1758)
		<i>Glycymeris striatularis</i> (Lamarck, 1819)
		<i>Tucetona audouini</i> Matsakuma, 1984
		<i>Tucetona guesi</i> (Jousseume, 1895)
	Noetiidae	<i>Congetia chesneyi</i> (Oliv. & Ches., 1994)

Order	Family	Species
		<i>Didimacar tenebrica</i> (Reeve, 1844)
		<i>Sheldonella lateralis</i> (L.A. Reeve, 1844)= cafrica
Carditida	Carditidae	<i>Beguina gubernaculum</i> (Reeve, 1843)
		<i>Carditella</i> sp.
		<i>Cardites</i> sp.
		<i>Cardites bicolor</i> (Lamarck, 1819)
		<i>Cardita finchi</i> (Melvill, 1898)
Carditida	Condylocardiidae	<i>Carditopsis majeeda</i> (Biggs, 1973)
Cardiida	Solecurtidae	<i>Solecurtus subcandidus</i> (Sturany, 1899)
Euheterodonta	Periplomatidae	<i>Periploma indicum</i> Melvill, 1898
Galeommatida	Galeommatidae	<i>Amphilepida</i> spp.
		<i>Amphilepida elongata</i> (Sowerby, 1897)
		<i>Amphilepida faba</i> (Deshayes, 1856)
		Galeommatidae sp. A
		<i>Lepirodes ambiguus</i> (Deshayes, 1856)
		<i>Marikellia pustula</i> (Deshayes, 1863)
		<i>Scintillula cf. variabilis</i> (Sturany, 1899)
		<i>Scintilla</i> sp.
		<i>Scintilla rosea</i> Deshayes, 1856
		<i>Scintilla layardi</i>
	Cardiidae	<i>Fragum sueziense</i> (Issel, 1869)
		<i>Fulvia fragilis</i> (Forsskål, 1775)
		<i>Trachycardium assimile</i> (Reeve, 1845)
		<i>Vasticardium lacunosum</i> (Reeve, 1845)
		<i>Vasticardium rubicundum</i> (Reeve, 1845)
		<i>Vasticardium flavum</i> (Linnaeus, 1758)
		Cardiidae gen. sp.
Gastrochaenida	Gastrochaenidae	<i>Cucurbitula cymbium</i> (Spengler, 1783)
		<i>Dufoichaena dentifera</i> (Dufo, 1840)
		<i>Gastrochaena cuneiformis</i> (Spengler, 1783)
		<i>Gastrochaena</i> sp.
Limida	Limidae	<i>Limatula leptocarya</i> (Melvill, 1898)
		<i>Limaria fragilis</i> (Gmelin, 1791)

Order	Family	Species		
Lucinida	Lucinidae	<i>Anodontia edentula</i> (Linnaeus, 1758)		
		<i>Bellucina seminula</i>		
		<i>Cardiolucina semperiana</i> (Issel, 1869)		
		<i>Chavanja erythraea</i> (Issel, 1869)		
		<i>Ctena divergens</i> (Philippi, 1850)		
		<i>Divalucina cumingi</i> (A. Adams & Angas, 1864)		
		<i>Euanodontia cf. ovum</i> juv. (Reeve, 1850)		
		<i>Pillucina angela</i> (Melvill, 1899)		
		<i>Rugalucina vietnamica</i> (Zorina, 1978)		
		<i>Scabrilucina victorialis</i> (Melvill, 1899)		
		Ungulinidae	<i>Transkeia raveyensis</i> (Sturany, 1899)	
		Mytiloida	Mytilidae	<i>Arcuatula japonica</i> (Dunker, 1857)
				<i>Brachidontes pharaonis</i> (Fischer, 1870)
<i>Brachidontes variabilis</i> (Krauss, 1848)				
<i>Brachidontes</i> sp.				
<i>Botula cinnamomea</i> (Gmelin, 1791)				
<i>Gregariella coralliophaga</i> (Gmelin, 1791)				
<i>Gregariella ehrenbergi</i> (Issel, 1869)				
<i>Gregariella petagnae</i> (Scacchi, 1832)				
<i>Lithophaga robusta</i> (Jousseume MS in Lamy, 1919)				
<i>Lithophaga teres</i> (Philippi, 1846)				
<i>Leiosolenus nasutus</i> (Philippi, 1846)				
<i>Leiosolenus peruvianus</i> (d'Orbigny, 1846)				
<i>Leiosolenus tripartitus</i> (Jousseume, 1894)				
<i>Leiosolenus</i> sp.				
<i>Lithodomus</i> sp.				
<i>Modiolus auriculatus</i> (Krauss, 1848)				
<i>Musculista senhousia</i> (Benson, 1842)				
<i>Musculus coenobitus</i> (Vaillant, 1865)				
<i>Musculus cf. costulatus</i> (Risso, 1826)				
<i>Musculus viridulus</i> (H. Adams, 1871)				
<i>Rhomboidella vaillanti</i> (Issel, 1869)				
<i>Septifer bilocularis</i> Linnaeus, 1758)				

Order	Family	Species
Myida	Pholadidae	<i>Aspidopholas tubigera</i> (Valenciennes, 1846)
Nuculida	Yoldiidae	<i>Scissileta tropica</i> (Melvill, 1897)
	Nuculanidae	<i>Ennucula layardii</i> (A. Adams, 1856)
		<i>Nucula inconspicua</i> H. Adams, 1871
		<i>Nucula</i> sp.
		<i>Saccella brookei</i> (Hanley, 1860)
Ostreida	Ostreidae	<i>Alectryonella plicatula</i> (Gmelin, 1791)
		<i>Alectryonella</i> cf. <i>crenulifera</i> (Sowerby, 1871)
		cf. <i>Booneostrea subucula</i> (Lamy, 1925)
		cf. <i>Nanostrea deformis</i> (Lamarck, 1819)
		<i>Lopha cristagalli</i> (Linnaeus, 1758)
		<i>Crassostrea</i> sp.
		<i>Ostrea</i> sp.
		<i>Minnivola pyxidata</i> (Born, 1778)
		<i>Saccostrea cucullata</i> (Born, 1778)
	Gryphaeidae	<i>Hyotissa hyotis</i> (Linnaeus, 1758)
	Malleidae	<i>Malleus anatinus</i> (Gmelin, 1791)
		<i>Malleus regula</i> (Forsskål in Niebuhr, 1775)
		<i>Malleus</i> sp.
	Pinnidae	<i>Pinna bicolor</i> Gmelin, 1791
		<i>Pinna muricata</i> Linnaeus, 1758
	Isognomonidae	<i>Isognomon legumen</i> (Gmelin, 1791)
		<i>Isognomon nucleus</i> (Lamarck, 1819)
	Pteriidae	<i>Pinctada margaritifera</i> (Linnaeus, 1758)
		<i>Parviperna dentifera</i>
		<i>Pinctada radiata</i> (Leach, 1814)
		<i>Pteria hirundo</i> (Linnaeus, 1758)
		<i>Pteria tortirostris</i> (Dunker, 1849)
Pectinida	Pectinidae	<i>Azumapecten ruschenbergerii</i> (Tryon, 1869)
		<i>Chlamys livida</i> (Lamarck, 1819)
		<i>Mimachlamys crassicostata</i> (Sowerby II, 1842)
		<i>Mimachlamys sanguinea</i> (Linnaeus, 1758)
	Plicatulidae	<i>Plicatula complanata</i> (Deshayes in Maillard, 1863)

