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RE: AMSA submission on the proposed marine parks in the Buccaneer Archipelago and surrounds

To the Plan Coordinator,

The Australian Marine Sciences Association (AMSA) is grateful for the opportunity to provide comment on the proposed marine parks in the Buccaneer Archipelago and surrounds. AMSA is Australia's largest professional association of marine scientists with more than 700 members, and this submission has been prepared following consultation and close involvement from many Kimberley region and marine park specialist members.

Executive Summary

AMSA welcomes the initiative to create three Marine Protected Areas (MPAs) in the Kimberley.

AMSA also welcomes the co-management model put forward between the Traditional Owners and the Government of Western Australia

AMSA supports the proposed management measures outlined in the proposed Management Plans (the Plans). However AMSA consider they fall short in certain areas needed to make an effective Marine Protected Area, particularly:

- The global target of 30% no-take areas has not been reached;
- The documentation and citation supporting recommendations and management prescriptions should be improved;
- There is insufficient commitment for further research to address knowledge gaps into key ecological processes including connectivity, marine wildlife and fisheries displacement in particular; and
- There is insufficient commitment to ongoing monitoring and review in key areas and for key activities.

AMSA makes the following recommendations:

1. *Modify the Plans to increase the level of sanctuary (no-take) zones to 30%.*
2. *Change the zoning on some part of the sanctuary zones to no-take even for Traditional harvest to serve as scientific reference sites.*
3. *Improve the documentation and citation of source documents used in the Plans.*
4. *Further justify the placement of the different zones, especially the sanctuary zones, to provide evidence for the representativeness across the parks' environmental gradients.*

5. *Undertake research, as well as monitoring, as a priority, especially where there are key knowledge gaps in areas such as; the type and distribution of subtidal benthic habitats, the status and health of benthic biodiversity; and predictions for benthic habitat based on environmental drivers.*
6. *Develop a system of monitoring of the ecological aspects of the marine park, including:*
 - *the health and condition of benthic habitats including aspects such as diversity, abundance of key benthic species, coral cover and the presence and abundance of invasive species;*
 - *the health of coral reef and intertidal reef communities in response to climate change and anomalous thermal events;*
 - *the effectiveness of EBFM within the proposed marine parks, including the total catch taken by recreational fishers, in high-risk areas and for site-attached target species, the effect of fishing effort displacement and the need for effort reductions; and*
 - *the impact of foot access to intertidal reefs and other areas sensitive to visitation.*
7. *Expand sanctuary and special purpose zones to include areas having critical habitat or aggregations of protected and/or culturally significant species to safeguard their populations.*
8. *Develop a fisheries management plan for comment within the current planning process.*
9. *Acknowledge the role of the Western Australian Museum in the provision of knowledge to underpin the Plans.*

More details to support these views are provided as follows in the body of this submission.

Introduction

This submission covers all three Marine Protected Area plans and the four relevant documents namely:

- Indicative joint management plan for the proposed Bardi Jawi Marine Park;
- The indicative joint management plan for the proposed Mayala Marine Park;
- The indicative joint management plan for the proposed Maiyalam Marine Park; and
- The amended joint management plan for the Lalang-garram/Camden Sound, Lalang-garram/Horizontal Falls and North Lalang-garram marine parks.

AMSA endorses MPAs as vital to the conservation of Australia's marine biodiversity and biomass and also to meet the nation's international obligations.

AMSA supports a balanced approach to managing multiple uses of the marine social-ecological system which engages all stakeholders including scientists and partnerships with traditional owners (TOs).

AMSA has developed a Position Statement on MPAs (attached) and the comments on the above Plans are in accord with it.

With respect to the Plans, AMSA has structured its response into three sections:

- Policy and Governance
- Marine Science
- Monitoring and Management.

Policy and Governance

a. **CAR: Is the plan Comprehensive, Adequate and Representative?**

AMSA's position is that MPAs should be aimed at achieving a Comprehensive, Adequate and Representative (CAR) network of marine protection.

AMSA notes that successive Western Australian Governments have been working towards this goal for the State and that this latest initiative significantly adds to the CAR network for Western Australia.

