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Arab Regional Centre for
World Heritage (ARC-WH)
under the auspices of UNESCO
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Supreme Council for Environment

The First Regional Red List Assessment of Selected Species in the Kingdom of Bahrain

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The First Regional Red List Assessment of Selected Species in the Kingdom of Bahrain

Contents

Foreword

Supreme Council for Environment (SCE)

Bahrain is an archipelago blessed with an array of diverse biological elements, which has contributed towards shaping its rich natural and cultural heritage. Small but unique, Bahrain is home to biodiversity of regional and international significance. However, biodiversity loss remains a challenge and is happening at an accelerating rate due to various anthropogenic activities threatening various species in Bahrain.

Significant progress has been made on protecting a number of species including the country's Houbara bustard and White-cheeked Bulbul which, once at risk of extinction, are now stabilising or even increasing. This is an encouraging sign and is a result of various national efforts including issuing specific protection laws that ban the hunting and trade of these species and the implementation of CITES.

In addition having two Ramsar sites and two UNESCO World Heritage Sites that encompass parts of Bahrain's notable natural heritage, Bahrain is home to the second largest population of Dugongs in the world and the largest breeding colony of the Socotra Cormorant worldwide. It is therefore natural that we embrace our responsibility to protect our ecosystems and species for future generations.

In this spirit, Bahrain is proud to be the first country in the GCC region to have established its Clearing House Mechanism (CHM), which serves as an information point on national biodiversity for all stakeholders and members of the public. Moreover, the Kingdom is committed to fulfil its international obligation to all biodiversity-related Conventions including the Convention on Biological Diversity (CBD) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

In an effort to increase species protection and rehabilitation, Bahrain has successfully revised its National Biodiversity Strategy & Action Plan (NBSAP), which aims to improve resilience of ecosystems in the Kingdom and sustainably manage their ecosystem services to ensure good quality of life for Bahraini citizens by 2030. This serves as part of the greater national vision of Bahrain's Vision 2030, which aspires towards social, environmental and economic sustainability. Bahrain understands that it is important to protect nature for its intrinsic value and essential contribution to human wellbeing and economic prosperity.

The Bahrain Red List Assessment Project marks the first attempt at highlighting threatened species in the Kingdom and putting them on a priority list for conservation. Bahrain is working hard at ensuring that the highest protection is given to its species by declaring and increasing the cover of national protected areas, issuing laws and legislations and regulating trade and hunting of various species of birds, fish, reptiles, insects and mammals.

Bahrain's ongoing development and commitment to biodiversity and species conservation is reflected in this landmark report which publishes the Kingdom's first Red List. This document is the result of two years of hard work, which would not have been possible without the successful collaboration between the Supreme Council for Environment and the Arab Regional Centre for World Heritage, in addition to the valuable contributions of all national experts and stakeholders.

Foreword

Arab Regional Centre for World Heritage (ARC-WH)

The Arab Regional Centre for World Heritage (ARC-WH) is an autonomous and independent legal entity at the service of Arab Member States. The Kingdom of Bahrain initiated the establishment of ARC-WH in order to enhance status of conservation of nature and culture heritage in the Arab Region. The Centre works closely with Arab States to develop programmes and activities that benefit their national World Heritage Programme.

Our mission is to create a better representation of Arab States' heritage on the World Heritage List, promote better protection and management of these properties, mobilise regional and international financial support, and raise awareness about World Heritage in the region.

The Arab Regional Centre for World Heritage (ARC-WH) is in a partnership with the International Union for Conservation of Nature (IUCN) to implement TABE'A, which means nature in Arabic and is the regional programme for natural World Heritage for the Arab States Region. The Arab Regional Centre for World Heritage (ARC-WH) continues to work closely with State Parties to ensure the effective implementation of the World Heritage Convention and therefore started its partnership with the Supreme Council for Environment (SCE) in the Kingdom of Bahrain by assessing the current challenges facing Natural Heritage in Bahrain.

ARC-WH is pleased to publish the first Regional Red List Assessment of selected species in the Kingdom of Bahrain;the Report is a result of collaboration between the Arab Regional Centre for World Heritage, the Supreme Council for Environment (SCE) and the participation of several groups of passionate Bahraini experts. This joint effort aims to safeguard the rich natural heritage of the country and provide practitioners, experts, researchers, decision makers and the general public with an assessment of the threatened species in the Kingdom of Bahrain.

The report will serve as a scientific reference for future conservation research and the beginning of a successful cooperation with the Supreme Council for Environment (SCE) in the Kingdom of Bahrain to enhance the protection and safeguarding of natural heritage, therefore, the RedList assessment is a continuous, detailed and scientific process which will not end with the publication of this report but it will indeed be dynamic to the changes within the Kingdom.

Acknowledgements

This report was prepared by the Supreme Council for Environment (SCE) and the Arab Regional Centre for World Heritage (ARC-WH) as part of the Centre's contribution to the conservation of the natural heritage of the Kingdom of Bahrain, in cooperation with University of Bahrain, Directorate of Fisheries, Arabian Gulf University and many other scientific institutions and individuals.

The team extends their thanks to the SCE President, H.H Sheikh Abdulla Bin Hamad Al Khalifa, and the ARC-WH Chairperson, H.E Sheikha Mai bint Mohammed Al Khalifa, for their continuous support.

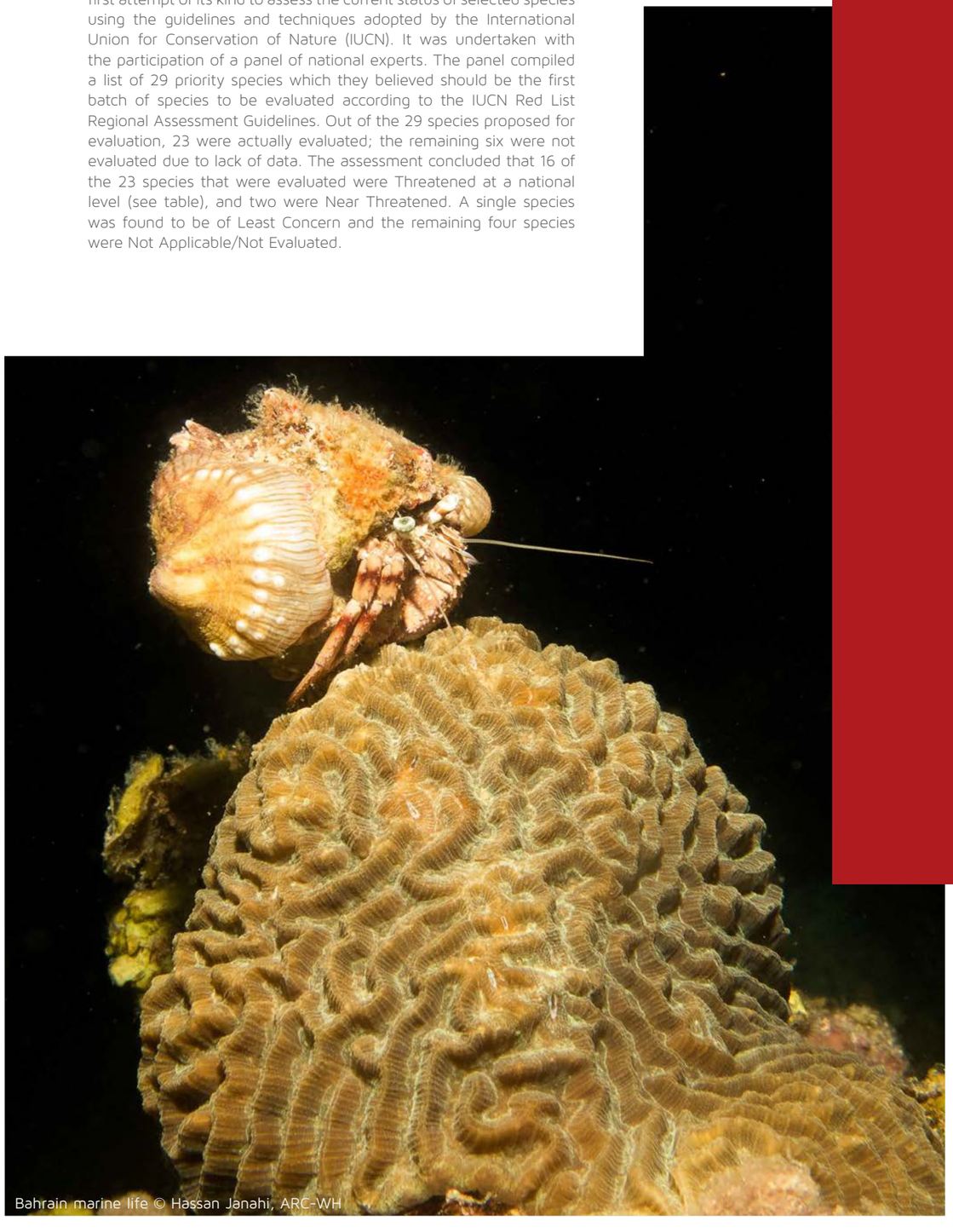
The team also recognises the valuable contributions of many individuals who have contributed to this report, including colleagues working in the Kingdom of Bahrain and the region. Special thanks are addressed to the experts and specialists who worked on the Red List assessment: Mr Ahmed Khamis (birds), Mr Hani Bader (fish), Dr Humoud Nasser (birds and marine), Prof. Jameel Al-Khuzai (plants and amphibians), Dr Mohammed Al-Rumaidh (marine mammals), Ms Reem Al-Muallah (marine and project coordination), Dr Thuraya Mansouri (plants) and Mr Laith El-Moghrabi (Red List specialist).

A final thank you is extended to H.E Dr Mohamed Mubarak bin Dainah (Executive Director, SCE), Dr Mounir Bouchenaki (Director, ARC-WH), and their respective teams, Ms Nouf Al-Wasmi (SCE Project Coordinator), Mr Mudhafar A. Salim, (ARC-WH Project Coordinator), Ms Haifaa Abdulhalim (TABE'A Programme Manager) and Sh. Khalifa Al-Khalifa (ARC-WH Assistant Director).

Bahrain marine life © Hassan Janahi, ARC-WH

Summary

The regional assessment of the Kingdom of Bahrain is considered the first attempt of its kind to assess the current status of selected species using the guidelines and techniques adopted by the International Union for Conservation of Nature (IUCN). It was undertaken with the participation of a panel of national experts. The panel compiled a list of 29 priority species which they believed should be the first batch of species to be evaluated according to the IUCN Red List Regional Assessment Guidelines. Out of the 29 species proposed for evaluation, 23 were actually evaluated; the remaining six were not evaluated due to lack of data. The assessment concluded that 16 of the 23 species that were evaluated were Threatened at a national level (see table), and two were Near Threatened. A single species was found to be of Least Concern and the remaining four species were Not Applicable/Not Evaluated.



Bahrain marine life © Hassan Janahi, ARC-WH

Summary of the assessment of the 29 species at a regional level

Bahrain Red List regional assessment	Global IUCN Red List assessment
CRITICALLY ENDANGERED	
Pavona cactus, Cactus Coral	2014 – Vulnerable
Acropora clathrata	2008 – Least Concern
Avicennia marina, Grey Mangrove	2010 – Least Concern
Pristis zijsron, Green Sawfish	2013 – Critically Endangered
Eretmochelys imbricata, Hawksbill Turtle	2008 – Critically Endangered
Neophocaena phocaenoides, Finless Porpoise	2012 - Vulnerable
ENDANGERED	
Halophila stipulacea	2010 – Least Concern
Halophila ovalis	2010 – Least Concern
Halodule uninervis	2010 – Least Concern
Chelonia mydas, Green Turtle	2004 – Endangered
Falco concolor, Sooty Falcon	2014 – Near Threatened
VULNERABLE	
Pelophylax ridibundus, Eurasian Marsh Frog	2009 - Least Concern
Mauremys caspica, Caspian Turtle	Not Evaluated
Egretta gularis, Western Reef Heron	2014 - Least Concern
Dugong dugon, Sea Cow	2008 - Vulnerable
Phalacrocorax negugolaris, Socotra Cormorant	2012 - Vulnerable
NEAR THREATENED	
Charadrius alexandrinus, Kentish Plover	2014 - Least Concern
Epinephelus coioides, Orange-spotted Grouper	2004 - Near Threatened
LEAST CONCERN	
Himantopus himantopus, Black-winged Stilt	2014 - Least Concern
NOT APPLICABLE	
Phoenicopterus roseus, Greater Flamingo	2012 - Least Concern
Charadrius hiaticula, Ringed Plover	2014 - Least Concern
Larus ridibundus, Black-headed Gull	2012 - Least Concern
NOT EVALUATED	
Pycnonotus leucotis, White-eared Bulbul	2012 - Least Concern

The assessment of these selected taxa of Bahrain biodiversity shows that marine and freshwater species in Bahrain are facing serious threats from urban development and encroachment on natural coastlines and wetlands, in addition to various other factors causing serious threats to several species, including some species that are of Least Concern status at the global level.

In the current document, the team has selected the cluster of different species based on thorough discussions and reviews in order to develop the first regional evaluation of these species on the national level and demonstrate their current status and the different kinds of threats they face. Based on the results of the in-depth discussions, the team went on to formulate a set of recommended actions to be adopted to eliminate or mitigate the threats facing these species or their habitats on the national level. The team realises the importance of the efforts that have been made so far in the current document and the necessity of investing its outcomes in different applications of conservation such as knowing the status and trends of the threatened species at the national level; moreover, it addresses priorities, and provides very essential material for any action plans to come.

In general, the investment in this enterprise had two objectives: the first was to produce a preliminary Red List assessment report for some selected taxa based on the available data; and the second, long-term goal was to use the current assessment as a practical exercise to build the capacity of a national team, to enable them to take on subsequent assessment processes over the years to come.

1.1 Bahrain's biological diversity

The Kingdom of Bahrain is an archipelago of more than 84 islands situated in the southern half of the Arabian Gulf in between the eastern coast of the Kingdom of Saudi Arabia and the western coast of the Qatar peninsula, with a total land area of 769.6 km^2 and its surrounding regional waters extending to a total area of 7497.1 km^2. Due to its location within the sub-tropical desert strip of the Arabian Peninsula, the climate of Bahrain is characterised as arid with scarce rainfall accompanied by high temperature and humidity levels (SCE, 2015).

The Kingdom of Bahrain holds vital aspects of biodiversity at both the regional and global levels despite its limited geographical area and harsh climatic conditions. For example, the Hawar Islands are home to the largest breeding and roosting colony of the Vulnerable bird species Socotra Cormorant (*Phalacrocorax nigrogularis*) in the world, while the world's second largest herd of Dugongs (*Dugong dugon*), after Australia, is found in Bahrain's territorial waters.

The Kingdom's wetlands are unique; two of its wetland sites are of international importance listed as Ramsar Sites (the Hawar Islands and Tubli Bay). Furthermore, Bahrain has a total of six protected areas of high biological diversity and is in the process of designating its seventh protected area – the Northern Oyster Beds Site which consists of three oyster beds and a reef, namely Najwat & Hayr Bul Thamah, Hayr Shtayyah and Hayr Bu Am'amah – following their inscription as a UNESCO World Heritage site in 2012 (SCE, 2015).

Despite the many efforts made to promote conservation and sustainable use of natural resources, biodiversity in Bahrain remains vulnerable to various anthropogenic pressures resulting from urban expansion, groundwater depletion, pollution, alien and invasive species, overfishing, dredging and reclamation activities, in addition to climate change. Unfortunately, most of the ecosystems, particularly those on the main island, have witnessed sharp declines due to various pressures. Nonetheless, existing ecosystems on other islands which are not inhabited have remained undisturbed and in pristine condition, especially the Hawar Islands.

At the species level, a preliminary total number of 1455 species belonging to various taxa have been identified in Bahrain (KoB NBSAP, 2016). Generally, there is a lack of recent national field studies and surveys that reflect the current diversity and abundance of species. However, observations of local experts indicate that a number of species are facing rapid decline due to habitat loss caused by the increasing pressures on habitats. This made it crucial to develop a Red List in order to prioritise, track and monitor the listed species that are seen at potential risk of extinction in the wild before it is too late.

Socotra Cormorant

1.2 Methodology of regional Red List assessment

Whale shark, Bahrain © Hassan Janahi, ARC-WH

The *IUCN Red List Categories and Criteria: Version 3.1* (IUCN, 2001)[1] were developed for classifying species at high risk of global extinction, that is, for assessment at the global level. At regional, national and local levels (hereafter referred to as regional level), there are essentially two options:

1. To publish an unaltered subset of the global Red List encompassing those species that reproduce in the region or at any stage regularly visit the region. This may be a feasible option, particularly when the region has a high number of endemics or threatened near endemics, or when there currently is a pronounced overall deficiency of data pertaining to species' status within the region; or

2. To assess species' extinction risk and publish Red Lists within the specific region. For the purposes of regional conservation assessments, there are important reasons to assess species' extinction risk and publish Red Lists within specific geographically defined areas.

[1] See also http://www.iucnredlist.org/static/categories_criteria_3_1.

While the first option is straightforward, the second involves a number of issues not encountered at the global level, including the assessment of populations across geopolitical borders, non-breeding phases of populations and non-indigenous taxa. When making assessments at regional levels, it is also particularly important to recognise that while IUCN Red List categories reflect the relative extinction risk of species, the process of setting priorities for conservation actions may require several additional considerations. As a consequence, regional guidelines were produced to assist in the application of the IUCN Red List categories and criteria at regional levels.

1.2.1 Application of the guidelines

Any country, or other region, using the IUCN Red List categories and criteria for listing species must follow these guidelines without deviation or modification, if they wish to state that their assessment follows the IUCN system.

1.2.2 The 'regional' concept

The word 'regional' is used here to indicate any sub-global geographically defined area, such as a continent, country, state, or province. Within any region, there will be taxa with different distribution histories, ranging from those that are indigenous (native to the area), and have been there since pre-human settlement, to those introduced more recently. There may also be breeding and non-breeding taxa. The latter are those that do not reproduce in the region but may still be dependent upon its resources for their survival. There may also be formerly native taxa that are now extinct in the region, but which are still extant in other parts of the world.

1.2.3 IUCN Red List criteria versus regional guidelines

All the rules and definitions in the *IUCN Red List Categories and Criteria Version 3.1* (IUCN, 2001) apply at regional levels, unless otherwise indicated here. Consequently, a careful study of all IUCN guidelines documents is highly recommended before application of the regional guidelines, and they should be constantly referred to.

1.2.4 Scale applicability

Provided that the regional population to be evaluated is isolated from conspecific populations outside the region, the IUCN Red List Criteria (IUCN, 2001) can be used without modification within any geographically defined area. The extinction risk of such an isolated population is identical to that of an endemic taxon. However, when the criteria are applied to part of a population defined by a geopolitical border, or to a regional population where individuals move to or from other populations beyond the border, the threshold values listed under each criterion may be inappropriate, because the unit being evaluated is not the same as the whole population or subpopulation. As a result, the estimate of extinction risk may be inaccurate. These guidelines present methods for adjusting the initial category obtained by evaluating a taxon using the IUCN Red List Criteria to obtain a final Red List Category that adequately reflects a taxon's risk of extinction within the region.

Although the Guidelines may in principle be applied at any geographical scale, application within very restricted geographical areas is strongly discouraged. The smaller the region, and the more wide-ranging the taxon under consideration, the more often the regional population will interchange individuals with neighbouring populations. Therefore the assessment of extinction risk becomes increasingly unreliable. It is not possible to provide any specific guidance on the precise lower limit for sensible application as this depends on the nature of the region, and especially the barriers to dispersal that exist.

1.2.5 Regionally determined applications and modifications

Given the wide range of circumstances encountered in assessing different taxonomic groups in different countries, it is impossible to be prescriptive in every aspect of the Guidelines. Variable interpretation of certain definitions and applications of the Guidelines is inevitable, and these are left to the discretion of regional Red List compilers. For example, the delimitation of natural range, time limits for regional extinction, and the nature of an initial filter for breeding and/or nonbreeding taxa, are left open for the regional Red List authorities to decide. Such regional decisions must be clearly recorded and documented, for example as part of an introductory text to the listings.

1.2.6 Taxonomy

Regional Red List authorities are encouraged to follow the same taxonomic checklists as used by the global IUCN Red List (see http://www.iucnredlist.org/technical-documents/information-sources-and-quality). For other taxonomic groups or any deviations from the recommended lists, the differences and the taxonomic authorities followed should be specified.

1.2.7 Scaling up assessments

Red List assessments from several smaller regions, such as countries on a continent, cannot be combined or scaled-up in any way to provide Red List Categories for the entire larger region. Assessments of extinction risk for the larger region require new evaluations using the pooled data from across the entire region. Data collected from individual smaller regions may be essential for the assessment of the larger region, and are often important for conservation planning.