Order	Family	Species
	Placunidae	<i>Placuna placenta</i> (Linnaeus, 1758)
	Spondylidae	<i>Plicatula plicata</i> (Linnaeus, 1767)
		<i>Spondylus gaederopus</i> Linnaeus, 1758
		<i>Spondylus nicobaricus</i> Schreibers, 1793
		<i>Spondylus marisrubri</i> Röding, 1798
		<i>Spondylus spinosus</i> Schreibers, 1793
		<i>Spondylus variegatus</i> Schreibers, 1793
	Yoldiidae	<i>Scissileta nicobarica</i> (Bruguière, 1789)
Venerida	Veneridae	<i>Callista florida</i> (Lamarck, 1818)
		<i>Callista umbonella</i> (Lamarck, 1818)
		<i>Circe scripta</i> (Linnaeus, 1758)
		<i>Circenita callipyga</i> (Born, 1778)
		<i>Clementia papyracea</i> (Gray, 1825)
		<i>Dosinia alta</i> (Dunker, 1849)
		<i>Dosinia erythraea</i> Römer, 1860
		<i>Dosinia contracta</i> (Philippi, 1844)
		<i>Dosinia</i> sp.
		<i>Dosinella caelata</i> (Reeve, 1850)
		<i>Gafrarium pectinatum</i> (Linnaeus, 1758)
		<i>Gouldiopa consternans</i> (Oliver & Zuschin, 2001)
		<i>Irus macrophylla</i> (Deshayes, 1853)
		<i>Lioconcha ornata</i> (Dillwyn, 1817)
		<i>Marcia cordata</i> (Forsskål in Niebuhr, 1775)
		<i>Marcia opima</i> (Gmelin, 1791)
		<i>Marcia recens</i> (Holten, 1802)
		<i>Paphia</i> sp.
		<i>Paratapes textilis</i> (Gmelin, 1791)
		<i>Paratapes undulatus</i> (Born, 1778)
		<i>Placamen lamellatum</i> (Röding, 1798)
		<i>Pelecypora ceylonica</i> (Dunker, 1865)
		<i>Petricola fabagella</i> (Lamarck, 1818)
		<i>Placamen lamellata</i> (Röding, 1798)
		<i>Protapes cor</i> (Lamarck, 1818)

Order	Family	Species
		<i>Protapes rhamphodes</i> (Oliver & Glover, 1996)
		<i>Tapes deshayesi</i> (Sowerby, 1852)
		<i>Tapes sulcarius</i> (Lamarck, 1818)
		<i>Timoclea arakana</i> (Nevill & Nevill, 1971)
		<i>Venerupis rugosa</i> (Sowerby, 1854)
	Chamidae	<i>Chama brassica</i> Reeve, 1847
		<i>Chama pacifica</i> Broderip, 1835
		<i>Chama</i> sp.
		<i>Circe intermedia</i> Reeve, 1863
	Ungulinidae	<i>Diplodonta (Felaniella) crebristriata</i> (Sowerby, 1905)
		<i>Diplodonta (Transkeia) globosa</i> (Forsskål in Niebuhr, 1775)
		<i>Diplodonta (Transkeia) moolenbeeki</i> (Aartsen & Goud, 2006)
		<i>Diplodonta genethlia</i> Melvill, 1898
		<i>Diplodonta holosphaera</i> (Melvill, 1899)
		<i>Diplodonta</i> sp.
		<i>Diplodonta subrotunda</i> (Issel, 1869)
	Corbulidae	<i>Corbula sulculosa</i> H. Adams, 1870
		<i>Corbula taitensis</i> Lamarck, 1818
		<i>Corbula</i> cf. <i>subquadrata</i> (Melv. & Standen, 1907)
	Lasaeidae	<i>Curvimysella</i> sp.
		<i>Kellia leucedra</i> (Melvill & Standen, 1907)
		<i>Mysella</i> sp. 1
		<i>Mysella</i> sp. 2
		<i>Mysella</i> sp. 3
	Donacidae	<i>Donax</i> sp.
		<i>Donax</i> cf. <i>erythraeensis</i> (Bertin, 1881)
	Psammobiidae	<i>Asaphis violascens</i> (Forsskål, 1775)
		<i>Gari maculosa</i> (Lamarck, 1818)
		<i>Gari</i> cf. <i>insignis</i> (Deshayes, 1855)
		<i>Hiatula ruppelliana</i> (Reeve, 1857)
		<i>Hiatula rosea</i> (Gmelin, 1791)
	Lucinidae	<i>Loripes</i> sp.
	Mactridae	<i>Mactra lilacea</i> Lamarck, 1818

Order	Family	Species
		<i>Maetrinula</i> sp.
		<i>Mactrotoma depressa</i> (Spengler, 1793)
	Mesodesmatidae	<i>Atactodea subobtusa</i> (Jousseame, 1895)
	Semelidae	<i>Cumingia mutica</i> (G. B. Sowerby I, 1833)
		<i>Ervilia purpurea</i> (Smith, 1906)
		<i>Ervilia scaliola</i> (Issel, 1869)
		<i>Ervilia</i> sp.
		<i>Semelangulus rosamunda</i> (Melv. & St., 1907)
		<i>Semele cordiformis</i> (Holten, 1802)
		<i>Syndesmya</i> sp.
		<i>Theora cadabra</i> (Eames and Wilkins, 1957)
	Tellinidae	<i>Confusella muscatensis</i> (Oliver & Chesney, 1997)
		<i>Hanleyanus immaculatus</i> (Philippi, 1849)
		<i>Iridona methoria</i> (Melvill, 1897)
		<i>Jactellina clathrata</i> (Deshayes, 1835)
		<i>Jitlada arsinoensis</i> (Issel, 1969)
		<i>Macomopsis dubia</i> (Deshayes., 1835)
		<i>Nitidotellina unifasciata</i> (Sowerby, 1867)
		<i>Pseudotellidora pellyana</i> (A. Adams, 1873)
		<i>Tellinimactra edentula</i> (Spengler, 1798)
		<i>Tellina arsinoensis</i> Issel, 1869
		<i>Tellina donacina</i> (Linnaeus, 1758)
		<i>Tellina methoria</i> Melvill, 1897
		<i>Tellina (Pinguitellina) pinguis</i> (Hanley, 1844)
		<i>Tellina valtonis</i> Hanley, 1844
		<i>Tellina vernalis</i> Hanley, 1844
		<i>Tellina</i> sp.
		<i>Soletellina rosea</i> (Gmelin, 1791)
		<i>Loxoglypta rhomboides</i> (Quoy and Gaimard, 1835)
	Trapezidae	<i>Neotrapezium sublaevigatum</i> (Lamarck, 1819)
Superorder Anomalodesmata	Thraciidae	<i>Thracia cf. adenensis</i> (Melvill, 1898)
	Laternulidae	<i>Laternula erythraea</i> (Morris & (Morris, 1993)

Annex 9

Dinoflagellates reported from Kuwait.

Class	Order	Family	Species		
Dinophyceae	Prorocentrales	Prorocentraceae	<i>Prorocentrum</i> sp.1		
			<i>Prorocentrum balticum</i> (Lohmann) Loeblich III 1970		
			<i>Prorocentrum compressum</i> (Baily) Abé ex Dodge 1975		
			<i>Prorocentrum gracile</i> Schütt 1895		
			<i>Prorocentrum lima</i> (Ehrenberg) Stein 1878		
			<i>Prorocentrum micans</i> Ehrenberg 1833		
			<i>Prorocentrum rhathymum</i> Loeblich III, Sherley and Schmidt 1979		
			<i>Prorocentrum triestinum</i> Schiller 1918		
Desmophyceae	Dinophysiales	Dinophysiaceae	<i>Dinophysis acuta</i> Ehrenberg 1841		
			<i>Dinophysis caudata</i> Saville-Kent 1881		
			<i>Dinophysis miles</i> Cleve		
			<i>Dinophysis mitra</i> (Schutt) Abé 1967		
			<i>Dinophysis norvegica</i> Claparède and Lachmann 1859		
			<i>Dinophysis rotundata</i> Claparède and Lachmann 1859		
			<i>Histioneis costata</i> Kofoid and Michener 1911		
			<i>Ornithocercus magnificus</i> Stein 1883		
			<i>Pseudophalacroma nasutum</i> Kofoid and Skogberg 1928		
			Gymnodiniales	Gymnodiniaceae	<i>Amphidinium</i> sp. 1
					<i>Cochlodinium</i> sp. 1
					<i>Akashiwo sanguinea</i> (Hirasaka) G. Hansen et Moestrup 2000
					<i>Gymnodinium</i> spp. cf. aff. <i>gracilentum</i>
					<i>Gyrodinium</i> sp. 1
<i>Katodinium glaucum</i> (Lebour) Loeblich III 1965					
		Kareniaceae	<i>Torodinium robustum</i> Kofoid and Swezy 1921		
			<i>Karenia selliformis</i> Haywood, Steidinger and Mackenzie 2004		
		Polykrikaceae	<i>Karenia cf. brevis</i> (Davis) G. Hansen and Moestrup 2000		
			<i>Polykrikos schwartzii</i> Bütschli 1873		
	Noctilucales	Noctilucaceae	<i>Noctiluca scintillans</i> (Macartney 1836) Kofoid and Swezy 1921		