AMSA also notes that given its total size most CAR criteria are met within the planning areas. Further, the overall plan will fill a critical gap in the West Australian Marine Conservation Reserve system: a recent review noted that the Buccaneer Archipelago has coral reef types that are not included elsewhere and is therefore the most conspicuous omission for adequate representation in marine parks of the Kimberley at the time of writing (Wilson 2016).

The Indigenous Land Use Agreement (ILUA) in place for the Bardi Jawi Marine Park is an excellent result meaning the intertidal areas are included in the proposed marine park. However it is not clear if there is an ILUA in place with Mayala and whether it is included in the proposed marine park.

b. Size of Protected Areas

AMSA's Position Statement on Marine Protected Areas is that "*MPAs with at least 30% sanctuary (no-take) zones are the most effective and the preferred design option*".

This is not met by the indicative joint management plans as only 21% of the proposed marine parks are designated as Sanctuary Zones. AMSA recognises that Special Purpose Zones (cultural protection), which covers a further 19% of the proposed marine parks offer a degree of protection. However Traditional Owner (TO) harvest is permitted in the cultural protection zones and sanctuary zones, and recreational fishing on charter boats will be permitted in the cultural protection zones. Thus, the current zoning scheme offers some level of protection from harvest to 40% (by total area) but no Special Purpose Zones (cultural protection) is fully protected.

AMSA recommends that the Plans be modified to increase the level of sanctuary (no-take) zones to 30%.

c. Information used to define the zones and scientific underpinning

The Plans have a strong level of engagement with Traditional Owners (TOs). The new category, that of Special Purpose Zones (cultural protection), provides clear indication that TO aspirations, Traditional Ecological Knowledge and two-way cultural learning was incorporated at the foundation of the Plans.

AMSA recognises that these Plans and this co-design process is the first of its kind and supports this initiative. This is especially important for this remote area where relatively little non-Indigenous baseline ecological information is available. The current impact of Traditional Owner fishing and hunting (in blue and green zones) is not well understood from a scientific perspective, and thus further research in this area is required. The current Plans provide the opportunity to research these impacts. Following this research, and in alignment with Traditional harvest practices, there may be a need to adjust zoning in the future.

The Kimberley Marine Research Project (KRMP) conducted by Western Australian Marine Science Institution (WAMSI) considerably enhanced the science knowledge base in this region and documented the traditional ecological knowledge for a broader audience. However, it is currently not transparent how much of that knowledge basis was incorporated in the development of the Plans. Details below show how the KMRP research and other MPA scientific design principles support the current Plans and also could be better utilised and articulated in the Plans.

It is also not clear whether and to what extent non-Indigenous recreational fishers or commercial fishers provided input to the Plans or exactly how that input has been incorporated. AMSA notes that a recent paper documents the majority of Australian recreational fishers support no-take zones, and this support increases with reserve age (Navarro et al. 2018). For example, opposition by fishers to Ningaloo Marine Park was hostile in 1986 when it was designated, but by 2004, four to one were in favour of the reserve system (Wilson 2016).

AMSA recommends that part of the sanctuary zones be zoned no-take even for Traditional harvest, to serve as scientific reference sites.

d. Source of information for Plans

AMSA is concerned that there is a lack of information provided in the Plans about the sources of key information and that some information is not up to date.

For example in the Mayala Plan on page 78 a, “A prioritized monitoring plan has been developed and approved by the JMB and monitoring activities are being implemented” but there is no detail provided in the monitoring settings about methods, frequency of reporting etc. Similarly in the Mayala Plan -12.2.3 Sanctuary Zones – it is not clear what data these decisions drew upon.

The Plans include the statement “The Kimberley region remains one of the last relatively undeveloped coastal areas left in the world and the scientific and conservation significance of the area is becoming increasingly recognised in a global context (Halpern et al. 2008)”. However a newer reference (Richards et al 2015) also identifies the national and international significance of the Kimberley.

AMSA is of the view that better documentation and citation of source documents used in the Plans is necessary. This includes further evidence to justify the statements in the Plans relating to ecological connectivity, health and condition of benthic habitats, marine wildlife status and fish stock condition. This should include a review of additional available studies on the megafauna of the planning area and incorporation of this knowledge into the Plans.

AMSA recommends better documentation and citation of source documents used in the Plans.

