PLAN OF MANAGEMENT
FOR THE KALBARRI BLUE HOLES
FISH HABITAT PROTECTION AREA

FISHERIES MANAGEMENT PAPER NO. 188

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SECTION 1 INTRODUCTION

The Kalbarri Blue Holes Fish Habitat Protection Area (FHPA) is located immediately to the west of the town of Kalbarri (Figure 1). The Kalbarri Blue Holes FHPA includes part of a near-shore limestone reef system, which stretches intermittently from Red Bluff in the South to the Murchison River Mouth in the North.

The FHPA has been declared to protect and conserve an example of a near-shore reef community. In order to achieve this aim, and encourage the appreciation and conservation of fish, a number of management strategies have been identified which restrict recreational and commercial fishing. The FHPA is approximately 420 metres long and approximately 130 metres wide at the southern end and 140 metres wide at the northern end, and is illustrated in Figure 2.

The Blue Holes are one of the few accessible and relatively safe beaches for families to explore within close proximity of the town. The reef within the FHPA is accessible to the general public by two car parks, and intensively used by locals and visitors to the Kalbarri area.

The population of Kalbarri is increasing and subsequently the residential areas are expanding, as the town is one of the fastest-growing towns in the Mid-West. The area is also a popular tourist destination. Peak use of the Blue Holes area is experienced during the summer holidays, when families are on holidays, tourist numbers rise and weather is conducive for use of the site.

The offshore reef system south of the Murchison River mouth is a popular recreational fishing site, particularly during summer months. Western rock lobster (*Panuluris cygnus*) and Roe's abalone (*Haliotis roei*) are also removed in season in the vicinity principally by recreational fishers. Pelagic fishing for finfish such as tailor is also a popular activity. Other marine organisms, such as oysters are also opportunistically harvested.

The Friends of the Blue Holes (FOBH) first nominated the Kalbarri Blue Holes as a FHPA under Section 115 of the *Fish Resources Management Act (FRMA) 1994* in 2001. The Minister for Fisheries subsequently endorsed formal consideration of the FPHA in July 2002.

The Australian Marine Conservation Society WA documented the benthic habitat and the diversity of tropical and temperate species in April 2002. More than 200 species were identified, including seagrasses, algae, fish, reef-dwelling organisms and corals (Appendix 1).

The Kalbarri Blue Holes FHPA was identified as a representative site that is typical of the near-shore reef ecosystem in the West-Coast bioregion. The need to protect a portion of this distinctive bioregion has been acknowledged in the report 'A Representative Marine Reserve System for Western Australia' (CALM, 1994) and in the 'Environmental Management Plan for the Gascoyne Region' (Department of Fisheries, 2002).

A draft plan of management was subsequently prepared by the Department of Fisheries with the assistance of the Friends of the Blue Holes and released for a three-month public comment period in March 2004, with the financial assistance of a 'Fishcare' grant.

Twenty submissions were received on the draft plan of management. A list of individuals and organisations that provided a submission is listed within Appendix 2. A summary of issues raised within the submissions is included as Appendix 3.

The overall objective of the FHPA and the associated Plan of Management is to conserve and protect a portion of the near-shore reef ecosystem in the vicinity of the Blue Holes, to manage activities within the area, and to promote the observation and protection of fish living within the area.

Strong community commitment has already been demonstrated, and this is crucial in the implementation of the management plan and the majority of submissions received reflect this commitment.

SECTION 2 METHODOLOGY

2.1 Identification of the site

In 2001, members of the local Kalbarri community discussed the past, current and future state of the Kalbarri Blue Holes, and its cultural, social, economic and environmental values to the community. Anecdotal evidence suggests the site has experienced increasing human use, particularly as the popularity of Kalbarri as a tourist destination grows.

The Friends of the Blue Holes (FOBH) initially nominated the Kalbarri Blue Holes as a FHPA under Section 115 of the *Fish Resources Management Act (FRMA) 1994* in 2001. The FOBH subsequently obtained a 'Fishcare' grant from the Department of Fisheries WA, for financial assistance in the preparation of the draft plan.

A marine survey conducted by Australian Marine Conservation Society WA (AMCSWA) produced a species list for a portion of the intertidal reef area south of the Murchison River mouth, and described and mapped the benthic habitat (Appendix 1). This survey indicated that the reef ecosystem in the vicinity of the Blue Holes is in good health, and represents a complex and diverse reef community.

2.2 Consultation

To gather further community feedback on the FHPA, a public workshop was organised on the 18 January 2003. This workshop was advertised in newspapers including the *Geraldton Guardian*, the *Midwest Times* and *The West Australian*.

A draft management plan was subsequently prepared for the FHPA, which incorporated the views expressed at the public workshop, in consultation with the FOBH, the Shire of Northampton, commercial and recreational fishers, Recfishwest and local indigenous groups and released for a three-month public review period. It should be noted the draft plan did not necessarily reflect the unanimous view of all these groups.

2.3 Objectives of the Fish Habitat Protection Area

The Kalbarri Blue Holes FHPA has been set aside under the provisions of Section 115 of the *Fish Resources Management Act 1994.* This Act allows the Department of Fisheries to enforce spatial closures of the aquatic ecosystem, and to establish a set of management regulations for a diversity of activities, that are not limited to the regulation of fishing activities.

This plan of management has been prepared in accordance with the *Guidelines for the Establishment of a Fish Habitat Protection Area* (Department of Fisheries, 2001a).

The Kalbarri Blueholes FHPA has been set aside to meet the following objectives:

(i) the conservation and protection of fish*, fish breeding areas, fish fossils or the aquatic ecosystem; and

(ii) the management of fish and activities relating to the appreciation or observation of fish, through signage and community awareness of the need to protect an unfished portion of the marine ecosystem, and to promote community understanding of the resident marine community.

*NOTE: *The Fish Resources Management Act 1994 defines 'fish' as all aquatic organisms (dead or alive) except for the higher vertebrates and includes parts of an organism, such as a shell. Under this broad definition, all the biological components of the [Blue Holes] aquatic ecosystem with the exception of birds, mammals, reptiles and amphibians, are defined as fish. This includes the reefs themselves*' (Fisheries Management Paper No 117, 1998:49)

This plan of management contains:

- a description of the site of the Kalbarri Blue Holes FHPA;
- a description of the environmental, heritage, recreational, research and education values of the area;
- an identification of current and potential threats to the area;
- management strategies; and
- a plan of action to implement management strategies.

SECTION 3 DESCRIPTION OF SITE

3.1 Location

Kalbarri or Wutumalu, as it is known to local indigenous people, is located in the Mid West region of Western Australia, approximately 590 kilometres north of Perth (27º 43' S and 114º 09 W), as indicated in Figure 1.

Kalbarri is bordered to the north by the Murchison River, and surrounded in the east and south by the Kalbarri National Park. Expansion of the residential area is limited to the stretch of coast between Red Bluff and the Murchison River.

The northern boundary of the FHPA is located immediately west of the Blue Holes car park and extends south from this point for a distance of approximately 420 metres. The width of the FHPA varies from approximately 130 metres wide at the southern end, to approximately 140 wide at the northern end (from high water mark to the edge of the intertidal reef platform).

