Ascension Island Habitat Action Plan

SHALLOW MARINE (SUB-LITTORAL)

Photo: Shallow Marine Surveys Group

SUMMARY

IUCN habitat classification: 9. Marine Neritic (Submergent Nearshore Continental Shelf or Oceanic Island).

Description: The shallow sub-littoral zone comprises the fringe of sunlit, nutrient rich coastal water between the low tide mark and a depth of approximately 50 m. On Ascension Island, these habitats are characterised by continuously warm waters (22–29 ^{o}C), abundant fish life and a scarcity of erect, benthic seaweeds, largely due to grazing by the ubiquitous black triggerfish. Species diversity is highest on the volcanic reefs and boulder fields that dominate the sub-littoral fringe. These are often covered with growths of coralline algae and encrusting sponges and corals and provide habitat for locally-harvested food species such as rock hind, spotted moray and spiny lobster. Sandy substrates are also common but are generally shifting and unstable, and support a depauperate, albeit distinctive, animal and plant community.

Threats: Inshore fishing for demersal fish species and lobster constitutes the only immediate threat to the shallow marine environment but is not currently regarded as severe. Climate change also presents a longer term but unpredictable threat.

Citation: Ascension Island Government (2015) Shallow marine habitat action plan. In: *The Ascension Island Biodiversity Action Plan*. Ascension Island Government Conservation Department, Georgetown, Ascension Island

2. Distribution

Total extent: 39.2 km^2

Being a truly oceanic island, Ascension's shallow sub-littoral zone is limited to a narrow halo of coastal water immediately surrounding the Island. The zone is widest on the western side of the island where the submarine slope is more gradual. Here the 50 m isobaths lies up to 2 km from the coast in places. On eastern and southern shores the seabed shelves away more steeply and the 50m isobath can lie less than 500 m from the coastline.

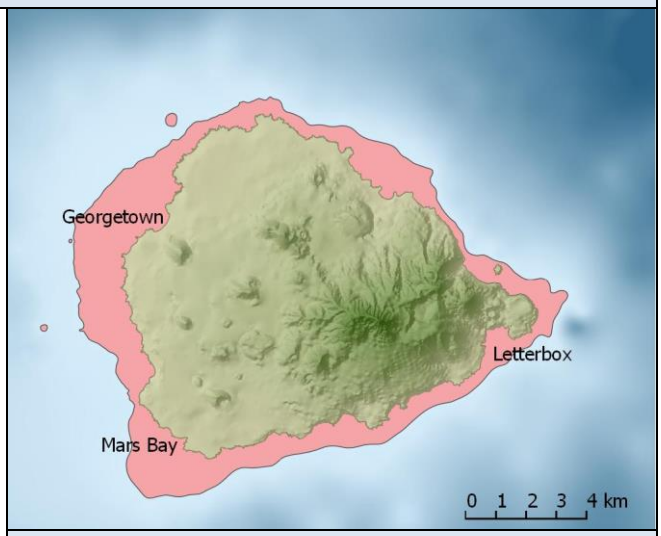

Figure 1. Distribution of shallow sub-littoral habitats (< 50m depth) on Ascension Island.

4. Habitat characteristics

Physical

The dominant sub-littoral substrates are volcanic rock and sand. Underwater rock formations consist of bedrock reefs, vertical cliffs and steep boulder slopes, as well as a variety of caves, canyons and lava tubes. There are also gently shelving areas of coarse sand and maerl cobbles, particularly on the western side of the Island. Water temperature in the shallow sub-littoral is relatively warm and stable, ranging between approximately 22-24 C in September/October and 28-29 C in March/April (AIG Conservation, unpublished data). Tidal range is small (0.8m) and average wave height does not exceed 2m [1]. Few areas could be regarded as even moderately sheltered, although wave and current action is strongest along southern and eastern shores exposed to the prevailing south easterly trade winds [2]. The trade winds and westward flowing surface currents have a pervasive effect on the oceanography of the shallow sub-littoral zone, with a clear east-west gradient in temperature and salinity and a difference in the depth of the upper thermocline, being deeper in the west and relatively shallow in the east [3].