Marine science

e. Benthic habitats

Overall representation of habitats in different zones

Following the principles of CAR, marine parks should be zoned to provide protection by representing the key habitat types, biodiversity and ecosystem function and services. Therefore the sanctuary zones should represent the range of oceanographic settings, habitats, depths, and substrates present.

There are several sanctuary zones across the three marine parks, but it is not clear the justification for their placement and the specific biological and ecological values they represent.

The distribution of the sanctuary zones is likely to capture a fair representation of the benthic habitats. While the intertidal, shallow coral reef habitats, mangroves and seagrass habitats are well protected, the deeper water habitats which support hard coral and filter feeding communities are less represented. Also it is not clear what percentage of the various benthic habitats are in the sanctuary zones and other management zones.

AMSA’s position is that, where possible, plans for marine protected areas should include the relative proportion of benthic habitats in each management zone to support the adequate representation of habitat criteria.

The Plans select benthic habitat sanctuary zones in a north-south line and sometimes from shorewards out, which could reflect some of the environmental gradients. However the placement of the sanctuary zones is potentially not capturing enough of the variation in habitats and biota. For example, three of the sanctuary zones, namely Ganangudee Eewuleg, Waddaddam and Yaloon cover fairly similar habitats: highly protected embayments lined in places with small areas of mangrove and located in the upper portions of their respective embayments. However there does not appear to be representation of potential transitions in habitat and biota further down the depth gradient from the protected shores to the subtidal and towards the openings into large bays such as Strickland and Cone.

There are three sanctuary zones placed at the seaward ends of the smaller embayments (Bullbull, Bordo and Didgee) which are likely to capture the more seaward habitat types. These habitats tend to have low coral cover and low diversity and the dominant fauna consisted of filter feeders such as sponges, soft corals, bryozoans, etc.

AMSA recommends adding further justification for the placement of the different zones, especially the sanctuary zones, to provide evidence for the representativeness across the parks using environmental gradients.

Benthic habitat descriptions and physical drivers

The link between habitat, bathymetry and substrate type to allow inference on habitat distributions in the subtidal is a significant knowledge gap.

The intertidal habitats in the proposed sanctuary zones are only described in general terms, but the knowledge gap for subtidal habitats should be clearly stated. Even more generic references to subtidal habitats reflect less knowledge of what exists there, although it is known that some hard and soft corals can occur, as well as a range of filter feeders.

The level of understanding of the type and distribution of subtidal benthic habitats is a knowledge gap, and comprehensive benthic habitat mapping and predictions for benthic habitat based on environmental drivers, specifically in subtidal areas is required to address this knowledge gap.

The Lallam-Garam plan, which includes the Maiyalam indicative management plan states: “Many coral and sponge species surveyed in this area are expected to be new to science”. This is more relevant to sponges than corals as a number of sponge diversity hotspots were noted during the WAMSI benthic surveys.

The proposed management settings for subtidal filter feeding communities, where the status is described mostly as unknown, prioritizes monitoring over research to characterise what exists. This is premature. Research to assess diversity, such as by the West Australian Museum, is necessary to establish what species exist and where, before monitoring and management can occur. This is because the Plans suggest potential management performance measure indicators could include, diversity, total cover and community composition, all of which will need research first.

AMSA recommends research as well as monitoring as a priority, especially where there are key knowledge gaps in areas such as; the type and distribution of subtidal benthic habitats; status and health of benthic biodiversity; and predictions for benthic habitat based on environmental drivers.

Description of condition of benthic habitats

Coral bleaching events have been reported in some areas of the Kimberley and may have occurred in the marine park. The status of coral and reefs in Bardi Jawi country are stated to be generally in good condition, however it is not clear what data this appraisal about the condition of coral and reefs is based upon.

Similarly the Mayala report that reefs have fewer octopus, blue crab, trochus and are threatened by climate change but reefs currently thought to be generally healthy. Again no supporting information is provided.

AMSA also considers that condition index for invasive species should be adopted. An invasive sponge has recently been recorded in the Kimberley (Fromont et al., 2019) and should be mentioned in the context of biosecurity.