Class	Order	Family	Species
			<i>Pronoctiluca pelagica</i> Fabre-Domergue 1889
	Gonyaulales	Ceratiaceae	<i>Ceratium breve</i> (Ostenfeld and Schmidt) Schröder 1906
			<i>Ceratium furca</i> (Ehrenberg 1836) Claparède and Lachmann 1859
			<i>Ceratium fusus</i> (Ehrenberg 1834) Dujardin 1841
			<i>Ceratium lineatum</i> (Ehrenberg) Cleve 1899
			<i>Ceratium massiliense</i> (Gourret) Jörgensen 1911
			<i>Ceratium trichoceros</i> (Ehrenberg) Kofoid 1908
			<i>Ceratium tripos</i> (O. F. Müller 1781) Nitzsch 1817
			<i>Ceratium</i> sp. 1
		Cladopyxidaceae	<i>Cladopyxis hemibrachiata</i> Balech 1964
		Goniodomataceae	<i>Alexandrium insuetum</i> Balech 1985
			<i>Alexandrium leei</i> Balech 1985
			<i>Alexandrium minutum</i> Halim 1960
			<i>Alexandrium tamarense</i> (Lebour) Balech 1985
			<i>Alexandrium</i> sp. 1
			<i>Goniodoma polyedricum</i> (Pouchet) Jörgensen 1899
			<i>Pyrodinium bahamense</i> var. <i>compressum</i> (Böhm) Steidenger, Tester, & Taylor 1980
		Gonyaulacaceae	<i>Gonyaulax polygramma</i> Stein 1883
			<i>Gonyaulax</i> sp.1
			<i>Lingulodinium polyedrum</i> (Stein) Dodge 1989
			<i>Protoceratium reticulatum</i> (Claparède & Lachmann) Bütschli 1885
			<i>Protoceratium</i> sp. 1
		Oxytoxaceae	<i>Corythodinium tessellatum</i> (Stein) Loeblich Jr. & Loeblich III 1966
			<i>Oxytoxum gracile</i> Schiller 1937
			<i>Oxytoxum sceptrum</i> (Stein) Schröder 1906
			<i>Oxytoxum</i> sp. 1
		Pyrocystaceae	<i>Pyrocystis obtusa</i> Pavillard 1931
			<i>Pyrocystis fusiformis</i> Wyville-Thomson in Murray 1885
		Pyrophacaceae	<i>Pyrophacus horologicum</i> Stein 1883
			<i>Pyrophacus steinii</i> (Schiller) Wall & Date 1971
		Calciodinellaceae	<i>Scrippsiella trochoidea</i> (Stein) Loeblich III 1976
	Peridinales	Kolkwitzellaceae	<i>Diplopsalis lenticula</i> Bergh 1881
			<i>Diplopsalopsis</i> Meunier 1910

Class	Order	Family	Species
			<i>Diplopsalopsis orbicularis</i> (Paulsen) Meunier 1910
			<i>Diplopelta parva</i> (Abé) Matsuoka 1988
			<i>Oblea rotunda</i> (Lebour) Sournia 1973
			<i>Preperidinium meunieri</i> (Pavillard) Elbrächter 1993
		Peridiniaceae	<i>Heterocapsa</i> sp.1
		Protoperidiniaceae	<i>Protoperidinium biconicum</i> (Dangeard) Balech
			<i>Protoperidinium bipes</i> (Paulsen 1904) Balech 1974
			<i>Protoperidinium cerasus</i> (Paulsen 1904) Balech 1974
			<i>Protoperidinium claudicans</i> (Paulsen) Balech 1974
			<i>Protoperidinium conicum</i> (Gran) Balech 1974
			<i>Protoperidinium crassipes</i> (Kofoid) Balech 1974
			<i>Protoperidinium curtipes</i> (Jørgensen) Balech 1974
			<i>Protoperidinium depressum</i> (Bailey 1855) Balech
			<i>Protoperidinium divergens</i> (Ehrenberg) Balech 1974
			<i>Protoperidinium elegans</i> (Cleve) Balech 1974
			<i>Protoperidinium grande</i> Kofoid 1907
			<i>Protoperidinium leonis</i> (Pavillard) Balech 1974
			<i>Protoperidinium marie-lebourae</i> (Paulsen) Balech 1974
			<i>Protoperidinium minutum</i> (Kofoid) Leoblich III 1970
			<i>Protoperidinium murrayi</i> Kofoid 1907
			<i>Protoperidinium ovatum</i> Pouchet 1833
			<i>Protoperidinium pellucidum</i> (Bergh) Balech 1974
			<i>Protoperidinium pentagonum</i> Gran 1902
			<i>Protoperidinium punctulatum</i> (Paulsen 1907) Balech
			<i>Protoperidinium spiniferum</i> (Schiller) Balech 1974
			<i>Protoperidinium steinii</i> (Jørgensen) Balech 1974
			<i>Protoperidinium subinermis</i> (Paulsen) Leoblich III 1970
			<i>Protoperidinium thorianum</i> (Paulsen) Balech 1974
			<i>Protoperidinium ventricum</i> (Abé) Balech 1974
			<i>Protoperidinium</i> sp. 1
			<i>Blepharocysta splendormaris</i> Ehrenberg 1859
		Podolampaceae	<i>Podolampas palmipes</i> Stein 1883
			<i>Podolampas bipes</i> Stein 1883

Annex 10

Diatoms reported from Kuwait.

Class	Order	Family	Species	
Coccinodiscophyceae	Rhizosoleniales	Probosciceae	<i>Proboscia alata</i> (Brightwell) Sundström	
			<i>Proboscia indica</i> (Péragallo) Hernández-Becerril	
		Rhizosoleniaceae	<i>Dactyliosolen phuketensis</i> (Sundström) Hasle	
			<i>Guinardia delicatula</i> (Cleve) Hasle	
			<i>Guinardia flaccida</i> (Castracane) Péragallo	
			<i>Neocalyptrella robusta</i> (Norman ex Ralfs) Hernández-Becerril et Meave	
			<i>Pseudosolenia calcar-avis</i> (Schultze) Sundström	
			<i>Rhizosolenia bergonii</i> Péragallo	
			<i>Rhizosolenia (Pseudosolenia?) cochlea</i> Brun	
			<i>Rhizosolenia hyalina</i> Ostefeld	
			<i>Rhizosolenia imbricata</i> Brightwell	
			<i>Rhizosolenia setigera</i> Brightwell	
		Triceratiales	Triceratiaceae	<i>Triceratium dubium</i> Brightwell
				<i>Triceratium robertsonianum</i> Greville
	Stephanopyxales	Stephanopyxidaceae	<i>Stephanopyxis palmeriana</i> (Greville) Grunow	
	Corethrales	Corethraceae	<i>Corethron histrix</i> Hensen	
	Asterolamprales	Asterolampraceae	<i>Asteromphalus cleveanus</i> Grunow	
			<i>Asteromphalus flabellatus</i> (Brébisson) Greville	
			<i>Asteromphalus heptactis</i> (Brébisson) Ralfs	
			<i>Asteromphalus sarcophagus</i> Wallich	
	Coccinodiscales	Aulacodiscaceae	<i>Schuettia annulata</i> var. <i>minor</i> (Grunow) De Toni	
		Coccinodiscaceae	<i>Coccinodiscus asteromphalus</i> Ehrenberg	
			<i>Coccinodiscus granii</i> Gough	
			<i>Coccinodiscus janischii</i> Schmidt var. <i>arafurensis</i> Grunow	
			<i>Coccinodiscus marginatus</i> Ehrenberg	
			<i>Coccinodiscus nobilis</i> Grunow	
			<i>Coccinodiscus oculus-iridis</i> Ehrenberg	
			<i>Coccinodiscus perforatus</i> Ehrenberg	