Biological

Ascension Island's sub-littoral zone is characterised by an abundance of fish, a largely cryptic and nocturnal invertebrate fauna, a lack of reef-building corals and a striking scarcity of erect, benthic macroalgae [4]. Although abundant, fish diversity is low when compared to other tropical Atlantic islands [5]. A total of 133 'coastal' fish species have been recorded in Ascension waters, representing a unique assemblage of western, eastern and amphi-Atlantic species [5]. Of these, 11 are single-island endemics and a further 20 are endemic to St Helena, Ascension and St Peter and Paul's rocks [5]. The sub-littoral ichthyofauna is dominated by the highly abundant black triggerfish, *Melichthys niger*. Grazing by this species severely limits the growth of non-calcareous seaweeds, and where these do occur they generally form only a sparse, basal turf [2,6]. Instead rocky, sub-tidal areas are dominated floristically by crustose coralline red algae (*Lithothamnia sp.*), or rhodoliths, which provide important biogenic habitat for small reef fish and invertebrates. Large pelagic fish such as yellowfin tuna (*Thunnus albacares*), rainbow runner (*Elagatis bipinnulata*) and Galapagos shark (*Carcharhinus galapagensis*) also venture into the shallow sub-littoral zone to feed on inshore species such as *Melichthys niger*.

3. Status

Ascension Island's shallow marine environment apparently remains in a favourable condition, with no documented species introductions, little pollution and generally light (although currently unregulated) fishing pressure. Fishing in the sub-littoral zone largely consists of small scale, shore-based and vessel-based angling and spearfishing for spiny

lobster (*Panulirus echinatus*) and reef fish such as rock hind (*Epinephelus ascensionis*), spotted moray (*Gymnothorax moringa*) and glasseye snapper (*Heteropriacanthus cruentatus*). Populations of these species are generally considered to be healthy at present (e.g. [7]), although historical baselines of abundance and demography with which to compare present populations are lacking. This paucity of numerical data combined with the relatively rapid turnover of staff within the Territory is a concern and may result in 'shifting baseline syndrome' whereby perceptions of what is normal in the marine environment change over time. Indeed, based on conversations with long-term Island residents, there have been noticeable declines in the abundance and average size of a number of inshore species over the past 40-50 years (AIG Conservation, unpublished data) [1]. These include glasseye snapper, rock hind, spiny lobster and dog snapper (*Lutjanus jocu*), all of which are popular food species. It is imperative that regular, standardised monitoring of exploited species is initiated and maintained so that long-term trends can be properly established.

4. Threats*

5.4.1 Fishing & harvesting aquatic resources: intentional use – small scale	**Impact:**	LOW

Ascension Island's small human population and lack of a commercial inshore fishery have apparently spared it from the rapid over-exploitation of inshore fish stocks that have affected many small island nations. Nonetheless, fishing remains one of the most popular recreational activities within the Territory and has the potential to deplete sought after species such as rock hind and spiny lobster if not managed responsibly. Rock hind makes up the majority of the inshore demersal fish catch [1,8] and belongs to a family that are known to be highly susceptible to over-fishing due to their slow growth rate, protogynous reproductive strategy and high site fidelity [9]. Indeed, this species appears to have been locally-depleted in the waters surrounding Ascension's more populous sister Island of St Helena [7] and significant quantities are now imported from Ascension in the personal shipping allowances of passengers travelling between the Islands. Less abundant species that make up a smaller proportion of the total catch may also be vulnerable to over-exploitation as a consequence of their lower numbers. Glasseye snapper (known locally as 'bullseye') in particular is a valued food fish and is reported to be considerably scarcer than it once was (Anon, pers. comm.). Baseline data and improved monitoring of the biomass and fishing mortality of target species is urgently needed in order to evaluate the impacts and sustainability of the inshore fishery.

