

# Fitzroy River Catchment Management Plan



Cover: 1. Geikie Gorge is a special place on the Fitzroy River.  
Photo: FitzCAM Project

2. The Purple-crowned Fairy-wren is one of many threatened species of wildlife supported by the Fitzroy River.  
Photo: W. Lawler (AWC)

3. The Fitzroy River is an important source of food and recreation.  
Photo: FitzCAM Project

4. The Pastoral Industry is currently the most significant industry in the Fitzroy River Catchment.  
Photo: K. Parker

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The maps in this report use a variety of data sets, where these are sourced from agencies or other organisations they are used with permission, and acknowledged as follows.

Digital datasets supplied:

- Road Centrelines (DLI)
- Hydrography – Linear (DOW)
- Hydrographic Catchments (DOW)
- LGA boundaries (DLI)
- Kimberley Language Groups (Kimberley Language Resource Centre)
- Pastoral Productivity estimates from Land Systems Mapping (DAFWA)

Some maps have been supplied by agencies for this report:

- DEC Priority Ecosystems (DEC)
- Land Tenure (DLI)

Some maps have been created for this report from other published sources:

- Pastoral lease Exclusions
- Eco Fire Project areas
- Town locations

The imagery used in the Kimberley Language Groups map is public domain imagery from <http://services.arcgisonline.com/arcgis/services>.

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*Cover photograph: A section of the Fitzroy River*

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## Background

The Fitzroy River Catchment is home to a diverse range of residents who derive their livelihoods, spiritual, cultural and historic character from its country and waters. It has been identified as a priority catchment by Rangelands NRM, and by several State and Federal government agencies as it has high environmental, social/cultural and economic values. Developing a broad scale management plan builds on the fundamental concepts expressed in the 2005 Rangelands Natural Resource Management (NRM) Strategy and the 2004 Kimberley Natural Resource Management Plan, and is supported by a range of stakeholders living and operating within the catchment. A list of these stakeholder groups is included as Appendix 1.

In accordance with the norm, a Catchment Management Plan (CMP) should cover all aspects of the catchment and should take into account ecological and cultural assets, as well as the production needs of local industries. It should also take into account as wide a range of local stakeholders as possible. A CMP should integrate current activities and begin to address threats to local cultural, Indigenous, ecological and other identified assets.

The objectives of the Fitzroy Catchment Risk Assessment Project are to:

- Develop a risk assessment framework and undertake risk analyses for significant locations and pressures in the Fitzroy Catchment using the Investment Framework for Environmental Resources (INFFER) approach.

- Produce a management plan which meets the needs of all stakeholders to maintain key values of the Fitzroy Catchment.

- Continue to facilitate and coordinate community engagement in catchment planning.

This CMP document was developed by the FitzCAM group which consisted of stakeholders from across the catchment

## Preamble

The Fitzroy River, and its catchment, is one of WA's last remaining areas that still retains its wilderness values. It is one of northern Australia's largest and most significant free-flowing rivers. The tropical rivers of Northern Australia form an integral part of a region that is considered to be environmentally significant in a national and global context, as recognized by the recent Northern Australia Land and Water Taskforce (2009) report:

- 'Northern Australia boasts a richness in biodiversity that is rare by world standards and is the only developed nation with a large tropical region. It supports the world's largest remaining tropical savannah, one of the world's largest networks of free-flowing tropical rivers, and the world's largest healthy near-shore tropical marine ecosystem'.

The Taskforce also reported that: 'Freshwater river systems in northern Australia need to be recognised as nationally significant and their hydrological connectivity maintained'.

The development of a CMP has been identified as a key step in ensuring sustainability of the river, its Indigenous values, its water quality, and the overall ecological integrity of the catchment. Significant interest in developing a broad-scale plan has already been shown by stakeholders (Indigenous and non-Indigenous). In particular, the plan was developed in cooperation with the Fitzroy Catchment Management Project – FitzCAM, and several government agencies in the region.

Figure 1 shows the location of the Fitzroy Catchment



Community involvement in NRM activities in the Fitzroy Catchment had its beginnings in the mid 1990s when the then Liberal government commissioned a feasibility study to look at the possibility of building a dam on the Fitzroy River at Dimond Gorge. A local group called BandarInggarri was formed. Their core aim was to oppose the damming of the river. In fact, for various reasons, the feasibility study recommended against the dam.

Once the threat of the proposed dam subsided, a broader river care project was developed. After fifteen months, this project also came to an end. The FitzCAM project was initiated through local concerns that the catchment still needed a united voice. This coincided with a push from a range of agencies, to establish a catchment wide focus group that could be engaged to discuss issues around development, planning and sustainability. FitzCAM was formed in late 2007 as a Rangelands initiative (the Fitzroy was one of 5 priority catchments which received NHT funding to develop a plan to guide future investment).

FitzCAM had a very broad, whole of catchment, cross-industry and interest group representation including Traditional Owners for ten language groups, the Pastoral and Graziers' Association, West Kimberley Irrigators Group, recreational fishers, Department of Water, Department of Environment and Conservation, Environs Kimberley, Australian Wildlife Conservancy, Department of Agriculture and Food, local government and mining. The first FitzCAM meeting was held in Fitzroy Crossing in June 2008. The primary function of FitzCAM was to contribute to the production of this CMP, but strong support has been given for the group to continue in the future in an advisory capacity in relation to NRM projects.

## FitzCAM'S VISION

*To work together to protect the catchment – its country, its community, its people*

In order to move towards this vision, the FitzCAM reference group worked with INFFER facilitators to produce a Fitzroy CMP. This document is the first presentation of that plan. It must be emphasized, however, that a great deal of catchment work was conducted by FitzCAM prior to working with the INFFER facilitators. The INFFER process was a way of bringing that data together into a formal document.

The Plan provides the framework for investment in works, projects, planning and research necessary to achieve sustainable and productive ecosystems and landscapes across the catchment. Adoption and implementation of the Fitzroy CMP will enable the catchment community to:

- Protect historical, Indigenous, linguistic and cultural heritage assets.
- Protect and enhance the region's unique native vegetation and biodiversity.
- Improve water quality and aquatic ecosystems.
- Improve and protect the productive and ecological values of soil ecosystems.
- Promote sustainable development, or expansion, of appropriate local industries
- Enhance cross catchment NRM networks

One of FitzCAM's core aims is to ensure that any development is ecologically sustainable, balanced and the benefits are spread across the interests of all catchment groups and individuals.

## How the CMP will help to achieve the FitzCAM vision

The objectives outlined in the FitzCAM vision statement will be achieved by:

- The development of a risk assessment framework that undertakes risk analyses for significant locations and pressures in the Fitzroy Catchment using the Investment Framework for Environmental Resources (INFFER) approach.
- The production a management plan which suggests areas of appropriate investment needed to maintain key values (social, cultural and environmental) of the Fitzroy Catchment.