Class	Order	Family	Species
			<i>Coscinodiscus radiatus</i> Ehrenberg
			<i>Coscinodiscopsis jonesiana</i> (Greville) Sar et Sunesen
			<i>Palmerina hardmaniana</i> Hasle
		Heliopeltaceae	<i>Actinoptychus senarius</i> (Ehrenberg) Ehrenberg
		Hemidiscaceae	<i>Actinocyclus curvatulus</i> Janisch
			<i>Actinocyclus exiguus</i> Fryxell et Semina
			<i>Actinocyclus octonarius</i> Ehrenberg
			<i>Actinocyclus octonarius</i> var. <i>crassus</i> (Smith) Hendey
			<i>Actinocyclus octonarius</i> var. <i>ralfsii</i> (Smith) Hendey
			<i>Actinocyclus octonarius</i> var. <i>tenellus</i> (Brébisson) Hendey
			<i>Actinocyclus subtilis</i> (Gregory) Ralfs
			<i>Actinocyclus</i> sp.
			<i>Roperia tessellata</i> (Roper) Grunow
			<i>Hemidiscus cuneiformis</i> Wallich
	Stellarimales	Stellarimaceae	<i>Stellarima stellaris</i> (Roper) Hasle et Sims
	Melosirales	Hyalodiscaceae	<i>Podosira stelligera</i> (Bailey) Mann
		Paraliaceae	<i>Paralia sulcata</i> (Ehrenberg) Cleve
Mediophyceae	Biddulphiales	Attheyaceae	<i>Attheya decora</i> West
		Bellocheaceae	<i>Bellochea horologicalis</i> von Stosch
			<i>Bellochea malleus</i> (Brightwell) Van Heurck
			<i>Bellochea</i> cf. <i>yucatanensis</i> von Stosch
		Biddulphiaceae	<i>Biddulphia pulchella</i> Gray
			<i>Biddulphia tuomeyi</i> (Bailey) Roper
			<i>Eucampia cornuta</i> (Cleve) Grunow
			<i>Eucampia zodiacus</i> Ehrenberg
	Briggerales	Streptothecaceae	<i>Helicotheca tamesis</i> (Shrubsole) Ricard
			<i>Streptotheca indica</i> Karsten
	Chaetocerotales	Chaetocerotaceae	<i>Bacteriastrum comosum</i> var. <i>hispidum</i> (Castracane) Ikari
			<i>Bacteriastrum delicatulum</i> Cleve
			<i>Bacteriastrum furcatum</i> Shadbolt
			<i>Bacteriastrum hyalinum</i> Lauder
			<i>Chaetoceros affinis</i> Lauder
			<i>Chaetoceros brevis</i> Schütt

Class	Order	Family	Species
			<i>Chaetoceros coarctatus</i> Lauder
			<i>Chaetoceros compressus</i> Lauder
			<i>Chaetoceros costatus</i> Pavillard
			<i>Chaetoceros curvisetus</i> Cleve
			<i>Chaetoceros danicus</i> Cleve
			<i>Chaetoceros decipiens</i> Cleve
			<i>Chaetoceros denticulatus</i> Lauder
			<i>Chaetoceros diadema</i> (Ehrenberg) Gran
			<i>Chaetoceros didymus</i> Ehrenberg
			<i>Chaetoceros distans</i> Cleve
			<i>Chaetoceros diversus</i> Cleve
			<i>Chaetoceros lacinosus</i> Schütt
			<i>Chaetoceros lauderi</i> Ralfs
			<i>Chaetoceros lorenzianus</i> Grunow
			<i>Chaetoceros paradoxus</i> Cleve
			<i>Chaetoceros peruvianus</i> Brightwell
			<i>Chaetoceros peruvianus</i> Brightwell f. <i>gracilis</i> (Schröder) Hustedt
			<i>Chaetoceros protuberans</i> Lauder
			<i>Chaetoceros pseudobrevis</i> Pavillard
			<i>Chaetoceros pseudocurvisetus</i> Mangin
			<i>Chaetoceros seiracanthus</i> Gran
			<i>Chaetoceros socialis</i> Lauder
			<i>Chaetoceros subtilis</i> var. <i>abnormis</i> Proskina-Lavrenko
			<i>Chaetoceros tenuissimus</i> Meunier
			<i>Chaetoceros teres</i> Gran
			<i>Chaetoceros tortissimus</i> Gran
			<i>Chaetoceros vanheurckii</i> Gran
		Leptocylindraceae	<i>Leptocylindrus danicus</i> Cleve
			<i>Leptocylindrus mediterraneus</i> (Pérageallo) Hasle
			<i>Leptocylindrus minimus</i> Gran
	Hemiaulales	Hemiaulaceae	<i>Cerataulina bicornis</i> (Ehrenberg) Hasle
			<i>Cerataulina dentata</i> Hasle
			<i>Cerataulina pelagica</i> (Cleve) Hendeby

Class	Order	Family	Species
			<i>Climacodium frauenfeldianum</i> Grunow
			<i>Hemiaulus hauckii</i> Grunow
			<i>Hemiaulus membranaceus</i> Cleve
			<i>Hemiaulus sinensis</i> (chinensis) Greville
	Cymatosirales	Cymatosiraceae	<i>Cymatosira lorenziana</i> Grunow
	Eupodiscales	Eupodiscaceae	<i>Odontella aurita</i> (Lyngbye) Agardh
			<i>Odontella weissflogii</i> (Grunow) Grunow
			<i>Trieres mobiliensis</i> (Bailey) Ashworth et Theriot
			<i>Trieres sinensis</i> (chinensis) (Greville) Ashworth et Theriot
	Lithodesmiales	Lithodesmiaceae	<i>Ditylim brightwellii</i> (West) Grunow ex Van Heurck
			<i>Ditylim sol</i> (Grunow ex Van Heurck) de Toni
	Stephanodiscales	Stephanodiscaceae	<i>Cyclotella atomus</i> Husted
			<i>Cyclotella choctawhatcheeana</i> Prasad
			<i>Cyclotella litoralis/cubiculata</i> complex: <i>Cyclotella cubiculata</i> Sar, Sunesen et Lavigne
			<i>Cyclotella stylorum</i> Brightwell
	Thalassiosirales	Lauderiaceae	<i>Lauderia annulata</i> Cleve
		Skeletonemataceae	<i>Skeletonema grevillei</i> Sarno et Zingone
		Thalassiosiraceae	<i>Cymatotheca minima</i> Voigt
			<i>Detonula pumila</i> (Castracane) Gran
			<i>Planktoniella sol</i> (Wallich) Schütt
			<i>Porosira pentaportula</i> Syvertsen et Lange
			<i>Shionodiscus oestrupii</i> var. <i>venrickiae</i> (Fryxell et Hasle) Alverson, Kang et Theriot
			<i>Thalassiosira andamanica</i> Gedde
			<i>Thalassiosira cathariensis</i> García
			<i>Thalassiosira</i> cf. <i>concava</i> Semina
			<i>Thalassiosira concaviuscula</i> Makarova
			<i>Thalassiosira decipiens</i> (Grunow) Jørgensen
			<i>Thalassiosira delicatula</i> Ostenfeld
			<i>Thalassiosira diporocyclus</i> Hasle
			<i>Thalassiosira eccentrica</i> (Ehrenberg) Cleve
			<i>Thalassiosira exigua</i> Fryxell et Hasle
			<i>Thalassiosira hendeyi</i> Hasle et Fryxell