5.4.3 Fishing & harvesting aquatic resources: unintentional effects – small scale	**Impact:**	LOW

By-catch of non-target species in the shallow sub-littoral fishery is currently minimal. Juvenile hawksbill turtles (*Eretmochelys imbricata*) are occasionally hooked by shore fishermen, particularly around the Pierhead where they aggregate at night to feed on fish discards [10], but are always released alive. Incidental capture of Ascension frigate birds in the shore-based and vessel-based recreational fisheries also occurs periodically and can result in drowning or fatal injury [11,12] (AIG Conservation, pers. obs.). The number of individuals affected is currently estimated to be low, but could become a concern if local fishing effort were to increase substantially.

11.2 Climate change & severe weather: temperature extremes	**Impact:**	UNKNOWN

According to global climate projections, mean sea surface temperatures will increase by 1.5 – 2.6 ^{o}C by the end of the 21st century, potentially coupled with greater variability and more pronounced extremes [13]. The impacts of rising global temperatures are expected to be particularly severe for tropical species which may already be operating above their thermal optima and often have a narrower temperature tolerance range than their temperate counterparts, having generally evolved in stable, aseasonal climates [14]. Very little is known about the thermal tolerances of Ascension Island's shallow marine biota with which to predict impacts. An experimental study of four invertebrate species reported upper lethal limits of 31–39 ^{o}C compared to mean water temperatures of 22–29 ^{o}C [15], suggesting that most species examined are capable of surviving even the most pessimistic predictions of ocean warming. However, these findings do not rule out the possibility of sub-lethal effects or wider ecosystem impacts. Mass mortalities of black triggerfish occurred in 2008, 2011 and 2012 and in at least one instance were coincidental with unusually high sea water temperatures of 31°C [16]. It is not known whether these die offs were temperature-induced or related to potential corollaries of ocean warming such as disease, algal blooms or oxygen depletion.

11.5 Climate change & severe weather: other effects – ocean acidification	**Impact:**	UNKNOWN

The predicted acidification of the World's oceans as atmospheric carbon dioxide concentrations rise is potentially a greater threat to many marine species than global warming. Calcifying organisms such as corals, crustaceans,

molluscs and some plankton will be most affected as reduced carbonate ion saturation in acidified surface waters will impair their ability to maintain their calcium carbonate shells and exoskeletons [17]. Coralline algae and to a lesser extent, corals are important components of reef habitats at Ascension Island and any declines in these species could have wide-reaching consequences for the shallow marine ecosystem.

8.1.2 Invasive non-native/alien species/diseases: named species	**Impact:**	NEGLIGIBLE

In contrast to the terrestrial ecosystem, Ascension Island's inshore marine environment is apparently pristine, with no documented species introductions. Nevertheless, a number of potential invasion pathways exist. The Island is regularly visited by commercial and military vessels and private yachts which constitute the major vectors of marine invasive species worldwide - ballast water and hull fouling being the principle routes of introduction [18,19]. Release of aquarium specimens has also been responsible for numerous damaging marine invasions [20], and could pose a threat on Ascension Island if pet imports are not regulated. Although it is known that some residents keep fish, there are no records of the species currently present on the Island making it difficult to assess the risks.

9.2.1 Pollution: industrial & military effluents – oil spills	**Impact:**	LOW

Petrochemical spills are the only significant coastal marine pollution threat on Ascension Island and are perhaps most likely during tanker offloading via floating pipeline from the Clarence Bay anchorage. However, regular pipeline maintenance, routine inspections during fuel transfer and risk-averse operating procedures mean that the probability of a substantial spill is very low.