1.2.8 Red List versus priority for conservation action

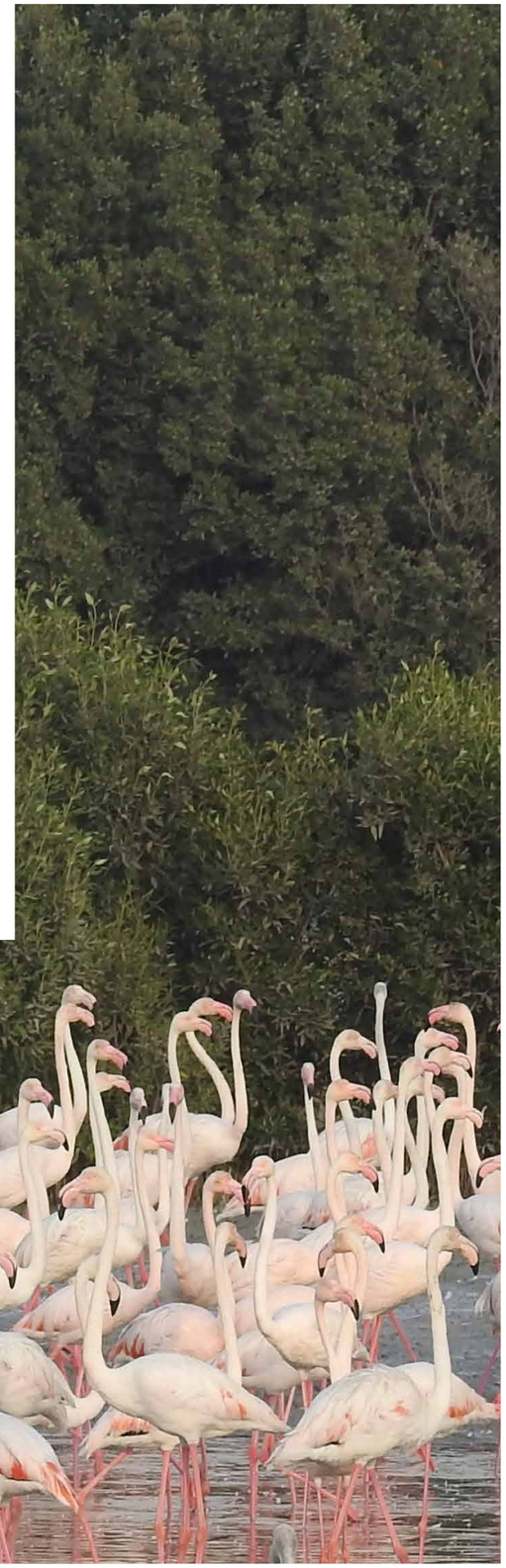
Assessment of extinction risk and setting conservation priorities are two related but different processes. Assessment of extinction risk, such as the assignment of IUCN Red List categories, generally precedes the setting of priorities. The purpose of the Red List categorisation is to produce a relative estimate of the likelihood of extinction of the taxon. Setting conservation priorities, on the other hand, which normally includes the assessment of extinction risk, also takes into account other factors such as ecological, phylogenetic, historical, or cultural preferences for some taxa over others, as well as the probability of success of conservation actions, availability of funds or personnel to carry out such actions, and legal frameworks for conservation of threatened taxa (Miller, *et al.* 2006, Miller *et al.* 2007). In the context of regional risk assessments, a number of additional pieces of information are valuable for setting conservation priorities. For example, it is important to consider not only conditions within the region but also the status of the taxon from a global perspective and the proportion of the global population that occurs within the region. Consequently, it is recommended that any publication that results from a regional assessment process should include at least three measures: (1) the regional Red List Category, (2) the global Red List Category, and (3) an estimate of the proportion (%) of the global population occurring within the region (see section V. Documentation and Publication).

Decisions on how these three variables, as well as other factors, are used for establishing conservation priorities is a matter for the regional authorities to determine. The authorities may also wish to consider other variables in setting priorities, which are to a large degree region-specific and therefore not covered by the Guidelines. However, one particular situation merits special attention. The application of the Red List Criteria, particularly criterion A, may under some circumstances result in a taxon qualifying for listing in a higher category at the global level than the regional level. This may be the case when the regional population is more or less stable but constitutes only a small percentage of the global population, which is experiencing a net decline. Such taxa should be given particular attention at the regional level because of their significance for global status.

It is not recommended to include a list of taxa of high regional conservation priority in a regional Red List publication, as a Red List indicates extinction risk only while conservation priority setting involves evaluating many other factors, as described above. The regional authorities are encouraged to establish a list of taxa of high regional conservation priority; however, this list should be published separately from the regional Red List. Regional Red List authorities should be aware that the view that a Red List based on the IUCN criteria is not automatically a list of priorities for conservation actions, may conflict with current legislation in some regions.

1.2.9 Data availability

It is important that no criteria be ignored during the assessment process, even if it is unlikely that data for those criteria exist for the taxon being evaluated. Only one criterion needs to be met to assign a threatened category (although data should be gathered for as many criteria as possible) and when little or no observed data are available, assessors are encouraged to make use of estimation, inference, projection and suspicion (IUCN 2001). The process of conducting regional assessments can generate data and stimulate data collection in the field.



Ras Sanad © Haifaa Abdulhalim, ARC-WH

1.3 The assessment

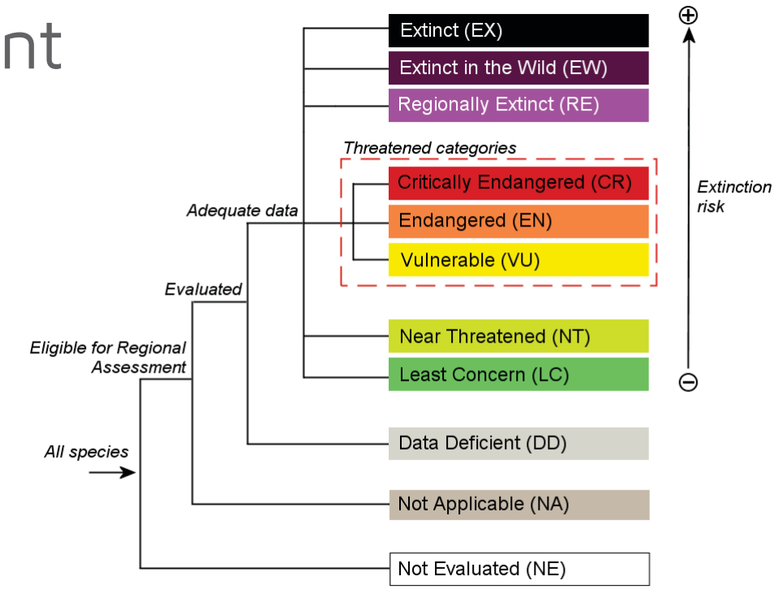


Figure 1: Structure of the categories

1.3.1 Overview of the assessment process

Regional assessments should be carried out in a three-step process, separate from the establishment of conservation priorities (Figure 1). First, assessors must determine which taxa and which regional populations to assess (step one). Next, the regional population for each taxon is evaluated according to the IUCN categories and criteria (IUCN, 2001), and a preliminary category is assigned (step two). The effect of populations of the same taxon in neighbouring regions on the regional population is then considered, and the preliminary category is up, or downlisted if appropriate (step three). Thus, the final categorisation reflects the extinction risk for the taxon within the region being evaluated, having considered potential interactions with populations outside that region.

1.3.2 Taxa to be evaluated

There are several issues to consider when determining which taxa to include or to exclude from a regional assessment (e.g., is the taxon native to the region, do breeding and non-breeding populations exist in the region, does the taxon occur only marginally within the region?, etc.).

The categorization process should be applied only to wild populations inside their natural range and to populations resulting from benign introductions. All taxa for which an important part of any stage of their life cycle (breeding, wintering, migrating, etc.) takes place in the region should be evaluated. Taxa only marginally within the region should also enter the assessment process (unless excluded by an optional filter, see below). But a taxon that occasionally breeds under favourable circumstances in the region but regularly becomes (regionally) extinct should not be considered. Similarly, a taxon that is currently expanding its distributional range outside the region and appears to be in a colonisation phase within the region should not be considered for regional assessment until the taxon has reproduced within the region for several years (typically for at least 10 consecutive years). The regional Red List should include all globally Red-listed taxa present within the region, including those that are NA at the regional level, and the global category should be displayed alongside the regional assessment.

Taxa formerly considered Regionally Extinct (RE) that naturally re-colonise the region may be evaluated after the first year of reproduction. Re-introduced, formerly RE taxa may be evaluated as soon as at least a part of the population successfully reproduces without direct support and the offspring are shown to be viable. Assessors are encouraged to assess visiting taxa. The definition of a visitor for purposes of this assessment must be explicitly defined within the documentation prepared for the regional Red List. Vagrant taxa should NOT be evaluated.

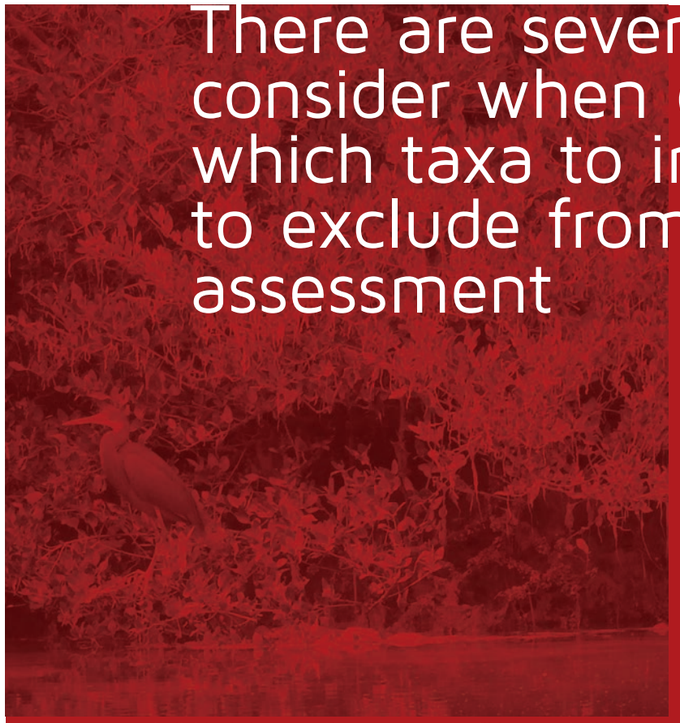
If breeding and visiting (non-breeding) populations can be distinguished, they should be evaluated separately. Breeding and visiting populations may be distinguishable because they:

- are clearly separated by range or habitat use;
- are isolated temporally (e.g., the breeding population is migratory, and so is absent when the visiting population is present);
- are clearly identifiable based on phenotype;
- differ greatly in population size. For example, if the breeding population is very small compared to the visiting population, the two populations can be evaluated separately. Although data collected on the visiting population may still include individuals from the breeding population, any influence these breeding individuals have on the assessment will be marginal. However, if the visiting population is relatively small compared to the breeding population, it should be filtered from assessment before this stage.

If members of the breeding and visiting populations cannot be differentiated, estimates for the visiting population will have to include information from the breeding population, and vice-versa. Alternately, one assessment could be made for the taxon, without differentiating between breeding and visiting populations.

The regional Red List authority may decide to apply a filter, for example, a preset threshold of global or continental population share, to the assessment of breeding and/or visiting taxa. For instance, a regional Red List authority may decide that they will not assess taxa where less than 1% of the global population occurs, or has occurred within the last century, within the region. All such filters applied must be clearly specified in the supporting documentation. Due to the many different geographic contexts in which regional assessments will be conducted, it is impossible to define a specific recommended filter threshold. It should be kept in mind that if the threshold above which taxa are evaluated is set too low, many marginal taxa will be considered highly threatened due to their small population sizes. For examples of how filters have been set for different countries, see Annex 2, Examples 3 and 4 of the Guidelines for Application of IUCN Red List Criteria at Regional and National Levels: Version 4.0 (IUCN, 2012).

Once the threshold for assessment of a taxon is determined (e.g., the fraction of the global or continental population of a taxon that is present in the region, predictability that a visiting taxon will be present in any given year, etc.), any taxa falling below that threshold should be assigned the category Not Applicable (see Point 3, below), with the global category (if there is one) also shown.



There are several issues to consider when determining which taxa to include in or to exclude from a regional assessment

1.3.3 The categories

The IUCN Red List categories (IUCN, 2001) should be used unaltered at regional levels, with three exceptions or adjustments:

1. Taxa extinct within the region but extant in other parts of the world should be classified as Regionally Extinct (RE). A taxon is RE when there is no reasonable doubt that the last individual potentially capable of reproduction within the region has died or disappeared from the region or, in the case of a former visiting taxon, individuals no longer visit the region. It is not possible to set any general rules for a time period since the last observation before taxa are classified as RE. This will depend on how much effort has been devoted to searches for the taxon, which in turn will vary, both with organism and region. If the regional authority decides to adopt any time frames for RE assessments, these should be clearly specified. Populations of long-lived individuals that have ceased to reproduce within the region (e.g., as a result of a deteriorating environment) should be regarded as potentially capable of reproduction and consequently should not be classified as RE. On the other hand, vagrant individuals of a formerly regionally breeding taxon that reach the region should not be regarded as potentially capable of reproduction.

2. The category of Extinct in the Wild (EW) should be assigned only to taxa that are extinct in the wild across their entire natural range, including the region, but that are extant in cultivation, in captivity, or as a naturalised population (or populations) outside the past range. If a taxon is (globally) EW but extant as a naturalised population within the region, the regional population should not be evaluated according to the IUCN criteria, but should still be considered of conservation importance and preserved as a relict of a taxon which is Extinct in the Wild. It may also be considered an important source of individuals for re-introduction efforts within its natural range.

3. Taxa not eligible for assessment at the regional level (mainly introduced taxa and vagrants) should be assigned the category Not Applicable (NA). The addition of the categories Regionally Extinct and Not Applicable means that there are possible categories for regional assessments.

Group of birds, Dohat Arad © Haifaa Abdulhalim

1.3.4 The assessment procedure

After determining which taxa to assess in step one, there may be distinct breeding and visiting populations to evaluate. The regional assessment process differs slightly for breeding and non-breeding populations.

In step two, the IUCN Red List Criteria are applied to the regional population of the taxon (as specified by IUCN 2001), resulting in a preliminary categorisation. All data used in this initial assessment – such as number of mature individuals and parameters relating to area, reduction, decline, fluctuations, subpopulations, locations, and fragmentation – should be from the regional population, NOT the global population. However, it must be noted that taxa migrating to other regions during part of the year may be affected by conditions there. It may be essential to take such conditions into account, particularly when applying criteria pertaining to decline and area (criteria A, B and C).

In step three, the existence and status of any conspecific populations outside the region that may affect the risk of extinction within the region should be investigated. If the taxon is endemic to the region or the regional population is isolated, the Red List Category defined by the criteria should be adopted unaltered. If, on the other hand, conspecific populations outside the region are judged to affect the regional extinction risk, the regional Red List Category should be changed to a more appropriate level that reflects the extinction risk as defined by criterion E (IUCN, 2001). In most cases, this will mean down-listing the category obtained in step two, because populations within the region may experience a "rescue effect" from populations outside the region. In other words, immigration from outside the region will tend to decrease extinction risk within the region.

Normally, such a down-listing will involve a one-step change in category, such as changing the category from Endangered (EN) to Vulnerable (VU) or from VU to Near Threatened (NT). For expanding populations, whose global range barely touches the edge of the region, a down-listing of the category by two steps may be appropriate (see Annex 2, Example 7). Likewise, if the region is very small and not isolated by barriers from surrounding regions, down-listing by two steps may be necessary. In extremely rare cases, a taxon may be down-listed by more than two categories, but in most situations this will not be appropriate.

Conversely, if the population within the region is a demographic sink (Pulliam, 1988) that is unable to sustain itself without immigration from populations outside the region, AND if the extra-regional source is expected to decrease, the extinction risk of the regional population may be underestimated by the criteria. In such exceptional cases, an up-listing of the category may be appropriate. If it is unknown whether or not extra-regional populations influence the extinction risk of the regional population, the category from step two should be kept unaltered.

Thorough documentation of the reasoning behind such category changes, including all decisions made and the number of categories up- or down-listed, is required. Heterogeneity in the amount and type of data available to inform these decisions is unavoidable; for this reason it is particularly important to be as consistent as possible between taxa when up- and down-listing, and to document thoroughly the decision-making process.

1.3.5 The criteria

There are five quantitative criteria which are used to determine whether a taxon is threatened or not, and if threatened, which category of threat it belongs in (Critically Endangered, Endangered or Vulnerable) (see Table 1). These criteria are based around the biological indicators of populations that are threatened with extinction, such as rapid population decline or very small population size. Most of the criteria also include sub-criteria that must be used to justify more specifically the listing of a taxon under a particular category. For example, a taxon listed as "Vulnerable C2a(i)" has been placed in the Vulnerable category because its population is fewer than 10,000 mature individuals (criterion C) and the population is undergoing a continuing decline and all its mature individuals are in one subpopulation (sub-criterion a(i) of criterion C2).

The five criteria are:

A. Declining population (past, present and/or projected)

B. Geographic range size, and fragmentation, decline or fluctuations

C. Small population size, and fragmentation, decline or fluctuations

D. Very small population or very restricted distribution

E. Quantitative analysis of extinction risk (e.g., Population Viability Analysis)

To list a particular taxon in any of the categories of threat, only one of the criteria, A, B, C, D or E needs to be met. However, a taxon should be evaluated against as many criteria as available data permit, and the listing should be annotated by as many criteria as are applicable for a specific category of threat. For example, Critically Endangered: A2cd; B1+2de; C2a(i). Only the criteria for the highest category of threat that the taxon qualifies for should be listed. For example, if a taxon qualifies for criteria A, B and C in the Vulnerable and Endangered category and only criterion A in the Critically Endangered category, then only the criterion A met in the Critically Endangered category should be listed (the highest category of threat). Additional criteria that the taxon qualifies for at lower-threat categories may be included in the documentation; although the criteria for each of the categories of threat are based on quantitative thresholds, the system remains relatively flexible to ensure that taxa for which there is very little information can also be evaluated. This has been achieved by incorporating inference and projection into the assessment process. Therefore, the person conducting an assessment is expected to use the best available information in combination with inference and projection to test a taxon against the criteria. However, if inference and projection are used, the assumptions made must be documented. If there is any reasonable concern that a taxon is threatened with extinction in the near future, it should qualify for the criteria of one of the categories of threat.

The different criteria (A–E) are derived from a wide review aimed at detecting risk factors across the broad range of organisms and the diverse life histories they exhibit. The criteria are aimed at detecting symptoms of endangerment rather than causes. Consequently, the criteria are applicable to any threatening process that results in symptoms such as past and future population decline, small population sizes, and small geographic distributions. A taxon may be classified as threatened even if a threatening process cannot be identified. Regardless of the nature of threats, assessments must follow IUCN (2001) and these guidelines to ensure valid application of the criteria. However, different threats, especially new threats or poorly understood processes such as global climate change may require further guidance in the application of definitions and criteria. Section 12 provides guidance specific to different threats.

The quantitative values presented in the various criteria associated with threatened categories were developed through wide consultation, and they are set at what are generally judged to be appropriate levels. Broad consistency between them was sought. The process and the technical background to the IUCN Red List system, and the fundamental biological processes underlying population decline and extinction that the criteria are based on, are described by Mace (Mace, *et al.*, 2008). Some studies suggest that when taxa are evaluated under all five criteria, there is a tendency for them to be listed under criteria A to D rather than under E. There are several possible reasons for this. First, a reliable assessment under Criterion E generally requires more data and analysis, and in practice the process may often be incomplete. Second, even if each criterion on average corresponds to an identical risk of extinction, the probability that a specific species meets at least one of four criteria will be higher than the probability that it meets one criterion. Third, the thresholds in criteria A to D may be more precautionary. This would be justified because they are based on partial information and are often used in data-poor situations, whereas criterion E can (and should) incorporate all factors that influence population dynamics. In data-poor situations, where data permit only one or two of criteria A–D to be evaluated, it would be very easy to 'miss' taxa that should be listed (Keith, *et al.*, 2000); in other words, the listing errors will be wider under A–D, so their thresholds should be more precautionary. Even so, it should be noted that while some studies suggest that criteria A–D are more precautionary than criterion E (e.g., Gärdenfors, 2000), other studies indicate that criteria A–D may not be very precautionary, particularly when data are limited (e.g., Keith, *et al.*, 2004).

Table 1. Summary of the five criteria (A–E) used to evaluate if a taxon belongs in an IUCN Red List threatened category (Critically Endangered, Endangered or Vulnerable)

A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.

A2 Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) *[(a) cannot be used for A3]*.

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation *[except A3]*
(b) an index of abundance appropriate to the taxon
(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality
(d) actual or potential levels of exploitation
(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

	Critically Endangered	Endangered	Vulnerable
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented **OR** Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals			
(c) Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals			

C. Small population size and decline

	Critically Endangered	Endangered	Vulnerable
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals			

D. Very small or restricted population

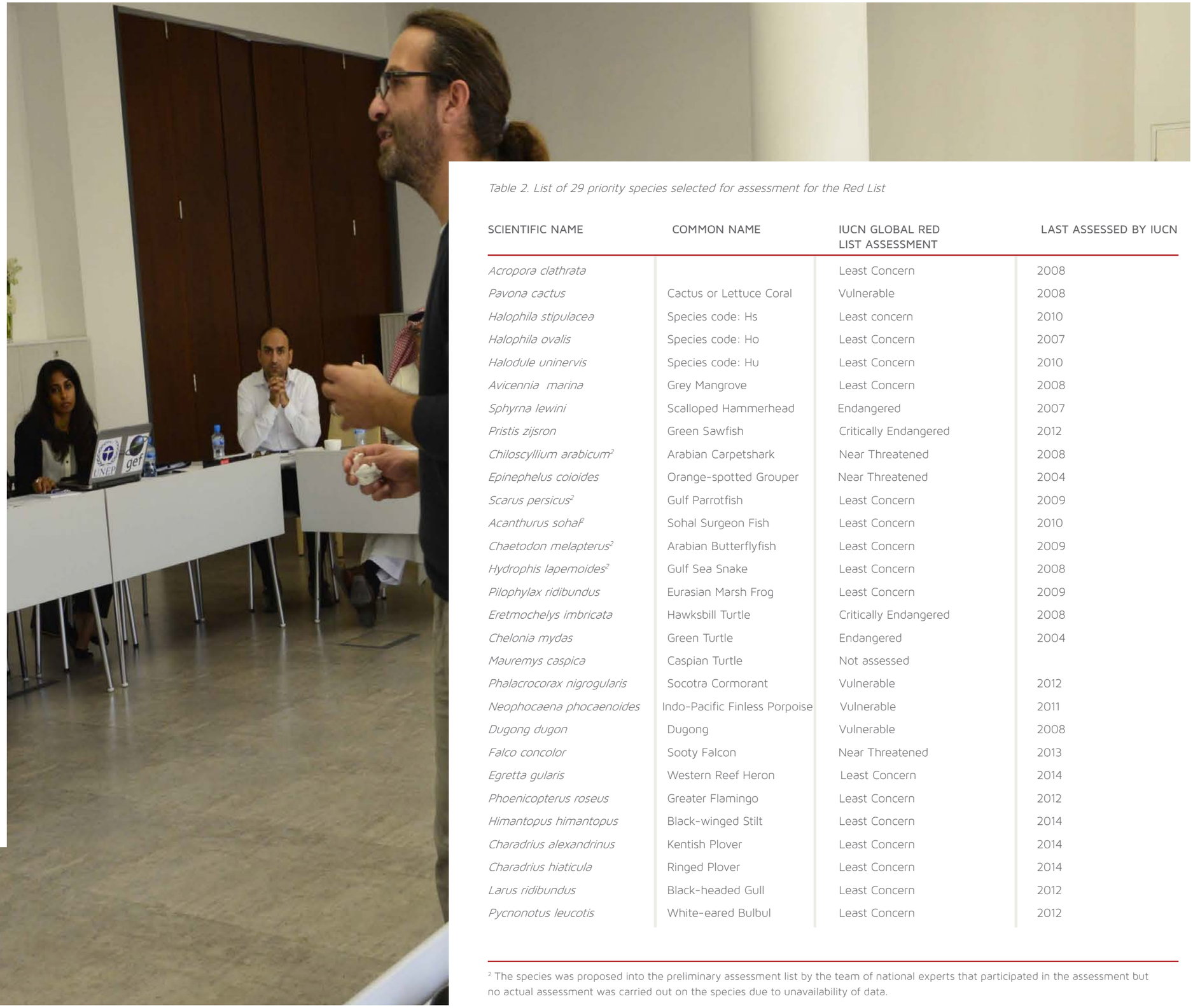
	Critically Endangered	Endangered	Vulnerable
D. Number of mature individuals	< 50	< 250	**D1.** < 1,000
D2. *Only applies to the VU category* Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	-	**D2.** typically: AOO < 20 km² or number of locations ≤ 5

E. Quantitative Analysis

	Critically Endangered	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

1 Use of this summary sheet requires full understanding of the *IUCN Red List Categories and Criteria* and *Guidelines for Using the IUCN Red List Categories and Criteria*. Please refer to both documents for explanations of terms and concepts used here.