## The Desired Outcomes:

Broad and improved community understanding of catchment management.

Community support and ownership of projects that develop out of the CMP.

Protection of a broad range of cultural, Indigenous, and historical sites and language information.

Sustainable use of natural and cultural resources.

Prosperous and vibrant communities, based on healthy and sustainable ecosystems.

In the production of the Fitzroy CMP, existing policies and strategies were taken into account, including the 2005 Rangelands NRM Strategy and the 2004 Kimberley Natural Resource Management Plan. The Rangelands NRM Strategy primarily targets investment based on three overarching objectives:

**Biodiversity conservation** - the conservation of Australia's biodiversity and related linguistic diversity through the protection and restoration of terrestrial, freshwater, estuarine and marine ecosystems and habitat for native plants and animals;

**Sustainable use of natural resources** - the sustainable use and management of Australia's land, water and marine resources to maintain and improve the productivity and profitability of resource based industries; and

**Community capacity building and institutional change** - support for individuals, landholders, industry and communities with skills, knowledge, information and institutional frameworks to promote biodiversity conservation and sustainable resource use and management.

Although not constrained by these policies and strategies, some of approaches outlined in them were used to inform some aspects of the Fitzroy CMP. The Rangelands NRM Strategy begins to address NRM challenges in the region by looking critically at three key questions:

What natural resources are important but are under threat or provide opportunities, and therefore should be maintained, protected or enhanced?

What condition should these natural resources be in, in the future?

What areas of activity should be invested in so that they are in this condition in the future?

These are the three core elements of the Regional NRM planning and delivery process, which provide the basis for NRM investment in the Rangelands. In the past, these elements have been developed using a range of community engagement processes but in the case of the Fitzroy CMP, the brief for the project

required the plan to be developed using the INFFER process (Investment Framework For Environmental Resources). This process will be outlined in the next section.

Information gathered at previous workshops was also used to inform the present process. For example, the Tropical Rivers Inventory and Assessment Project (TRIAP) Fitzroy catchment community consultation workshop was held in Derby on Friday 17 February, 2006. This workshop was organised by the National Centre for Tropical Wetland Research and was funded under Land and Water Australia's Tropical Rivers Program. Results of this workshop, as well as several other previous workshops organized by FitzCAM and other groups in the region (e.g. Kimberley Regional Water Forum, Round Table), are incorporated as an input into the INFFER process.

Although the opinions of a wide range of stakeholders have been taken into account in compiling this document, the two major landholder groups in the region are the Indigenous community and the pastoral industry. The following section will, therefore, list of some of the issues that each of these groups wanted to emphasise.

### **Indigenous Concerns in relation to NRM over traditional lands.**

In May 2008, a "Working Agreement" was reached between Kimberley Land Council, Kimberley Aboriginal Law and Culture Centre, Kimberley Language Resource Centre, and Kimberley Aboriginal Pastoralists Incorporated (*Working together to support a sustainable future for Kimberley Aboriginal people through natural and cultural resource management*. May 2008). The core values contained in this agreement have subsequently been incorporated into various "Caring for Country" documents (e.g. [Kimberley Aboriginal Caring for Country Plan](#), Discussion Paper , 2010) and they are summarized below:

#### **Core Values**

Aboriginal people are committed to Caring for Country

Aboriginal Knowledge must be maintained, protected and valued.

The transmission of language, cultural skills and practices from elders to younger generations is vital.

Improved collaboration requires appropriate consultation, engagement and communication processes.

Creating employment and building empowerment in businesses, especially on Country, is essential.

Recognising Aboriginal ownership of land and the need for people to be on Country is critical to achieving healthy Country and healthy people.

Language is a critical part of Aboriginal engagement with the landscape.

Aboriginal livelihoods and community capacity can be encouraged and empowered by Caring for Country.

Caring for Country has a vital role in building leadership and instilling cultural, political and social values in younger generations.

These core values have been taken into account in formulating the Fitzroy CMP.

It should also be noted that native title has been granted to some Traditional Owners in parts of the catchment, whilst other claims are still in negotiation. This should acknowledge and protect native title rights and interests to the Fitzroy River, and the principle of Free, Prior and Informed Consent of the Traditional Owners should underpin the Plan.

## **The Pastoral Industry and NRM in the Fitzroy Catchment.**

There is no doubt that pastoralism is currently the most important industry in the catchment and, as a result, pastoralists are a key stakeholder group for engagement. There are 44 pastoral properties within the Fitzroy catchment, with 16 of them being Aboriginal pastoral lease holdings (DoW 2009). This means that, collectively, pastoralists have direct land management responsibility for large tracts of the catchment. In an NRM context, it must be acknowledged that pastoral land managers have made significant contributions in the past to rangeland management through improving rangeland condition, maintaining infrastructure throughout the region, and protecting the region's biodiversity. The Rangelands NRM Coordinating Group is committed to continue working with the pastoral industry on initiatives that will see the achievement of the dual objectives of sustainable land management and protection of biodiversity. Pastoral leases are administered by the Pastoral Lands Board (PLB) under the *Land Administration Act of 1998*. Lease conditions require that the land is managed to ensure conservation and regeneration of vegetation, and the Board requires that all pastoral leases are maintained as *bona fide* pastoral operations.

In relation to this CMP, some of the issues that were raised by pastoralists included:

Pastoralists work hard, both to ensure success of the pastoral industry, and in NRM activities in the region

The industry is already subjected to some restrictive government policies

They conserve country in order to keep running their businesses

They allow access to the Traditional Owners (TOs) for the country of their leases

They want to develop and maintain the on-going strength of the cattle industry

They are concerned about native animals and threatened species, and they often provide protection for them by maintaining habitat and not allowing open access

These issues have been taken into account in formulating the Fitzroy CMP.

## Description of the Catchment.

There were substantial reports produced in 2001 on the environmental values of the Fitzroy River catchment (Storey et al 2001) and the Indigenous cultural values of the region (Toussaint et al 2001). These are extremely valuable sources of information. In addition, the Australian Heritage Commission has found that “The Fitzroy River corridor is unique in its ability to convey four very distinct expressions of the Rainbow Snake story as part of an integrated Aboriginal cosmology that unites ten Aboriginal language groups along one tropical riverine system”

(<http://www.environment.gov.au/heritage/ahc/national-assessments/kimberley/pubs/kimberley-combined-map-values.pdf>).