3.2 Geomorphology

The Blue Holes forms part of an inshore coastal limestone reef system, located to the west of the town of Kalbarri. The intertidal and sub-tidal reef platforms feature irregular shaped depressions with sandy bottom, commonly referred to as the 'Blue Holes'.

Large winter swells seasonally alter the morphology of the coastline and affect the extent to which the inshore reef is covered by sand, and hence the amount of beach present at different times of the year. This is a natural occurrence, and results in a net northern flow of coastal sediment.

The Blue Holes reef system is composed of broken, undulating calcarenite limestone, some aoelinite limestone and Tumblagooda sandstone. The limestone often supports colonies of seagrasses (Amphibolis) and algae (Sargassum and Cystophora).

The aquatic sandstone areas are generally devoid of seagrass and algae, but are covered in oysters or limpets. Small colonies of corals are associated with both limestone and sandstone features; these are unusual since they occur within metres of the beach. This feature provides a sheltered environment that is accessible by users during periods of low swell.

The tidal range is in the order of 0.5 metres, which exposes large sections of the intertidal platform. Semidiurnal tides are experienced in the area and obtain maximal ranges in spring and autumn. Subsequently, conditions within the intertidal environment change rapidly throughout the day.

Some organisms will arrive and depart with the tides and season, while others remain as residents with varied tolerance to environmental variability. The inshore, intertidal area is often exposed and is inhabited by a variety of marine organisms.

The outer edges of the intertidal platform are the high-energy, impact zones, where the waves unload their energy and sweep cool, oxygenated water over the platform. Water flow within the reef system is generally northwards (except after periods of prolonged northerly winds).

The sub-tidal platform extends 400 metres west to depths of 15 to 20 metres. Outside the surf-zone, the bottom is rugged with many cliffs and overhangs, and becomes more gently undulating further to the west.

The Blue Holes reef system provides a structurally diverse habitat for temperate and tropical organisms. The marine survey conducted by AMCSWA identified more than 200 species, comprising sponges (10), algae (17), seagrasses (4), hard coral (11), fish (71), echinoderms (11) and crustacea (14), as listed in Appendix 1.

Many organisms, such as corals, tropical fish and basket stars, occur in close proximity of the beach and can be viewed in a relatively safe environment. The intertidal pools are also utilised by migratory and highly mobile fish species, including the western rock lobster and tailor, as a foraging area.

3.3 Climate

In winter, Kalbarri experiences relatively mild temperatures of 10-20ºC; however, summer temperatures can peak at up to 40 ºC.

In summer strong winds are common, especially the afternoon southerly winds that arise when large high pressure cells dominate the continent. Nonetheless, when heat troughs (tropical lows) or ex-tropical cyclones travel down the coast, weak winds with easterly and northerly components are experienced. It is during these times that temperatures peak.

In winter the winds are variable and weak. During this time, strong winds and rains are generally associated with rain bearing depressions or fronts that move eastwards across the Indian Ocean.

An annual rainfall of 370mm is experienced, but is highly variable. Most of the rain is derived from winter fronts, but occasionally the area is affected by rain-bearing summer heat troughs. The rainfall is highly variable in accordance to large-scale climatic events linked to the Southern Oscillation Index and, as a result, discharge rate of the Murchison River catchment into the ocean is highly variable.

Intertidal areas are naturally exposed to the sun, and to varying extents by daily tides. Prolonged periods of extremely low tides were experienced in 2002, when most of the reef was exposed during the day. This prolonged exposure resulted in additional environmental stress on sedentary intertidal organisms.

Ocean swell during winter months also contributes to natural seasonal damage to the reef substrate and biota such as corals.

SECTION 4 VALUES OF AREA

Kalbarri is a rapidly-growing town with a resident population of 2,500, which supports a thriving fishing, surfing and tourism industry. All industries are based upon the use of natural resources and assets.

Tourism in Kalbarri peaks during school holidays, with maximal use of the Blue Holes area experienced in the summer holidays when temperatures peak and water activities are favoured.

Kalbarri Blue Holes is one of the few places for safe swimming along a high-energy, rocky coastline. The area is a central recreational site for the local community, due to its close proximity to the urban area. Tourists and tourist operators also use the site. The marine environment is diverse and is considered to be of high conservation value.

4.1 Environmental values

4.1.1 Marine communities

A marine survey of the FHPA documented a healthy and diverse reef community composed of both temperate and tropical species (Appendix 1). However, undocumented anecdotal evidence from local residents suggests that the number of large territorial fish may have reduced as a result of fishing activity, and the close proximity of a growing town and popular tourist destination has resulted in intensive use of the area.

Small colonies of corals occurring within metres of the beach are highly accessible during periods of low swell.

The FHPA will provide an example of a largely unfished near-shore reef community. Ongoing monitoring will be undertaken to provide a record of any changes to the habitat or community over time. Adjacent areas of similar composition, that are not similarly protected, could be used as comparative study sites.

The FHPA is also likely to play an education role within the local community - and to the visitors to the area - in regard to the environmental value and rich diversity of the inshore reef ecosystem.

4.1.2 Water quality

Seasonal discharge from the Murchison River occurs following inland rainfall events in winter and summer. The prevailing southerly winds experienced along the Western Australian coast usually result in a north flowing coastal current. However, sediment-loaded riverine water may occasionally move southwards along the coast and affect water quality within the FHPA. The riverine water is brackish and often turbid.

Stormwater from the urban areas of Kalbarri discharges directly into the near-shore marine waters in the vicinity of the FHPA. This discharge may include herbicides, pesticides and fertilisers, which has the potential to affect local water quality.

4.2 Heritage values

4.2.1 Aboriginal heritage

To Aboriginal people, the highly accessible nature of this coastal reef system, which is in near proximity of the river mouth, is likely to have made it a significant site for hunting fish and gathering seafood.

The river mouth, which is now in the locality of Kalbarri, is called Wudumalu or Wutumalu by the local Nhanda language group. Similarly, Red Bluff is referred to as Gabagaba and Witecarra as Withikara (source: Nhanda Language Draft Dictionary, Yamatji Language Centre).

The Department of Fisheries acknowledges input from the Yamatji Language Centre, Geraldton and the Yamatji Land and Sea Council for the provision of the above advice.

4.2.2 European heritage

Historical records indicate that the Dutch survivors of the Batavia shipwreck visited a mainland river mouth in the Mid West in 1629. It is highly likely this landing occurred near Kalbarri.

The Murchison area was mined by Cornish miners, who enjoyed the respite offered by the fresh waters of the river. The sheltered waters of the Murchison River, provided a natural harbour for fishing vessels and resulted in settlement by fishermen and their families.

Maximum use of the harbour occurs in February when additional licensed fishing boats move north to fish for rock lobster in the offshore ‘Big Bank’ area and use the town and harbour for services. Recreational boats are also launched in the Murchison River.

The river mouth can be difficult to pass during extremely large swells and low tides.