1.4 Bahrain Red List assessment process



1.4.1 Red-listing training workshop

The process for carrying out this assessment has followed a series of steps. The first step was providing a training workshop on IUCN's Red-listing assessment process in general and on the regional level in particular. It was attended by a selected group of national Bahraini experts and specialists who would form the core team of evaluators for the selected taxa to be evaluated at a later stage.

1.4.2 Selection of taxa to be evaluated

A provisional list of species to be assessed was provided during the workshop mentioned above. The national experts were then asked to edit the species list as they saw fit. By the end of the workshop, the final species list for assessment was agreed upon. The list of species was divided among the experts based on their expertise; plants, sea mammals, fish etc. The panel of compilers and evaluators selected a list of 29 priority species that, based on their expertise at the regional level of Bahrain, they believed were priority for evaluation according to the IUCN Regional Red List as the first taxa to be assessed for the current stage (see Table 2).

1.4.3 The assessment

After distributing the roles and assigning tasks to team leaders for each taxon, each team worked on assessing their selected taxon. Prior to the assessment, a desktop review was undertaken for the selected species in order to provide all data available for each species on the Bahraini regional level. During this stage, the national experts provided valuable input in their respective expertise to guide the assessment process. All draft assessments were then delivered to the expert evaluators for revision. The assessments were reviewed and a series of meetings were held, mainly teleconferences, in order to make sure that due process had been followed; then the assessments were finalised.

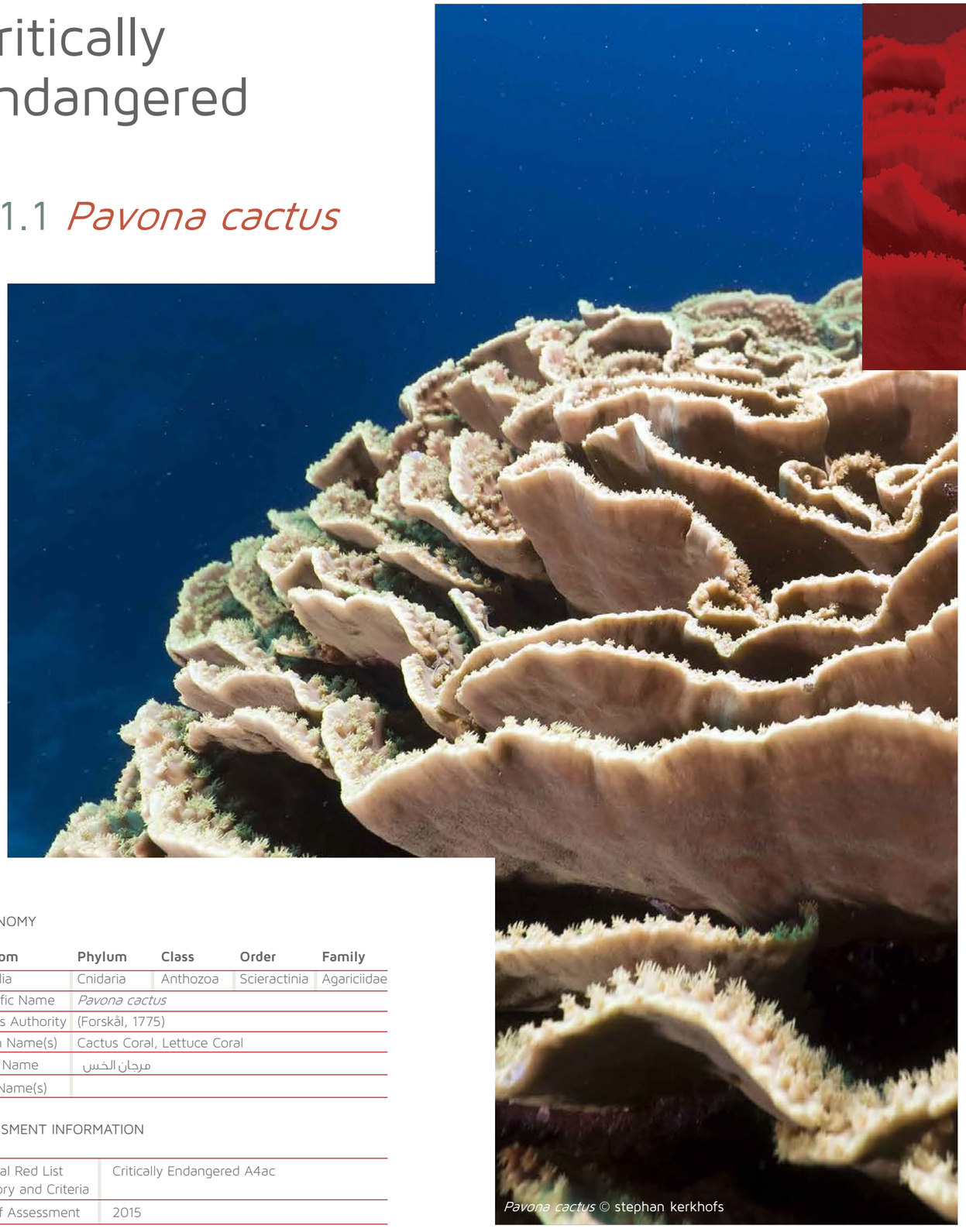
Table 2. List of 29 priority species selected for assessment for the Red List

SCIENTIFIC NAME	COMMON NAME	IUCN GLOBAL RED LIST ASSESSMENT	LAST ASSESSED BY IUCN
Acropora clathrata		Least Concern	2008
Pavona cactus	Cactus or Lettuce Coral	Vulnerable	2008
Halophila stipulacea	Species code: Hs	Least concern	2010
Halophila ovalis	Species code: Ho	Least Concern	2007
Halodule uninervis	Species code: Hu	Least Concern	2010
Avicennia marina	Grey Mangrove	Least Concern	2008
Sphyrna lewini	Scalloped Hammerhead	Endangered	2007
Pristis zijsron	Green Sawfish	Critically Endangered	2012
Chiloscyllium arabicum[2]	Arabian Carpetshark	Near Threatened	2008
Epinephelus coioides	Orange-spotted Grouper	Near Threatened	2004
Scarus persicus[2]	Gulf Parrotfish	Least Concern	2009
Acanthurus sohal[2]	Sohal Surgeon Fish	Least Concern	2010
Chaetodon melapterus[2]	Arabian Butterflyfish	Least Concern	2009
Hydrophis lapemoides[2]	Gulf Sea Snake	Least Concern	2008
Pilophylax ridibundus	Eurasian Marsh Frog	Least Concern	2009
Eretmochelys imbricata	Hawksbill Turtle	Critically Endangered	2008
Chelonia mydas	Green Turtle	Endangered	2004
Mauremys caspica	Caspian Turtle	Not assessed	
Phalacrocorax nigrogularis	Socotra Cormorant	Vulnerable	2012
Neophocaena phocaenoides	Indo-Pacific Finless Porpoise	Vulnerable	2011
Dugong dugon	Dugong	Vulnerable	2008
Falco concolor	Sooty Falcon	Near Threatened	2013
Egretta gularis	Western Reef Heron	Least Concern	2014
Phoenicopterus roseus	Greater Flamingo	Least Concern	2012
Himantopus himantopus	Black-winged Stilt	Least Concern	2014
Charadrius alexandrinus	Kentish Plover	Least Concern	2014
Charadrius hiaticula	Ringed Plover	Least Concern	2014
Larus ridibundus	Black-headed Gull	Least Concern	2012
Pycnonotus leucotis	White-eared Bulbul	Least Concern	2012

[2] The species was proposed into the preliminary assessment list by the team of national experts that participated in the assessment but no actual assessment was carried out on the species due to unavailability of data.

2.1 Critically Endangered

2.1.1 *Pavona cactus*



Pavona cactus © stephan kerkhofs

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Cnidaria	Anthozoa	Scieractinia	Agariciidae
Scientific Name	*Pavona cactus*			
Species Authority	(Forskål, 1775)			
English Name(s)	Cactus Coral, Lettuce Coral			
Arabic Name	مرجان الخس			
Local Name(s)				

ASSESSMENT INFORMATION

National Red List Category and Criteria	Critically Endangered A4ac
Year of Assessment	2015

Justification - Specific population trends for this species are unknown in Bahrain but population reduction can be inferred from declines in coral reef habitat quality based on current lost reefs and those that are in a critically degraded form. This comes as a result of continued reef degradation due to the combination of anthropogenic impacts such as reclamation and dredging activities and natural impacts such as bleaching. In the seven years between 1985 and 1992, a total of 38,700 m^2 of dense coral and an additional 180,000 m^2 of sparse coral habitat were lost from the western portion of Fasht Al-Adhm alone (Zainal, *et al.*, 1993; Burt, *et al.*, 2012).

Major rises in sea temperatures and bleaching events had a significant impact on Bahraini reefs in the late 1990s, resulting in an estimated loss of >90% of coral in Bahrain (Public Commission for the Protection of Marine Resources, Environment and Wildlife, 2006; Burt, *et al.*, 2012). Lastly, based on a survey conducted by Burt *et al.* in 2011 on Bahraini reef habitats covering six major sites, the percentage cover of *Pavona cactus* observed during the survey was 0.2%.

As the species population in Bahrain is expected to receive immigration from neighbouring regions and the regional population is not believed to be a sink, the evaluation has been kept as is and so the species is believed to be Critically Endangered.

Global Red List Assessment
2008 Vulnerable

GEOGRAPHIC RANGE

Range Description - There are insufficient data on this species' geographic range; however, it is known to be embedded within coral habitats. The main coral habitats include the 200 km^2 Fasht Al-Adhm immediately to the east of Bahrain, Khawr Fasht and Fasht Al-Jarim 20 km to the north, and Bulthama 70 km northeast; various other smaller reef habitats are interspersed around eastern Bahrain (Vousden, 1988a; Burt *et al.*, 2012).

Population - Not known
Trend - Decline

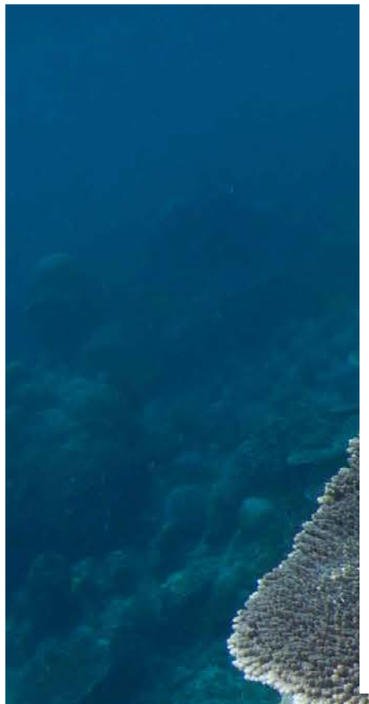
THREATS

This species is under continuals threat from anthropogenic pressures, mostly continuous dredging and reclamation activities which result in the silt and sediment accumulations that smother coral species. Moreover, the future potential impacts of climate change and ocean acidification need to be kept in sight when assessing this species since it is clear that events such as sea temperature rise have caused bleaching, resulting in loss.

CONSERVATION ACTIONS

Conservation actions underway - Efforts are being made to conserve coral reef ecosystems in Bahrain by establishing marine protected areas (MPAs) (Al Zayani, 2003; Al-Wedaei *et al.* 2011) and through various management actions ranging from fishing gear management, coral propagation programmes and establishment of artificial coral reef systems.

2.1.2 *Acropora clathrata*



TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Cnidaria	Anthozoa	Scieractinia	Agariciidae
Scientific Name	*Acropora clathrata*			
Species Authority	(Brook, 1891)			
English Name(s)				
Arabic Name	قرن الغزال			
Local Name(s)				

ASSESSMENT INFORMATION

National Red List Category and Criteria	Critically Endangered A4ac
Year of Assessment	2016

Justification - Specific population trends for this species are unknown in Bahrain but population reduction can be inferred from declines in coral reef habitat quality based on current lost reefs and those that are critically degraded. This comes as a result of continued reef degradation due to the combination of anthropogenic impacts such as reclamation and dredging activities and natural impacts such as bleaching. In the seven years between 1985 and 1992, a total of 38,700 m^2 of dense coral and an additional 180,000 m^2 of sparse coral habitat were lost from the western portion of Fasht Al-Adhm alone (Zainal, *et al.*, 1993; Burt, *et al.*, 2012).
Major rises in sea temperatures and bleaching events had a significant impact on Bahraini reefs in the late 1990s, resulting in an estimated loss of >90% of coral in Bahrain (Public Commission for the Protection of Marine Resources, Environment and Wildlife, 2006; Burt, *et al.*, 2012). Lastly, based on a survey conducted by Burt *et al.* in 2011 on Bahraini reef habitats covering six major sites, no species of *Acropora* were recorded or observed during the survey.

Global Red List Assessment
2008 Least Concern

GEOGRAPHIC RANGE

Range Description - As with the previous species, there are insufficient data on this species' geographic range; however, it is known to be embedded in coral habitats. The main coral habitats include the 200 km^2 Fasht Al-Adhm immediately to the east of Bahrain, Khawr Fasht and Fasht Al-Jarim 20 km to the north, and Bulthama 70 km northeast; various other smaller reef habitats are interspersed around eastern Bahrain (Vousden, 1988a; Burt, *et al.*, 2012).

Population - Not known
Trend - Decline

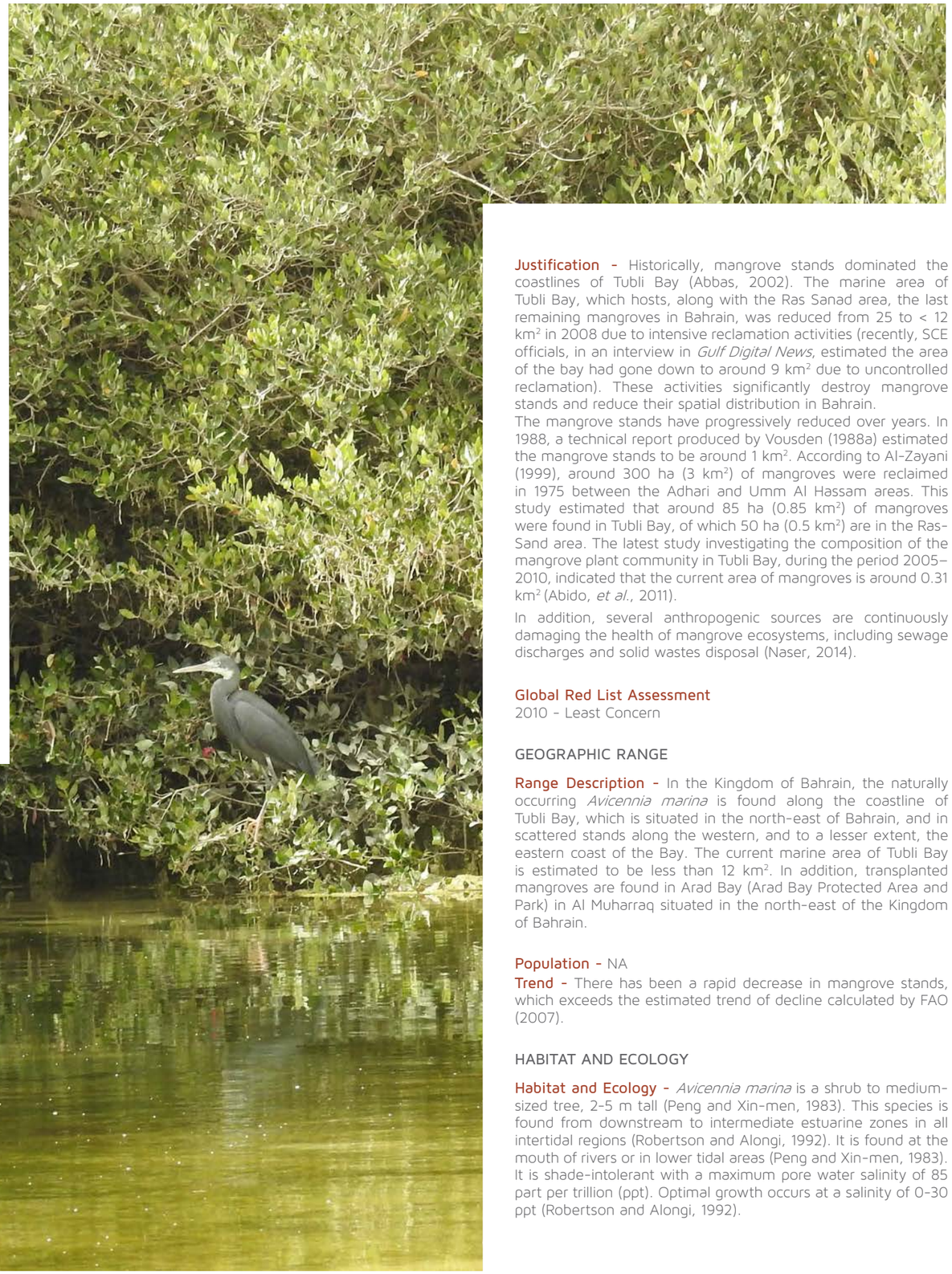
THREATS

Threats facing this species are similar to those facing the *Pavona cactus*, namely anthropogenic pressures, in particular continuous dredging and reclamation activities which result in the silt and sediment accumulations which smother coral species. Moreover, the future impacts of climate change and ocean acidification need to be kept in sight when assessing this species since it is clear that events such as sea temperature rise have caused bleaching, resulting in loss.

CONSERVATION ACTIONS

Conservation actions underway - Efforts are being made to conserve coral reef ecosystems in Bahrain by establishing MPAs (Al Zayani, 2003; Al-Wedaei, *et al.* 2011) and through various management actions such as fishing gear management etc.

2.1.3 *Avicennia marina*



Avicennia marina © Haifaa Abdulhalim, ARC-WH

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Plantae	Tracheophyta	Magnoliopsida	Lamiales	Avicenniaceae
Scientific Name	*Avicennia marina*			
Species Authority	(Forsk.) Vierh			
English Name(s)	Grey Mangrove			
Arabic Name	قرم رمادي			
Local Name(s)				

ASSESSMENT INFORMATION

National Red List Category and Criteria	Critically Endangered A2c; B1ab(i,iii) + B2ab(i, iii)
Year of Assessment	2015

Justification - Historically, mangrove stands dominated the coastlines of Tubli Bay (Abbas, 2002). The marine area of Tubli Bay, which hosts, along with the Ras Sanad area, the last remaining mangroves in Bahrain, was reduced from 25 to < 12 km^2 in 2008 due to intensive reclamation activities (recently, SCE officials, in an interview in *Gulf Digital News*, estimated the area of the bay had gone down to around 9 km^2 due to uncontrolled reclamation). These activities significantly destroy mangrove stands and reduce their spatial distribution in Bahrain.
The mangrove stands have progressively reduced over years. In 1988, a technical report produced by Vousden (1988a) estimated the mangrove stands to be around 1 km^2. According to Al-Zayani (1999), around 300 ha (3 km^2) of mangroves were reclaimed in 1975 between the Adhari and Umm Al Hassam areas. This study estimated that around 85 ha (0.85 km^2) of mangroves were found in Tubli Bay, of which 50 ha (0.5 km^2) are in the Ras-Sand area. The latest study investigating the composition of the mangrove plant community in Tubli Bay, during the period 2005–2010, indicated that the current area of mangroves is around 0.31 km^2 (Abido, *et al.*, 2011).

In addition, several anthropogenic sources are continuously damaging the health of mangrove ecosystems, including sewage discharges and solid wastes disposal (Naser, 2014).

Global Red List Assessment
2010 - Least Concern

GEOGRAPHIC RANGE

Range Description - In the Kingdom of Bahrain, the naturally occurring *Avicennia marina* is found along the coastline of Tubli Bay, which is situated in the north-east of Bahrain, and in scattered stands along the western, and to a lesser extent, the eastern coast of the Bay. The current marine area of Tubli Bay is estimated to be less than 12 km^2. In addition, transplanted mangroves are found in Arad Bay (Arad Bay Protected Area and Park) in Al Muharraq situated in the north-east of the Kingdom of Bahrain.