In recent years, scientific knowledge of the ecological and cultural values of the catchment has been markedly improved in some areas (e.g. fish species). Language information has also begun to be incorporated into this kind of ecological research (e.g. Morgan, 2005). However, there is less readily accessible information available on the economic and social assets and values of the catchment. Most economic reports examine the Kimberley region, or the West Kimberley, as a whole (i.e. Kimberley Development Commission 2006; ACIL Tasman & Worley Parsons, 2005). The following sections will, therefore, include specific information on the ecological and cultural values of the Fitzroy River catchment, whilst the economic and social assets and values will be viewed in the wider context of the Kimberley as a whole.

## Physical and biological profile

The Fitzroy River Catchment comprises approximately 23 % of the area of the Kimberley region and includes internationally significant geological sites such as the Devonian reef system (e.g. Geike Gorge) and Mimbi Caves. There are three shires Wyndham East Kimberley, Halls Creek and Derby West Kimberley and two major towns – Fitzroy Crossing and Derby, more than 40 pastoral leaseholds, and more than 57 Aboriginal communities within the catchment

The Fitzroy River is a major floodplain system with a catchment area of over 95,000km<sup>2</sup> (Ruprecht and Rodgers 1998). According to National Water Commission information (2005) the Fitzroy River surface water management area is 93,830 km<sup>2</sup>. The upper catchment of about 45,000km<sup>2</sup> (upstream of Fitzroy Crossing) can be divided into the catchments of the Margaret and Fitzroy Rivers (Ruprecht and Rodgers 1998). The river has a significant storage capacity below Fitzroy Crossing and is characterised by braiding and anabranching (after Storey *et al.* 2001). The natural values of the river and catchment include the provision of important ecosystem services such as climate and hydrological regulation, nutrient recycling and soil formation. The catchment, and sub-catchments, are illustrated in Figure 2.

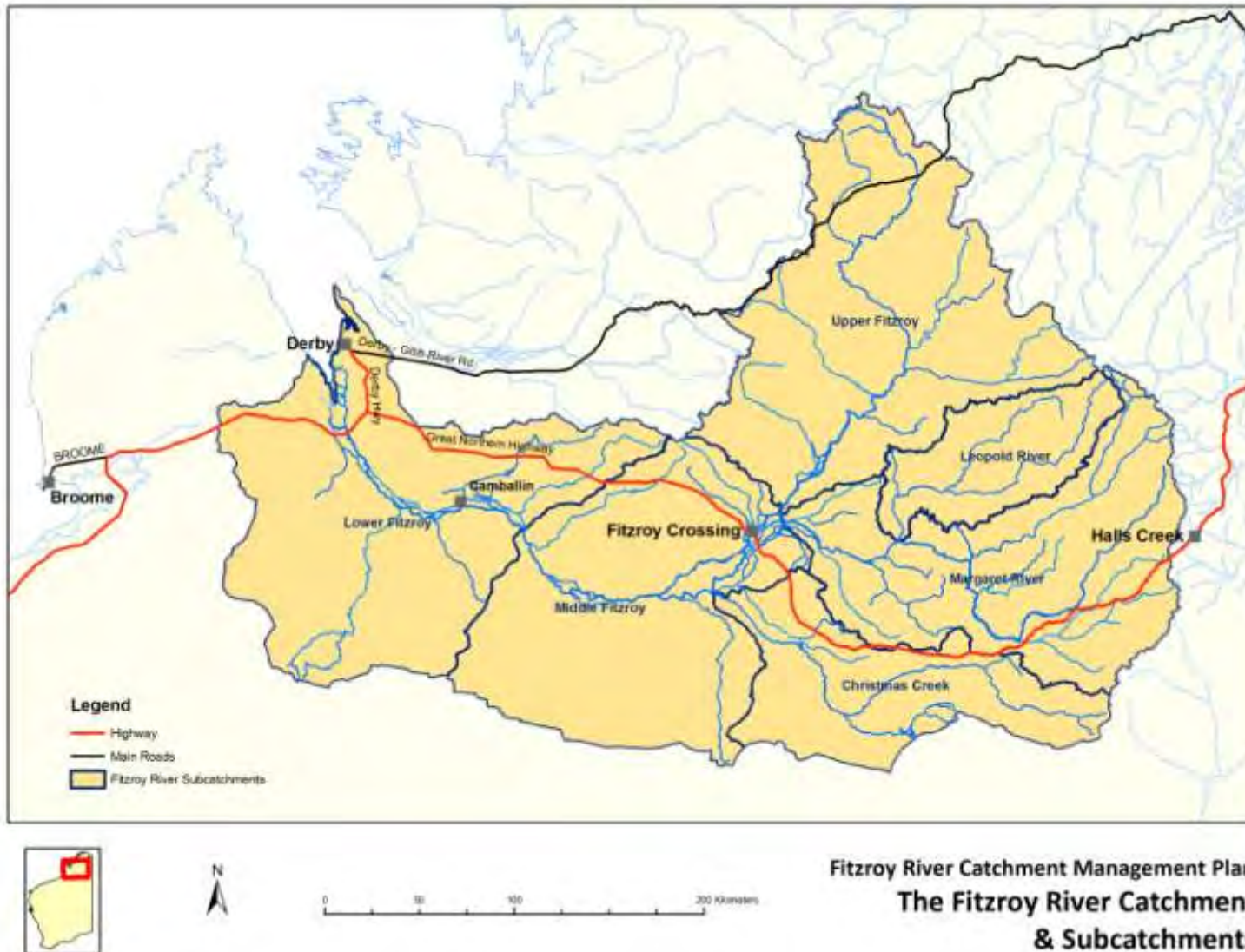


Figure 2. Fitzroy Catchment

Rainfall in the Fitzroy River catchment is about 500mm p/a of which, approximately 90% occurs between November and March (Goh, 1998) usually with tropical cyclones. However, there is considerable spatial variation in rainfall with less than 400mm p/a in the south-eastern, Christmas Creek catchment, to about 900mm p/a in the northerly Hann River catchment. The runoff rates are about 10 to 25% of mean annual rainfall. Runoff is again highly variable within the catchment, with 50mm/year in the permeable sands of the southern plains to about 150mm/year in the bedrock and rocky hills in the northern region (Ruprecht and Rodgers 1998). Evaporation rates are high and exceed rainfall in all months of the year. River flows are highly dominated by wet season flows, with dry season flows only a small fraction of total annual flow. However, environmental assets are adapted to this strong seasonality and any significant changes in the frequency and duration of wet season high flows and dry season low flows are likely to have an environmental impact (CSIRO 2009):

The catchment supports extensive eucalypt woodlands on the alluvial plains and scattered vine thickets and hummock grass in the more rugged limestone reef areas. Extensive areas of native grasses occur, some of which are relatively drought resistant and suitable for grazing. Some fertile soils are found in the alluvial areas, but the catchment contains generally highly weathered soils with low fertility.