Class	Order	Family	Species
			<i>Thalassiosira lineata</i> Jousé
			<i>Thalassiosira lundiana</i> Fryxell
			<i>Thalassiosira mala</i> Takano
			<i>Thalassiosira minima</i> Gaarder
			<i>Thalassiosira minuscula</i> Krasske
			<i>Thalassiosira nanolineata</i> (Mann) Fryxell et Hasle
			<i>Thalassiosira simonsenii</i> Hasle et Fryxell
			<i>Thalassiosira sinica</i> Li et Guo
			<i>Thalassiosira teleata</i> Takano
			<i>Thalassiosira tenera</i> Proschkina-Lavrenko
			<i>Tryblioptychus cocconeiformis</i> (Grunow) Hendey
Bacillariophyceae	Rhaphoneidales	Rhaphoneidaceae	<i>Asterionellopsis glacialis</i> (Castracane) Round ex Round, Crawford et Mann
			<i>Delphineis surirella</i> (Ehrenberg) Andrews
			<i>Diplomenora cocconeiformis</i> (Schmidt) Blazé
			<i>Perissonoë cruciata</i> (Janisch et Rabenhorst) Andrews et Stoelzel
	Licmophorales	Licmophoraceae	<i>Licmophora abbreviata</i> Agardh
	Rhabdonematales	Grammatophoraceae	<i>Grammatophora oceanica</i> Ehrenberg
	Thalassionematales	Thalassionemataceae	<i>Thalassionema frauenfeldii</i> (Grunow) Tempère et Pérageallo
			<i>Thalassionema nitzschioides</i> (Grunow) Mereschkowsky
			<i>Thalassionema pseudonitzschioides</i> (Schuette et Schrader) Hasle
	Cocconeidales	Cocconeidaceae	<i>Anorthoneis excentrica</i> (Donkin) Grunow
			<i>Cocconeis coronatoides</i> Riaux-Gobin et Romero
			<i>Cocconeis neothumensis</i> var. <i>marina</i> De Stefano, Marino et Mazella
			<i>Cocconeis placentula</i> var. <i>euglypta</i> (Ehrenberg) Grunow
			<i>Cocconeis scutellum</i> Ehrenberg sensu lato
	Lyrellales	Lyrellaceae	<i>Lyrella abrupta</i> (Gregory) Mann
			<i>Lyrella lyroides</i> (Hendey) Mann
			<i>Petroneis granulata</i> (Bailey) Mann
			<i>Petroneis marina</i> (Ralfs) Mann
	Mastogloiales	Mastogloiaceae	<i>Mastogloia rostrata</i> (Wallich) Hustedt
	Naviculales	Diploneidaceae	<i>Diploneis weissflogii</i> (Schmidt) Cleve
		Naviculaceae	<i>Caloneis elongata</i> (Grunow) Boyer
			<i>Gyrosigma balticum</i> (Ehrenberg) Rabenhorst

Class	Order	Family	Species
			<i>Gyrosigma tenuissimum</i> (Smith) Griffith et Henfrey
			<i>Haslea gigantea</i> (Hustedt) Simonsen
			<i>Haslea howeana</i> (Hagelstein) Giffen
			<i>Haslea</i> cf. <i>meteorou</i> Hinz et Sterrenburg
			<i>Haslea wawriake</i> (Hustedt) Simonsen emend. Sterrenburg et Hinz
			<i>Mastoneis biformis</i> (Grunow) Cleve
			<i>Navicula directa</i> (Smith) Ralfs
			<i>Navicula palpebralis</i> Brébisson ex Smith
			<i>Seminavis robusta</i> Danielidis et Mann
			<i>Trachyneis antillarum</i> (Cleve et Grunow) Cleve
			<i>Trachyneis aspera</i> (Ehrenberg) Cleve
			<i>Trachyneis debyi</i> (Leudiger-Fortmorel) Cleve
		Plagiotropidaceae	<i>Ephamera planamembrancea</i> (Hendey) Paddock
			<i>Plagiolemma confusa</i> (Hendey) Paddock
			<i>Meuniera membranacea</i> (Cleve) Silva
			<i>Plagiotropis lepidoptera</i> (Gregory) Kuntze
			<i>Plagiotropis tayrecta</i> Paddock
		Pleurosigmataceae	<i>Pleurosigma decorum</i> Smith
			<i>Pleurosigma diversestriatum</i> Meister
			<i>Pleurosigma elongatum</i> Smith
			<i>Pleurosigma falx</i> Mann
			<i>Pleurosigma formosum</i> Smith
			<i>Pleurosigma inflatum</i> Shadbolt
			<i>Pleurosigma inscriptura</i> Harper
			<i>Pleurosigma intermedium</i> Smith
			<i>Pleurosigma javanicum</i> Grunow
			<i>Pleurosigma speciosum</i> var. <i>javanicum</i> Pérégallo
			<i>Pleurosigma strigosum</i> Smith
			<i>Toxonidea insignis</i> Donkin
		Amphipleuraceae	<i>Amphiprora angustata</i> Hendey
			<i>Amphiprora gigantea</i> var. <i>sulcata</i> (O'Meara) Cleve
		Berkeleyaceae	<i>Climaconeis lorenzii</i> Grunow
			<i>Climaconeis undulata</i> (Meister) Lobban, Ashworth et Theriot

Class	Order	Family	Species
			<i>Climaconeis</i> sp.
	Bacillariales	Bacillariaceae	<i>Bacillaria paxillifera</i> (Müller) Marsson
			<i>Cylindrotheca closterium</i> (Ehrenberg) Reimann et Lewin
			<i>Cymatonitzschia marina</i> (Lewis) Simonsen
			<i>Giffenia cocconeiformis</i> (Grunow) Round et Basson
			<i>Gomphotheca sinensis</i> (Skvortzov) Hendey et Sims
			<i>Nitzschia amabilis</i> Suzuki
			<i>Nitzschia bicapitata</i> Cleve
			<i>Nitzschia braarudii</i> Hasle
			<i>Nitzschia dissipata</i> (Kützing) Rabenhorst
			<i>Nitzschia distans</i> Gregory
			<i>Nitzschia distans</i> var. <i>tumescens</i> Grunow
			<i>Nitzschia fluminensis</i> Grunow
			<i>Nitzschia hybrida</i> Grunow
			<i>Nitzschia lanceolata</i> Smith
			<i>Nitzschia longissima</i> (Brébisson) Ralfs
			<i>Nitzschia lorenziana</i> Grunow
			<i>Nitzschia pellucida</i> Grunow
			<i>Nitzschia reversa</i> Smith
			<i>Nitzschia sigma</i> (Kützing) Smith
			<i>Nitzschia sigmaformis</i> Hustedt
			<i>Nitzschia spatulata</i> Brébisson
			<i>Nitzschia ventricosa</i> Kitton
			<i>Nitzschia</i> sp. 1
			<i>Nitzschia</i> sp. 2
			<i>Psammodictyon panduriforme</i> (Gregory) Mann
			<i>Psammodictyon roridum</i> (Giffen) Mann
			<i>Tryblionella coarctata</i> (Grunow) Mann
			<i>Tryblionella compressa</i> (Bailey) Poulin
			<i>Pseudo-nitzschia americana</i> (Hasle) Fryxell
			<i>Pseudo-nitzschia</i> cf. <i>calliantha</i> Lundholm, Moestrup et Hasle
			<i>Pseudo-nitzschia pungens</i> (Grunow ex Cleve) Hasle
			<i>Pseudo-nitzschia</i> sp. 1

Class	Order	Family	Species
			<i>Pseudo-nitzschia</i> sp. 2
	Surirellales	Entomoneidaceae	<i>Entomoneis alata</i> (Ehrenberg) Ehrenberg
			<i>Entomoneis paludosa</i> (Smith) Reimer
			<i>Entomoneis punctulata</i> (Grunow) Osada et Kobayasi
		Surirellaceae	<i>Campylodiscus</i> cf. <i>fastuosus</i> Ehrenberg
			<i>Campylodiscus iyengarii</i> Subrahmanyam
			<i>Campylodiscus</i> sp.
			<i>Coronia daemeliana</i> (Grunow) Ruck et Guiry
			<i>Petrodictyon gemma</i> (Ehrenberg) Mann
			<i>Surirella comis</i> Schmidt
			<i>Surirella fastuosa</i> (Ehrenberg) Kützing
	Mastogloiales	Mastogloiaceae	<i>Tetramphora decussata</i> (Grunow) Stepanek et Kociolek
			<i>Tetramphora lineolata</i> (Ehrenberg) Mereschkowsky
			<i>Tetramphora lineolatoides</i> Spepanek et Kociolek
			<i>Tetramphora ostrearia</i> (Brébisson) Mereschkowsky
	Thalassiosphaerales	Catenulaceae	<i>Amphora hyalina</i> Kützing
			<i>Amphora laevis</i> Gregory
		Thalassiosphaeraceae	<i>Thalassiosphaera hyalina</i> (Greville) Paddock et Sims

Annex 11

Dicotyledoneae recorded from Kuwait.