Population - NA
Trend - There has been a rapid decrease in mangrove stands, which exceeds the estimated trend of decline calculated by FAO (2007).

HABITAT AND ECOLOGY

Habitat and Ecology - *Avicennia marina* is a shrub to medium-sized tree, 2-5 m tall (Peng and Xin-men, 1983). This species is found from downstream to intermediate estuarine zones in all intertidal regions (Robertson and Alongi, 1992). It is found at the mouth of rivers or in lower tidal areas (Peng and Xin-men, 1983). It is shade-intolerant with a maximum pore water salinity of 85 part per trillion (ppt). Optimal growth occurs at a salinity of 0-30 ppt (Robertson and Alongi, 1992).

This is a pioneer species on newly formed habitats of mud with a high proportion of sand, but does not seem to grow on pure mud (Peng and Xin-men, 1983). It is a hardy species in natural conditions and regenerates quickly from coppices, both as individuals and as a species. It is a colonising species on newly formed mudflats in SE Asia (Terrados, *et al.*, 1997), and has a high tolerance to hypersaline conditions.

Systems - Terrestrial, Marine

THREATS

Mangrove stands are under threat from on-going anthropogenic activities, including:

- Reclamation operations, which have drastically reduced the total area of Tubli Bay from 25 km^2 to less than 12 km^2.
- Sand-washing factories discharging waste water into Tubli Bay.
- Discharge of secondary treated sewage water from the major outfall (Tubli Water Pollution Control Centre).
- Illegal dumping of solid wastes.
- Fishing activities in the Bay.

CONSERVATION ACTIONS

Conservation actions underway

- Protected Areas: in order to reduce the reclamation operations, in 1995 Tubli Bay was declared nationally as a protected area and in 1997 it was designated internationally as a RAMSAR Site (Public Commission for the Protection of Marine Resources, Environment and Wildlife, 2006).
- The SCE has prohibited further release of waste water from sand washing factories into Tubli Bay.
- The SCE – Department of Fisheries – in collaboration with the Ministry of Work and Municipal Affairs and Urban Planning successfully transplanted more than 1500 mangrove seedlings in 2013 in both Tubli and Arad Bay.
- Currently, there is a plan by the SCE to transplant 3000 mangrove seedlings in Tubli Bay and Arad Bay (Unnikrishnan, 2015).
- There are attempts to propagate mangrove plants via seed germination by the Ministry of Work and Municipal Affairs and Urban Planning.

Conservation actions proposed

- In order to prevent further deterioration of the mangrove habitat in the Kingdom of Bahrain, there is urgent need to enforce the legislation, which is intended to protect Tubli Bay.
- Investing in developing the activities related to mangrove propagation and transplantation.
- Continuous monitoring of mangrove habitat by specialists and amateurs in GOs and NGOs.

2.1.4 *Pristis zijsron*

Pristis zijsron © Shaun Wilkinson`

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Chondrichthyes	Rajiformes	Pristidae
Scientific Name	*Pristis zijsron*			
Species Authority	Bleeker, 1851			
English Name(s)	Green Sawfish, Olive Sawfish, Narrowsnout Sawfish, Longcomb Sawfish			
Arabic Name	الكَوْسَجْ أو سمك المنشار			
Local Name(s)	أبو سياف			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Endangered A2cd
Year of Assessment	2015

Justification - This species used to be abundant around Bahrain. However, since the 1960s, a rapid decline in its population has been observed. Currently, it is considered very rare. During the period 1997–2007, not one sawfish was reported around the Hawar Islands. However, around four rostra (or snouts) of this species were reported in 1997, 2002 and 2011. As the species population in Bahrain is expected to receive immigration from neighbouring regions and the regional population is not believed to be a sink, the evaluation has been kept as is and so the species is believed to be Critically Endangered.

Global Red List Assessment

2013 – Critically Endangered

2006 – Critically Endangered

2000 - Endangered

GEOGRAPHIC RANGE

Range Description - This species is found in the shallow areas surrounding Bahrain. In particular, around the Hawar Islands and the area between Bahrain and Qatar.

Population - A historical review for the abundance of this species indicated a widespread distribution along the entire coast of the Arabian Gulf during the 1960s, including areas around Bahrain. However, a rapid decline in the population has been observed through the Arabian Gulf and Bahrain.
Trend - Decreasing

HABITAT AND ECOLOGY

A number of historical and recent sawfish records are from areas between Bahrain and Qatar, where there are wide expanses of shallow water < 20m in depth. Although seagrass has not previously been identified as a critical habitat for sawfishes, some limited association has been reported from research elsewhere. Further, it is notable that the majority of Bahrain's well-developed seagrass beds occur to the south-east of Bahrain, where the Hawar Islands are loc`ated (a former area of sawfish abundance).

Systems - Marine

THREATS

The greatest threat to sawfishes is from gillnets, which are common in the Arabian Gulf. Besides fisheries, another significant threat is degradation of shallow coastal environments critical to sawfish. Coastal development and in-fill activities have profound impacts on these habitats. Bahrain has expanded by 11% since 1963.

CONSERVATION ACTIONS

Conservation actions underway - The Hawar Islands and Mashtan Island are MPAs. Bahrain has taken measures to protect this species, including reporting on this species in cooperation with the Shark Conservation Society (2012).

Conservation actions proposed - In Bahrain, the Green Sawfish is protected by law under Decision (2) of 2012 on shark conservation. Any attempt at regional sawfish recovery must involve strict and well-enforced restrictions on the use of gillnets. Such enforcement in the Arabian Gulf could significantly benefit a range of species including overexploited and commercially valuable finfish, other threatened elasmobranchs, and Dugongs and turtles.

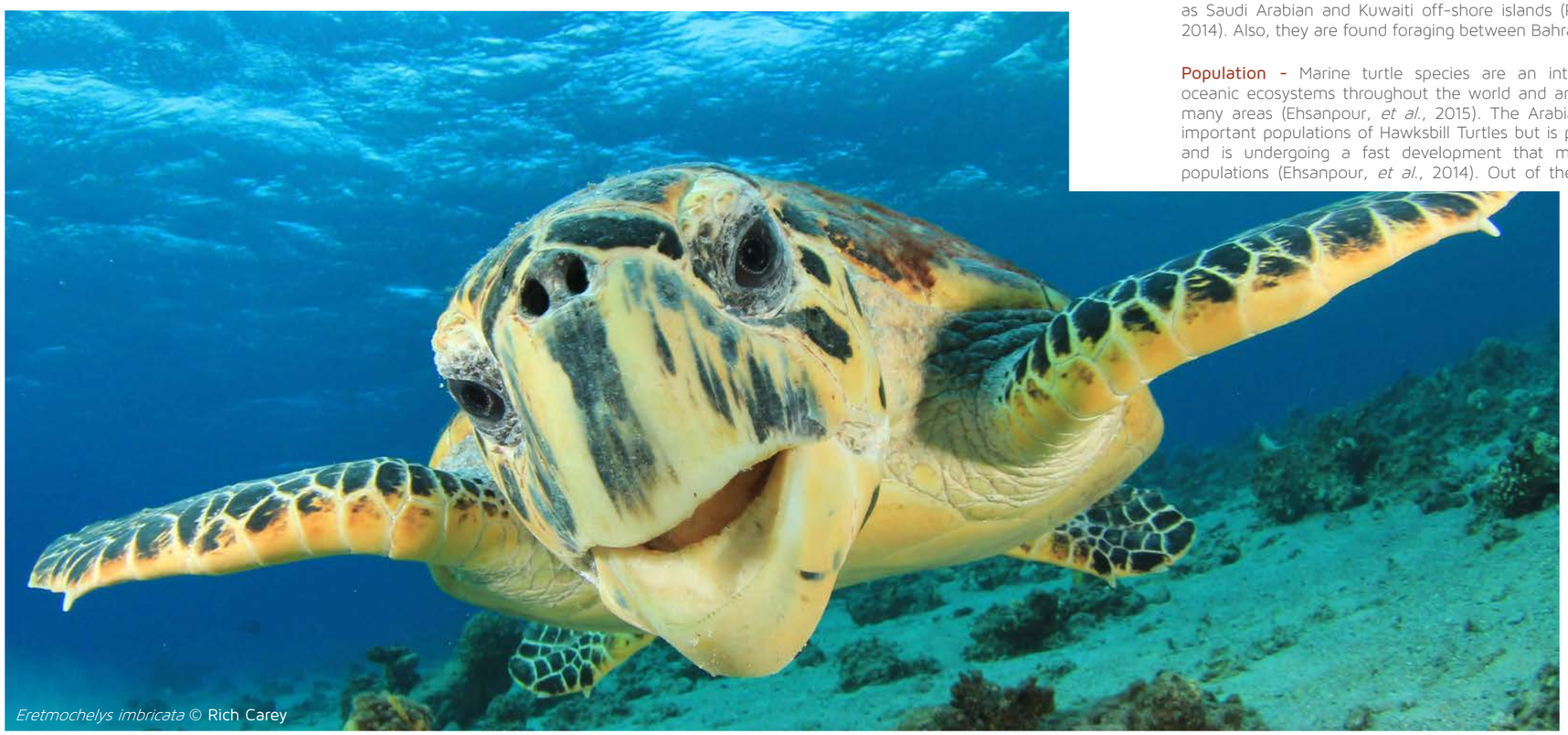
2.1.5 *Eretmochelys imbricata*

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Reptilia	Testudines	Cheloniidae
Scientific Name	*Eretmochelys imbricata*			
Species Authority	Linnaeus, 1766			
English Name(s)	Hawksbill Turtle			
Arabic Name	سلحفاة منقار الصقر			
Local Name(s)	أحمسه			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Critically Endangered A2bd
Year of Assessment	2015



Eretmochelys imbricata © Rich Carey

Justification - It is reported that Hawksbill Turtles forage in Bahraini waters (Pilcher, *et al.*, 2014) with no indications of whether they nest on the coastal areas of Bahrain islands. However, information on this species in this part of the Arabian Gulf is lacking.
Hawksbills have been classified as Critically Endangered by IUCN. As the Arabian Gulf is part of the marine system where the Hawksbills are threatened significantly, actions need to be taken to protect this species in this part of the world's ocean. As the species population in Bahrain is expected to receive immigration from neighbouring regions and the regional population is not believed to be a sink, the evaluation has been kept as is and so the species is believed to be Critically Endangered.

Global Red List Assessment

2008 – Critically Endangered
1996 - Critically Endangered
1996 - Critically Endangered
1994 - Endangered
1990 - Endangered
1988 - Endangered
1986 - Endangered
1982 - Endangered

GEOGRAPHIC RANGE

Range Description - Hawksbill Turtles are reported to exist in a number of sea areas around the Arabian Gulf, and to nest in various coastal areas, viz Rass Laffan (14 km of coastline) in Qatar (Ficetola, 2008); Bu Tinah (8.5 km^2) and Jarnain Islands (6 km^2) in United Arab Emirates (Al-Ghais, 2009); in Iran, Hormoz Island (45 km^2) (Devin, *et al.*, 2008) and Qeshm Island (1,495 km^2) the largest Iranian Island in the Gulf (Ehsanpour, *et al.*, 2014); as well as Saudi Arabian and Kuwaiti off-shore islands (Pilcher, *et al.*, 2014). Also, they are found foraging between Bahrain and Qatar.

Population - Marine turtle species are an integral part of oceanic ecosystems throughout the world and are declining in many areas (Ehsanpour, *et al.*, 2015). The Arabian Gulf hosts important populations of Hawksbill Turtles but is poorly studied and is undergoing a fast development that might threaten populations (Ehsanpour, *et al.*, 2014). Out of the five species of marine turtles that inhabit the Arabian Gulf waters (Al-Mansi, *et al.*, 1999), Hawksbill Turtles and Green Turtles are the most abundant species nesting in the Gulf (Al-Ghais, 2009). The former reported 48 and 17 Hawksbill Turtle nests in Jarnain and Bu Tinah Island of UAE, respectively. Devin *et al.* (2008) reported an estimated population of 50–100 females nesting at Queshm, Larak and Hurmoz islands in the Straits of Hormoz, while Ross and Barwani (1982) estimated another 300 females nested on Shitver and Lavan Islands in the Gulf, and approximately 1000 females annually in the whole of Iran's waters. At Rass Laffan on the eastern coastline of Qatar, 300 turtles nest annually in this area, with Hawksbill Turtles amongst them (Ficetola, 2008).

Trend - Investigations of Hawksbill Turtles in the Arabian Gulf are fragmented because research has been conducted at the individual country level, rather than from a regional perspective. Lack of previous (historic) information and currently available data do not provide evidence on the population status across a time period in terms of increase or decline of this species numbers in the Gulf.

HABITAT AND ECOLOGY

Habitat and Ecology - Gulf turtles were among the smallest in size in the world (mean curved carapace length 81.7 cm (Pilcher, *et al.*, 2014b). Hawksbill Turtles are globally distributed but occupy a relatively narrow temperature range common to their principal habitat in the tropics (Pilcher, *et al.*, 2014a). It was reported that during high temperature season (June-August) where temperature goes as high as 35°C, turtles tend to temporarily migrate an average of 70 km to deeper waters at northern latitudes, returning after 2–3 months (September–October) to their original feeding grounds. Furthermore, Pilcher *et al.* (2014b) reported that turtles from Qatar, Iran and the UAE generally migrate south and southwest to waters shared by the UAE and Qatar. Also, smaller numbers of turtles were seen to migrate northward towards Bahrain, Saudi Arabia and one reached Kuwait. Various parts of the Jarnain and Bu Tinah Islands (UAE), Hormoz and Qashm Islands (Iran), Rass Laffan beach (Qatar), and the offshore islands of Kuwait and Saudi Arabia provide suitable habitats for foraging and nesting. Hawksbill Turtles in the Gulf spend 68% of the time in foraging grounds with home ranges of 40–60 km^2 and small core areas of 6 km^2 (Pilcher, *et al.*, 2014b). The nesting season of the Hawksbill Turtles at the Jarnain and Bu Tinah Islands extends from mid-March to mid-July with peak nesting activities in April and May (Al-Ghais, 2009), whereas it is from March–April on Qeshm Island (Ehsanpour, *et al.*, 2015).

System(s) - Marine

THREATS

The most commonly cited causes of the decline of Hawksbill Turtles are direct exploitation and the alteration or destruction of habitat in foraging shallow grounds. Human alteration of beaches where these turtles nest can have profound consequences on the demography of population. Also, changing the natural vegetation along the coastlines can increase the temperature of nests and thus affect the sex ratio (Ficetola, 2008; Pilcher, *et al.*, 2014a). Oil and gas industries, urban and industrial development, fishery pressure as well as shipping, are major threats to turtles (Pilcher, *et al.*, 2014a).

CONSERVATION ACTIONS

Conservation actions underway - Hawksbill Turtles are protected by law in Bahrain; Ministerial Order No. (3) of 2003 bans the hunting of all species of turtles, within the territorial fishing areas of the Kingdom of Bahrain.
Conservation actions proposed - In addition to Ministerial Order No. (3) of 2003, it is proposed to protect the coral reef habitats where Hawksbill Turtles forage.

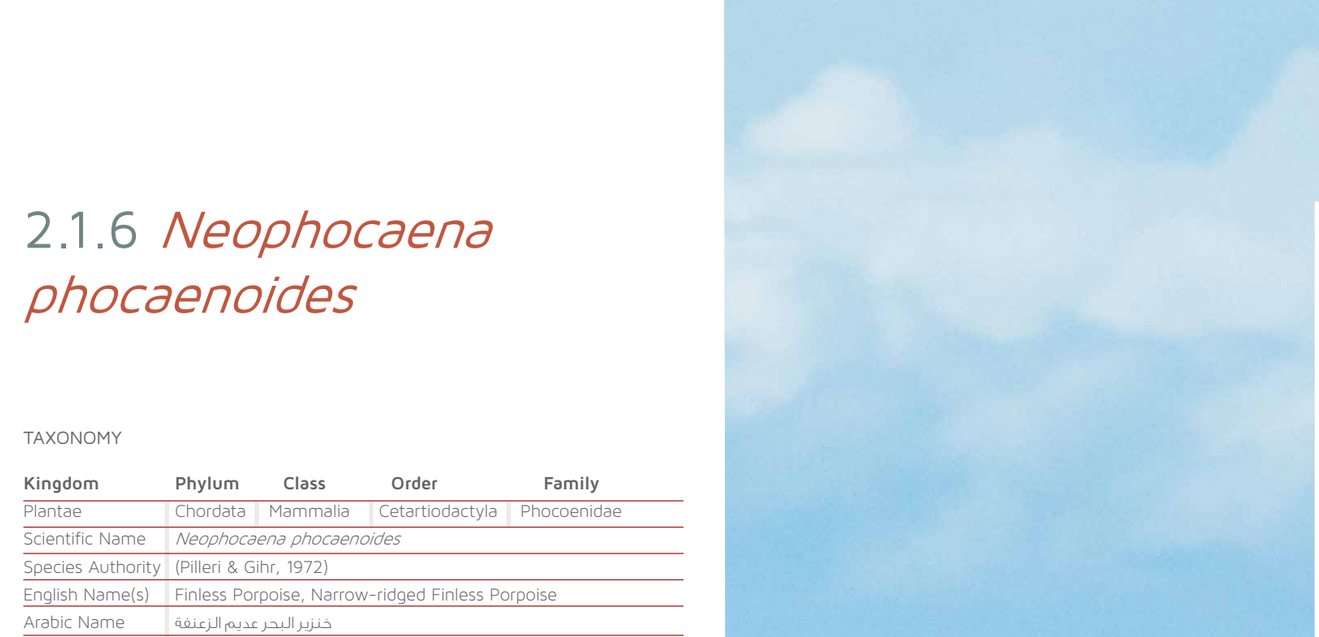
2.1.6 *Neophocaena phocaenoides*

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Plantae	Chordata	Mammalia	Cetartiodactyla	Phocoenidae
Scientific Name	*Neophocaena phocaenoides*			
Species Authority	(Pilleri & Gihr, 1972)			
English Name(s)	Finless Porpoise, Narrow-ridged Finless Porpoise			
Arabic Name	خنزير البحر عديم الزعنفة			
Local Name(s)	دغس			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Critically Endangered A2cde
Year of Assessment	2015



Neophocaena phocaenoides © Lodimup

Justification - This species is evidently extremely rare and apparently restricted in its distribution. It is also subject to several anthropogenic pressures that may lead to extinction of this animal from the waters of Bahrain and the Arabian Gulf. As the species population in Bahrain is expected to receive immigration from neighbouring regions and the regional population is not believed to be a sink, the evaluation has been kept as is and so the species is believed to be Critically Endangered.

Global Red List Assessment
2012 - Vulnerable
2011 - Vulnerable

GEOGRAPHIC RANGE

Range Description - Records of this species are known from Bahrain, Iraq, Saudi Arabia and UAE. Records from Bahrain include two animals found as by-catch in fishermen's nets during 1976 in Ras Sand area, Tubli Bay. One specimen was also recorded in Bahrain in 1989. Two corpses from Bahraini waters were recovered in 1986 and following the 1991 oil spill (Aspinall and Baldwin, 1999; Collins, et al., 2005).

Population - The Finless Porpoise (Neophocaena phocaenoides) is thought to be an uncommon resident in the Arabian Gulf and accounts for less than 2% of the total cetacean population (Preen, 2004). There have been very few confirmed sightings of live animals. The sightings are only of singles and pairs in most cases. Knowledge of the occurrence of this species in the Arabian Gulf relies mainly on discovery of shoreline corpses (Aspinall and Baldwin, 1999). Therefore, this animal is clearly very rare in the Arabian Gulf.

Trend - Decreasing

HABITAT AND ECOLOGY

Habitat and Ecology - The Finless Porpoise is known to breed in the Arabian Gulf. Sightings of calves and a juvenile have been recorded during April and early May. This species is typically associated with shallow waters, sheltered areas and creeks. However, the majority of sightings are generally localised and these may be a reflection of habitat preference.

Systems - Marine

THREATS
A variety of factors have led to severe degradation of available habitats within the Arabian Gulf and these extend throughout the potential range of Finless Porpoises. Impacted areas are likely to include all nearshore environments, particularly those that are shallow and targeted for coastal development. Dredging and reclamation are likely to displace the animal or at least disrupt its feeding or breeding activities. These activities are attributed to the loss of several valuable coastal and marine habitats. Coastal pollution and oil spills have profound effects on this species. Additionally, seine-netting, set- and drift-nets account for an unknown quantity of premature deaths.