Further evidence should be provided where possible to justify the statements relating to the health and condition of benthic habitats. The lack of data on the status and health of benthic biodiversity across the Buccaneer Archipelago should be stated as a knowledge gap in all the Plans. These and other knowledge gaps can be addressed through further monitoring and research to improve understanding of the health and condition of benthic habitats including aspects such as diversity, abundance of key benthic species, coral cover cover and bleaching and presence and abundance of invasive species.

f. Fisheries

AMSA notes that the Plans recognise that Ecosystem-based fisheries management (EBFM) is a key component of the suite of management measures envisaged.

AMSA supports EBFM as a way of managing fishery resources that recognizes all the interactions within an ecosystem rather than considering a single species or an issue in isolation (Townsend et al. 2019) so as to maintain ecosystems in a healthy, productive, and resilient condition.

The proposed marine parks in the Buccaneer Archipelago incorporate a network of habitats across the Dampier peninsula, ensuring maintenance of connectivity between ecological units, and maximising

resilience to external impacts (Green et al., 2014). Given current environmental conditions and increasing threats to shallow coastal communities from climate change, pollution, and increased visitation to the region (Collins 2008) using EPFM to maximise ecosystem resilience via protection of natural resources is a high priority. In the Kimberley region, climate change has been identified as the largest factor affecting the future of marine ecosystems, with site-attached species including reef fish, at greater risk. These species benefit the most from an expansion of sanctuary zones and Marine Protected Areas (Boschetti et al. 2020).

By including mangrove, seagrass and coral reef systems in special purpose (blue cultural protection) and sanctuary zones (green), AMSA is of the view that the Plans will ensure maintenance of essential fish habitat and nursery areas for important recreational fishery species in the region, such as mangrove jack and trevally.

AMSA is of the view that the Plans address the needs of the following groups in an EBFM approach:

- a subsistence fishery for Aboriginal people who have relied on animal protein from the sea for thousands of years,
- a recreational fishery for those interested in the sport of fishing or catching fish to eat,
- a recreational fishery linked to tourism operators with cultural knowledge to operate in the region, and
- a number of commercial fisheries targeting scalefish and invertebrates including commercial fisheries for *Trochus* and mud crabs which are operated by Traditional Owners.

Close monitoring will need to be implemented to ensure the effectiveness of EBFM within the proposed marine parks.

AMSA notes that the Bardi-Jawi Rangers, in partnership with AIMS, have an on-going monitoring program (3 years to date), that will continue to evaluate fish populations via fishery-independent methods at five locations within the proposed Bardi-Jawi Marine Park.

AMSA is of the view that these monitoring efforts should be extended to other marine parks as well as monitoring for fishing effort and catch.

A program to monitor the total catch taken by recreational fishers within the marine parks will also be necessary, particularly in high use areas as there is a high risk of local over-depletion, especially for site-attached target species.

The proposed zoning in the Plans is likely to displace some fishing effort, mainly by recreational fishers, who are one of four groups of fishers in the region. The Plans will limit access to recreational fishers such that fishing effort will likely be displaced to popular areas like Roebuck and Pender Bays to the south and to the areas around Kooljaman, Catamaran Bay and Deep Water Point to the north. However, these are locations where most of the fishing effort currently exists (e.g. Kooljaman, Catamaran Bay), given the easy access for boat launching and well-maintained tracks (hence the risk of greater localised fishing pressure).

AMSA notes however that some of the best-known fishing sites in the Kimberley region, which include distant off-shore reefs and several major river mouths, are within General Use Zones in the proposed Plans (Collins 2008). AMSA acknowledges the goodwill exhibited in the Plans which maintains accessibility to these areas.

Given the increased visitation to the Marine Parks expected and the concentration of fishing effort into somewhat smaller areas, AMSA is of the view that more widespread monitoring and enforcement via fisheries officers and TO Rangers will be needed across the region to limit fishing effort. This is particularly important given that fisheries in the area are characterised by low productivity and scalefish species that are long-lived (Molony et al. 2011).

To avoid fishing effort transfer, AMSA is of the view that MPA designation should also be accompanied by appropriate reductions in overall fishing effort or catch for affected fisheries, particularly those which are at, or near, full exploitation levels. A number of commercial fisheries may require restructuring to ensure sustainability considering the likely concentration of effort and loss of productive fishing areas. This will

require a fisheries management plan to be developed concomitant to the protection plans being presented for comment within the current planning process.