Family	Species
Acanthaceae	<i>Avicennia marina</i> (Forssk.) Vierh.
Aizoaceae	<i>Aizoon canariense</i> L.
	<i>Aizoanthemum hispanicum</i> (L.)
	<i>Mesembryanthemum nodiflorum</i> L.
Amaranthaceae	<i>Aerva javanica</i> (Burm. f.)
	<i>Agathophora alopecuroides</i> (Delile) Fenzl. ex Bunge
	<i>Amaranthus graecizans</i> L.
	<i>Amaranthus hybridus</i> L.
	<i>Amaranthus lividus</i> L.
	<i>Anabasis lachnantha</i> Aellen & Rech.
	<i>Anabasis setifera</i> Moq.
	<i>Atriplex dimorphostegia</i> Kar. & Kir.
	<i>Atriplex leucoclada</i> Boiss
	<i>Bassia eriophora</i> (Schrad.) Asch.
	<i>Bassia muricata</i> (L.) Asch
	<i>Bassia scoparia</i> (L.)
	<i>Beta vulgaris</i> L.
	<i>Bienertia sinuspersici</i> Akhani
	<i>Caroxylon cyclophyllum</i> (Baker) Akhani & Roalson
	<i>Caroxylon imbricatum</i> (Forssk.) Akhani & Roalson
	<i>Chenopodiastrum murale</i> (L.) S.Fuentes, Uotila & Borsch
	<i>Chenopodium album</i> L.
	<i>Chenopodium ficifolium</i> Sm., F
	<i>Chenopodium glaucum</i> L.
	<i>Chenopodium opulifolium</i> Schrad.
	<i>Cornulaca aucheri</i> Moq
	<i>Cornulaca monacantha</i> Delile
	<i>Halocnemum strobilaceum</i> (Pall.) M. Bieb.

Family	Species
	<i>Halothamnus iraqensis</i> Botsch.
	<i>Hammada salicornica</i> (Moq.) Iljin
	<i>Salicornia europaea</i> L.
	<i>Seidlitzia rosmarinus</i> Bunge ex Boiss.
	<i>Suaeda aegyptiaca</i> (Hasselq.) Zohary
	<i>Suaeda vermiculata</i> Forssk. ex J.F. Gmel
	<i>Traganum nudatum</i> Delile
Apiaceae	<i>Ammi majus</i> L.
	<i>Anisosciadium isosciadium</i> Bornm.
	<i>Anisosciadium lanatum</i> Boiss.
	<i>Bupleurum semicompositum</i> L.
	<i>Ducrosia anethifolia</i> (DC.) Boiss.
	<i>Pituranthos triradiatus</i> (Hochst. ex Boiss.) Asch. & Schweinf
Apocynaceae	<i>Calotropis procera</i> (Aiton) W.T. Aiton
Asteraceae	<i>Aaronsohnia factorovskyi</i> Warb. & Eig
	<i>Artemisia inculta</i> Delile
	<i>Acantholepis orientalis</i> Less
	<i>Achillea fragrantissima</i> (Forssk.)
	<i>Anthemis melampodina</i> Delile
	<i>Anthemis pseudocotula</i> Boiss.
	<i>Anvillea garcini</i> (Burm.f.)
	<i>Aster squamatus</i> (Spreng.)
	<i>Atractylis carduus</i> (Forssk.) C. Chr
	<i>Calendula arvensis</i> (Vaill.) L.
	<i>Calendula tripterocarpa</i> Rupr
	<i>Carduus pycnocephalus</i> L.
	<i>Carthamus oxyacantha</i> M.Bieb.
	<i>Centaurea bruguierana</i> (DC)
	<i>Centaurea mesopotamica</i> Bornm.
	<i>Cichorium endivia</i> L.
	<i>Erigeron bonariensis</i> (L.)
	<i>Echinops polyceras</i> Boiss
	<i>Filago pyramidata</i> L.

Family	Species
	<i>Flaveria trinervia</i> (Sprengel) C. Mohr
	<i>Gnaphalium uliginosum</i> L.
	<i>Gymnarrhena micrantha</i> Desf
	<i>Ifloga spicata</i> (Forssk.) Sch. Bip.
	<i>Koelpinia linearis</i> Pall.
	<i>Lactuca serriola</i> L.
	<i>Launaea angustifolia</i> (Desf.)
	<i>Launaea capitata</i> (Spreng.) Dandy
	<i>Launaea nudicaulis</i> (L.) Hook.f.
	<i>Leontodon laciniatus</i> (Bertol.) Widder
	<i>Matricaria aurea</i> (Loefl.) Sch. Bip.
	<i>Picris babylonica</i> Hand.-Mazz
	<i>Pulicaria undulata</i> (L.) C.A. Mey.
	<i>Pallenis hierochuntica</i> (Michon) Greuter
	<i>Reichardia tingitana</i> (L.) Roth
	<i>Rhanterium epapposum</i> Oliv.
	<i>Scorzonera papposa</i> DC.
	<i>Scorzonera tortuosissima</i> Boiss., Fl. Orient. 775 :3.
	<i>Senecio glaucus</i> L.
	<i>Senecio vulgaris</i> L.
	<i>Sonchus oleraceus</i> L.
	<i>Sonchus tenerrimus</i> L.
	<i>Urospermum picroides</i> (L.) F.W. Schmidt
	<i>Xanthium strumarium</i> L.
Boraginaceae	<i>Anchusa hispida</i> Forssk.
	<i>Arnebia decumbens</i> (Vent.) Coss. & Kralik
	<i>Arnebia linearifolia</i> A. DC. in DC. Prodr. 1846 .10:95
	<i>Arnebia tinctoria</i> Forssk
	<i>Echium rauwolfii</i> Delile
	<i>Heliotropium bacciferum</i> Forssk.
	<i>Heliotropium kotschyi</i> Gürke
	<i>Heliotropium lasiocarpum</i> Fisch. & C.A. Mey
	<i>Lappula spinocarpos</i> (Forssk.) Asch. ex Kuntze

Family	Species
	<i>Moltkiopsis ciliata</i> (Forssk.) I.M. Johnst.
	<i>Ogastemma pusillum</i> (Coss. & Durand ex Bonnet & Baratte) Brummitt
Brassicaceae	<i>Alyssum homolocarpum</i> (Fisch & Mey.)
	<i>Alyssum linifolium</i> Steph. ex Willd.,
	<i>Anastatica hierochuntica</i> L.
	<i>Brassica juncea</i> L.
	<i>Brassica tournefortii</i> Gouan
	<i>Cakile arabica</i> Velen
	<i>Carrichtera annua</i> (L.) DC
	<i>Cardaria draba</i> (L.) Desv.
	<i>Capsella bursa-pastoris</i> (L.)
	<i>Coronopus didymus</i> (L.) J. E. Smith
	<i>Descurainia sophia</i> L.
	<i>Diplotaxis acris</i> (Forssk.) Boiss.
	<i>Diplotaxis harra</i> (Forssk.) Boiss
	<i>Eruca vesicaria</i> (L.) Cav.
	<i>Farsetia aegyptia</i> Turra
	<i>Farsetia burtonae</i> Oliv.
	<i>Horwoodia dicksoniae</i> Turrill
	<i>Lepidium aucheri</i> Boiss.
	<i>Leptaleum filifolium</i> (Willd.) DC
	<i>Lepidium sativum</i> L.
	<i>Malcolmia africana</i> (L.)
	<i>Malcolmia grandiflora</i> (Bunge) Kuntze, 1887
	<i>Malcolmia pygmaea</i> (DC.)
	<i>Matthiola longipetala</i> (Vent.) DC.
	<i>Notoceras bicornis</i> (Aiton)
	<i>Savignya parviflora</i> (Delile) Webb
	<i>Schimpera arabica</i> Hochst. & Steud. ex Steud.
	<i>Sinapis arvensis</i> L.
	<i>Sisymbrium erysimoides</i> Desf.
	<i>Sisymbrium irio</i> L.
	<i>Sisymbrium orientale</i> L.