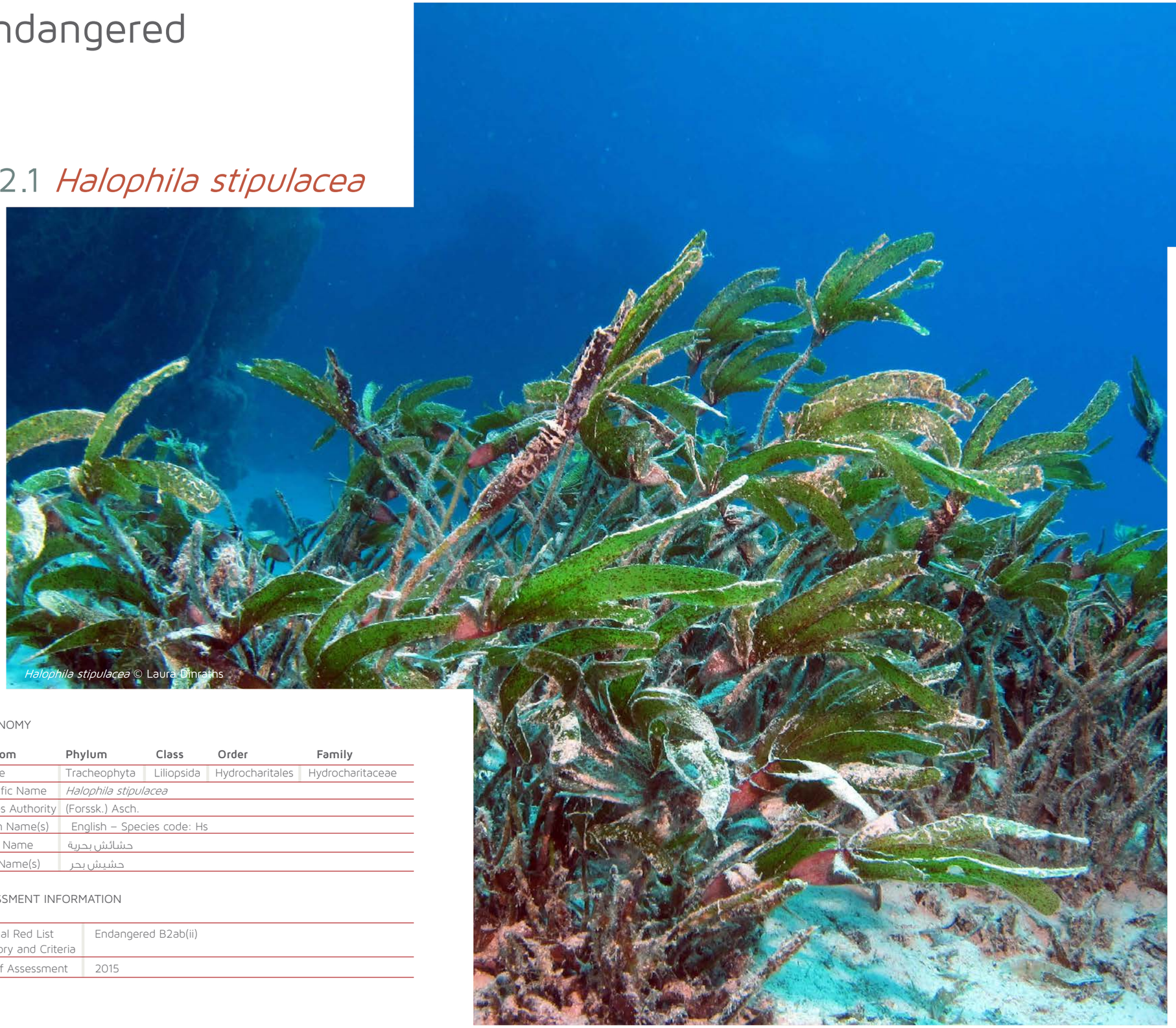
CONSERVATION ACTIONS

Conservation actions underway -The country has established various MPAs in order to conserve species that reside in those areas or those who pass by the area.

Conservation actions proposed - In the light of the species rarity, survey efforts are urgently required to investigate its spatial and temporal distribution. Due to the overlapping distribution of similarly affected species such as the Humpback Dolphin and Dugong, regional cooperation to conserve the Finless Porpoise is required. Enforcing environmental and fishing regulations could minimise habitat degradation in the Arabian Gulf.

2.2 Endangered

2.2.1 *Halophila stipulacea*



Halophila stipulacea © Laura Dinraths

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Plantae	Tracheophyta	Liliopsida	Hydrocharitales	Hydrocharitaceae
Scientific Name	*Halophila stipulacea*			
Species Authority	(Forssk.) Asch.			
English Name(s)	English – Species code: Hs			
Arabic Name	حشائش بحرية			
Local Name(s)	حشيش بحر			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Endangered B2ab(ii)
Year of Assessment	2015

Justification - Seagrass in the region is highly associated with the Dugong species especially as Bahrain's territorial waters host the second largest population of Dugongs in the world after Australia (SCE, 2015).

Specific population trends for this species are unknown in Bahrain but their area of occupancy can be inferred from a decline in geographic range based on current lost seagrass beds and those that are critically degraded due to land reclamation and dredging. In the past two decades, reclamation activities have resulted in an increase of 11% of the total land area thereby expanding its area by 91 km^2 (Zainal, 2009; van Lavieren, *et al.*, 2011).

Zainal *et al.* (1993) reported a loss of 10.2 km^2 of seagrass beds on the east coast of Bahrain that were detected from remote sensing imagery in the period 1985–1992, which was mainly attributed to dredging and reclamation activities.

As the species population in Bahrain is not expected to receive immigration (extension) from neighbouring regions, the evaluation has been kept as is and so the species is believed to be Endangered.

Global Red List Assessment
2010 – Least Concern

GEOGRAPHIC RANGE

Range Description - The eastern and western coasts of Bahrain (Vousden, 1995; Al-Wedaei, *et al.*, 2011). The majority of seagrass habitats are located in the eastern subtidal waters, mainly beginning south of Fasht Al Adhm extending to the Hawar Islands. The second largest seagrass beds are found in the western subtidal areas with patches recorded to the north-west at Fasht Al Jarim (Geomatec, 2006).

Population - NA
Trend - Decline

THREATS

This species is under continuous threats from anthropogenic pressures mostly reclamation and dredging in addition to industrial effluents, domestic discharges and brackish water from desalination plants.

CONSERVATION ACTIONS

Conservation actions underway - Efforts are being made to conserve seagrass ecosystems in Bahrain by establishing MPAs (Al Zayani, 2003; Al-Wedaei, *et al.*, 2011). However, there are no direct actions being undertaken targeting seagrass conservation specifically.

2.2.2 *Halophila ovalis*

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Plantae	Tracheophyta	Liliopsida	Hydrocharitales	Hydrocharitaceae
Scientific Name				
Species Authority	(Forssk.) Asch.			
English Name(s)				
Arabic Name	حشائش بحرية			
Local Name(s)	حشيش بحر			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Endangered B2 ab(ii)
Year of Assessment	2015

Justification - Seagrass in the region is highly associated with the Dugong species especially as Bahrain's territorial waters host the second largest population of Dugongs in the world after Australia (SCE, 2015).

Specific population trends for this species are unknown in Bahrain but their area of occupancy can be inferred from a decline in geographic range based on current lost seagrass beds and those that are critically degraded due to land reclamation and dredging. In the past two decades, reclamation activities have resulted in an increase of 11% of the total land area thereby expanding its area by 91 km^2 (Zainal, 2009; van Lavieren, *et al.*, 2011).

Zainal *et al.* (1993) reported a loss of 10.2 km^2 of seagrass beds on the east coast of Bahrain that were detected from remote sensing imagery in the period 1985–1992, which was mainly attributed to dredging and reclamation activities.

As the species population in Bahrain is not expected to receive immigration (extension) from neighbouring regions, the evaluation has been kept as is and so the species is believed to be Endangered.

Global Red List Assessment
2010 – Least Concern

GEOGRAPHIC RANGE

Range Description - The eastern and western coasts of Bahrain (Vousden, 1995; Al-Wedaei, *et al.*, 2011). The majority of seagrass habitats are located in the eastern subtidal waters, mainly beginning south of Fasht Al Adhm extending to the Hawar Islands. The second largest seagrass beds are found in the western subtidal areas with patches recorded to the north-west at Fasht Al Jarim (Geomatec, 2006).

Population - NA
Trend - Decline

THREATS

This species is under continuous threat from anthropogenic pressures mostly reclamation and dredging in addition to industrial effluents, domestic discharges and brackish water from desalination plants.

CONSERVATION ACTIONS

Conservation actions underway - Efforts are being made to conserve seagrass ecosystems in Bahrain by establishing MPAs (Al Zayani, 2003; Al-Wedaei, *et al.*, 2011). However, there are no direct actions being undertaken targeting seagrass conservation specifically.

2.2.3 *Halodule uninervis*

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Plantae	Tracheophyta	Liliopsida	Najadales	Cymodoceaceae
Scientific Name	*Halodule uninervis*			
Species Authority	(Forssk.) Boiss.			
English Name(s)				
Arabic Name	حشائش بحرية			
Local Name(s)	حشيش بحر			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Endangered B2 ab(ii)
Year of Assessment	2015

Halodule uninervis © Richard Carey

Justification - Seagrass in the region is highly associated with the Dugong species especially as Bahrain's territorial waters host the second largest population of Dugongs in the world after Australia (SCE, 2015).

Specific population trends for this species are unknown in Bahrain but their area of occupancy can be inferred from a decline in geographic range based on current lost seagrass beds and those that are critically degraded due to land reclamation and dredging. In the past two decades, reclamation activities have resulted in an increase of 11% of the total land area thereby expanding its area by 91 km^2 (Zainal, 2009; van Lavieren, *et al.*, 2011).

Zainal *et al.* (1993) reported a loss of 10.2 km^2 of seagrass beds on the east coast of Bahrain that were detected from remote sensing imagery in the period 1985–1992, which was mainly attributed to dredging and reclamation activities.

As the species population in Bahrain is not expected to receive immigration (extension) from neighbouring regions, the evaluation has been kept as is and so the species is believed to be Endangered.

Global Red List Assessment
2010 – Least Concern

GEOGRAPHIC RANGE

Range Description - The eastern and western coasts of Bahrain (Vousden, 1995; Al-Wedaei, *et al.*, 2011). The majority of seagrass habitats are located in the eastern subtidal waters, mainly beginning south of Fasht Al-Adhm extending to the Hawar Islands. The second largest seagrass beds are found in the western subtidal areas with patches recorded to the North-West at Fasht Al-Jarim (Geomatec, 2006).

Population - NA
Trend - Decline

THREATS

This species is under continuous threat from anthropogenic pressures mostly reclamation and dredging in addition to industrial effluents, domestic discharges and brackish water from desalination plants.

CONSERVATION ACTIONS

Conservation actions underway - Efforts are being made to conserve seagrass ecosystems in Bahrain by establishing MPAs (Al Zayani, 2003; Al-Wedaei, *et al.*, 2011). However, there are no direct actions being undertaken targeting seagrass conservation specifically.

2.2.4 *Chelonia mydas*

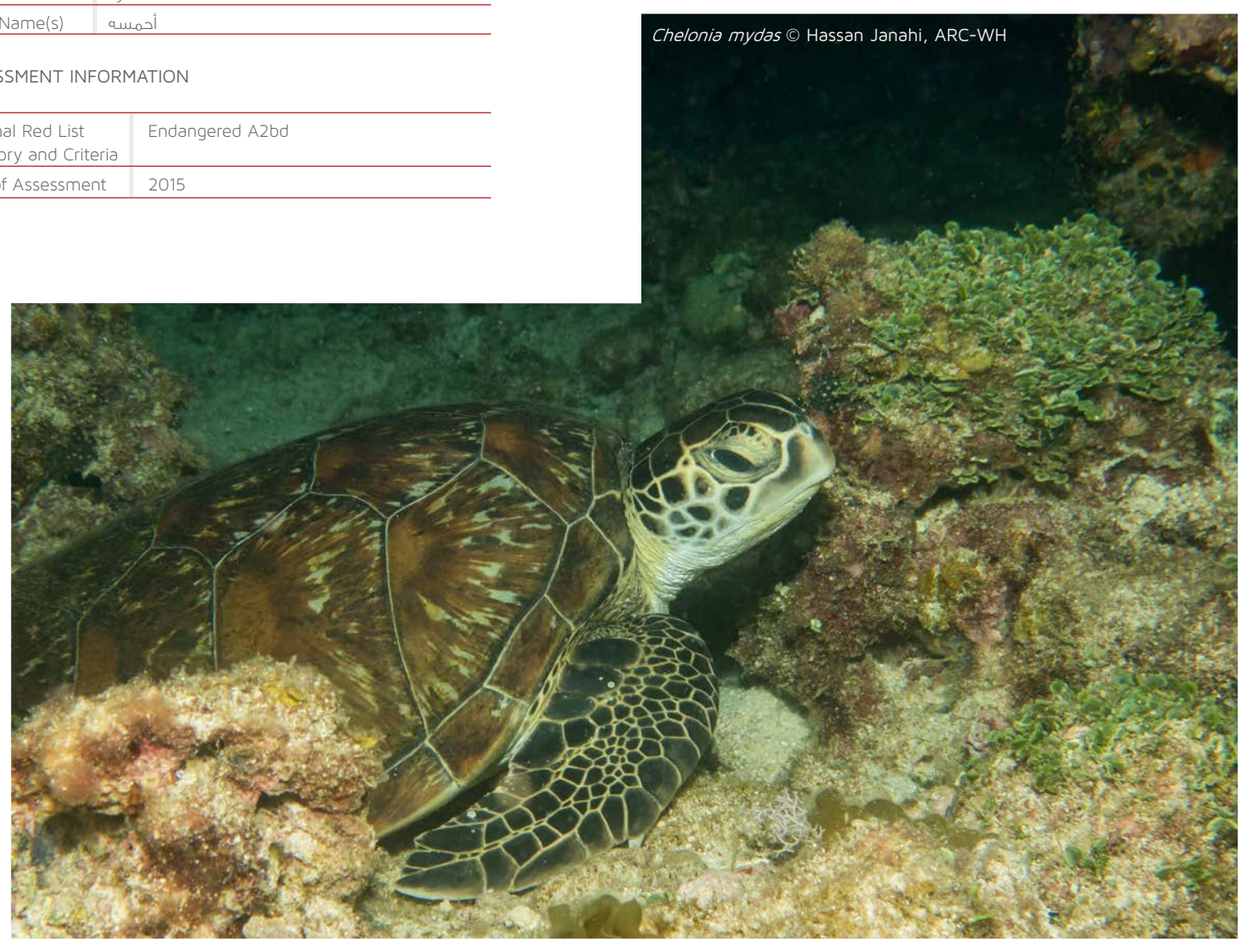
TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Reptilia	Testudines	Cheloniidae
Scientific Name	*Chelonia mydas*			
Species Authority	Linnaeus, 1758			
English Name(s)	Green Turtle			
Arabic Name	السلحفاه الخضراء			
Local Name(s)	أحمسه			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Endangered A2bd
Year of Assessment	2015

Justification - Analysis of historic and recent published accounts indicates extensive subpopulation declines in all major ocean basins over the last three generations (IUCN Red List). Investigating marine turtles in the Arabian Gulf, Pilcher *et al.* (2015) reported that Green Turtles as well as Hawksbill Turtles appear to be stable, with no widespread evidence of decline. Nevertheless, despite the numerous nesting sites of Green Turtles in the Gulf region, they are still an endangered species and should be protected, before they become rare in the Gulf.
As the species population in Bahrain is not expected to receive immigration (extension) from neighbouring regions, the evaluation has been kept as it is and so the species is believed to be Endangered.



Chelonia mydas © Hassan Janahi, ARC-WH

Global Red List Assessment
2004 – Endangered
1996 – Endangered
1994 – Endangered
1990 – Endangered
1988 – Endangered
1986 – Endangered
1982 - Endangered

GEOGRAPHIC RANGE

Range Description - The Green Turtle has a global distribution, occurring throughout tropical and, to a lesser extent, subtropical waters (IUCN Red List). In the Arabian Gulf basin this marine species is known to extend from the United Arab Emirates in the southeast, all the way to Kuwaiti waters in the northwest of the Gulf.
Population - Out of the five species of marine turtles that inhabit the Arabian Gulf waters (Al-Mansi, *et al.*, 1999), Hawksbill Turtles and Green Turtles are the most abundant species nesting in the Gulf (Al-Ghais, 2009). In the course of reviewing the articles on Green Turtles for the current evaluation, none gave even an approximate estimate of their numbers in the Arabian Gulf. However, almost all articles emphasise the number of nest areas around the Gulf. Pilcher *et al.* (2015) cited after others that some 1000 Green Turtles nest annually on the offshore islands of Saudi Arabia, and less than 10 individuals on islands off the coast of Kuwait. However, nesting populations in the United Arab Emirates remain unknown.
Genetic analysis of the Green Turtles in the Arabian Gulf has revealed two types of mtDNA patterns, suggesting a mixed population of this species in this part of the world's ocean (d'Aloia and Al-Ghais, 2000).

Trend - Information on the population of Green Turtles in the Arabian Gulf region remains inadequate and hence, no data are available to judge the condition of the population. It has been noted that during the shrimp fishing season in Bahrain, the number of dead Green Turtles that are being reported has increased, especially in recent years.

HABITAT AND ECOLOGY

Habitat and Ecology - Green Turtles are associated with seagrass beds (NCWCD, 2005). Seagrass communities are widespread in the Arabian Gulf basin comprising three euryhaline species, *Halodule uninervis, Halophila ovalis and Halophila stipulacea*. These seagrasses sustain the Green Turtle (Sale, *et al.*, 2011). Green Turtles are highly migratory and they undertake complex movements and migrations through geographically disparate habitats (IUCN Red List).
Many important nesting areas for this species are known around the coasts within the Gulf, on the Saudi Arabian Gulf offshore islands, viz Karan and Jana (Pilcher and Al-Marghani, 1992). Green turtles also nest on Ras Al-Khaimah beaches (UAE) (d'Aloia and Al-Ghais, 2000). Ras Laffan Industrial City beach on the eastern coast of Qatar is another of their nesting areas (Ficetola, 2008). Ress *et al.* (2013) reported that green Turtles nested on Kuwait's off-shore islands, Qara and Umm Al-Maradin, and that low-level nesting was also observed on several Iranian islands within the Gulf. As far as Bahrain is concerned, there is no evidence indicating nesting on its beaches. However, the turtles are present around the Hawar Islands, which form part of their foraging habitats (Pilcher, *et al.*, 2003).

There is no information on the Arabian Gulf sea-turtle sex ratios in development and foraging grounds or on age-class structure; nor are there any descriptions of non-adult components of the populations (Pilcher, *et al.* 2015). Green Turtles in the Gulf have low reproductive capacities, with estimates of sexual maturation ranging from 15–40 years, and a hatchling survival rate of roughly only one in one thousand (Pilcher, *et al.*, 2003).

In the Arabian Gulf, their migrations take them across the breadth of the Gulf, and at times out into the Arabian Sea (Pilcher, *et al.*, 2003). After a number of years in the oceanic zone, these turtles retire to shallow-water developmental areas rich in seagrass and/or marine algae where they forage and grow to maturity. Upon attaining sexual maturity, they commence their breeding migrations between foraging grounds and nesting areas that are undertaken every few years. Migrations are carried out by both males and females and may traverse oceanic zones, often spanning thousands of kilometres. During non-breeding periods, adults reside at coastal shallow-water feeding areas that sometimes coincide with juvenile developmental habitats (IUCN Red List).

System - Marine

THREATS

Turtles in near-shore habitats can be affected by coastal development, reclamation and pollutant run-off. Other threats facing the turtles in the Gulf is accidental death caused by vessel traffic as well as by-catch in commercial fishing, which is one of the greatest threats to marine turtles across the globe. Furthermore, small-scale coastal artisanal fisheries can also cause significant declines in turtle populations. Green Turtles are herbivorous and are associated with seagrass beds, so the destruction of their foraging habitats is considered to be a significant major threat for their existence.

Onshore where turtles nest, threats come from overexploitation of eggs by human and animal predators, as well as marine birds feeding off hatchlings.

CONSERVATION ACTIONS

Conservation actions underway - Ministerial Order No. (3) of 2003 bans the hunting of all species of turtles within the territorial fishing areas of the Kingdom of Bahrain.

Conservation actions proposed - In addition to Ministerial Order no. (3) of 2003, it is proposed to preserve the shallow-water habitats where turtles forage. The local governmental agencies that are concerned with regulating marine resources, for example, the Directorate of Fisheries and the SCE, as well as the Parliament, should formulate the necessary regulations to protect the seagrass beds around Bahrain waters, in order to protect the habitats (foraging areas) of Green Turtles. Awareness of marine turtles needs to be introduced into the curriculum of the Ministry of Education as well as at the higher education level.

2.2.5 *Falco concolor*

Pelophylax ridibundus © Enishimi | Dreamstime.com

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Aves	Falconiformes	Falconidae
Scientific Name	*Falco concolor*			
Species Authority	Temminck, 1825			
English Name(s)	Sooty Falcon			
Arabic Name	صقر الغروب أو الصقر الفاحم			
Local Name(s)	شرياص حوار			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Endangered D1
Year of Assessment	2015

Justification - The most recent documented population estimate in Bahrain is of 20 pairs on the Hawar Islands (Jennings, 2010). References show that this is the only location where the species breeds in Bahrain. The habitats suitable for the species in the Hawar Islands are believed to be safe and are not vulnerable to any direct documented threats. It is believed that the regional population would most likely receive immigration from surrounding colonies. Still, the breeding population in Bahrain is considered to be highly vulnerable since it is located in a single location (an island). Since the regional population is not believed to be a sink, there will be no change of the category of the assessment and thereby the species regional population in Bahrain is assessed as Endangered D1.

Global Red List Assessment
2014 - Near Threatened

Regional Red List Assessment
2015 - Endangered

GEOGRAPHIC RANGE

Range Description - The Hawar Islands are the only location in Bahrain where the species is known to breed.

Population - 20 pairs (2006)

Trend - Decreasing

HABITAT AND ECOLOGY

Habitat and Ecology - It breeds colonially in hot, arid environments; on cliffs, small rocky islands and rugged desert mountains where its breeding is timed to coincide with the autumn migration of small birds on which it feeds. Its nest is a shallow depression dug into the ground (Gaucher, *et al.*, 1988). It is a migratory species, with birds arriving in their wintering grounds in Madagascar and south-east Africa from late October, and returning to breeding sites in April (del Hoyo, *et al.*, 1994). Migrants generally travel singly, or in pairs or small flocks (Brown, *et al.*, 1982; Ferguson-Lees and Christie, 2001). In the non-breeding season it forages for large insects over grassland and open country with trees.

Systems - Terrestrial

THREATS

Most of its breeding colonies are inaccessible or in protected areas so it would appear to be declining due to pressures in wintering grounds or on migration. Still, human disturbance may be a factor in some areas, including Bahrain's Hawar Islands (Kavanagh and King, 2008; McGrady and Nicoll, 2008). Increased pesticide use has been suggested as a causal factor, but egg analysis indicates that it is at very low concentrations in these birds.

CONSERVATION ACTIONS

Conservation actions underway - The breeding colony of Sooty Falcons in Bahrain is located in a protected area.

Conservation actions proposed - Periodic monitoring of this small breeding colony must be established in order to detect any change that occurs suddenly that might affect this small population on a national level.