Like many towns north of Perth, European settlement at the site increased in 1950s with the expansion of tourism and commercial fishing activity along the Western Australian coast. The western rock lobster industry has traditionally been the main source of direct or indirect employment in coastal towns between Perth and Kalbarri. However, since the 1950s, tourism has increased dramatically and now provides a significant source of income for the area.

4.3 Recreational values

The Blue Holes reef system and its waters are popular for a variety of recreational activities.

The Blue Holes is one of the few safe beaches where swimming is possible outside the Murchison River. The site is both easily accessible and very attractive to locals and visitors, and during periods of low swell provides an ideal and very attractive swimming location and snorkelling area for both children and adults.

The near-shore reef in the vicinity of the FHPA is known to be a popular recreational fishing site for line fishers targeting pelagic finfish such as tailor from the shore. Recreational rock lobster potting also occurs in the area.

Existing recreational uses of the site are indicative of the importance of the site to visitors to the area as well as the local community This significance was articulated in the submissions received on the draft plan of management.

4.4 Commercial values

The FHPA is located within the Zone B of the West Coast Rock Lobster Managed Fishery. However, the waters are relatively shallow and it is dangerous to manoeuvre a boat within the rocky pools, particularly during high swell conditions, and is not utilised by commercial rock lobster fishers.

The FHPA is also located within Area 8 of the Roei Abalone Managed Fishery. The Abalone Industry Association of WA has indicated that while the area has been fished in the past, more recent effort has been focused on the reefs north of the Kalbarri River mouth.

4.5 Education and research values

The educational and research values of the Kalbarri Blue Holes FHPA include the opportunity for school groups, universities and the general public to observe and monitor a relatively undisturbed near-shore reef ecosystem in close proximity to Kalbarri.

The FHPA will also provide the opportunity to protect a representative mixed assemblage of both temperate and tropical marine flora for research and education.

SECTION 5 CURRENT AND POTENTIAL THREATS

5.1 Non-extractive activities

The major threat faced by the area is increased visitation as the Kalbarri population grows and tourism increases.

The fishing prohibitions within the FHPA will remove much of the extractive user pressure; however there is a need to adequately manage non-extractive activities such as reef walking which also has the potential to damage near-shore reef habitat.

5.2 Extractive activities

The removal of reef biota has the potential to alter the composition of the marine community and subsequently change subtle dynamics within the ecosystem.

5.2.1 Recreational fishing

The FHPA is easily accessible by land, and recreational fishing for pelagic fish such as tailor (*Pomatomus saltatrix)* is a popular activity at both the northern and southern extremeties, and off the western edge of the intertidal reef platform. Some non-local fishers also fish for tailor within the FHPA.

Recreational shore-based rock lobster fishers also target the area. Pots are placed in crevices and holes on the outer edge of the reef platform, particularly during low swell conditions. Boat-based recreational rock lobster fishing also occurs off the intertidal reef platform during the December 'whites run'.

The removal of shellfish (oysters and abalone), crustaceans, echinoderms (sea urchins and relatives) and cephalopods (squid and octopus) for eating and use as bait is also popular during periods of low swell.

Undocumented anecdotal evidence from some long-term Kalbarri residents suggests that the Blue Holes reef system may have suffered as a result of long-term recreational fishing in the area.

5.2.2 Collecting

While the recreational collection of coral and live rock is prohibited throughout WA, the recreational collection of dead shells, seaweed and other flotsam occurs within the FHPA. Persons with a commercial 'Marine Aquarium Fishery' licence can also legally remove organisms and "live rock" within the FHPA.

Pedestrian traffic across the inter-tidal reef areas also has the potential to damage the reef substrate and exposed organisms.

5.2.3 Commercial fishing and aquaculture

Commercial fishing for the western rock lobster takes place off the outer edge of the intertidal reef platform during low swell conditions, in waters with a minimum depth of four metres. There is a risk (albeit low) for fishing gear associated with these operations to be washed onto the reef platform during periods of unexpected swell.

In 1997 a combination of environmental factors resulted in the high mortality of abalone in near shore reef areas in the vicinity of Kalbarri. While there are a number of licensed commercial abalone fishers who are legally authorised to fish the area, only four divers currently work the area as part of a coordinated fishing plan, and the majority of fishing occurs along the coastline north of Murchison River mouth.

This is a commendable industry initiative to promote local abalone stock recovery and to avoid localised depletion of the stocks in vulnerable areas.

There is no aquaculture activity within the FHPA.

SECTION 6 MANAGEMENT STRATEGIES

The following management strategies have been developed to assist the community in developing a sense of stewardship for the area, to minimise potentially harmful activities, and enable effective management of the area by the local community.

6.1 Boundaries of the Kalbarri Blue Holes FHPA

The northern boundary of the FHPA is located immediately west of the Blue Holes car park and extends south from this point for a distance of approximately 420 metres. The width of the FHPA varies from approximately 130 metres wide at the southern end, to approximately 140 wide at the northern end (from high water mark to the edge of the intertidal reef platform).

Management Strategy 1

- *Install interpretive signage at key access points to ensure visitors are aware of the boundaries of the FHPA, and to promote awareness of the environmental values of the area.*

6.2 Commercial fishing and aquaculture

There is the potential for commercial fishing for western rock lobster, and to a lesser extent for Roei abalone, to occur within the FHPA. There are no aquaculture operations present.

Commercial fishing is not consistent with the key objective of the FHPA to conserve and protect fish.

Management Strategy 2

- *Prohibit all commercial fishing and aquaculture within the FHPA under the provisions of the Fish Resources Management Act (FRMA) 1994.*

6.3 Recreational fishing

6.3.1 Line fishing

Recreational line fishing is a popular activity along the Kalbarri coast, particularly in summer months during periods of low swell. Fishing occurs from boats, beach and reef platforms. Line fishing in the proposed FHPA is primarily shore-based from the reef ledges. Target species are primarily pelagic fish species, such as tailor.

When line fishing occurs near the reef platform, fishing rigs (sinkers, line and hooks) can become snagged and litter the marine system.

A five-year management strategy for recreational fishing on the West Coast of WA was implemented in 2003. This strategy aims to manage the increasing pressure on WA's aquatic environment and fish stocks from growing numbers of recreational fishers, increasing coastal development, and the demands of various key user groups along the central West Coast in areas such as Kalbarri.

A recreational catch survey undertaken by the Department of Fisheries indicates most species taken by anglers in the vicinity of the Kalbarri Blue Holes FHPA are mainly those that are widely distributed throughout the West Coast bioregion.

The key objectives of the FHPA are to conserve and protect fish, and to manage activities relating to the appreciation or observation of fish. While it is recognised that highly mobile pelagic finfish species, such as tailor, with large ranges, cannot be effectively protected using spatial closures, the FHPA is being primarily managed as a snorkelling area for people who wish to observe the fish resources in the area. It is for these reasons that a total prohibition on all recreational fishing within the FHPA is recommended.

Management Strategy 3

- *Prohibit all recreational line fishing within the FHPA under the provisions of the FRMA 1994.*

6.3.2 Rock lobster fishing

During periods of low swell, recreational rock lobster fishers drop pots off the outer reef edge and within tidal rock pools inside the FHPA.