Family	Species
	<i>Sisymbrium septulatum</i> DC.
	<i>Zilla spinosa</i> (L.) Prantl
Caprifoliaceae	<i>Valerianella dufresnia</i> Bge. ex Boiss.
	<i>Seetzenia lanata</i> (Willd.) Bullock
	<i>Tribulus macropterus</i> Boiss., Diagn. Pl. Or. Ser. 1:61 .1
	<i>Tribulus terrestris</i> L.
	<i>Zygophyllum qatarense</i> Hadidi.
Caryophyllaceae	<i>Gypsophila capillaris</i> (Forssk.)
	<i>Herniaria hemistemon</i> J. Gay
	<i>Herniaria hirsuta</i> L.
	<i>Leoflingia hispanica</i> L.
	<i>Paronychia arabica</i> (L.) DC
	<i>Polycarpaea repens</i> (Forssk.) Asch. & Schweinf
	<i>Polycarpaea robbairea</i> (Kuntze) Greuter & Burdet
	<i>Polycarpon tetraphyllum</i> (L.)
	<i>Pteranthus dichotomus</i> Forssk
	<i>Sclerocephalus arabicus</i> Boiss
	<i>Silene arabica</i> Boiss
	<i>Silene conoidea</i> L.
	<i>Silene arenosa</i> C. Koch
	<i>Silene villosa</i> Forssk
	<i>Spergula fallax</i> (Lowe) E.H.L. Krause
	<i>Spergularia diandra</i> (Guss.) Boiss
	<i>Spergularia marina</i> (L.) Griseb
	<i>Stellaria media</i> (L.) Vill
	<i>Telephium sphaerospermum</i> Boiss
	<i>Vaccaria hispanica</i> (Mill.) Rauschert
Cistaceae	<i>Helianthemum kahiricum</i> Delile
	<i>Helianthemum ledifolium</i> (L.)
	<i>Helianthemum lippii</i> (L.) Dum.-Cours
	<i>Helianthemum salicifolium</i> (L.)
Convolvulaceae	<i>Convolvulus arvensis</i> L.
	<i>Convolvulus cephalopodus</i> Boiss.

Family	Species
	<i>Convolvulus oxyphyllus</i> Boiss.
	<i>Convolvulus pilosellifolius</i> Desr
	<i>Cressa cretica</i> L.
	<i>Cuscuta planiflora</i> Ten
Crassulaceae	<i>Crassula alata</i> (Viv.) A. Berger
Cucurbitaceae	<i>Citrullus colocynthis</i> (L.) Schrad.
Cynomoriaceae	<i>Cynomorium coccineum</i> L.
Caprifoliaceae	<i>Lomelosia olivieri</i> (Coulter) Greuter & Burdet
	<i>Lomelosia palaestina</i> (L.) Rafin
	<i>Valerianella dufresnia</i> Bunge ex. Boiss
Euphorbiaceae	<i>Chrozophora obliqua</i> (Vahl) Adr. Juss. ex Spreng.,
	<i>Chrozophora tinctoria</i> (L.) Raf
	<i>Euphorbia densa</i> Schrenk
	<i>Euphorbia granulata</i> Forssk., Fl.
	<i>Euphorbia grossheimii</i> (Prokh.)
	<i>Euphorbia isthmia</i> Täckh.
	<i>Euphorbia helioscopia</i> L.
	<i>Euphorbia hirta</i> L.
	<i>Euphorbia indica</i> Lam., Encycl. Meth. Bot. 423 :2
	<i>Euphorbia peplus</i> Radium
	<i>Euphorbia serpens</i> Kunth
Fabaceae	<i>Alhagi graecorum</i> Boiss.
	<i>Astragalus annularis</i> Forssk
	<i>Astragalus bombycinus</i> Boiss.
	<i>Astragalus corrugatus</i> Bertol.
	<i>Astragalus hauarensis</i> Boiss.
	<i>Astragalus schimperi</i> Boiss
	<i>Astragalus sieberi</i> DC.
	<i>Astragalus spinosus</i> Muschl.
	<i>Astragalus tribuloides</i> Delile
	<i>Coronilla scorpioides</i> (L.) W.D.J. Koch
	<i>Hippocrepis areolata</i> Desv.
	<i>Hippocrepis unisiliquosa</i> L.

Family	Species
	<i>Lathyrus aphaca</i> L.
	<i>Lotus halophilus</i> Boiss. & Spruner
	<i>Medicago laciniata</i> (L.) Mill.
	<i>Medicago polymorpha</i> L.
	<i>Medicago rotata</i> Boiss.
	<i>Melilotus indicus</i> (L.) All.
	<i>Melilotus alba</i> Medik.
	<i>Onobrychis ptolemaica</i> DC.
	<i>Ononis reclinata</i> L.
	<i>Ononis serrata</i> Forssk.
	<i>Prosopis farcta</i> (Banks & Sol.)
	<i>Scorpiurus muricatus</i> L.
	<i>Trifolium lappaceum</i> L.
	<i>Trifolium resupinatum</i> L.
	<i>Trigonella anguina</i> Delile
	<i>Trigonella hamosa</i> L.
	<i>Trigonella stellata</i> Forssk.
	<i>Vachellia pachyceras</i> O. Schwartz
Frankeniaceae	<i>Frankenia pulverulenta</i> L.
Geraniaceae	<i>Erodium ciconium</i> (L.) L'Hér.
	<i>Erodium cicutarium</i> (L.) L'Hér.
	<i>Erodium glaucophyllum</i> (L.) L'Hér.
	<i>Erodium laciniatum</i> (Cav.) Willd
	<i>Monsonia nivea</i> (Decne.) Webb
Lamiaceae	<i>Lallemantia royleana</i> Benth. in Wall.
	<i>Salvia aegyptiaca</i> L.
	<i>Salvia lanigera</i> Poir.
	<i>Salvia spinosa</i> L.
	<i>Teucrium oliverianum</i> Ging. ex Benth.
	<i>Teucrium polium</i> L.
Malvaceae	<i>Althaea ludwigii</i> L.
	<i>Hibiscus trionum</i> L.
	<i>Malva nicaeensis</i> All.

Family	Species
	<i>Malva parviflora</i> L.
Neuradaceae	<i>Neurada procumbens</i> L.
Orobanchaceae	<i>Cistanche tubulosa</i> (Schrenk) Wight
	<i>Orobanche aegyptiaca</i> Pers.
	<i>Orobanche cernua</i> Loefl.
	<i>Orobanche minor</i> Sm.
	<i>Orobanche ramosa</i> L.
Oxalidaceae	<i>Oxalis corniculata</i> L.
Papaveraceae	<i>Fumaria parviflora</i> Lam.
	<i>Hypecoum pendulum</i> L.
	<i>Hypecoum littorale</i> Wulfen in Jacq.,
	<i>Glaucium corniculatum</i> (L.) Rudolph.
	<i>Papaver rhoeas</i> L.
	<i>Roemeria hybrida</i> (L.) DC.
Phyllanthaceae	<i>Andrachne telephioides</i> L.
Plantaginaceae	<i>Linaria albifrons</i> Spreng.
	<i>Linaria simplex</i> (Willd.) DC.
	<i>Plantago amplexicaulis</i> Cav
	<i>Plantago boissieri</i> Hausskn. & Bornm
	<i>Plantago ciliata</i> Desf.
	<i>Plantago coronopus</i> L.
	<i>Plantago notata</i> Lag.
	<i>Plantago ovata</i> Forssk
	<i>Plantago psammophila</i> Agnew & Chal.-Kabi
Plumbaginaceae	<i>Limonium carnosum</i> Kuntze
	<i>Limonium lobatum</i> (L.f.) Kuntze
	<i>Psylliostachys spicata</i> (Willd.) Nevski
Polygalaceae	<i>Calligonum polygonoides</i> L.
	<i>Emex spinose</i> (L.)
	<i>Polygonum patulum</i> M. Bieb.
	<i>Rumex pictus</i> Forssk.
	<i>Rumex vesicarius</i> L.
Portulacaceae	<i>Portulaca oleracea</i> L.