2.3 Vulnerable

2.3.1 *Pelophylax ridibundus*

Pelophylax ridibundus © Mudhafar Salim

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Amphibia	Anura	Ranidae

Scientific Name	*Pelophylax ridibundus*
Species Authority	Pallas, 1771
English Name(s)	Marsh Frog/Eurasian Marsh Frog
Synonym(s)	*Pelophylax ridibunda Pallas,* 1771 *Rana ridibunda Pallas,* 1771
Arabic Name	ضفدع المستنقعات
Local Name(s)	ضفدع

ASSESSMENT INFORMATION

National Red List Category and Criteria	Vulnerable B1ab(i)
Year of Assessment	2015

Justification - The Marsh Frog in Bahrain is associated with freshwater springs and agricultural water channels which used to be abundant in the northern, eastern and western areas. There are no population counts of the species; however, observations indicate that the population is declining. This is particularly the case when the status of its habitats is considered. Up to the early 1970s, freshwater springs were still available. However, today not one freshwater spring is viable. This represents a 100% decline in this type of habitat. In addition, the agricultural areas, where flood irrigation systems included agricultural channels, have decreased. Data on vegetable crop area (CIO, 2015) show a decrease of 40% between 1999 and 2008. Also, Bahrain's cultivated land area decreased from 6000 hectares to 1500 hectares in the period 1971–2000 (Nations Encyclopedia, 2015). Agricultural affairs data show a decline in the agriculture areas from 4500 hectares in 1996 to 3731 hectares in 2011 (personal communication). Urbanisation and wasted agricultural lands are factors that have caused the destruction and fragmentation of these habitats. These have led to a decrease in the area of occupancy and the area of occurrence for this species. This decrease is estimated to be between 25–50%. It is considered vulnerable based on its number of reported locations being 10.

As the species population in Bahrain is not expected to receive immigration (extension) from neighbouring regions, the evaluation has been kept as is and so the species is believed to be Vulnerable.

Global Red List Assessment

2009 - Least Concern

GEOGRAPHIC RANGE

Range Description - Northern, eastern and western agricultural areas.

Population - NA

Trend - Decline

THREATS

The species is a highly opportunistic amphibian, living in mixed and deciduous forests, forest steppe, and steppe and other grasslands, semi-desert and desert zones. Arid areas are largely colonised through river valleys and channels. The frog prefers open, well-warmed areas with abundant herbaceous vegetation. It is a semi-aquatic species, inhabiting (and breeding in) a wide variety of flowing and stagnant water habitats, from shallow puddles and ponds to large lakes, reservoirs, rivers and brooks (Kuzmin, *et al.*, 2009). However, locally it is highly threatened by the destruction of its habitats (freshwater springs and agricultural water channels).

CONSERVATION ACTIONS

Conservation actions underway - There is currently a captive breeding programme in Al-Areen Wildlife Reserve. Countless numbers of individuals of the species are reported to be found in captivity (Haider, 2010).

2.3.2 *Mauremys caspica*

TAXONOMY

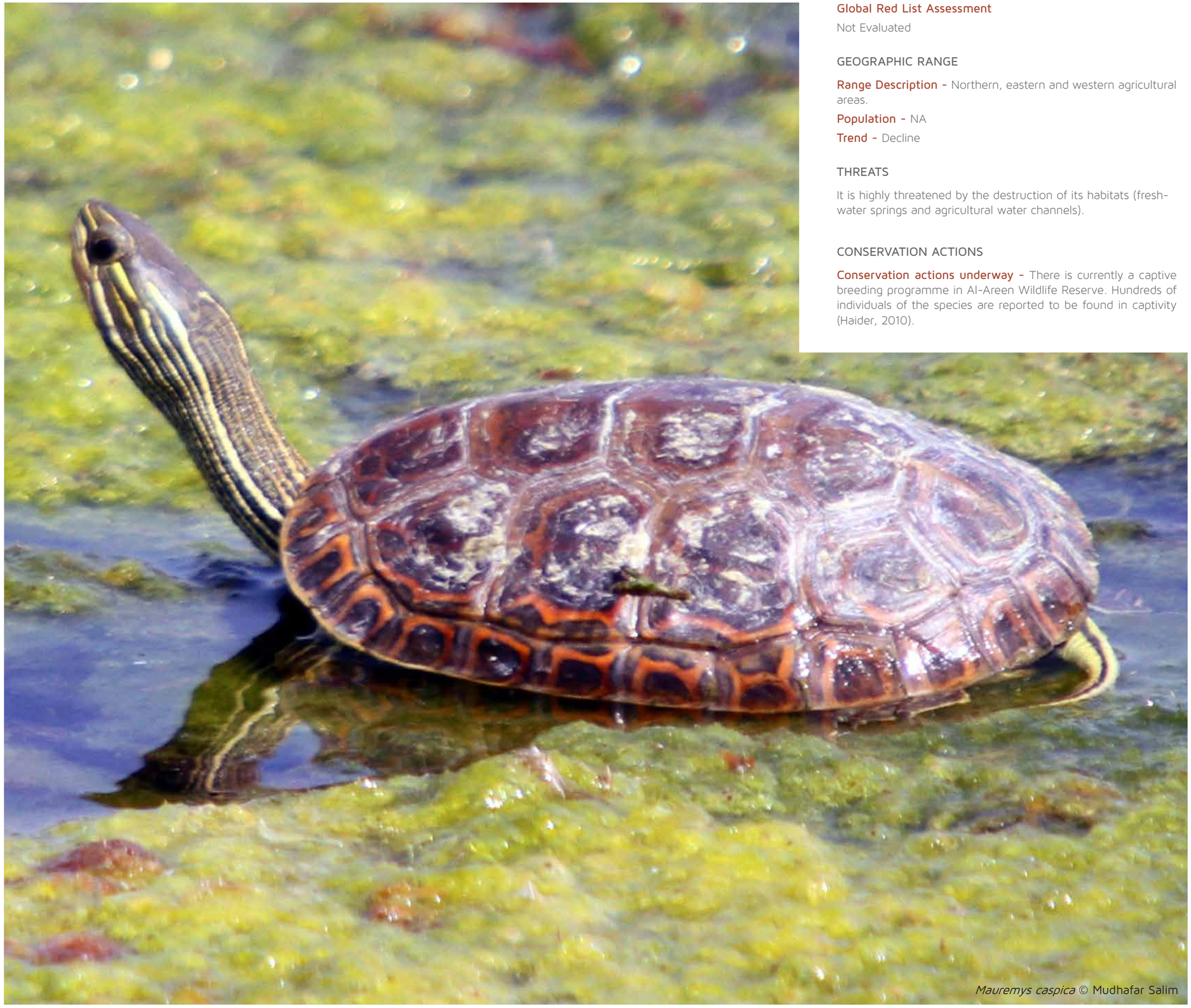
Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Reptilia	Testudines	Geoemydidae
Scientific Name	*Mauremys caspica*			
Species Authority	Gmelin, 1774			
English Name(s)	Caspian Turtle			
Arabic Name	سلحفاة المياه العذبة			
Local Name(s)	غيلمه			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Vulnerable B1ab(i)
Year of Assessment	2015

Justification - The Caspian Turtle in Bahrain is associated with freshwater springs and agricultural water channels which used to be abundant in the northern, eastern and western areas. There are no population counts of the species. However, observations indicate that the population is declining. This is particularly the case when the status of its habitats is considered. Up to the early 1970s, freshwater springs were still available. However, today not one freshwater spring is viable. This represents a 100% decline in this type of habitat. In addition, the agricultural areas, where flood irrigation systems include agricultural channels, have decreased. Data on vegetable crop area (CIO, 2015) show a decrease of 40% between 1999 and 2008. Also, Bahrain's cultivated land area has decreased from 6000 hectares to 1500 hectares in the period 1971–2000 (Nations Encyclopedia, 2015). Agricultural affairs data show a decline in agriculture area from 4500 hectares in 1996 to 3731 hectares in 2011 (personal communication). Urbanisation and wasted agricultural lands are factors that have caused the destruction and fragmentation of these habitats. These have led to a decrease in the area of occupancy and the area of occurrence for this species. This decrease is estimated to be between 25–50%. It is considered vulnerable based on its number of locations being 10.

As the species population in Bahrain is expected to receive immigration from neighbouring regions and the regional population is not believed to be a sink, the evaluation has been kept as is and so the species is believed to be Vulnerable.



Mauremys caspica © Mudhafar Salim

Global Red List Assessment

Not Evaluated

GEOGRAPHIC RANGE

Range Description - Northern, eastern and western agricultural areas.

Population - NA

Trend - Decline

THREATS

It is highly threatened by the destruction of its habitats (fresh-water springs and agricultural water channels).

CONSERVATION ACTIONS

Conservation actions underway - There is currently a captive breeding programme in Al-Areen Wildlife Reserve. Hundreds of individuals of the species are reported to be found in captivity (Haider, 2010).

2.3.3 *Egretta gularis*

Egretta gularis © Haifaa Abdulhalim, ARC-WH

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Aves	Ciconiiformes	Ardeidae
Scientific Name	*Egretta gularis*			
Species Authority	(Bosc, 1792)			
English Name(s)	Western Reef-egret, Reef Heron			
Arabic Name	بلشون الصخر أو بلشون البحر			
Local Name(s)	خصيفي			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Vulnerable D1
Year of Assessment	2015

Justification - The most recent documented population estimate in Bahrain is of 450 pairs, 400 of which are in the Hawar Islands and 50 pairs which have become established on Bahrain Island since 2005 (Jennings, 2010). The habitats suitable for the species in the Hawar Islands are believed to be conserved whereas the habitats on Bahrain Island are known to be threatened. According to the estimate mentioned above (450 pairs), the species status is assessed as Vulnerable D1, which states that the number of mature individuals is less than 1000. It is believed that the regional population is unlikely to experience significant immigration of propagules that are likely to reproduce in the region. Therefore, there will be no change of the category of the assessment and thereby the species regional population in Bahrain is assessed as Vulnerable D1.

Global Red List Assessment

2014 - Least Concern

GEOGRAPHIC RANGE

Range Description - Breeds on the Hawar Islands and Bahrain Island.

POPULATION

Population - 450 pairs (2010)
Trend - Unknown

HABITAT AND ECOLOGY

Habitat and Ecology - Behaviour: There is little knowledge about the movements of this species (Hancock and Kushlan, 1984; Kushlan and Hancock, 2005), although it apparently disperses widely (Hancock and Kushlan, 1984; del Hoyo, *et al.*, 1992; Kushlan and Hancock, 2005) and may be partially migratory (Hancock and Kushlan, 1984; Kushlan and Hancock, 2005). It breeds between April and July or in October (del Hoyo, *et al.*, 1992) in solitary pairs, or more usually in small colonies of around 12 pairs (sometimes up to 100) (Brown, *et al.*, 1982). When not breeding, the species is solitary foraging for food, although it is occasionally found in small groups (Brown, *et al.*, 1982). It feeds diurnally, but also at night depending on the tides, and roosts at night in large numbers between 500 and 1000, in mangroves or on rocky cliffs and islets (Brown, *et al.*, 1982).

Habitat: The species shows a preference for rocky or sandy shores and reefs (Brown, *et al.*, 1982; del Hoyo, *et al.*, 1992; Kushlan and Hancock, 2005), but will also frequent other coastal habitats such as estuaries, mudflats, saltmarshes, mangroves, tidal creeks (Brown, *et al.*, 1982; del Hoyo, *et al.*, 1992) and lagoons (Brown, *et al.*, 1982).

Diet: The diet of this species consists mainly of fish, crustaceans and molluscs, but crickets, grubs and earthworms are also taken (Brown, *et al.*, 1982).

Breeding site: The species nests in solitary pairs or small colonies on the ground, or in reed beds, bushes and mangrove trees up to 20 m high, as well as on ledges or boulders (del Hoyo, *et al.*, 1992), the nest being a platform of twigs and seaweed (Brown, *et al.*, 1982).

Systems - Terrestrial, freshwater, marine

THREATS

This species was seriously persecuted and hunted for the plume trade in the past, but has since recovered (del Hoyo, *et al.*, 1992).

CONSERVATION ACTIONS

Conservation actions underway - The larger proportion of the population is present on the Hawar Islands which is a protected area.

Conservation actions proposed - A monitoring programme for this species needs to be established in order to detect any changes within the population.

2.3.4 *Dugong dugon*

Justification - Although there was no substantive change in Dugong abundance in the Arabian Gulf between 1986 and 2006, there is no recent information about the current status of the population. The whole population in the Arabian Gulf is estimated to be less than 7500 individuals while the population in Bahrain is around 1200 individuals. There are several present major threats (e.g. dredging and reclamation, pollution and by-catch) affecting the population in Bahrain. Even though there is legislative protection for Dugongs in Bahrain, little management intervention has been implemented to reduce anthropogenic impacts. Dugongs are a slow-breeding and long-lived species, which makes them vulnerable to anthropogenic impacts. Since the regional population may experience immigration that is likely to reproduce in the region and although the immigration is expected to decrease while the regional population is not believed to be a sink, there will be no change of the category of the assessment, thereby the species regional population in Bahrain is assessed as Vulnerable

Global Red List Assessment
2006 – Vulnerable
1996 – Vulnerable
1994 – Vulnerable
1990 – Vulnerable
1988 – Vulnerable
1986 – Vulnerable
1982 - Vulnerable

GEOGRAPHIC RANGE

Range Description - This species found between Bahrain and Qatar, south of Fasht Al-Adham and north of the Hawar Islands; and between Saudi Arabia and Bahrain, south of King Fahad causeway and north of Al-Uquair along the east coast of Saudi Arabia (Preen, *et al.*, 2012).

Population - The estimated total population in the Arabian Gulf in 1989 was 7307 (1302 S.E) (Baldwin and Cockcroft, 1997). During this survey, two large groups composed of 577 and 97 Dugongs were sighted between Bahrain and Qatar within an area of less than one km^2. In 2004, the total regional population was estimated to be around 5800 (Preen, 2004).

The population in Bahrain's territorial waters was recorded to be around 1164 (317 S.E) in 2006 (Preen, *et al.*, 2012). A preliminary summer survey (June, 33oC) conducted in Bahraini waters in 2005 observed few Dugongs between Bahrain Island and the Hawar Islands. However, about 300 individuals were reported during the winter (November, 18oC), which could be considered as evidence of migration patterns in and out of Bahraini waters.

Trend - It appeared that there was no substantive change in Dugong numbers in the Arabian Gulf between 1986 and 2006 as reported by Preen *et al.* (2012). However, there are no current data for the status of the population.

HABITAT AND ECOLOGY

Habitat and Ecology - Seagrass beds are the main habitat for Dugongs. Only three species of seagrass are found in Bahrain, namely *Halodule uninervis, Halophila stipulacea* and *Halophila ovalis*. The most extensive seagrass beds occur between Fasht Al-Adham and the Hawar Islands. However, much seagrass habitat is influenced by human activities related to the oil industry, shipping and coastal modification.

Systems - Marine

THREATS

The territorial waters of Bahrain are subject to several threats that can impact the Dugong populations. Habitat loss due to reclamation and dredging is a main concern. Considerable areas of seagrass have been dredged or reclaimed. Turbidity produced by dredging can smother seagrass beds. Zainal *et al.* (1993) reported a loss of 10.2 km^2 of seagrass beds on the east coast of Bahrain detected by remote sensing imagery between the period 1985–1992.

Trawling and accidental capture can affect Dugong populations. Trawling is common in Dugong habitat in Bahrain. Additionally, the use of the draft technique by gillnetters may increase the by-catch of Dugongs (Preen, *et al.*, 2012).

The Arabian Gulf is one the most oil-polluted areas in the world. Oil spills are a major threat to Dugongs in Bahrain. Around 37 dead Dugongs were found on the shores of Saudi Arabia and Bahrain after a major oil spill in 1983–1984. Similarly, 14 Dugongs were observed dead in the region due to the massive oil spill in 1991 (Fingas, 2015).

The Arabian Gulf is also the hottest sea in the world during summer months (Riegl and Purkis, 2012). Therefore, the Arabian Gulf is considered a harsh environment, and many species are at or near their physiological limits. Consequently, Dugongs and their habitats might be vulnerable to climate change impacts.

CONSERVATION ACTIONS

Conservation actions underway - Ministerial Order No. 4 of 2003 bans the hunting of Dugongs. Hawar Islands and Mashtan Island (MPAs). Currently, the SCE runs a dead mammal monitoring programme to monitor the number of dead Dugongs as a result of various illegal fishing activities, by-catch etc.

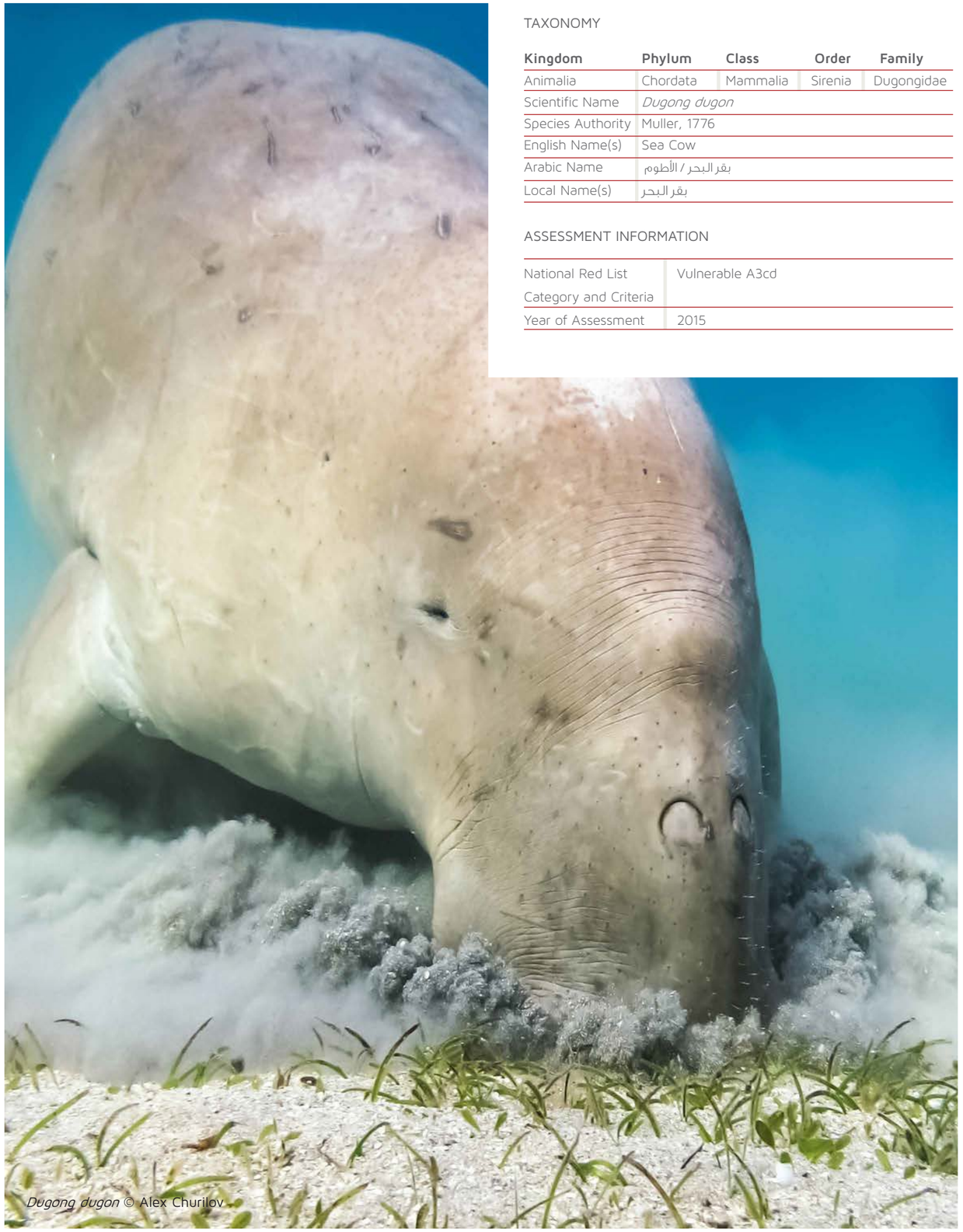
Conservation actions proposed - Official collaboration between Saudi Arabia, Bahrain, Qatar and UAE for the purpose of monitoring and conservation of Dugongs. Dugongs are considered to be an important part of Bahrain's marine heritage. Production of educational and awareness-raising materials to foster an appreciation of Dugongs among students, fishermen and the public might help in protecting this flagship species. Monitoring movements of Dugongs between countries in the region may help in formulating effective management programmes. A regional MPA (Saudi Arabia, Bahrain, Qatar and UAE) could be considered an important measure for their protection..