While it is appreciated the competition for available space to set rock lobster pots can be intense – particularly at the start of the season - the Blue Holes are a major attraction for tourist and locals who wish to swim and snorkel in the relatively protected waters.

Given the objects of the FHPA are to manage the fish resources for the purpose of conservation and observation, a prohibition on all forms of rock lobster fishing is recommended.

Management Strategy 4

- *Prohibit recreational rock lobster fishing within the FHPA under the provisions of the FRMA 1994.*

6.3.3 Spear fishing (underwater fishing)

Spear fishing occurs within the inter-tidal pools of the FHPA, allowing divers to target large residential fish. Divers also cross the reef area within the FHPA to access deeper waters off the western side of the reef platform.

Spear fishing presents a risk to other users of the FHPA, and has the potential to impact on resident reef fish in the area.

Spear fishing is an extractive activity, which is contrary to the overall objective of managing fish in the FHPA for the purpose of conservation and observation. Consequently, a prohibition on spearfishing within the FHPA is recommended.

Management Strategy 5

- *Prohibit all forms of taking fish (including rock lobster) whilst diving within the FHPA under the provisions of the FRMA 1994.*

6.3.4 Recreational collecting

Rock, seaweed and reef fauna, including oysters, anemones, echinoderms and shellfish are easily accessible off rocky intertidal reef platforms, which run parallel to the beach within the FHPA. These animals are removed opportunistically for either food or use as bait, and unsubstantiated anecdotal evidence from local Kalbarri residents suggests the abundance of these organisms has decreased over recent years.

One of the key objectives of the FHPA is to conserve and protect fish, fish breeding areas, fish fossils and the overall aquatic ecosystem. The collection of reef flora and fauna is clearly contrary to this objective. It is important that all parts of the reef ecosystem remain 'in-situ', to ensure the long-term sustainability of a healthy reef ecosystem. The recreational collection of coral and "live rock" is prohibited throughout WA.

It is recognised sampling of marine flora and fauna may be necessary on occasion as part of continuing research and monitoring proposals within the Kalbarri Blue Holes FHPA. In this case, exemptions for the collection of samples of marine flora or fauna would need to be sought from the Department of Fisheries under the provisions of the *Fish Resources Management Act 1994.*

Management Strategy 6

- *Prohibit the recreational collection of all marine organisms within the FHPA under the provisions of the FRMA 1994.*

6.4 Recreational boating and use of jet skis

Motorised vessels (boats and jet skis) can be launched in the natural harbour provided by the Murchison River. The boats leave the river mouth on favourable tides, but do not generally anchor within the FHPA as it is too shallow and hazardous for small craft.

The use of jet skis is likely to become increasingly popular as a result of growing tourism in the Kalbarri region. The use of such vehicles is contrary to a key objective of the FHPA to conserve and protect fish, and to manage activities relating to the appreciation of fish.

Management Strategy 7

- *Prohibit the use of all motorised vessels within the waters of the FHPA under the provisions of the FRMA 1994.*

6.5 Snorkelling and scuba diving

The Kalbarri Blue Holes FHPA is a popular snorkelling and scuba diving site, particularly during summer in low swell conditions.

Passive recreation activities such as snorkelling and scuba diving promote public awareness of the natural value of the reef habitat, and are consistent with the objectives of a FHPA to manage activities relating to the appreciation and observation of fish.

Management Strategy 8

- *Promote snorkelling and scuba diving within the FHPA as part of education strategies to promote the environmental values of the FHPA.*

6.6 Aquatic nature-based tourism

Aquatic nature-based tourism (aquatic eco-tourism) can increase public awareness and education about environmental values. However, it is important that these are managed to ensure that the values of the FHPA are protected.

The Department of Fisheries has licensing and management arrangements for this form of tourism. These arrangements require all ecotourism ventures to have an Aquatic Ecotourism licence before they are allowed to operate.

To facilitate the assessment of these licence applications, the Department has prepared Ministerial Policy Guideline No.12 (*The assessment of applications for the granting, renewal or transfer of fishing tour operator licences and aquatic eco-tourism operators licences*). To ensure operations of this kind are undertaken in a responsible manner, Ministerial Policy Guideline No. 12 provides guidelines that assist the Department of Fisheries' Chief Executive Officer in the assessment of applications for aquatic nature-based aquatic tourism-based ventures.

Although aquatic nature-based tourism is by its nature believed to have a minimal impact on fish and fish habitats, the assessment guidelines encourage a precautionary approach until the relative impacts of ecotourism ventures on fish resources and fish habitat have been established. This approach is consistent with a key objective of the FHPA to manage activities relating to the appreciation of fish.

Management Strategy 9

- *Assess proposals for aquatic ecotourism and, where consistent with the FHPA, licence with appropriate conditions, in accordance with the* 'The assessment of applications for the granting, renewal or transfer of fishing tour operator licences and aquatic ecotourism operators' *licences' (Ministerial Policy Guideline No. 12).*

Management Strategy 10

- *Educate visitors to promote the ecological values of the FHPA and to encourage sustainable use of the area, with the assistance of the Department of Fisheries, through pamphlets, displays, signage and other educational strategies.*

6.7 Stormwater, river, groundwater and nutrient management

Water quality within the near-shore marine environment is affected by nutrients from stormwater, river water and groundwater discharge from the adjacent urban area. Nitrogen in particular is known to contribute to macroalgal growth in marine communities, and a major source of nutrients within the catchment is excessive fertiliser use on private and public land.

The management of diffuse sources of nutrient pollution is obviously difficult, as it involves numerous groups and individuals working in partnership with local government and State Government agencies to tackle the problems through an Integrated Catchment Management approach.

Awareness and education programs need to continue to maintain the understanding of the local community of existing nutrient management problems and the need to alter current practices.

6.8 Information, Interpretation and Management

A primary objective of this plan of management is to raise public awareness, appreciation and understanding of the biodiversity and conservation values of the Kalbarri Blue Holes FHPA, and to promote community stewardship and management. An understanding of the Aboriginal heritage values of the area should also be encouraged. This information is required to ensure management and interpretation programs are consistent with these values.

The Department of Fisheries recognises that management of the FHPA will primarily be undertaken in partnership with the community. It is anticipated a working group

will be established (in conjunction with the Northampton Shire Council) that will have a vital role in the coordination of management strategies for the FHPA, with support from key local and State Government agencies where appropriate.

Management Strategy 11

- *Form a Kalbarri FHPA Working Group to promote community stewardship and management of the FHPA in accordance with strategies contained within FHPA plan of management.*

Management Strategy 12

- *Support an anthropological assessment of the Aboriginal heritage values of the site. This assessment should include consultation with Aboriginal people with traditional associations with the area.*

6.9 Research and Monitoring

By encouraging use of the FHPA, increasing public visits may put additional pressure on the fragile reef ecosystem. Therefore, it is vital to ensure there is a coordinated continuous monitoring program to compare and interpret data over a period of time. This should include the monitoring of recreational activities and so identify which areas of the FHPA are under the greatest user pressure.

In devising long-term monitoring and research programs, the natural variability of the marine ecosystem will be taken into consideration. In view of the high level of community involvement in the protection and management of the FHPA, it is also important to ensure monitoring and research proposals are suitable for implementation by the community.