Fringing vegetation of riparian areas was identified in the 2002 Biodiversity Audit of WA's Biogeographical Sub-regions as being of sub-regional importance. In addition, at least nine other ecosystems that were considered to be "at risk" were identified in the National Land and Water Audit (2001).

The presence of numerous species of threatened wildlife has been recorded in areas such as Mornington Sanctuary and these species include Red Goshawk, Purple-crowned Fairy-wren, Gouldian Finch, Freshwater Crocodile, Peregrine Falcon, Grey Falcon, Australian Bustard and Northern Quoll.

Waterways, springs, permanent pools and wetlands provide habitat for a diverse range of plant and animal life, including ecologically significant riparian vegetation and aquatic macro-invertebrates such as the freshwater prawn. There are clear and specific links between the ecological and cultural values of the river, floodplain and permanent pools (Toussaint *et al.*, 2001; Storey, 2001). The permanent pools, sustained by groundwater recharge, are the only enduring water sources during the dry season for terrestrial, aquatic and avian fauna and represent significant resources for local people (Lindsay & Commander, 2005). Permanent pools in the Fitzroy River are very likely to be significantly affected by substantial groundwater drawdown.

The Assessment of River Health found the catchment as a whole to be 'significantly impaired' (Halse *et al* 2002) whereas the AusRivAS reported the system to be in 'good ecological health' (Vernes 2007). The reason for this discrepancy is probably associated with the different methodologies used. In a more recent survey (Dixon, et al, 2009) macroinvertebrates were collected from sites distributed throughout the Fitzroy catchment, between July and September 2009. Samples were collected from 'channel' habitats following the Western Australian AusRivAS sampling protocol (Halse *et al.*, 2001).. The macroinvertebrate sub index score for the Fitzroy (0.87) was similar to results for the Ord River (0.83) (Dixon *et al.* 2009). Surveys conducted as part of The Monitoring River and Health Initiative (MRHI) showed that the Ord and the Fitzroy have the greatest disturbance in the Kimberley with values classified in the AusRivAS significantly impaired band score. They proposed that these values were a result of cattle grazing. Fish assemblage data were also recorded from sites distributed throughout the Fitzroy catchment. A total of 22 species were collected in the field surveys, with all species previously known to occur in the catchment

The Margaret River, a major tributary of the Fitzroy is assessed as in a worse condition than the remainder of the catchment, with heavy grazing resulting in bare, eroded areas, and a wide riverbed flanked by sand deposits (WRC 1997; Graham 2002).

The Fitzroy River estuary, and nearby King Sound, contain ecologically significant mangroves that are recognized for the important role that they play in supporting a variety of terrestrial and aquatic organisms, particularly as nurseries for marine and estuarine fish including, in this case, the endangered northern river shark. The King Sound, with 13 species of mangrove, is one of the most species rich macrotidal mangrove-vegetated tidal flat systems in the world. Within King Sound there are relatively wide bands of mangroves occupying gentle gradients that exhibit clearly defined patterns of zonation.

## **Economic and social profile**

The Fitzroy catchment takes in parts of three Kimberley Shires, those being the Shires of Wyndham East Kimberley, Halls Creek and Derby West Kimberley. The catchment supports a population of roughly 6870 people, living in the two major town centres of Fitzroy Crossing and Derby, with many people living in small communities (ABS, 2007; Larson & Alexandridis, 2009; Carson, et al. 2009). The region has experienced a period of rapid growth over the past 10 years. Approximately 80% of the population is Indigenous, the catchment supporting over 57 Indigenous communities and their customary economies (DoW 2009) and languages (Figure 3). Aboriginal people play a significant role in the regional economy through participation in the arts, tourism, mining and pastoral industries, and through customary fishing, food collecting and hunting activities.

An indication of the importance of the pastoral industry is that the value of cattle disposals from the Kimberley region (not specifically the Fitzroy Catchment) was \$48.0 million in 2003/04, being 9.7 per cent of the State total. This value increased to between \$60 to \$70 million in 2004/05. The Department of Local Government and Regional Development estimated that the Kimberley herd of beef cattle was around 600,000, representing around 30 per cent of the total State herd (KDC, 2006).

A number of Indigenous organisations play a significant role in the development of social, economic and cultural infrastructure and activities in the catchment i.e. KLC (Kimberley Land Council), KALACC (Kimberley Aboriginal Law and Culture Centre); KLRC (Kimberley Language Resource Centre); Indigenous art centres at Yiyili, Ngumpun, Fitzroy Crossing and Mowanjumb; Karrayili Adult Education Centre; Marninwarntikura (Women's Resource Centre); and other local organisations such as CDEP resource agencies (Thorburn 2006).

Larson and Anderson (2009) reported on results of a study on socio-economic profiling of tropical rivers in northern Australia. Some parts of their report included reference to the Fitzroy region and these aspects will be included in the following socio-economic descriptions.

The Government of Western Australia (2005) has identified 5 million hectares in the West Kimberley that contains soils potentially suitable for irrigated agriculture. Detailed studies indicate that around 200,000 hectares of this land located near the Fitzroy River floodplains and the sandplain areas south of Broome are capable of immediate development. However, the North Australia Land and Water Taskforce (2009) report found that the potential for growth in groundwater irrigable land in northern Australia is estimated at between 20 000 – 40 000 hectares.

Mineral assets in the catchment include diamonds (Ellendale Mine is currently operating), coal, uranium, phosphate, zinc and lead. The Kimberley Region's total mineral and petroleum production was valued at \$660.6 million in 2004/05 (KDC 2006).

Estimates provided by Tourism Western Australia show that across 2004 and 2005, an average of 285,800 domestic and international visitors arrived in the Region. These visitors stayed a total of 2.3 million nights, which represented 5.2 per cent of all visitor nights for Western Australia for those years (KDC 2006).



Figure 3. Kimberley Language Groups

Fishing and hunting were identified as an important recreational activities for Aboriginal and non-Aboriginal people in the West Kimberley region (Beckwith and Associates 2006). Fishing and hunting are also important customary activities for Aboriginal people

The Kimberley Ranger Initiative founded through the KLC Land and Sea Management Unit is an important NRM project. Through the project, Aboriginal men and women to look after country while equipping them with TAFE qualifications in Conservation and Land Management.

The staff aim to increase the ranger program to include ranger groups across the catchment. At present four of the ten traditional owner groups have rangers with Gooniyandi developing an NRM group through the local CDEP provider and the adult education centre.