AMSA acknowledges that the extent of the impact, and the process of fishing effort displacement from MPAs to other sites (particularly for recreational fisheries) is poorly understood. More research into this issue is needed.

AMSA notes that the designation of new areas of protection (particularly green sanctuary zones) should confer fishery benefits as the basis of a network of connected zones that allow for recruitment spill-over (e.g. Harrison et al. 2012). This should give rise to higher fish biodiversity, biomass and abundance of large (> 20 cm) and fishery target species (Edgar et al., 2014; Malcolm et al., 2018; Turnbull et al., 2018).

AMSA notes that whilst some user groups may initially disagree with certain sanctuary area designations, experience has shown that these effects generally result in support as fishery benefits become apparent.

AMSA recommends a fisheries management plan be developed for comment within the current planning process.

g. Marine wildlife

The Plans have identified key marine wildlife that rely on habitat within the Buccaneer Archipelago that are important to traditional owners, many of which are protected under national legislation -*Environment Protection and Biodiversity Conservation Act (Cth) 1998 (EPBC 1998)* and/or state law (*Biodiversity Conservation Act 2016*) or are listed under international conventions (e.g. IUCN). Marine wildlife includes marine turtles, shorebirds, sharks and rays, sea snakes, coastal dolphins, dugongs and humpback whales. Species listed in the Plans are either seasonal migrants (e.g. humpback whale), are highly mobile or are year-round residents of the region. For instance, the region is within the core breeding and calving grounds of conservation dependent and EPBC listed humpback whales. Coastal dolphins in the region include IUCN-listed vulnerable snubfin dolphins, vulnerable Australian humpback dolphins and near-threatened Indo-Pacific bottlenose dolphins.

Research on coastal dolphins indicates that they have high sight-fidelity, limited gene flow (Parra et al. 2006, Cagnazzi et al. 2011, 2013; Brown et al. 2016), and have populations that are often fragmented. While most of the region has not been surveyed adequately to identify critical habitat for coastal dolphins, aggregations and/or regular sightings of coastal dolphins have been confirmed for locations within the marine park, including Cygnet Bay and Cone Bay, with a possible third snubfin dolphin genetic population north/east of King Sound. Information on many other species occurring in the region is limited, including dugong abundance and occupancy. In addition, there are many other species that have been sighted visiting the area of which very little is known, such as the false killer whales.

The Plans have been informed by a combination of published scientific research and traditional knowledge but may not be comprehensive. Further studies not identified in the Plans should be considered and drawn from.

For instance there is work on estuarine and freshwater environments in the Kimberley region indicating these are important habitats for sawfishes (Thorburn and Morgan 2004, Thorburn et al. 2007a, Thorburn et al. 2007b, Stevens et al. 2008, Morgan et al. 2011a, Morgan et al. 2011b, Lear et al. 2019). Although most studies have been carried out in a limited number of river systems, sawfish and river sharks are likely to be present in other similar systems. In addition, foraging green and flatback turtles tagged in other regions (Pilbara, Kimberley and Scott Reef) also utilise the marine park region for foraging (Thums et al. 2017, Thums et al. 2018, Ferreira et al. 2021).

These additional available studies on marine wildlife of the planning area should be reviewed and relevant information incorporated into the Plans.

The scientific underpinning for some designated areas is not as comprehensive as would be desirable. The proposed sanctuary zones will offer only localised protection from pressures affecting marine wildlife such as impacts related to commercial fishing, and petroleum exploration activities and infrastructure within the

sanctuary zones. This protection, however, needs to be considered within the broader context of critical habitat for highly mobile species (including pressures experienced elsewhere). In areas outside of special purpose and sanctuary zones permitted activities such as commercial fishing, aquaculture and industry activities may occur that present potential threats, including entanglement risk with marine debris (e.g. fishing and aquaculture gear), collision risk, and habitat degradation (e.g. pollution, prey depletion and underwater noise).