Research in the FHPA will be encouraged where possible with a focus on documenting the values and effectiveness of the FHPA in protecting the marine environment.

Management Strategy 13

- *In conjunction with the community, undertake a coordinated monitoring program of the marine ecosystem and use of the FHPA through baseline surveys and on-going monitoring programs, to develop an understanding and appreciation of the Kalbarri Blue Holes FHPA.*

Management Strategy 14

- *Incorporate information gathered through baseline surveys and on-going monitoring programs into interpretation and education products.*

Management Strategy 15

- *Encourage the trial of monitoring methods developed by the Australian Marine Conservation Society (AMCS) in cooperation with the Department of Environment and Conservation (DEC) as part of Phase Three of 'The Marine Life of Western Australia' program.*

SECTION 7 COMMUNITY INVOLVEMENT IN MANAGEMENT

The declaration of the Kalbarri Blue Holes FHPA follows demonstrated community involvement in the management of the area.

Community support for the FHPA has been demonstrated by the 'Friends of Blue Holes', who initially nominated the reef system for consideration as a FHPA. Public workshops were held during the preparation of the draft plan of management, and submissions were received during the review of the draft plan of management.

The protection of the area's values is dependent upon community support and stewardship to ensure effective compliance with regulations. This means that information and educational initiatives, including establishing a community ethic about appropriate forms of behaviour toward the marine environment, are essential.

SECTION 8 IMPLEMENTATION

This plan identifies management strategies to ensure the FHPA is managed in a manner which is consistent with the objectives outlined in Section 2.3 of this document, and which maintains and promotes the environmental values of the area.

The management of the FHPA will be in partnership with the community. An important aspect of this will be the sourcing of funds to support management through community groups and associations. An important task of the Working Group will be to identify and seek funding through Natural Resource Management and other programs.

The Department of Fisheries will be directly responsible for the implementation of those strategies enforced directly under the provisions of the *Fish Resources Management Act 1994*. These strategies have been identified as follows:

- **Management Strategy 1:** Install signs to identify boundaries of FHPA, and promote awareness of the environmental values of the area**;**

- **Management Strategies 2, 3, 4, 5, and 6:** Prohibit all forms of fishing and aquaculture within the FHPA; and

- **Management Strategy 7:** Prohibit the use of all motorised vessels within the waters of the FHPA.

The Department of Fisheries will also assist in the preparation of pamphlets advertising the environmental values of the FHPA, to promote a code of conduct at popular tourism nodes, to educate visitors, and to promote passive forms of recreation such as swimming and snorkelling.

It is anticipated that a Working Group will be established soon after formal gazettal of the FHPA, and which will provide a key role in supervising the continuous implementation of the remaining strategies contained within this plan. The Working Group would ideally include representation from key groups including the Shire of Northampton, the 'Friends of the Blue Holes', the Department of Fisheries and community members.

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APPENDIX 1 THE RESULTS OF A MARINE SURVEY OF THE PROPOSED KALBARRI BLUE HOLES FHPA

April 2002

Edited by H. Paterson

Written by members of
The Australian Marine Conservation Society
on behalf of
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SUMMARY

A survey of the proposed Kalbarri Fish Habitat Protection Area, to the west of the town of Kalbarri, was undertaken in April 2002. The aims of the survey were to:

1. Identify the benthic habitats and develop a substrate map.
2. Compile a species list as a base line for future monitoring.

The surveyed area consisted of a perched beach oriented north/south. Parallel to and extending 100 m west of the beach was an intertidal reef platform, which extended to a subtidal platform. The substrate was characterised by calcarenite and to a less degree aoelinite limestone partially overlain with calcareous sand. Deeper depressions called 'blue holes' occur along the length of the platform.

In the northern part of the study area oysterbeds cover sandstone outcrops surrounded by coral colonies. The southern sector has seagrass **Amphibolis antarchica** ***overlying limestone pavement as the dominant habitat. The near shore sandbanks along the length of the study area also provided deagrass habitat with*** **Halophila** ***and*** **Heterozostera** ***meadows which were quite dense and established in places.***

The offshore area adjacent to the reef slope and lip was characterised by gently undulating calcarenite (limestone) pavement with a moderately dense algal cover; small depressions and outcrops were relatively common.

Introduction

The proposed Kalbarri Blue Holes Fish Habitat Protection Area (The study area) is a 400m stretch of beach and reef platform reaching another 400m west into the sea. Local people and visitors use the inner reef area for beach and water based recreational activities. The outer area is difficult for swimmers and divers due to the swell surge and can only be accessed during favourable conditions.

In 2001 members of the local community with an interest in the Kalbarri Blue Holes began the process of protecting a small part of the reef platform area from fishing impacts. They obtained a Fishcare Grant from the Department of Fisheries to assist in developing a Fish Habitat Protection Area. They invited members of The Australian Marine Conservation Society WA to help undertake the initial survey of the area. This survey was conducted in April 2002. The objectives were to:

1. Produce a species list for the proposed study area

2. Produce a benthic habitat map of the proposed study area

Kalbarri is located on the mid west coast of Western Australia at approximately 27º 43’ S and 114º 09 W.

The habitat consists of intertidal and sub tidal reef platforms, with holes having sandy bottoms. The tidal range is in the order of 0.50m with much of the intertidal platform exposed at 1m above chart datum. The outer limits of the intertidal platform are often subject to large swell, making this a very high-energy zone.

Beyond the platform the bottom is initially rugged with many cliffs and overhangs but becomes more gently undulating further to the west, eventually becoming sandy.

Marine survey

The survey of this marine environment involved nine divers over a two-day period using both SCUBA and snorkel.

On the first morning of the survey all divers snorkelled on the inner intertidal reef platform. The area was divided into four equal zones to facilitate mapping and to develop an understanding of the distribution of flora and fauna. All divers began at the southern extent to make use of the long shore current. Substrate mapping was conducted as well as invertebrate, fish, algae and seagrass identification. Most of the identification relied on individual’s expertise; however, a number of specimens were collected for identification on the beach with the aid of books (specimens were collected under licence). Two divers conducted video records of the area, one concentrating on seagrass and algae and the other on coral.

Five divers undertook two dives outside the reef in the afternoon at a general depth of 10 - 15m. One group videoed the bottom and noted the seagrass and algae present (D1). Another pair began at the southern end and swam north ending their dive in the middle of the proposed area. This group concentrated on the substrate and fish.

On the second day the divers split into two groups. A group of four divers dived at a depth of 20m with one video camera. This group recorded fish, seagrass, algae and invertebrate species in addition to looking at the substrate. The second group snorkelled inside the reef finishing the remaining identifications and videoing interesting areas.

Over the two days the shape of the beach was profiled using a Debenham Level. There were a total of nine transects run on the beach.

The recordings were collated at the end of the day, with species unable to be identified to at least family, excluded from the final list. No quantitative data (other than the beach profile) was collected during the survey.

Results

Substrate Mapping

Preliminary interpretations of the substrate types were developed using aerial photography. These drawings were ground-truthed by divers.

The following key describes the area and the substrate types used in map 1 (Appendix 2).