Family	Species
Primulaceae	<i>Anagallis arvensis</i> L.
Ranunculaceae	<i>Adonis dentata</i> Delile.
Resedaceae	<i>Caylusea hexagyna</i> (Forssk.) M.L.Green
	<i>Ochradenus baccatus</i> Delile
	<i>Oligomeris linifolia</i> (Vahl) J.F. Macbr
	<i>Reseda arabica</i> Boiss.
	<i>Reseda decursiva</i> Forssk.
	<i>Reseda muricata</i> C. Presl.
Rubiaceae	<i>Crucianella membranacea</i> Boiss.
	<i>Galium tricornutum</i> Dandy
Rutaceae	<i>Haplophyllum tuberculatum</i> (Forssk.) Juss.
Scrophulariaceae	<i>Scrophularia deserti</i> Del.
Solanaceae	<i>Datura innoxia</i> Mill.
	<i>Hyoscyamus muticus</i> L.
	<i>Hyoscyamus pusillus</i> L.
	<i>Lycium shawii</i> Roem. & Schult.
	<i>Physalis angulata</i> L.
	<i>Solanum nigrum</i> L.
	<i>Withania somnifera</i> (L.)
Tamaricaceae	<i>Tamarix aucheriana</i> (Decne.) Baum
Thymelaeaceae	<i>Thymelaea mesopotamica</i> (C. Jeffrey) B. Peterson
	<i>Nitraria retusa</i> (Forssk.) Asch.
Nitrariaceae	<i>Peganum harmala</i> L.
Nyctaginaceae	<i>Boerhavia diffusa</i> L.
Urticaceae	<i>Urtica urens</i> L.
Verbenaceae	<i>Phyla nodiflora</i> (L.) Greene
	<i>Verbena tenuisecta</i> L.
Zygophyllaceae	<i>Fagonia bruguieri</i> DC.
	<i>Fagonia glutinosa</i> Delile
	<i>Fagonia indica</i> Burm. f

Annex 12

Monocotyledoneae recorded from Kuwait.

Family	Species
Asparagaceae	<i>Bellevalia saviczii</i> Woronow
	<i>Dipcadi erythraeum</i> Webb & Berthel
Asphodelaceae	<i>Asphodelus tenuifolius</i> Cav.
	<i>Asphodelus viscidus</i>
Cymodoceaceae	<i>Halodule uninervis</i> (Forssk.) Asch.
Cyperaceae	<i>Cyperus conglomeratus</i> Rottb., Pl. Rar. Descr. 16.
	<i>Cyperus rotundus</i> L.
Hydrocharitaceae	<i>Halophila ovalis</i> (R. Br.) Hook. f
Iridaceae	<i>Gladiolus italicus</i> Mill.
	<i>Moraea sisyrinchium</i> (L.)
Ixioliriaceae	<i>Ixiolirion tataricum</i> (Pall.) Herb.
Juncaceae	<i>Juncus rigidus</i> Desf.
Amaryllidaceae	<i>Allium longisepalum</i>
	<i>Allium sindjarensense</i> Boiss. & Hausskn. ex Regel
	<i>Allium sphaerocephalum</i> L.
	<i>Gagea reticulata</i> (Pall.) Schult. & Schult.f.
Poaceae	<i>Aegilops bicornis</i> (Forssk.) Jaub. & Spach
	<i>Aegilops kotschyi</i> Boiss.
	<i>Aegilops triuncialis</i> L.
	<i>Aeluropus lagopoides</i> (L.) Trin. ex Thwaites
	<i>Aeluropus littoralis</i> (Gouan) Parl., Fl. Ital. 461 :1.
	<i>Ammochloa palaestina</i> Boiss.
	<i>Avena barbata</i> Pott ex Link.
	<i>Avena fatua</i> L.
	<i>Avena sativa</i> . L.
	<i>Avena sterilis</i> L.
	<i>Brachypodium distachyum</i> (L.) P. Beauv.
	<i>Bromus catharticus</i> Vahl.

Family	Species
	<i>Bromus danthoniae</i> Trin.
	<i>Bromus madritensis</i> L.
	<i>Bromus sericeus</i> Drobov
	<i>Bromus tectorum</i> L.
	<i>Cenchrus ciliaris</i> L
	<i>Cenchrus setigerus</i> Vahl
	<i>Centropodia forsskalii</i> (Vahl) Cope
	<i>Cutandia dichotoma</i> (Forssk.)
	<i>Cutandia memphitica</i> (Spreng.) Benth.
	<i>Cymbopogon commutatus</i> (Steud.) Stapf
	<i>Cynodon dactylon</i> (L.) Pers.
	<i>Dactyloctenium aegyptium</i> (L.) Willd.
	<i>Dactyloctenium aristatum</i> Link, Hort. Berol. 59 :1.
	<i>Dichanthium annulatum</i> (Forssk.) Stapf
	<i>Dichanthium foveolatum</i> (Delile) Roberty
	<i>Digitaria ciliaris</i> (Retz.) Koeler
	<i>Digitaria sanguinalis</i> (L.) Scop.
	<i>Dinebra retroflexa</i> (Vahl) Panzer
	<i>Echinochloa colona</i> (L.) Link
	<i>Eleusine indica</i> (L.)
	<i>Eragrostis barrelieri</i> Daveau
	<i>Eragrostis minor</i> Host, Gram. Austr. 4:15.
	<i>Eremopoa persica</i> (Trin.) Rozhev.
	<i>Eremopyrum bonaepartis</i> (Spreng.) Nevski
	<i>Eremopyrum distans</i> (C. Koch) Nevski
	<i>Hordeum marinum</i> Huds.
	<i>Hordeum murinum</i> L.
	<i>Imperata cylindrica</i> (L.) Raeusch.
	<i>Lasiurus scindicus</i> Henrard
	<i>Leptochloa fusca</i> (L.) Kunth
	<i>Lolium rigidum</i> Gaudin
	<i>Lolium multiflorum</i> Lam.
	<i>Lolium temulentum</i> L.

Family	Species
	<i>Melinis repens</i> (Willd.) Zizka
	<i>Panicum antidotale</i> Retz.
	<i>Panicum turgidum</i> Forssk.
	<i>Parapholis incurva</i> (L.) C.E. Hubb.
	<i>Pennisetum divisum</i> (J.F. Gmel.) Henrard
	<i>Phalaris minor</i> Retz.
	<i>Phalaris paradoxa</i> L.
	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.
	<i>Poa annua</i> L.
	<i>Poa sinaica</i> Steud., Syn. Pl. Glum. 1:256.
	<i>Poa infirma</i> Kunth.
	<i>Polypogon monspeliensis</i> . (L.) Desf.
	<i>Rostraria cristata</i> (L.) Tzvelev.
	<i>Rostraria pumila</i> (Desf.) Tzvelev
	<i>Schismus arabicus</i> Nees
	<i>Schismus barbatus</i> (L.) Thell.
	<i>Setaria verticillata</i> (L.) P. Beauv
	<i>Setaria viridis</i> (L.) P. Beauv
	<i>Sorghum halepense</i> (L.) Pers.
	<i>Sporobolus arabicus</i> Boiss., Diagn. ser. 1 .47 :13 ,1
	<i>Stipa capensis</i> Thunb.
	<i>Stipagrostis ciliata</i> (Desf.) De Winter
	<i>Stipagrostis drarii</i> (Täckh.) De Winter.
	<i>Stipagrostis obtusa</i> (Delile) Nees
	<i>Stipagrostis plumosa</i> (L.) Munro ex T. Anderson
	<i>Trisetaria linearis</i> Forssk.
Typhaceae	<i>Typha domingensis</i> (Pers.) Poir. ex Steud.



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