9.4 Pollution: garbage & solid waste	**Impact:**	NEGLIGIBLE

The growing volume of plastic and other anthropogenic debris released into the World's oceans represents a substantial threat to marine biodiversity [21]. Local contributions to marine plastic pollution are negligible on a global scale, but should be addressed as part of wider reforms to the Island's waste management and a more concerted approach towards tackling casual littering. Discarded fishing tackle and other debris around popular fishing spots is an on-going problem, although is primarily an aesthetic concern.

*Threats are classified and scored according to the IUCN-CMP Unified Classification of Direct Threats [22]

5. Relevant policies & legislation

Enabling legislation for the regulation and licensing of fishing within the sub-littoral zone are provided by the Fishery Limits Ordinance, Cap A15, and the Wildlife Protection Ordinance 2013, which confer powers to declare closed areas and seasons, issue licenses, impose catch limits and gear restrictions and prohibit the taking of certain species. At present all species of seabirds and marine turtles, dolphins, manta rays and 11 species of endemic reef fish, including several desirable aquarium specimens, are protected under the Wildlife Protection Ordinance. The harvesting of egg-bearing spiny lobster is also prohibited. Non-commercial exports of fish are allowed subject to a permit issued under the Customs (Export Control) Order 2014 which limits holders to a maximum of 10 kg of fish per person and prohibits the export of spiny lobster.

Ascension Island does not have any specific marine protected areas, although approximately 0.45 km^2 of sandy, sub-littoral habitat adjacent to major sea turtle nesting beaches are included in nature reserves designated under the National Protected Areas Order 2014 and National Protected Areas Regulations 2014. These are primarily intended to protect the mating and inter-nesting habitat of the internationally important green turtle population, with restrictions on development and access by certain types of water craft.

6. Management notes

Several management plans and consultancy reports relating to Ascension Island's inshore fishery have been produced previously [1,7,8,23,24], although until the establishment of a dedicated Fisheries Department and Marine Science Unit in 2014 a lack of resources within Government has limited progress. Key recommendations from these reports are: the establishment and enforcement of a formal licensing regime to monitor and regulate inshore fishing activity; improved data collection on catch rates and biomass/abundance of target species; and greater awareness-raising and engagement within the local fishing community.

A licensing regime and catch reporting system for the inshore fishery has been operated intermittently by

Government but compliance and enforcement has generally been low. Improving this situation will be critical to the management of Ascension's sub-littoral zone as license uptakes and catch returns are the only means by which fishing effort and yields can be monitored. To be effective, any system will require the support and cooperation of the local fishing community so it is vital that management objectives are developed cooperatively. The formation of an inshore advisory committee with broad stakeholder representation may be one way of achieving this.

Various management options exist for controlling fishing pressure in the shallow sub-littoral zone including the enactment of bag limits, size limits, gear restrictions, closed seasons and no take areas. However, with the possible exception of rock hind [7], knowledge of the biology of target species is generally too limited to make informed management decisions. Research into the abundance, distribution and life history of key species is currently underway through a two year Darwin Initiative-funded project and should be continued on a more permanent basis to monitor trends in population size and demography. In the interim, a precautionary approach may be necessary. This could include categorising species by risk and putting in place responsible limits based on existing information and expert judgement. For example, Hecht & Malan proposed an arbitrary bag limit of 2 lobster and 4 grouper per person per day for private individuals and 20 grouper per vessel per day for commercial sale [1]. Minimum size limits of 28-35 cm total length for grouper and 6 cm carapace length for lobster have also been suggested [1,7]. As with licensing, the introduction of restrictions will require the backing of the local community to be effective and is best approached as a collaborative exercise through the proposed inshore advisory committee. Whether support will be forthcoming is currently unclear and a more gradual process of awareness-raising may be necessary to generate buy-in.

Aside from fishing, climate change constitutes the only other significant threat to Ascension's sub-littoral zone and will be impossible to influence locally. Research into the physiological tolerances of keystone species may allow predictions of likely impacts while periodic monitoring of water chemistry and bio-indicators (such as corals and rhodoliths) may help to detect any incipient changes.

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