Sand - Commonly occurs in very shallow (<0.5 m) near shore waters. Seagrass and algae are absent from the surface. Generally found adjacent to shallow calcarenite rock platform or grading into shallow sandbanks.

Sandbanks - Occur in shallow inshore locations, generally adjacent to shallow calcarenite rock platform or bare sand substrate. Sandbanks have a height of up to 0.5m and are characterised by a sparse seagrass covering of *Halophila spp*. and *Heterozostera.*

Bare calcarenite (limestone) platform - The limestone platform occurs as either a bare rock surface or with a thin veneer of sand in inshore locations. Sparse algae growth may occur, however the surface of the mostly horizontal platform is predominantly exposed. Inshore calcarenite (limestone) platform - The majority of the reef 'lagoon' is characterised by broken and undulating calcarenite outcrops. In places, seagrass (*Amphibolis spp*.) and alga (often *Sargassum* and C*ystophora*) are found on the rocky substrate –varying in density and species composition. The rock substrate is characterised by frequent small depressions and crevasses (with small to moderate overhangs (to 0.5m). Depressions are up to 1.5m in depth and of varying shape.

***Amphibolis spp*. on calcarenite substrate** - This is included as a separate substrate classification as the density of seagrass was not noted to occur elsewhere within the reef 'lagoon'. *Amphibolis spp*. provides a dense covering to the limestone pavement substrate and few other seagrass or algal species occur.

Sandstone outcrops - the rock outcrops locally referred to as 'oyster covered' are in fact sandstone (Tumblagooda Sandstone formation which is widespread in the Kalbarri-Port Gregory region and outcrops at the cliffs at Red Bluff). The sandstone outcrops are characterised by a thin horizontal bedding and coarse grain size. Sandstone substrate is considerably different to the limestone substrate in that the sandstone is characterised the absence of algae or seagrasses.

The surfaces are often bare and have an almost 'smoothed' appearance or are covered in limpets and 'oysters'. The outcrops are exposed at low tide. Where sand covers the sandstone surfaces, the sand reaches depths of only 5-6cm. Corals also occur about the sandstone outcrops in the northern part of the study area.

Blue Holes - The larger depressions in the reef lagoon, commonly referred to as the 'Blue Holes' are of varying depth (1-2.5m) and are irregular in shape. The outer edges of the 'holes' are characterised by a limestone ridge and overhanging ledge (width 0.5~2m). Coral outcrops are common around the edges of the holes and under the overhangs where hydrodynamic conditions are most calm. Topography within the 'blue holes' is varied, and depressions and potholes are common. Bare rock rubble may be found where current flow is turbulent and scouring of rock substrate is noted where rock rubble is trapped or at the northern boundaries of the holes where it is likely the dominant northerly current has a greater impact on transport of sediment and rock debris. Sandy substrate also occurs in the depressions. The 'blue holes' are characterised by a wide range of micro-habitats as a result of the varied topography, hydrodynamic conditions and range of substrates.

Reef Crest and Back Reef Platform

This area could not be surveyed due to the wave conditions -the estimate of extent of this unit is based on wave breaking conditions (noted on the aerial photograph) and expectations following survey of similar reef systems.

Offshore rocky substrate

The offshore area adjacent to the reef slope and reef crest is characterised by gently undulating calcarenite (limestone) substrate with a moderately dense (*Sargassum* dominated) algal cover; small depressions and outcrops are relatively common. To the south of the study area the reef slope has a significantly lower gradient than in the north. Where the reef slope was encountered, rock ledges, ridges and depression/runnel/trench topography was encountered. The runnels are 2-3m in depth. Sandstone outcrops were also noted as part of the offshore rock substrate (horizontal layering and quartz-rich geology apparent), however any significant difference between habitats provided by limestone and sandstone offshore rock substrate were not noted. Isolated potholes (diameter 2m) with significant basal scouring were recorded. Shallow (4-5m depth) rock substrate was sparsely vegetated.

Offshore, the rock substrate grades to sand at approximately 17 -18m depth. This sand- rock boundary is characterised by either limestone ledges (1-2m height) or low rock outcrops (minimal gradient). Sandy substrate is characterised by ripples suggesting a dominant northerly drift (with some West to East swell component) current. Sand is fine to medium grain size, however gravels and cobbles are common,

especially in scour holes, gutters and depressions. The sand-rocky substrate boundary runs approximately north-south.

Marine Species Survey

Two-hundred species of flora and fauna were identified to the family, genus or species level during the two-day survey. These included seventeen algae; four sea grasses; six sponges; eleven scleretine corals; one annelid; fourteen crustaceans; fifty-two molluscs; eleven echinoderms and seventy-seven chordates of which 6 were ascidians and the remainder were fish. In addition to identifying many species the known ranges of several species has been extended. The brittle star *Ophiarachnella ramsayi* and the Echinoid *Holopneustes porosissimus* have had their ranges extended north from the Houtman Abrolhos. There was also the first record of the ascidian *Pyura gibbosa* from the Kalbarri region.

Sponges

Ten sponge specimens were identified by staff at the WA Museum. Five of the specimens were Demosponges and the other five were Calcarea although only one of these species was identified. Some of the species had been seen previously around Perth, at South Mole and in the Marmion Parine Park. It is therefore likely that the Kalbarri specimens belong to species that have a temperate distribution in WA.

Corals

Eleven species of coral were identified by members of the survey party and by Western Australian Museum staff viewing samples and images of the corals.

It should be noted that the general size of the coral colonies is smaller than the colonial size found as far south as the Lancelin Island. This raises the question of the degree of influence that the Leeuwin current has on this system. The Leeuwin current may prove to be the conduit for larval transport, however the prevailing local conditions may fail to support populations long enough for them to grow to considerable sizes. This may result in a high species richness and considerable turnover in individual colonies. Further study in this area should gauge existing colonies and colonisation of coral colonies within the inner lagoon. In addition loss or damage to colonies through increased recreational use of the area or through prevailing environmetal conditions can also be assessed.

The coral fauna is typical of south-western Australia coastal areas, apparently with fewer species than Geograph Bay where 14 species have been recorded. However more species are likely to be found outside the reef when more diving there is possible. The Blue Holes provide a limited habitat for corals, with periodical sand scour, but several large healthy colonies of *Montipora mollis* were found in this area.

Fish

Seventy-one fish species were recorded during the survey. There were many tropical species observed. As with the coral species the viability of the species found needs to be assessed. Further investigations should determine if species population such as those of *Chaetodon lunula* (Racoon butterfly fish) are reproducing locally at replacement levels or are they dependent on larval recruitment from elsewhere?

Algae and seagrasses

Seventeen species of algae and 4 species of Seagrass were identified in the study area. The calcarenite reef surfaces in the lagoon area were observed to support mainly sparse populations of brown algae, particuarly *Dictyopteris* and *Padina.* Beneath ledges and in more sheltered location various red algae were also observed, in particular various genticulate (articulated) coralline species. Seagrasses occurred in two main habitat types: *Amphybolis* ovaly, *Heterozosta* and *Syringodium isoetifolium* were observed on sandy substrates in deeper patches of water and close inshore in the lagoon.