As examples Cone Bay and potentially north/east of King Sound are occupied by aggregations of protected coastal dolphin species, however these are currently set as General Purpose zones. In addition, Cygnet Bay that also supports an aggregation of coastal dolphins is zoned as Special Purpose, which allows for the possibility of general marine infrastructure, dredging and dredge spoil dumping activities. The region seaward from Pender to Yampi Sound is an important breeding habitat for humpback whales, with many whales accompanied by newborn calves. Locations of aggregations and critical habitats of other marine wildlife species should be identified where they have been missed and sanctuary or special purpose zones designed to include these, possibly tailored to seasonal variations.

With the recent increased protection afforded to coastal dolphins, AMSA considers they should be included in the proposed management approaches. With the exception of humpback whales, robust data to estimate and monitor decline in abundance of these megafauna is mostly lacking and increased monitoring is desirable.

AMSA is also of the view that an achievable, robust monitoring and research plan should be developed that follows a collaborative process between managers, scientists and Traditional Owners, to achieve these targets.

*AMSA **recommends** sanctuary and special purpose zones be expanded to include areas having critical habitat or aggregations of protected and/or culturally significant species to safeguard their populations.*

Monitoring and management

h. **Monitoring:**

Goals, performance measures, monitoring programs and adequate resourcing

AMSA supports the Marine Park objectives in principle and believes that the proposed jointly managed Marine Park proposals have been carefully considered and designed. The Plans include a holistic aim to jointly manage both the implementation and operation of the three Marine Parks in a consistent and efficient way through a sharing of resources and in consideration of the connectivity between the areas.

Joint management confers considerable advantages and considers aspects beyond ecological significance. The proposed marine park areas are rich in traditional management practices that have operated for tens of thousands of years, with thriving local indigenous populations in place that have a cultural responsibility to look after Country.

AMSA notes that explicit cultural, ecological and social Key Performance Indicators (KPI's) have been established within the Plans to support management strategies and track management success:

- Cultural examples include relationship to, looking after, and enjoyment of Country.
- Ecological examples include mangroves, water and sediment quality, turtle, dugong, seagrass and coral reefs.
- Social examples include language and traditional knowledge and enjoyment of Country

In addition to the KPI's, AMSA notes that the current status, pressures, management objectives and strategies to reach targets through performance indicators have been developed.

However, establishing and monitoring natural baselines has been recognised as an essential tool to measure future human-induced changes, determine any rate of recovery following remediation, and provide a scientific basis for adaptively managing the Parks. Ongoing long-term monitoring programs are already in

place in some park areas for (at least) benthos, fish and water temperature through collaborative projects between indigenous ranger groups and AIMS, DBCA & DPIRD.

AMSA believes that the extension of existing, and development of new monitoring programs is necessary to more comprehensively capture other ecological aspects in aid of joint management objectives. The areas for such monitoring have been highlighted previously.

Monitoring the 'condition' of marrgoorr (coral) and marnany (reef) communities and the pressures acting on them in the proposed marine park is listed as an objective; however it is important to specifically mention in the Plans that the 'health of marrgoorr and marnany communities in response to climate change and anomalous thermal events' should be monitored.

The Plans state the desire to regulate foot access to intertidal marnany and other areas unsuitable for visitation through commercial operator licences, by regulation or other mechanisms as relevant. AMSA is of the view that a research permit system should also be introduced to allow foot access to intertidal reefs in order to undertake monitoring and research.

The Bardi Jawi plan suggests mapping significant marrgoorr and marnany communities which could become opportunities for monitoring areas and future tourism snorkelling locations. However snorkeling is not recommended for safety reasons (crocodiles) and we recommend this be removed from the plan.

The Western Australian Museum (WAM) is not listed in any of the Plans as an agency that should be involved in monitoring however this institution has led numerous expeditions in the wider inshore and offshore Kimberley. WAM houses the State's Aquatic Zoology Collection, including substantial material from the Kimberley, and has baseline data about fishes, hard corals, soft corals, molluscs, crustaceans, echinoderms and worms against which monitoring could be based and/or compared. WAM should be listed as a leading authority with the capability to undertake baseline surveys of benthic biodiversity. From this baseline dataset, longer-term monitoring programs can be established that are undertaken by the Bardi and Jawi or Mayala in collaboration with other agencies such as AIMS. WAM is also in a strong position to assist with the local capacity building to ensure the diversity of marine life is accurately documented.

AMSA recommends that the role of the Western Australian Museum in the provision of knowledge to underpin the Plans be acknowledged.