Ranger work plans are guided by elders in the community and traditional knowledge, in how to care for country, is passed down from generation to generation to ensure culture remains alive. A combination of cultural, linguistic and traditional knowledge and western technologies is used to achieve work tasks. The Kimberley Ranger Initiative gets people working back on country, while also providing employment and skills training through on-ground practical work and TAFE qualifications. It has many flow-on benefits and has contributed to improved social cohesion in communities with rangers emerging as positive role models. The program has led to improved self esteem, health and well-being while reducing unemployment.

Rangers complete a range of tasks including the protection of cultural sites, weeding, wildlife and biodiversity monitoring, burning, conducting research, monitoring the health of rivers and waterways and fish sampling.

The Kimberley Appropriate Economies Roundtable, held in Fitzroy Crossing, Western Australia on 11-13 October 2005, explored options for appropriate development in the Fitzroy Valley and Canning Basin. Workshops were held on pastoralism, tourism, organic agriculture, culture, language, arts and land management. Key principles for appropriate development were identified beginning with: 'Development proposals recognise that the Kimberley region is a place of special cultural and environmental values with national and international significance' (Hill et al 2006).

## **Cultural profile**

The CMP is not only for the landscape – the people who are born here, live, work raise families and who will die in catchment country are integral to the implementation of the plan. This fact is clearly recognized in the draft Rangelands NRM strategy where it states,

The “management” component of natural resource management is an inherently human activity and is therefore conditioned by culture and heritage.

The cultural life of the catchment emanates from a dynamic blend of Indigenous laws and customs, the colour and energy of the pastoralist pioneers and their descendants, itinerants, and the oft quoted mix of missionaries, misfits and madmen.

The two core cultural and historical blocks that exist are those of the ten traditional owner groups and the Pastoralists who arrived just before the turn of the 19<sup>th</sup> Century. The former have strong and complex ties to the land within the catchment, a fact acknowledged by the recent recommendation to

the Minister that the river corridor be added to the register of the National Estate as a “High integrity Indigenous riverine sociocultural system”. Permanent water sources are referred to by Indigenous people as ‘living water’ animated by spirit beings emanating from the creative epoch. The Indigenous groups of the river believe that it is their responsibility to ‘look after’ the river country so as to maintain the replenishment of seasonal resources upon which they are dependent. Talking to country in language is seen as central to this.

Pastoralists also have equally strong, yet fundamentally different, ties to the same country. Opening up vast tracts of land and the establishment of the pastoral industry in the region is a legacy, of which those involved, are fiercely proud. The pastoral industry has contributed to the development and prosperity of the Kimberley region since the 1880’s, and has played a major role in preserving the many natural attributes of the region. It is also important to note that the Pastoral Industry has been implementing progressive landcare practices for over a century in the Fitzroy Catchment. In this context, it is important to note, however, the Bunuba resistance to pastoral expansion, led by Jandamarra, of which Aboriginal people are also fiercely proud.

The traditional owner groups include Western Jaru, Gooniyandi, Kija, Walmajarri, Bunuba, Nyikina, Mangala, Worro, Andajin and Ngarinyin. The key features of the beliefs of these riverine groups revolve around stories of water spirits commonly known as the Rainbow Serpent that unite the ten groups along the length of the river system. The evidence of these claims is clearly reflected in the strength of the languages and the vast number of stories that exist for the catchment country.

European settlers followed closely on the heels of the explorer, Alexander Forrest who traversed areas of the catchment in 1875 with the first sheep stations appearing as early as 1882. In 1886 along with the establishment of sheep stations at Noonkanbah and Quanbun, the Macdonald brothers arrived and established Fossil Downs. This has also been nominated for listing in the national heritage estate as “the eventual destination of the longest droving journey in Australian history. From 1883 to 1886, members of the MacDonald and MacKenzie families drove cattle over 5,600 kilometres from Goulburn (NSW)”.

Another culturally important aspect is that of language. According to information supplied by the Kimberley Language Resource Centre, “Language protects our history through story and song. It holds the key to kinship systems and to the intricacies of tribal law including spirituality, sacred objects and rites.” [ATSIC Chairman Geoff Clark’s Intervention on Culture at the UN Permanent Forum on Indigenous Issues, May 2003]

“All the old people know the meaning of the story for their own country . . . Aboriginal people have stories about land and animals and people from the beginning when the world was soft. These stories teach you everything. How to live in the country and how to respect each other . . . They tell you about important places we have to look after.” [Joe Brown, Kimberley Aboriginal Law and Culture Centre Chairperson, 1992-1994. Quoted in *Yirra: Land Law and Language: Strong and Alive*]

The Aboriginal world view is inextricably linked to language. It is hard for English speakers to understand the interrelationship between language, thought and cultural knowledge. Aboriginal languages can be linked to specific groups of people and, importantly, to specific areas of country. The languages were never written down. The complexity of meanings encapsulated in each language did not go through a process of being identified, recorded and diluted. In the same way, the knowledge of land, water resources, flora and fauna possessed by speakers of these languages cannot be interpreted in the scientific manner of Western knowledge. Western scientific knowledge is literacy-based and operates

from the ethos of Western concepts of identification and classification. Aboriginal scientific knowledge operates from the ethos that there is a relationship between all things within the environment and a human responsibility for it. Many academics have linked loss of Indigenous languages to the loss of biological diversity. In other words, as the languages die out, so does the knowledge of how to care for the environment, resulting in the loss of species of flora and fauna.

The devastating effect of colonisation on traditional Aboriginal languages of Australia has endangered the cultural knowledge of thousands of years. With the loss of language, the way this knowledge is transmitted to younger generations has been disrupted and changed. We believe, however, it is not too late to try and capture some of the cultural depth of this knowledge while speakers of the languages are still willing to share their intellectual property whilst still alive.

People may still ask the question, why can't the knowledge possessed by Aboriginal people be expressed in English? A few examples might help to explain this.

Indigenous and Western knowledge travels in parallels that have their foundations in two very different world perspectives. Often there is no suitable translation for Indigenous language into Western concepts. The environment, in terms of Indigenous relations to what exists in the environment, is balanced in gender, that is male and female elements, and through kinship relationships to country.

#### *Skin names*

Not just people, but animals and plants, have skin names. In other words, all living things in the environment are related to each other. They are part of the Aboriginal kinship system. The relationship that humans have with the plants and animals might be one of responsibility (such as caring for a species of plant) or avoidance (a person with the same skin name as a kangaroo may have to care for the animal, but not kill it or eat the meat). Through the kinship system, every person has a role to play in looking after the environment.

In researching knowledge about the environment, it is clear that knowing the skin names of flora and fauna taps in to a much deeper knowledge of the country and how to care for it. This kind of knowledge dies with the loss of language.