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Sirenia	Dugongidae
Scientific Name	*Dugong dugon*			
Species Authority	Muller, 1776			
English Name(s)	Sea Cow			
Arabic Name	بقر البحر / الأطوم			
Local Name(s)	بقر البحر			

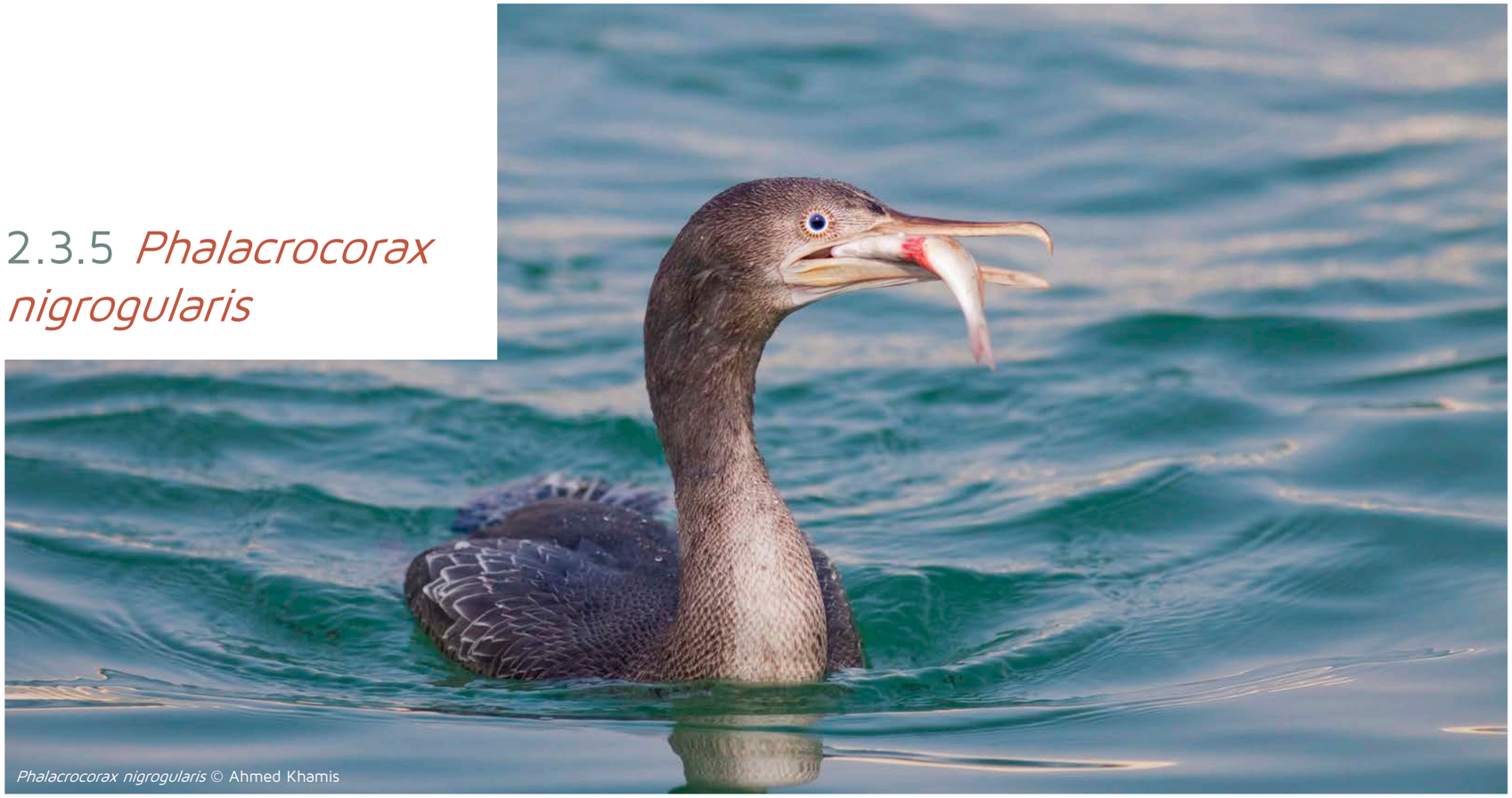
ASSESSMENT INFORMATION

National Red List Category and Criteria	Vulnerable A3cd
Year of Assessment	2015



Dugong dugon © Alex Churilov

2.3.5 *Phalacrocorax nigrogularis*



Phalacrocorax nigrogularis © Ahmed Khamis

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Aves	Suliformes	Phalacrocoraciidae

Scientific Name	*Phalacrocorax nigrogularis*
Species Authority	Ogilvie-Grant & Forbes, 1899
English Name(s)	Socotra Cormorant
Arabic Name	غراب البحر السقطري
Local Name(s)	لوهه

ASSESSMENT INFORMATION

National Red List Category and Criteria	Vulnerable A2acd+A3acd+A4acd
Year of Assessment	2016

Justification - The species is endemic to the Arabian Islands of the Arabian Gulf and the Sea of Arabia. The species is believed to be facing a continuing decline due to several factors mentioned below. Reports indicate the number of breeding colonies has been decreasing throughout its distribution range including Bahrain.

Global Red List Assessment
2012- Vulnerable

Regional Red List Assessment of Arabia
2015 - Vulnerable

GEOGRAPHIC RANGE

Range Description - Its main breeding locations in Bahrain are located in the Hawar Islands and in Suwad Al-Janubiya where, in 2006, 27,000 bred in the season 2005–2006.

POPULATION

Population - 27,000

Trend - Decreasing

HABITAT AND ECOLOGY

Habitat and Ecology - This species is highly gregarious, occurring throughout the year in large aggregations (Johnsgard, 1993; King, 2004; Nelson, *et al.*, 2005). Roosts are tightly packed, occupying the smallest possible ground footprint, potentially to maximise shade to the feet (King, 2004). Some seasonal movements are thought to occur, probably related to fish migrations (Symens, *et al.*, 1993; Aspinall, 1996), where the species travels in large flocks (del Hoyo, *et al.*, 1992) within the Persian Gulf and the Arabian Sea. However it is difficult to separate seasonal movements from dispersal (Johnsgard, 1993), and there is little conclusive information available regarding patterns of movement (del Hoyo, *et al.*, 1992).
The species is exclusively marine and occurs within the range of productive upwellings (Nelson, *et al.*, 2005). It breeds on offshore islands and islets that have shores of level sand or gravel (del Hoyo, *et al.*, 1992), or gently sloping hills free from vegetation (Johnsgard, 1993), since unimpeded access by foot is essential (Aspinall, 1996). Nests consist of depressions in the substrate, or in small mounds of substrate, and occur at high densities (Nelson, *et al.*, 2005) in colonies that range in size from 50 to tens of thousands of pairs (Johnsgard, 1993; Nelson, *et al.*, 2005).

Systems - Terrestrial, marine

THREATS

The very high rate of coastal development on the breeding islands is the main threat, since colonies are displaced and may not be able to successfully relocate elsewhere (Gallagher, *et al.*, 1984; Symens, *et al.*, 1993; Aspinall, 1996). Colonies suffer from frequent human disturbance, which allows wide-scale predation of eggs by large gulls *Larus* spp. (Gallagher, *et al.*, 1984; Symens, *et al.*, 1993; Aspinall, 1996). The extinction of 12 colonies since the 1960s is attributed to encroachment by development and prolonged human disturbance (King, in litt., 2005). The species is very vulnerable to marine oil spills (Gallagher, *et al.*, 1984; Symens and Suhaibani, 1993). For example, in August 1980, an oil spill of about 20,000 barrels of light crude oil off the coast of Bahrain killed up to 1000 birds, most of which were this species (Baha El Din, 1991). As well as direct mortality, reduced immune function and reduced breeding success from oiling and oil ingestion, oil-spills also deplete fish stocks (Baha El Din, 1991). As a piscivore, the species is susceptible to other marine pollutants such as heavy metals and PCBs (Polychlorinated biphenyls), as well as neurotoxins (Baha El Din, 1991). Potential threats are posed by fisheries (food depletion), introduced predators on breeding islands, the harvesting of chicks and eggs for food (Symens, *et al.*, 1993; Morris, 1996; Jennings, in litt., 2012), and persecution (Symens, *et al.*, 1993; Aspinall, 1996; Morris, 1996). The species is regularly found drowned in fishing traps (King, in litt., 2005). Ectoparasites may be a problem in some colonies, causing breeding cormorants to desert sites or abandon their young to die (Gallagher, *et al.*, 1984). As a ground-nesting species, it is vulnerable to the effects of storms, such as the flooding of nests during heavy rains, as took place on Suwad in November 1997, and the sudden termination of breeding and mass abandonment of chicks, as occurred due to an isolated thunderstorm with strong winds on Suwad in April 2003 (King, in litt., 2005).

CONSERVATION ACTIONS

Conservation actions underway - The breeding colony of Socotra Cormorants is located in a protected area and thus can be described as protected.

Conservation actions proposed - Updated counts of the breeding pairs are needed by conducting new surveys and establishing a monitoring programme.

2.4 Near Threatened

2.4.1 *Charadrius alexandrinus*

Charadrius alexandrinus © Mudhafar Salim, ARC-WH

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Aves	Charadriiformes	Charadriidae
Scientific Name	*Charadrius alexandrinus*			
Species Authority	Linnaeus, 1758			
English Name(s)	Kentish Plover			
Arabic Name	قطقاط اسكندري			
Local Name(s)	كريوي			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Near Threatened D1
Year of Assessment	2015

Justification - The most recent documented population estimate in Bahrain is of 200 pairs on the Hawar Islands (Jennings, 2010). References show that this is the only location where the species breeds in Bahrain. The habitats suitable for the species in the Hawar Islands are believed to be safe and are not vulnerable to any direct documented threats. According to the estimate mentioned above (200 pairs), the species status is assessed as Vulnerable D1, that is, the number of mature individuals is less than 1000. It is believed that the regional population is likely to experience significant immigration of propagules that are likely to reproduce in the region. Although the global population of the species is decreasing, the breeding population in Arabia is believed to be stable. So, it is believed that this immigration is not expected to decrease and therefore the assessment has been downlisted to Near Threatened (NT).

Global Red List Assessment
2012 - Least Concern

Regional Red List Assessment of Arabia
2015 – Least Concern

GEOGRAPHIC RANGE

Range Description - The Hawar Islands are the only location in Bahrain where the species is known to breed.

Population - 200 pairs (2010)

Trend - Unknown

HABITAT AND ECOLOGY

Habitat and Ecology - Although some populations of this species are sedentary or only disperse short distances (del Hoyo, *et al.*, 1996), most inland and northern coastal populations (Hayman, *et al.*, 1986) are fully migratory and have distinct separate breeding and wintering ranges (del Hoyo, *et al.*, 1996). The species occupies its breeding grounds chiefly from March to October (Hayman, *et al.*, 1986), dispersing from late June immediately after the young fledge, with the southward migration peaking in September (del Hoyo, *et al.*, 1996). The species nests solitarily or in loose semicolonial groups (Johnsgard, 1981; Urban, *et al.*, 1986; del Hoyo, *et al.*, 1996), usually in densities of 0.5 to 20 pairs per hectare (exceptionally up to 100 pairs per hectare) (Johnsgard, 1981), and sometimes in association with other species (Powell and Collier, 2000). Outside of the breeding season (Snow and Perrins, 1998), the species feeds singly (MacKinnon and Phillipps, 2000) or in small flocks of 20–30 individuals (del Hoyo, *et al.*, 1996; Snow and Perrins, 1998), and occasionally in larger flocks of up to 260 individuals (Urban, *et al.*, 1986), often roosting in large mixed-species flocks (Urban, *et al.*, 1986).

During all seasons, the species is predominantly coastal (Johnsgard, 1981; Hayman, *et al.*, 1986; del Hoyo, *et al.*, 1996) and is usually found on sand, silt or dry mud surfaces (del Hoyo, *et al.*, 1996). It also shows a preference for sparsely vegetated and sandy areas when breeding (Johnsgard, 1981).

Its diet consists mainly of insects and their larvae (e.g. beetles and flies) (Johnsgard, 1981; del Hoyo, *et al.*, 1996), gammarids (Johnsgard, 1981), crabs (Urban, *et al.*, 1986), other crustaceans (del Hoyo, *et al.*, 1996) and brine shrimps (Johnsgard, 1981), bivalve and univalve molluscs (Johnsgard, 1981; del Hoyo, *et al.*, 1996), polychaete worms (Johnsgard, 1981; del Hoyo, *et al.*, 1996), spiders (del Hoyo, *et al.*, 1996) and small pieces of seaweed (Urban, *et al.*, 1986).

Systems - Terrestrial, freshwater, marine

THREATS

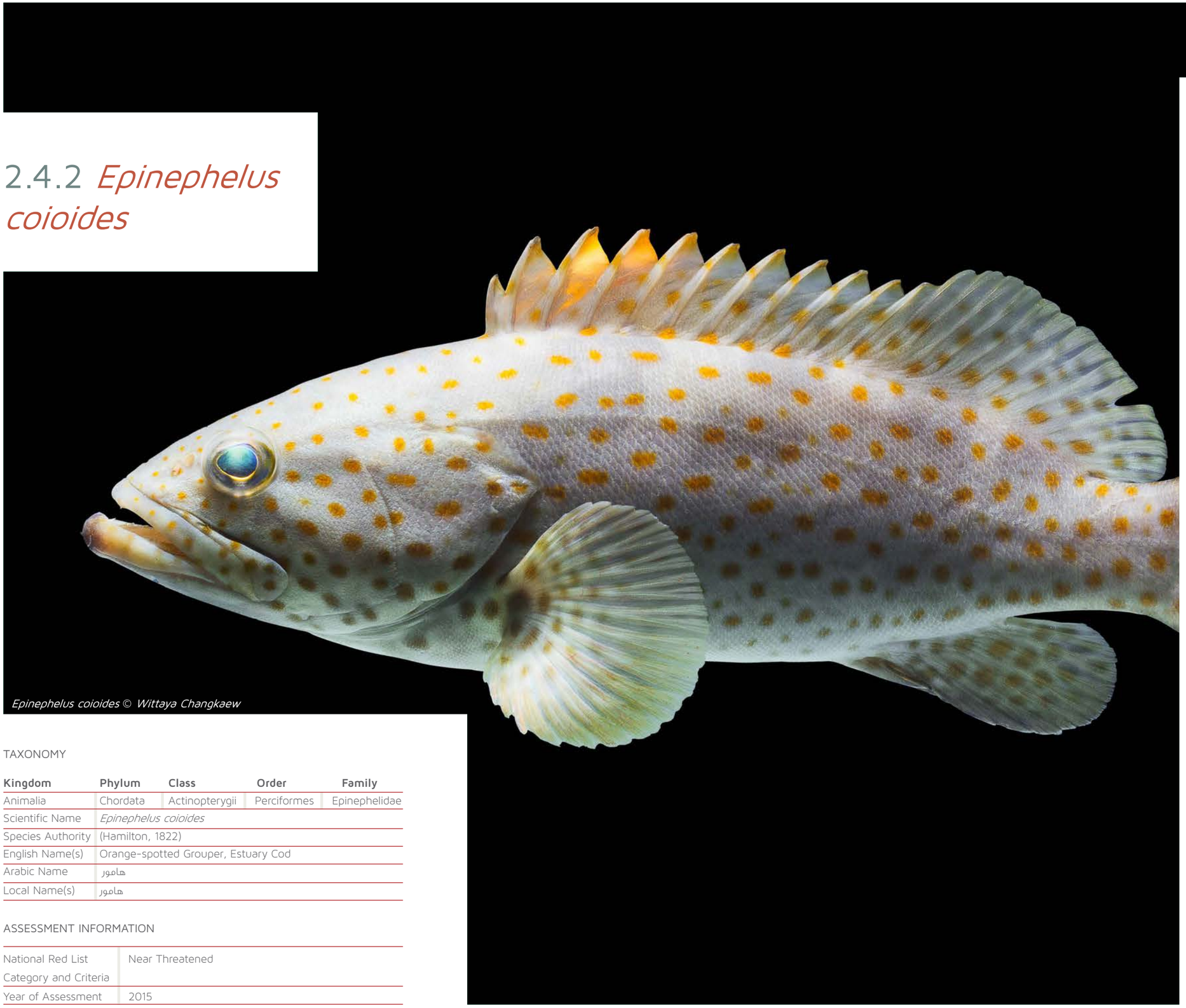
The species is threatened by disturbance in its coastal habitats (e.g. tourists trampling nests and disturbing roosts on beaches) (Lafferty, *et al.*, 2006). It is also threatened by the degradation and loss of wetland habitat through environmental pollution (Barter, 2006; Kelin and Qiang, 2006), land reclamation (del Hoyo, *et al.*, 1996; Barter, 2006), declining freshwater flows (Barter, 2006; Kelin and Qiang, 2006) (from water abstraction), unsustainable harvesting of benthic fauna (Barter, 2006; Kelin and Qiang, 2006), urbanisation (del Hoyo, *et al.*, 1996) and a reduction in the amount of sediment being carried into coastal areas by rivers (Barter, 2006). The species is susceptible to avian botulism, so may be threatened by future outbreaks of the disease (Blaker, 1967).

CONSERVATION ACTIONS

Conservation actions underway - The species is in a location that is an official protected area.

Conservation actions proposed - Establishment of a monitoring programme to ensure that the small population is not harmed without notice for any reason whether anthropogenic or natural.

2.4.2 *Epinephelus coioides*



Epinephelus coioides © Wittaya Changkaew

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Perciformes	Epinephelidae
Scientific Name	*Epinephelus coioides*			
Species Authority	(Hamilton, 1822)			
English Name(s)	Orange-spotted Grouper, Estuary Cod			
Arabic Name	هامور			
Local Name(s)	هامور			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Near Threatened
Year of Assessment	2015

Justification - The Orange-spotted Grouper is unlikely to become extinct as hatcheries in a number of countries are now able to produce fry from captive-bred stock. However, there is only a limited supply of Grouper seed for mariculture, and much current grouper mariculture is still based on the supply of wild-caught grouper seed (Sadovy, 2000). This reliance on wild-caught seed may actually remove groupers that might otherwise reproduce and supplement the wild stock (Sadovy, 2000). Given that Orange-spotted Groupers are widely targeted across their global range as adults for food, and as juveniles in SE Asia for culture, it is unlikely that such intensive harvesting is sustainable in the long term, and wild populations are likely being depleted. However, more information on catch volumes is needed, since trade volumes can reflect many things other than catch rates.

This species also forms spawning aggregations (at least in some regions), and shows long life (maximum recorded 22 years, FishBase, 2003), factors which are likely to increase its vulnerability to over-exploitation. Spawning aggregations of groupers have consistently been shown to be easily overexploited as fishes from a large area will gather in a small place at the same time and place each year, making them attractive targets for fishers. It seems likely that species of grouper that are sought after for food and that form spawning aggregations, will be more vulnerable to overfishing than those that are not targeted and do not.

For such a significant commercial species, little is known of its biology or catch rates – efforts need to be made to address both data gaps.

Global Red List Assessment
2004 – Near Threatened

GEOGRAPHIC RANGE

Range Description - The species is harvested from almost all waters of the Kingdom of Bahrain but with a higher concentration of fisheries in the southern waters. Fishing the species is less concentrated and less intensive fishing gear is used in the northern waters of the Kingdom.

Population - *E. coioides* is so widely distributed that estimating overall population size, or changes in overall population size, is near impossible. As a result little is known about the population. *Epinephelus coioides* is the most important commercial fish in the Arabian Gulf and the dominant grouper (Randall, 1995). It is the major trap fishery species in Kuwait (Morgan, 1983). In Bahrain, *E. coioides* is perceived to be overfished and 54,400 fish were hatchery-raised and released between 1994 and 1996 (Uwate and Shams, 1997). The total catch of *E. coiodes* in the Emirate of Abu Dhabi in the UAE during 2002 was 2020 tonnes, representing 35% of the total for all demersal species (Grandcourt, *et al.*, 2003). A stock assessment found that this species, which is normally caught by traps, had a mean size at first capture of 24.9 cm which is considerably less than the size of sexual maturity in females. However, the existing exploitation rate was less than that required to achieve maximum sustainable yield and was similar to the safe harvest level, indicating the fishery is sustainable at current fishing levels. However, the extremely low male to female ratio in catch samples (1: 47) is cause for concern and suggests fishing is selectively removing the largest animals (males), which may adversely affect future reproductive output (Grandcourt, *et al.*, 2003).

Trend - Decreasing

2.5 Least Concern

2.5.1 *Himantopus himantopus*

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Aves	Charadriformes	Recurvirostridae

Scientific Name	*Himantopus himantopus*	Species Authority	(Linnaeus, 1758)
English Name(s)	Black-winged Stilt		
Arabic Name	أبو المغازل		
Local Name(s)	جويري		

ASSESSMENT INFORMATION

National Red List Category and Criteria	Least Concern
Year of Assessment	2015

Justification - The size of the breeding population in Bahrain is believed to be increasing. Fluctuations have been observed in the number of breeding pairs over the years but that is mainly believed to be due to changes in local conditions. In 2003, it was estimated that a total of 500 birds bred in Bahrain and this number is believed to be generally stable. According to the IUCN Red List regional assessment that has been carried out for the breeding birds of the Arabian Peninsula, of which the breeding population of Bahrain is part (Symes, *et al.*, 2015), the population estimate is around 2500 pairs and is believed to be increasing, and the population continues to find new sites to breed. Based on all of the above, the species is believed to be of Least Concern.

Global Red List Assessment
2014 - Least Concern

Regional Red List Assessment of Arabia
2015 - Least Concern

GEOGRAPHIC RANGE

Range Description - No specific data are available but it is present regularly in suitable habitats around Bahrain in general, including on the Hawar Islands.

Population - 500 pairs are estimated to breed in Bahrain in general. The population faces fluctuations due to suitability of conditions but the population is not believed to be facing decline.

Trend - Increasing

Himantopus himantopus © Cédric Devais

2.6
Not Applicable

2.6.1 *Phoenicopterus roseus*

Phoenicopterus roseus © Haifaa Abdulhalim

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Aves	Phoenicopteriformes	Phoenicopteridae
Scientific Name	*Phoenicopterus roseus*			
Species Authority	Pallas, 1811			
English Name(s)	Greater Flamingo			
Arabic Name	النحام الكبير			
Local Name(s)	فنتير			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Not Applicable – NA
Year of Assessment	2015

Justification - The species does not have any significant populations in Bahrain, currently or historically. None of the references show that Bahrain hosts any breeding populations. Additionally, no specific figures could be obtained that show the numbers that use any specific locations for breeding or other activities.