AMSA notes that important macro-Invertebrates (e.g. mudcrabs, Trochus, oysters) are dealt with separately to coral in the Mayala plan and that is recommended for the Bardi Jawi plan as well.

[Please note *Trochus niloticus* is now *Rochia niloticus*. A reference relevant to the connectivity of trochus populations in the inshore Kimberley is Berry et al., 2020.]

Monitoring 'diversity' is a specific performance measure in the Bardi Jawi plan, however it is not clear what "diversity is being reported on". Important benthic taxa include scleractinian corals, anemones, sponges, soft corals and clams.

Other performance measures in the Plans are 'community composition' and 'colony size distribution'. It is not clear what communities are being measured - scleractinian coral communities, or wider benthic communities including algae. Details such as to what level of taxonomic precision communities are being monitored would help operationalize the Plans. It is suggested monitoring coral size structure could be too ambitious and time consuming for routine monitoring.

The target is set as 'no significant decline in diversity or total coral cover as a result of human activity'. However it is not clear what the definition of human activity is to be used or at what level is significance being tested. It will not be possible to measure the decline in diversity as no baseline data exists. Climate change and cyclones would be the major drivers of benthic impacts in the marine park hence frequent monitoring would be required to determine if natural events or human activity are responsible for declines.

Further, with respect to the target of ‘no significant change in community composition or colony size distribution as a result of human activity’, coral communities are very dynamic and it may be too restrictive to have ‘no change in colony size distribution’ as a specific target.

In the Mayala Plan on page 80 “Climate change management strategy” some mention of “response surveys” is required to enable rapid response monitoring surveys to be undertaken in between scheduled monitoring should the need arise based on predicted extreme thermal stress events.

With respect to monitoring for management of seagrass and macroalgal communities, the indicative measures are relevant. However, for monitoring, biomass destructive techniques should be avoided. Considering the many areas where the seagrass habitat is dynamic, monitoring seed banks or flowering is also important to understand the potential for resilience.

AMSA **recommends** a system of monitoring of the ecological aspects of the marine park including:

- *the health and condition of benthic habitats including aspects such as diversity, abundance of key benthic species, coral cover and the presence and abundance of invasive species;*
- *the health of coral reef and intertidal reef communities in response to climate change and anomalous thermal events;*
- *the effectiveness of EBFM within the proposed marine parks, including the total catch taken by recreational fishers in high-risk areas and for site-attached target species, the effect of fishing effort displacement and the need for effort reductions; and*
- *the impact of foot access to intertidal reefs and other areas sensitive to visitation.*

i. Management:

AMSA believes that the Plan sufficiently empowers managers and traditional owners to effectively manage the proposed parks and that they have a strong existing capacity from which to do so. Continuing to build research and monitoring capacity through further training and funding of Traditional Owner Ranger groups would help improve outcomes for the proposed Parks.

Management funding of Traditional Owner Ranger groups

AMSA is aware that Ranger groups, including the Bardi-Jawi, and Dambeemangarddee Rangers, are underwritten and supported by the Commonwealth funded National Indigenous Australian Agency (NIAA). The Program has been a successful initiative, and funding was recently extended to 2028 providing a stable source of funding and security for the Ranger Program to support management objectives. However AMSA considers that the Management capacity and capability of Traditional Owner Ranger groups has not been taken sufficiently into account. For example:

- Dambeemangarddee and Bardi-Jawi already have strong established Sea Ranger groups with a skilled, qualified, and salaried workforce and infrastructure that includes boats, workshops, office space and administration. Mayala share close kinship with the Bardi Jawi who will soon facilitate the emergence and training of a Mayala Ranger group soon.
- All TO Ranger groups have significant science and management experience through active involvement in research, monitoring and setting of traditional sea country management targets. This experience is based on the best that western science and traditional ecological knowledge (TEK) offers (Depczynski et al 2019).
- The occupation of Traditional Lands coupled with an obligation to look after country provides “eyes on the water” and management capacity in many remote locations that government agencies such as the DBCA are unable to cover, providing important sentinels on Australia’s massive coastline.
- The DBCA are further supported in research and monitoring to guide management of the parks through their Marine Science Program, their long-term monitoring team and staff from the Kimberley regional office.

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