#### *Creation myths*

Stories about the creation of the world and the living things in it (sometimes referred to as Dreaming or Dreamtime Stories) contain a depth of factual knowledge about geographical features (their creation, their use and dangerous aspects), the natural behaviour of animals and the distribution of plants and animals. This knowledge does not translate into English, because the knowledge and the languages themselves are linked. The language is not just being used to talk about every day things.

## **Existing NRM capacity in the Fitzroy Catchment**

There is a diverse range of stakeholders in the Fitzroy catchment engaged in NRM. There are 44 pastoral properties within the Fitzroy catchment, with 16 of them being Aboriginal pastoral lease holdings. Pastoral land managers are represented by several groups, namely the Pastoral and Graziers Association (PGA), the more localised West Kimberley Land Conservation District Committee (LCDC) and the Kimberley Aboriginal Pastoral Industry (KAPI). Pastoralists have been engaged in a range of natural resource management processes and projects over the years, such as the Kimberley Regional Fire Management Project and, more recently, Fitzroy Catchment Action Management group (FitzCAM).

Indigenous people in the region have been engaged in NRM and research through various avenues, such as the Kimberley Land Councils Land and Sea Management Unit (KLC-LSMU), Kimberley Language and Resource Centre (KLRC), Kimberley Aboriginal Law and Culture Centre (KALACC), projects through NAILSMA, the NRM planning process (RCG, 2005), NHT Rivercare program, and various research projects (partnered by Government Departments and research organisations). The NRM process has captured some community values and aspirations for water management providing valuable information to underpin planning and future projects in the Kimberley.

The original Caring for Country program, supported by the Commonwealth, assisted Indigenous people to engage in land and water planning and management and proposals are currently being prepared for the latest Commonwealth NRM initiative, Caring for our Country. NAILSMA has now established the Indigenous Water Policy Group through funding from the National Water Commission to provide a voice for Indigenous people through the national water reform and water planning.

The Kimberley Aboriginal Reference Group (KARG) is currently developing a 'Kimberley Aboriginal Caring for Country Plan' to provide a regionally coordinated approach to Natural Resource Management across the Kimberley. This plan will include a coordinated and strategic regional approach for Aboriginal land, sea and water management.

FitzCAM is Fitzroy Catchment representative group with stakeholders from all sectors including mining, pastoral, fishing, tourism and also catchment residents and all Aboriginal language groups are represented. This is an important development in progressing towards an inclusive NRM management framework.

Stakeholders of Fitzroy Catchment convened the Kimberley Appropriate Economies Roundtable in Fitzroy Crossing in October 2005 (Hill *et al.*, 2006), which was a significant contribution to community-driven planning in this region. The Roundtable resulted in development of 11 principles for appropriate regional development put forward to all stakeholders and Government to adopt. There were also numerous recommended actions and outcomes agreed to, some of which were specific to water resource management in WA (Jackson, 2005a; Seidel, 2005).

Building on the Roundtable work the Kimberley Water Forum in March 2008 was jointly convened by the Department of Water, Environs Kimberley, Kimberley Land Council, Department of Agriculture and Food, and Tropical Rivers and Coastal Knowledge (TRaCK). This aimed to bring together key Kimberley stakeholders to share information about water planning and management and to set the scene for Kimberley-wide water planning.

It is important to recognise that key organisations have been working together to build the local capacity for community engagement in NRM (Table 2), through a range of initiatives over the last 10 years. There has been a growing interest in the environmental values of the Fitzroy region and there is now more widespread recognition of its ecological, cultural and possible economic value. This is evidenced by the growing body of literature focused on the Fitzroy as well as the broader interest in research involvement in the region.

Several examples of this include the New Opportunities for Tropical and Pastoral Agriculture (NOTPA), Northern Agricultural Irrigation Futures and the Tropical Rivers and Coastal Knowledge (TRaCK) research consortium. NOTPA was a program established by the Department of Agriculture and Food to support

the investigation and development of agricultural enterprises in pastoral areas and Indigenous communities (Table 2). This is particularly relevant to pastoral diversification opportunities and was focused on the West Kimberley. Ongoing funding for the NOTPA program has not been confirmed.

TRaCK is an integrated research program, primarily funded by Land and Water Australia. The Fitzroy has been identified as one of three focus catchments within northern Australia to be studied as part of the four year \$16 million research investment. The Department of Water is the lead State Government management agency in WA for involvement in TRaCK.

**Table 1: Projects or initiatives of relevance to NRM in the Fitzroy.**

Camballin barrage Fishway	A group of stakeholders have been discussing the idea of a fishway to be constructed on the Camballin barrage. Environs Kimberley is leading a feasibility study and a stakeholder consultation process.
FitzCAM (Fitzroy Catchment Action Management)	FitzCAM is a reference group for the Fitzroy catchment, currently funded by the Commonwealth Government through NHT.
Fitzroy Futures	Planning process jointly run by Bunuba and Department for Planning and Infrastructure.
Indigenous Water Policy Group (IWPG)	Supported by NAILSMA to bring together Indigenous people to contribute to water policy and planning and keep abreast of water reform.
Irrigation Review (2005)	Independent review of irrigation potential in WA prepared for WA Govt.
Kimberley Appropriate Economies Roundtable	A community-driven planning event. The meeting looked at options, principles and actions that promote appropriate and sustainable development with a focus on the Fitzroy valley but also more broadly across the Kimberley.
Madjulla Incorporated	Building a Culture Conservation Economy the Nyikina Mangala Way
National Heritage Listing Assessment	The Commonwealth Government is undertaking a heritage assessment that encompasses part of the Fitzroy catchment. This process aims to identify key areas of high environmental and cultural heritage for possible inclusion on the National heritage listing. The process might overlap with some of this planning work.
National Water Initiative	Australia's blueprint for national water reform – to which WA Govt is signatory.
New Opportunities for Tropical and Pastoral Agriculture (NOTPA)	Objectives: 1) To identify opportunities in pastoral and tropical agriculture which have a high chance of success and economic impact on the two regions; 2) To support the identification and capture of economic opportunities for Indigenous communities; 3) To develop new opportunities that meet community values and expectations; and 4) To develop opportunities that aim for sustainability beyond the life of the project..
Northern Agricultural Irrigation Futures (NAIF)	Providing new knowledge, tools, and processes to support debate and decision making regarding irrigation in northern Australia: The NAIF project seeks to add value to government and community processes addressing natural resource management in order to ensure existing irrigation in northern Australia, and any new irrigation if developed, is done so sustainably within a catchment

	context.
Northern Australia Water Futures Assessment (NAWFA)	Commonwealth Government
State Water Plan 2007	A strategy for ensuring sustainable water future for WA.
Tropical Rivers and Coastal Knowledge (TRaCK)	A research hub that brings together Australia's leading tropical river and coastal scientists and managers to provide knowledge and processes for managing the region.
Tropical Rivers Inventory and Assessment Project (TRIAP)	A risk assessment process was trialled in the Fitzroy catchment with key stakeholders via a workshop held in Derby in 2006. Assets and threats were identified then a risk model was used to explain the interactions between them.
Water Planning	The Department of Waters strategic water planning program.
Waterways Education Program (and previously Ribbons of Blue)	Department of Water and the University of Western Australia are developing a community education/awareness program aimed at increasing community awareness and understanding about local water quality, and embedding skills for water monitoring
Yiriman Project	'Back to country' project that supports leadership, land management and community development: many joint projects and partnerships (Shire of Derby/West Kimberley, Dept of Justice, Dept. Community Devt., KLC Land and Sea Unit, KLRC, NAILSMA).