Global Red List Assessment
2012 - Least Concern

GEOGRAPHIC RANGE

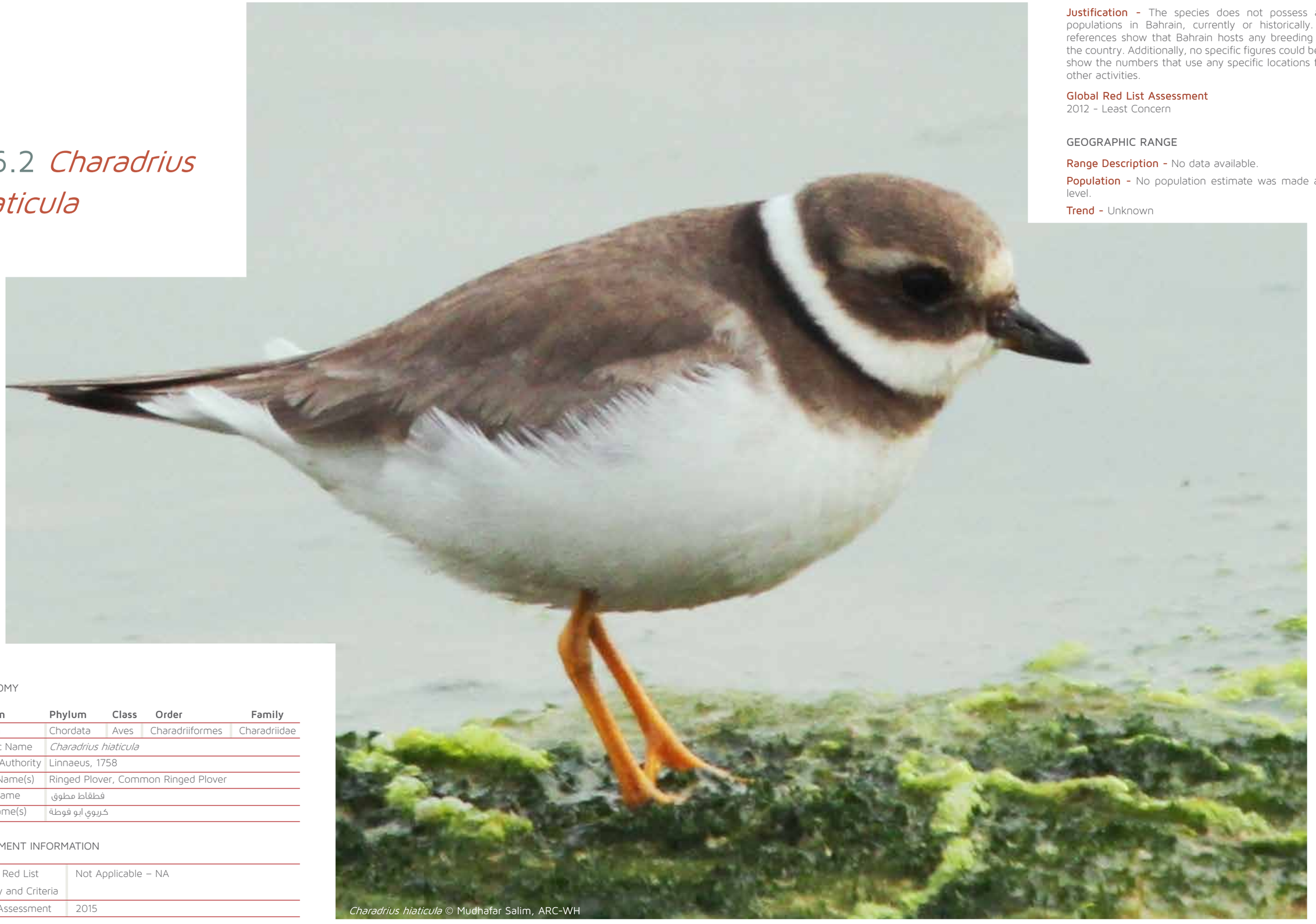
Range Description - No data available.

Population - No population estimate was made at the national level.

Trend - Unknown

Not Applicable

2.6.2 *Charadrius hiaticula*



Charadrius hiaticula © Mudhafar Salim, ARC-WH

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Aves	Charadriiformes	Charadriidae
Scientific Name	*Charadrius hiaticula*			
Species Authority	Linnaeus, 1758			
English Name(s)	Ringed Plover, Common Ringed Plover			
Arabic Name	فطقاط مطوق			
Local Name(s)	كريوي ابو فوطة			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Not Applicable – NA
Year of Assessment	2015

Justification - The species does not possess any significant populations in Bahrain, currently or historically. None of the references show that Bahrain hosts any breeding populations in the country. Additionally, no specific figures could be obtained that show the numbers that use any specific locations for breeding or other activities.

Global Red List Assessment
2012 - Least Concern

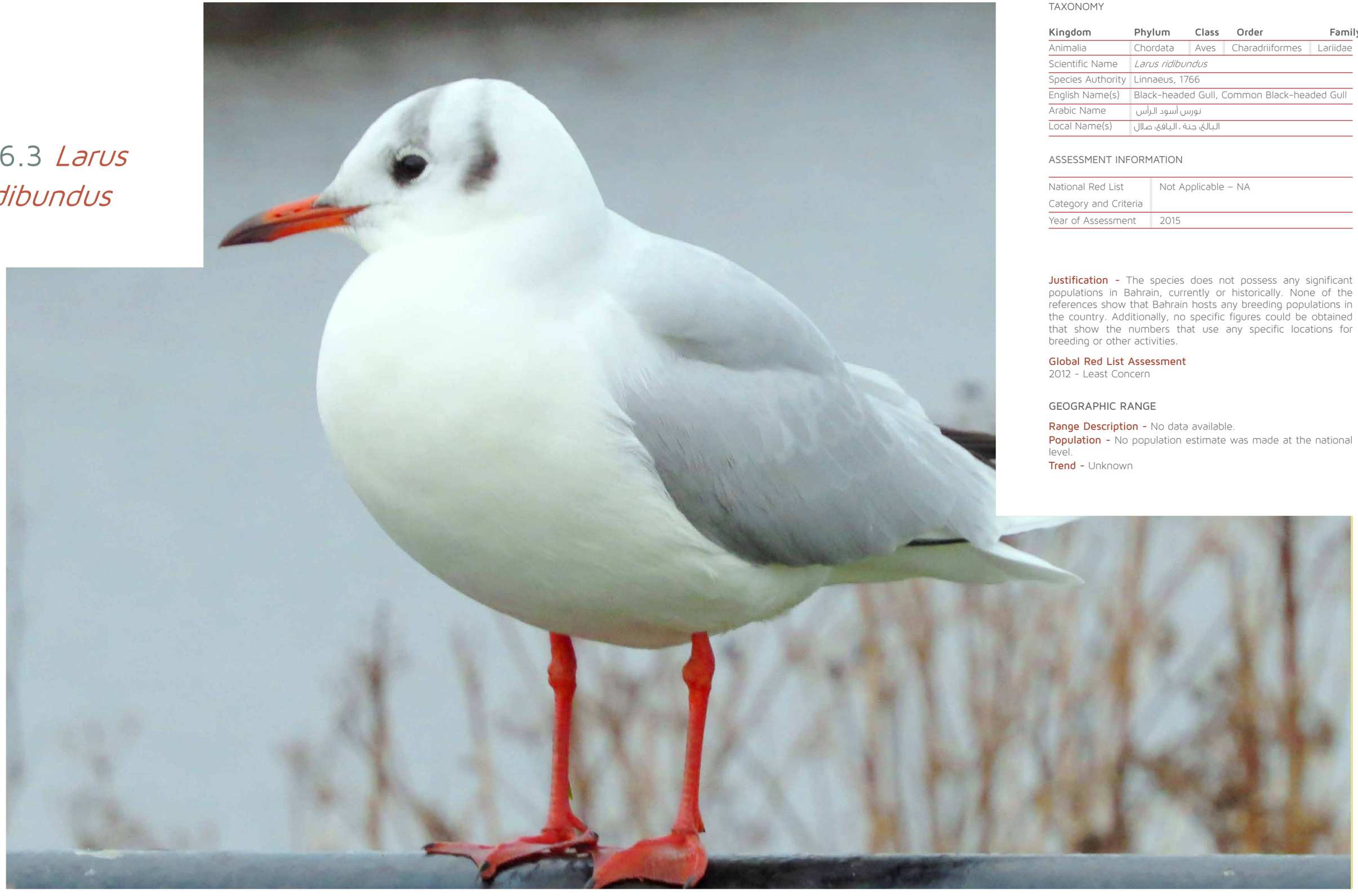
GEOGRAPHIC RANGE

Range Description - No data available.

Population - No population estimate was made at the national level.

Trend - Unknown

2.6.3 *Larus ridibundus*



TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Aves	Charadriiformes	Lariidae
Scientific Name	*Larus ridibundus*			
Species Authority	Linnaeus, 1766			
English Name(s)	Black-headed Gull, Common Black-headed Gull			
Arabic Name	نورس أسود الرأس			
Local Name(s)	البالغ: جنة ، اليافع: صلال			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Not Applicable – NA
Year of Assessment	2015

Justification - The species does not possess any significant populations in Bahrain, currently or historically. None of the references show that Bahrain hosts any breeding populations in the country. Additionally, no specific figures could be obtained that show the numbers that use any specific locations for breeding or other activities.

Global Red List Assessment
2012 - Least Concern

GEOGRAPHIC RANGE

Range Description - No data available.
Population - No population estimate was made at the national level.
Trend - Unknown

2.7.1 *Pycnonotus leucotis*

Pycnonotus leucotis © Haifaa Abdulhalim

TAXONOMY

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Aves	Passeriformes	Pycnonotidae
Scientific Name	*Pycnonotus leucotis*			
Species Authority	(Gould, 1836)			
English Name(s)	White-eared Bulbul			
Arabic Name	بلبل أبيض الخد			
Local Name(s)	بلبـول			

ASSESSMENT INFORMATION

National Red List Category and Criteria	Not Applicable – NA
Year of Assessment	2015

Justification - An assessment for the White-eared Bulbul was considered, since it is considered the national bird of Bahrain and is known to breed in the Kingdom. There are no specific figures about its population size or trend. It is well documented that the species is caught to be sold in bird markets as a cage bird but there is no information on the impact this is having on the species population in Bahrain. The species assessment was discussed thoroughly with the national experts and it was finally decided that no assessment would be made for the species. On the other hand, there is a need to carry out a detailed survey for the species to document its distribution, population size and to weigh the threats affecting this population in Bahrain including live collecting and others. It should be mentioned that the species is protected by law and it is illegal to collect or kill it, but again, this would need to be assessed in parallel with what was recommended earlier. Regarding the global population, the species is assessed as Least Concern by the IUCN Red List of Globally Threatened Species (IUCN, 2012). Nevertheless, its Least Concern status is justified by the fact that the species has an extremely large population and does not approach the thresholds for Vulnerable under the range size criterion. Despite the fact that the population trend appears to be decreasing, the decline is not believed to be rapid enough to trigger the population trend criterion. Although the global population size has not been quantified, it is not believed to approach the thresholds for Vulnerable under the population size criterion. One last point worth mentioning is that the species is generally considered as having been introduced to Bahrain and is not native (BirdLife International, 2012). It was recorded in Bahrain back in 1923 and it has been suggested since then that the population was introduced, perhaps from Basra. The species is considered to be native to Afghanistan; India; Islamic Republic of Iran; Iraq; Kuwait; Pakistan; Saudi Arabia, while it is considered to be introduced to Bahrain; Oman; Qatar; and UAE.

Global Red List Assessment
2012 – Least Concern

GEOGRAPHIC RANGE

Range Description - The species is a resident along the coasts and is largely sedentary. The species is commensal with humans and never far from settlements, being quite at home in small gardens and parks in the heart of major cities.

POPULATION

Population - No population estimate was made at the national level but the population in Arabia is estimated at around 250,000 birds. Based on the breeding atlas squares, the species in Bahrain is believed to be not less than 20,000 birds.

Trend – Stable

DR HUMOOD ABDULLA NASER

Dr Humood A. Naser is Assistant Professor of Environmental Biology at the Department of Biology, College of Science, UoB. Dr Naser has an MSc in Integrated Environmental Studies from the University of Southampton, UK, and a PhD in Environmental Biology from Newcastle University, UK. He is author of several books, book chapters, and articles published in reputable journals. His expertise relates to environmental and ecological impact assessment, conservation biology, species and ecosystem biodiversity, environmental monitoring, environmental pollution, marine ecology and sustainable development. He teaches a course in conservation biology (BIOLS 442) that explores the principles of conservation biology, including biological diversity and its value, threats to biological diversity, conservation at the population and species levels, and management of habitats and ecosystems. This course also covers aspects of biodiversity conservation in Bahrain.

Dr Naser's main contribution to the Regional Red List Assessment of Selected Species in the Kingdom of Bahrain was the assessment of marine mammals and birds.

DR ABDULAZIZ M.A. MOHAMED

Dr AbdulAziz Mohamed is Associate Professor and Chairman of the Life Sciences Dept at the Arabian Gulf University. He got a PhD degree from the University of Wisconsin-Madison (major Entomology and minor Agronomy) in 2003. Before joining the Arabian Gulf University, he spent nine years as a Director of Plant Wealth Directorate at Agriculture Affairs, Ministry of Municipal Affairs and Urban Planning. He maintained his research activities before and after joining the University with a focus on biological control and field population studies on the major pests of Date palms, insect-symbiont interactions, and biodiversity conservation. He has published a number of publications related to his field of expertise in international journals and participated in many workshops and conferences. He also teaches courses in integrated pest management, biological control, agricultural ecology and bioscience communication. He is also a member of the Regional Red List Assessment Panel of Experts in the Kingdom of Bahrain.

Dr AbdulAziz Mohamed's major contribution to the Assessment was the status of certain species of insects such as the butteflies and dragon flies of Bahrain.

NOUF ALI ABDULMOHSEN AL-WASMI

Nouf A. Al-Wasmi holds a Masters degree and a Postgraduate diploma in Biotechnology (Environmental Application), awarded by the Arabian Gulf University in 2003. Her Bachelor's Degree in General Chemistry is from the College of Arts and Sciences, Dammam, Saudi Arabia in 1998.

During the period 2007–2015, she served as an Environmental Specialist at the Supreme Council for Environment (SCE). In 2016, she became Senior Environmental Specialist at the SCE. Currently, she supervises all the tasks related to and those within the Directorate of Biodiversity.

In addition, she is currently serves as the Kingdom of Bahrain's National Focal Point for many international and regional conventions such as the RAMSAR Convention on Wetlands, the Cartagena Protocol on Biosafety, the CBD Clearing-house Mechanism (CHM), the CBD Protected Areas Programme, the Convention on the Conservation of Wildlife and their Natural Habitats in the Countries of the Gulf Cooperation Council (GCC), the Technical Focal Point for the Convention on Biological Diversity (CBD), and Member of the Committee on Access to Genetic Resources and Benefit Sharing (ABS) for the GCC.

Nouf Al Wasmi has coordinated and supervised numerous national projects including the preparation of the Third National Report on the Implementation of the Cartagena Protocol on Biosafety, the updating of the NBSAP, and the preparation of the Kingdom of Bahrain's Fifth National Report to the CBD. Some of the most notable projects supervised and coordinated by her include the National Mangrove Conservation and Restoration (Replantation) Project, the preparation of the National Report on Wildlife of the Kingdom of Bahrain to the Convention on the Conservation of Wildlife and their Natural Habitats in the Countries of the Gulf Cooperation Council (GCC), The National Dead Mammals and Turtles Monitoring Project and The Northern Hayrat UNESCO Site. Moreover, she participated in the preparation of the Fourth National Report to the CBD, prepared the Report on the Year of Biodiversity in the Kingdom of Bahrain, participated in the preparation of the Report on Sand Storms in the Kingdom of Bahrain, and the Status of Marine Environment Report. She also took part in the analysis of marine benthic samples in the Kingdom of Bahrain, and in the preparation of the first NBSAP, and was chosen as a judge in the international Global Learning and Observations to Benefit the Environment (GLOBE) Program for assessing school students' projects on environmental protection.

Lastly, she has represented the Kingdom of Bahrain at various regional and international conferences and official meetings, and participated in several workshops and training sessions in the field of environment, wildlife and biodiversity conservation.

REEM AL MEALLA

Reem Al Mealla is a nature lover by default, a marine biologist and conservation specialist by profession, a climate advocate by concern and the founder of bnature – Bahrain's first environmental online platform. She has worked in the field in South Africa, Indonesia, Madagascar and Bahrain in addition to being involved in the United Nations Framework Convention on Climate Change (UNFCCC) and the CBD processes. In Bahrain, she is currently working on establishing the Foundation for the Implementation of the Cartagena Protocol through her role as national expert, following the completion of her term as the National Project Coordinator for the Revision of the NBSAP at the SCE. Reem is a recipient of the Abel Imray Prize from the University of Essex, UK and the author of "Resource Partitioning in the Indo-Pacific".

Her role within the Bahrain Red List Assessment was focused on the assessment of marine species, provision of text on Bahrain's biodiversity for the main report, data collection and collation of information in addition to co-coordinating the training workshop, meetings and overall project between February 2015 and January 2016.

AHMED KHAMIS

Ahmed Khamis graduated in 2003 with a BSc in Chemistry (Single Track) from the University of Bahrain, and started his working life as a science teacher for the Ministry of Education. In 2006, he joined the SCE as Chemist and was promoted to Senior Chemist in 2010. He is a nature photographer who strives to record the diversity of life in Bahrain through his wonderful camera shoots.

Ahmed's role in the Bahrain Red List Assessment was focused on the evaluation of birds, given his extensive local field experience.

BASSAM AL-SHUWAIKH

Bassam Al-Shuwaikh is the coordinator of the National Mariculture Center. He got an MSc degree in Marine Resources Development and Protection from Heriot-Watt University, UK in 2008. Before

joining the National Mariculture Center, he spent four years as a senior Marine Resources Specialist in the Directorate of Fisheries. He maintained his duties and research activities before and after joining the National Mariculture Center with the focus on coral reef status and biodiversity.

His participation in the Red List Assessment was to assist in selecting fish species and other marine organisms that could be classified as Endangered in the Kingdom of Bahrain.

KHALIFA BIN AHMED AL-KHALIFA

Khalifa bin Ahmed Al Khalifa joined the Bahrain Authority for Culture and Antiquities in 2016 as Director of Museums. He holds an MA in Museum Anthropology from Columbia University, USA (2015), an MSc in Sustainable Development from University College London, UK (2010), and a BSc in Marine Biology and Wildlife Management from Griffith University in Australia (2007). He started his career at the Public Commission for the Protection of Marine Resources, Environment and Wildlife in the Directorate of Environmental Assessment and Planning in 2008, followed by an appointment at the Ministry of Culture in 2011, joining the team working on "Pearling: Testimony of an island economy", where he overlooked the management and protection of the marine component of the site. He was also designated as the National Focal Point for the World Heritage Convention. In 2013, he was appointed Assistant Director at the Arab Regional Centre for World Heritage, where he planned and supervised the activities and programmes of the Centre till 2016.

HAIFAA ABDULHALIM

Haifaa is currently TABE'A Programme Manager – the natural World Heritage Programme for Arab States, and part of the IUCN global World Heritage Programme. She joined IUCN's Protected Areas programme in July 2007, then quickly climbed up the ladder to lead IUCN World Heritage activities in the Arab Region to be one of the main experts in the region to the World Heritage Convention . Since 2014, Haifaa has been seconded to the Arab Regional Centre for World Heritage under a partnership agreement between IUCN and ARC-WH – she leads the natural heritage programme there too.

She is also a co-author of *TABE'A: Nature and World Heritage in the Arab States: towards future IUCN priorities (2011)*, and *TABE'A II Report- Enhancing Regional Capacities for World Heritage (2015)*.

As the lead from the ARC-WH side of the Natural Heritage Programme which is responsible for the Bahrain Red List project, she was supervising the project through the team leader Laith Al Moghrabi and Mudhafar Salim the project coordinator.

MUDHAFAR A. SALIM

Mudhafar Salim is an ornithologist who has made many additions to the description of Iraqi avifauna. He has contributed to various environmental and nature-related activities in addition to being a nature photographer. He has written a number of books and book chapters about birds and the environment of which the Field Guide to the Birds of Iraq is the most important one. He has also written various scientific papers, reports and technical articles in a number of reputable journals. At the regional level, he has worked on a number of projects including the African-Eurasian Waterfowl Agreement, Important Bird Areas in the Middle East, and assessing the Red List of Birds of the Arabian Peninsula. Mudhafar worked as a Technical Expert for the United Nations Environment Programme (UNEP), and has provided technical advice for the Ministry of Environment voluntarily on various environmental issues for a long time. He has participated in many technical workshops, meetings and conferences at an international level, and delivered many training sessions on various environmental issues as well. He is a member of various international institutions, societies and technical groups. He worked as the Natural Team Leader during the preparation of the Iraqi Marshlands nomination file as a World Heritage property where he supervised the collection and analysis of the data and the writing of the natural part of the nomination file. Mudhafar is currently a part-time staff member for the ARC-WH.

Mudhafar Salim's contribution in the Red List Assessment was collecting the data and following up with the national team, reviewing the final draft, participating in the layout and design of the document, and providing some photos.

LAITH EL MOGHRABI

El-Moghrabi has over 20 years of professional experience in ecological and avifaunal research, including baseline ecological and ornithological assessments and ecological monitoring and evaluation. During this period, El-Moghrabi has taken part in and led hundreds of ecological assessments covering all the various stages. In addition to his extensive work in the different parts and habitats of Jordan, El-Moghrabi has worked in several countries in West Asia and the Mediterranean Basin, including Bahrain, Egypt, France, Iraq, Lebanon, Libya, Morocco, Oman, Palestine, Syria, Tunisia and Yemen.

In addition to his experience as an ecologist, El-Moghrabi managed several environmental national and regional projects. He has worked for several international organisations including BirdLife International and Wetlands International. He has also worked as a senior biodiversity consultant over the past decade for the International Union for Conservation of Nature IUCN in West Asia. After his last post as the leader of the Mediterranean Programme of Wetlands International based in La Fondation Tour du Valat, France, El-Moghrabi worked as a freelance environmental consultant where he coordinated and participated in several capacity-building programmes in the Arab region, assisted and led several ecological research programmes and management planning processes in various protected areas of the neighbouring countries in addition to providing services for environmental impact assessments for several wind energy projects in the country.

El-Moghrabi led the training workshop on IUCN Red List of Threatened Species that was provided for the national experts in Bahrain and has worked as the main compiler and evaluator of the report that was produced.

Marine life of Bahrain © Hassan Janahi, ARC-WH

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