The offshore reef system was observed to support mainly large brown algae, especially *Ecklonia radiata* and *Sargassum sp*, with genticulate coralline red algae making up the understory. This ties in well with the typically rough-water habitats preferred by these larger brown algae. More diverse algae assemblages were observed in more sheltered locations, in potholes and under ledges.

It should be noted that this was a preliminary survey with only four small algal species identified.

Discussion

The proposed Kalbarri Fish Habitat Protection Area was found to support a diverse array of marine life and provide a range of benthic habitat types. The area is relatively undisturbed with healthy seagrass meadows and few green algae, indicative of a healthy system. Various tropical reef fish were identified and there is the potential for fish populations to increase in size and diversity should the area be afforded some protection. There are many small coral colonies that appear to have recently established in addition to a couple of established colonies.

This survey provides baseline data, essential for establishing an on-going monitoring plan for the area in the future. In addition it provides an opportunity to look at potential shifts in species should fishing pressures be reduced. For example:

Trochus shells were prolific inside the reef. This raises the question regarding the number of natural predators for this species. Octopus is a predator to trochus that has been targeted within the area. (pers. obs. K Wheeler) If this area is declared a FHPA then monitoring might focus on changes in octopus and trochus numbers.

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APPENDIX 2 LIST OF INDIVIDUALS AND ORGANIZATIONS PROVIDING SUBMISSIONS ON THE DRAFT PLAN OF MANAGEMENT FOR THE PROPOSED KALBARRI BLUE HOLES FHPA

Dr M. Payne
Ms W. Payne
Mr J. Slattery
Mr P. Jones
Mr A. Thornett
Ms E. Pett
Ms A. Tietz
Ms F. Sutherland
Mr J. Waite
Mr R. Horley
D and L. Pratt
Ms M. MacFarlane
Department of Aquatic Zoology, WA Museum
Kalbarri Development Association
Recfishwest
Abalone Industry Association of WA
Western Angler magazine
WA Fishing Industry Council
Peel Region Recreational Fishing Advisory Committee
Shire of Northampton

APPENDIX 3 SUMMARY OF ISSUES RAISED IN SUBMISSIONS

The following provides a summary of issues raised within the submissions. The italic text which follows each point indicates how the issue has been dealt with in the final plan of management:

1. AREA SPECIFIC

1.1 The proposed FHPA is too big.

The dimensions of the FHPA have been the subject of considerable interest within submissions – some submissions expressing the view that the FHPA should be bigger, and some smaller. During development of the final plan of management, careful consideration was given to meeting the overall objectives of the FHPA, to protect an unfished near shore marine community, while minimising potential conflicts with recreational fishing activity.

1.2 Boundary of the FHPA should be expanded north, south and west to encompass the entire Blueholes Reef system and effectively protect reef flora and fauna.

See explanation for 1.1 above.

1.3 Boundary of the FHPA should in the long term extend from the Kalbarri River mouth to Jakes Point.

See explanation for 1.1 above.

1.4 The 'keyholes' area is a popular recreational fishing site and unsafe for snorkellers (subject to storm surge and surf), and should be excluded from the FHPA.

The area known as the 'keyholes' is a large lagoon, with a small channel to the outer reef, located approximately 120 metres north of the southern boundary of the FHPA. This is a key component of the FHPA and fishing is not considered to be a compatible activity with the key objectives of the FHPA.

1.5 There are inaccuracies between the description of the actual area of the FHPA in the text, and figure included within the plan of management.

The text and figure have been reviewed to ensure that references to dimensions are consistent and accurate

2. FISHING

2.1 Enforcement of a fishing prohibition will increase compliance expectations.

It is anticipated that community education and stewardship of the FHPA will ensure that there is no fishing within the FHPA. It is not anticipated that a strong compliance presence will be necessary over time as the role and value of the area is increasingly recognised by locals and visitors to the area.

2.2 It is unfair to exclude recreational fishing for pelagic species or rock lobster close to Kalbarri. This is the only easily accessible location along the coast close to Kalbarri. The prohibition will force fishers to focus on other areas along the coast, which may be dangerous.

The FHPA encompasses a relatively small area, and there are easily accessible beach fishing areas to the north and south of the Blueholes, which can still be fished in safety.

2.3 Consideration should be given to permitting recreational lure fishing for pelagic fin fish species (such as tailor) at sunrise and sunset.

The logistics of creating species specific or temporal fishing restrictions within the FHPA is considered to be impractical as they would be largely unenforceable from an operational perspective, and the likelihood of successful prosecutions would be low.

2.4 Consideration should be given to permitting fishing for pelagic species along a two – five metre buffer along the reef platform.

See response to 2.3 above.

2.5 The claim that there has been loss of fish species within the FHPA as a result of overfishing leading to local depletion has not been successfully demonstrated and undermines the credibility of the plan of management.

It is acknowledged that there has been no formally documented record in the decline of local fish species in the vicinity of the FHPA. Reference to local depletion through overfishing has therefore been deleted.

3. MANAGEMENT

3.1 It is unclear who will be responsible for interpretative signage at the site – area of FHPA needs to be clear.

It will be made clear within the final plan of management that the Department of Fisheries will be responsible for the preparation and installation of interpretative signage of the FHPA.

3.2 Timetable needs to be established to implement strategies.

A list of strategies for which the Department of Fisheries will be directly responsible for will be included within the final plan of management. It is envisaged that these strategies would be met within the first 12 months after declaration of the FHPA. The timing of all other strategies would be the direct responsibility of the FHPA Working Group.

3.3 It is unclear who will be responsible for water quality and catchment management plan.

Issues associated with water quality and catchment management are considered to be beyond the scope of management of the FHPA. Management strategies in relation to this matter have been removed from the final plan of management.

3.4 Use of pesticides and fertilizers within Kalbarri townsite should be discouraged to prevent polluted groundwater entering the FHPA.

See response to 3.3 above.

3.5 Dog access to the beach should be retained.

The issue of dog access is beyond the scope of the plan of management for the FHPA.

3.6 Education program/code of practice for fishers needs to be prepared.

No fishing will be permitted within the FHPA. This will be made clear within all FHPA, educational material, including brochures and signage.

3.7 Effective implementation of plan requires full community support.

There is no question that the successful implementation of all management strategies contained within the final plan of management requires full community support. This will be reiterated and emphasised within the final plan of management.

3.8 The draft plan of management does not include sufficient information to warrant the protection of the area for conservation purposes. Further, encouraging increased visitation to the area is likely to detract from environmental values of the area (trampling etc.). These are of direct relevance to the objectives of the FHPA and appear to counter act each other.

The Blueholes has been nominated for protection by a local conservation group, and the nomination of the area as a FHPA was endorsed for consideration by the Minister for Fisheries in 2001. The final plan of management includes two objectives for the FHPA:

- *for the conservation and protection of fish, fish breeding areas, fish fossils or aquatic ecosystems; and*
- *for the management of fish and activities relating to the appreciation or observation of fish. This is proposed to be achieved through signage and community awareness of the need to protect the marine ecosystem in the vicinity of the Blueholes.*

The two objectives are considered to compliment each other.