## Development of the Fitzroy River CMP

The Fitzroy River CMP was developed using a risk assessment framework that undertook risk analyses for significant locations and pressures in the Fitzroy Catchment using the Investment Framework for Environmental Resources (INFFER) approach. The INFFER process is described in Appendix 3. Identification and prioritization of assets was achieved through a number of INFFER Stakeholder Workshops and by on-ground visits to some stakeholders who were unable to attend workshops. Community consultations was designed, as far as possible, to be consistent with the Protocol for Community Engagement of the Bilateral Agreements to deliver the extension of NHT and NAP. Every effort was made to meet the Protocol's requirement to include:

- Local government; State and Commonwealth agencies; Indigenous communities; key industry, environmental and community development groups; relevant NRM community groups; the relevant academic/ scientific community, as well as the general public and individuals with an interest in NRM in the Region.

A list of workshop participants is given in Appendix 2.



**Figure 4. Participants at the INFFER stakeholder workshop in Broome**

During the various workshops, a total of 122 individual assets were identified, ranging from over-arching assets (such as the river as a whole) and including cultural assets, ecological assets, agricultural assets, water resources, and tourism/ recreational assets. Where possible, comparative values were assigned to each asset, following the INFFER approach to valuing assets. In addition, the type and level of threat to each asset was categorized. In many cases, identified assets were subject to similar types of threats and so, to simplify subsequent sections of this CMP, the next section will list and discuss the various threats in a generalized way and then, in subsequent sections, threats will be discussed more specifically as they apply to individual assets.

A number of threatening processes, both current and potential, were identified for this region. These include:

- uncontrolled fire
- damage to vegetation and aquatic ecosystems through invasive species (plants and animals)
- over-grazing / overharvesting
- siltation, sedimentation, flooding and erosion impacts on waterways
- dams and potential future water extraction
- uncontrolled tourism, vandalism and recreational access to sites
- mining
- loss of Indigenous and/or non-Indigenous knowledge and the associated languages
- exclusion of Traditional Owners from sites
- climate change
- lack of NRM capacity
- legislation

***It should be noted that, for many of the potential threats listed below, extensive management programs are already underway in the catchment. The following list is not intended in any way under-value the importance of the initiatives already underway – but merely to highlight the threat areas in which additional investment may still be required. In the following descriptions, each type of threat will be given a code letter that will be used in subsequent tables.***

## **FIRE (F)**

Many regions of the catchment and, in particular, many of the pastoral leases, already have adequate and well-planned fire management protocols in place. It is obviously in the interests of pastoral leaseholders to protect their properties from fire and, for this reason, many have worked in conjunction with organizations such as the Fire and Emergency Services Authority of Western Australia (FESA) to design and implement extremely good fire management plans. Many such plans have been shown to be workable and efficient and there is no reason to suggest any changes to them. In addition, the Kimberley Language Resource Centre (KLRC), in association with FESA, undertook a project in 2007 that was designed to ensure that emergency procedures were translated into documents that were easily understandable by Indigenous communities (Indigenous Translation of Western Australian Emergency Management Guidelines and the Emergency Management Arrangements, KLRC 2008). Unfortunately, however, there are still some areas of the catchment where fire management is not sufficiently coordinated and this is why it was felt that a more inclusive, catchment-wide, fire management protocol is needed so that such areas can be brought up to the standards already achieved by some of the better-managed pastoral leases.

At the INFFER stakeholder workshops, fire was identified as one of the major threats to many of the natural assets of the region. This is not the first time that fire has been identified as a threat, and several previous workshops have investigated this problem. For example, a range of views were expressed by people attending meetings convened by the EPA Fire Committee during November and early December 2005 and in March 2006. It was generally agreed that whilst fire is a natural environmental factor that has shaped tropical savanna ecosystems over millennia, in some places, fires are now more frequent and intense than they once were under a traditional burning regime. As well as lightning-caused fires, Aboriginal people lit fires extensively to hunt game, to regenerate food and medicinal plants, or to “clean up country”. Since European settlement there has been a significant reduction in traditional Aboriginal use of fire because in many areas people are not ‘on country’ as they were in the past, and land use and tenure have changed. The fire regime has changed from one dominated by mild, patchy fires, mostly lit early in the dry season, to one where more intense, large fires, later in the dry season, have become more common (DEC, 2006).

The impacts of fires include simplified vegetation structures, dominated by annual grasslands, with fewer perennial trees, shrubs and grasses and loss of obligate seeders. Although there is a lack of definitive research documenting the extent of biodiversity values that are being lost, workshop participants recorded considerable anecdotal evidence, from members of the scientific and wider community, that animal numbers are in severe decline in some regions, some fire sensitive plant communities are declining, complex ecosystems are becoming homogenised and landscapes impoverished. In addition, soil erosion and the loss of leaf litter increases. This results in greater runoff volumes and velocities, with increased alluvial deposition on floodplains and in estuaries, and increased sedimentation into rivers (DEC, 2006).

The general attitude towards fire is summarized in the words of one of the workshop participants - “Fire is bad when you light it in the wrong season, but if it is used under controlled conditions, such as mosaic burning over small areas, then it can be used to regenerate the land. All the front yard of Bohemia used to be spinifex. With the early burning that we’ve done, that spinifex has turned into feed for cattle” (Lawford, A. cited in Hill, R. et al., 2006 ). There was general agreement that, from a biodiversity viewpoint, the fires in the Fitzroy Catchment are too frequent and that they are occurring at the wrong time of year.

Many organisations are already involved in fire management in the Fitzroy Catchment and some excellent work has been done by bodies such as FESA working, in particular, with individual pastoral leases. In addition, the problem of large destructive fires is currently being addressed by the Australian Wildlife Conservancy (AWC) through a regionally coordinated fire management project called EcoFire. It should be noted that EcoFire is not the only fire management protocol being used in the catchment, and is not necessarily supported universally. It will, however, be described as an example of what might be achieved through coordinated fire management.