4. BROADER FISHERIES MANAGEMENT ISSUES

4.1 A prohibition on the recreational collection of abalone in the FHPA will increase pressure on adjacent areas, which will in turn make management of commercial take more difficult.

The Abalone Industry of WA has indicated in its submission on the draft management plan that while the FHPA has been fished commercially in the past, more recent efforts have been focused on the reefs north of the Kalbarri River mouth. It is therefore unlikely that the closure will have any significant impact on commercial abalone fishing.

4.2 The creation of fishing closures in the form of FHPA's is an *ad-hoc* process which does not allow for the compensation of either commercial or recreational fishers

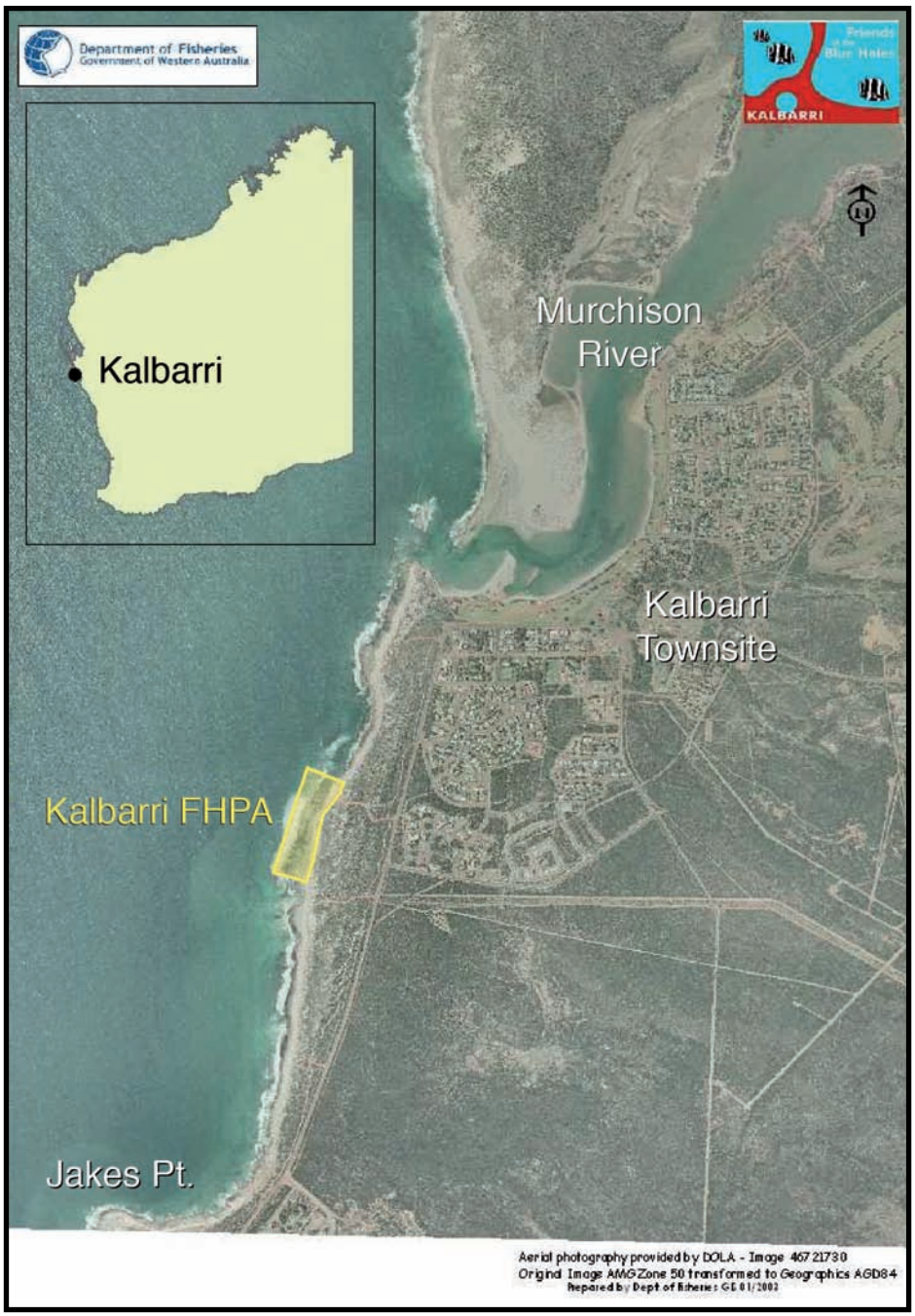
4.3 The cumulative impact of recreational fishing closures along the WA coast through existing marine planning processes is unacceptable.

4.4 The creation of fishing closures is inconsistent with Integrated Fisheries Management principles.

4.5 A full time Fisheries officer should be appointed at Kalbarri.

Points 4.2, 4.3, 4.4 and 4.5 raise wider fisheries management issues, which are beyond the scope of this plan of management

FIGURE 1 MAP OF THE KALBARRI BLUE HOLES FISH HABITAT PROTECTION AREA IN RELATION TO THE KALBARRI TOWNSITE



List of Fisheries Management Papers

Not all have been listed here. A complete list is available online at http://www.fish.wa.gov.au

141 Fish Protection Measures in Western Australia (June 2001)

142 Fisheries Environmental Management Plan for the Gascoyne Region (June 2002)

143 Western Rock Lobster. Discussion paper for seasons 2001/2002 and 2002/2003 (July 2000)

144 The Translocation of Brown Trout (Salmo trutta) and Rainbow Trout (Oncorhynchus mykiss) into and within Western Australia. Prepared by Jaqueline Chappell, contributions from Simon Hambleton, Dr Howard Gill, Dr David Morgan and Dr Noel Morrissy. (not published, superseded by MP 156)

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149 Final Plan of Management for the Lancelin Island Lagoon Fish Habitat Protection Area (March 2001)

150 Draft Plan of Management for the Cottesloe Reef Proposed Fish Habitat Protection Area (April 2001)

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165 Report to the Minister for Agriculture, Forestry and Fisheries by the Integrated Fisheries Management Review Committee (November 2002)

166 Fisheries Statutory Management Authority Inquiry. A background paper (February 2003)

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169 Hardy Inlet discussion paper (February 2004)

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171 Draft Aquaculture Plan for Shark Bay (April 2004)

172 Draft Aquaculture Plan for Exmouth Gulf (April 2004)

173 Draft Plan of Management for the proposed Point Quobba Fish Habitat Protection Area (August 2003)

174 Translocation of Golden Perch, Murray Cod and Australian Bass into and within Western Australia for the Purposes of Recreational Stocking, Domestic Stocking and Commercial and Non-commercial Aquaculture (December 2003)

175 Fish Stock and Fishery Enhancement in Western Australia - a discussion paper. By Jane Borg (February 2004)

176 Fish Stock and Fishery Enhancement in Western Australia - a summary report. By Jane Borg (February 2004)

177 Fisheries Environmental Management Plan for the Gascoyne Region (in press)

178 Draft Plan of Management for the Kalbarri Blue Holes Fish Habitat Protection Area (March 2004)

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