The EcoFire project is run from AWC’s base at Mornington Wildlife Sanctuary in the central Kimberley and is coordinated in collaboration with DEC and FESA, across boundaries and tenures. EcoFire reflects AWC’s commitment to improve land management on a regional scale, outside the boundaries of its sanctuaries. The project area includes 14 central and northern Kimberley pastoral, Indigenous and conservation properties (covering almost 5 million ha), including Mornington and Marion Downs Wildlife Sanctuaries. EcoFire is funded by the federal government through the Rangelands Natural Resource Management Coordinating Group (Rangelands NRM) and is guided by a Steering Committee of representatives from organisations and stakeholder groups with an interest in fire management in the

Kimberley. EcoFire is improving Kimberley fire patterns through a strategic prescribed burn program. Each year before the dry season, AWC works with neighbouring properties within the EcoFire project area to produce a Regional Burn Plan. Fire histories (prepared using archived satellite imagery) help property owner/managers to design routes for prescribed firebreaks on their property, which are then linked between EcoFire properties. The firebreaks are created using aerial incendiaries dropped from a R44 helicopter in the early-dry season (April-May) when the vegetation is still damp and the air is humid causing fires to go out overnight. Property managers also carry out on-ground follow-up work.



**Figure 5. A charred landscape after a late, dry-season fire**

**(photo. Sarah Legge)**

The EcoFire project area is illustrated in Figure 6.

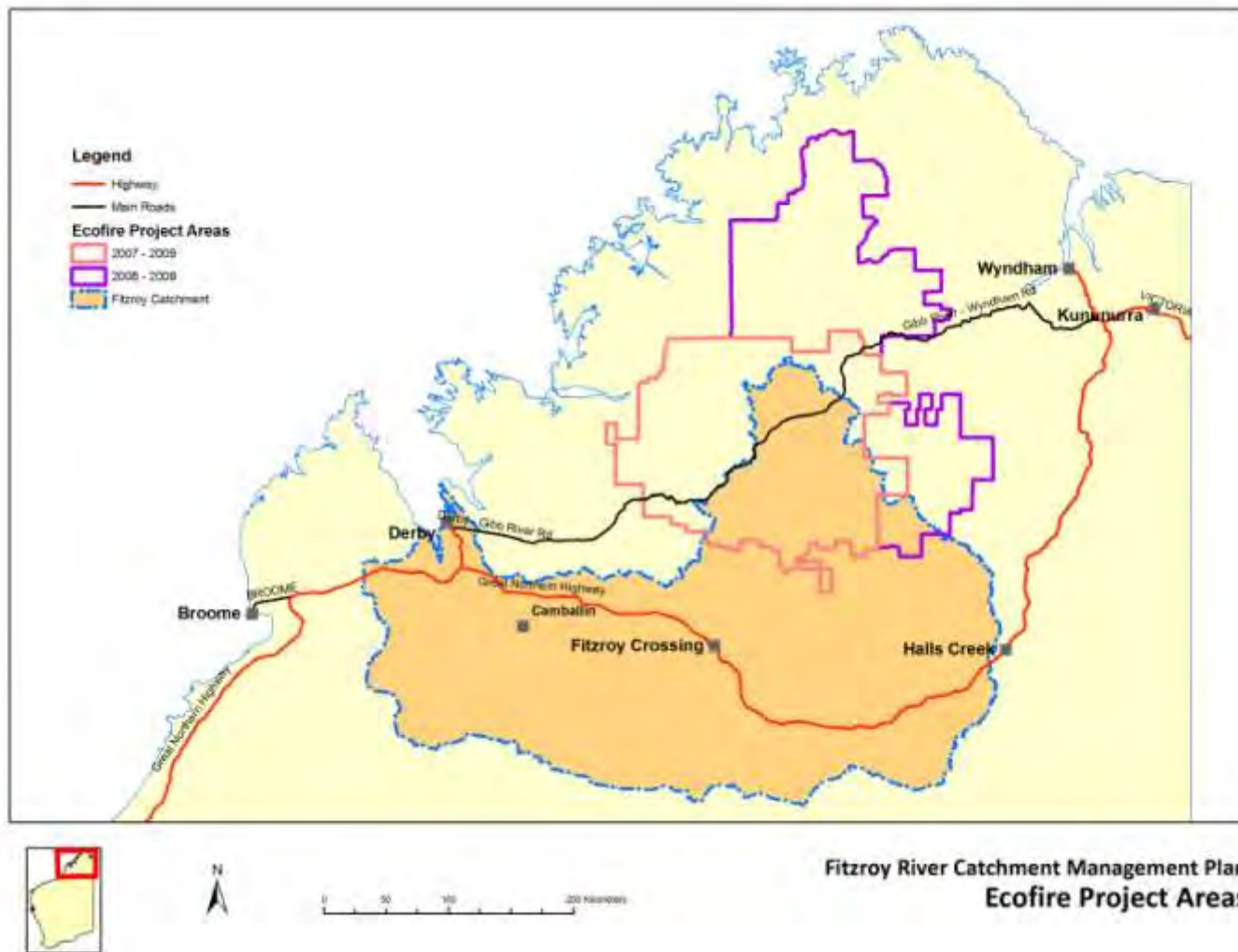


Figure 6. Ecofire areas



**Figure 7. Burning a firebreak on Mornington from aurally dropped incendiaries**

**(Photo. Alex Dudley)**

AWC's analysis of satellite imagery has demonstrated that fire patterns within the project region had improved within one year. This reduction in the extent of intense fires is expected to benefit biodiversity, improve pastoral production, and limit damage to cultural sites.

During the INFFER Fitzroy CMP workshops, considerable support was expressed for extension of some type of fire management system into additional areas of the Fitzroy Catchment. Although excellent fire management protocols exist on some of the pastoral leases, there are other areas where fire management is still insufficient. The effects of frequent late dry season fires on populations of plants and animals is now seen as having a major impact on biodiversity and sustainable land management (Palmer et al 2002). Given that there is widespread agreement that many of the late dry season fires occurring today are harmful, management needs to reintroduce integrated fire management, taking in a range of methods to sustain biodiversity. This will require coordination with FESA, other fire management agencies, Traditional Owners, local landholders, land managers and the general community.

## **WEEDS AND FERAL PLANTS (W)**

The Fitzroy River falls within the Fitzgerald Botanical District, Central Kimberley region, Northern Botanical Province. Currently the Fitzroy Catchment is fortunate to have large areas of relatively natural vegetation. Weeds are, however, entering the region either by spreading in from Northern Australia, or as a result of accidental or deliberate introductions. Some infestations have been spreading more quickly than they can be controlled.

Documentation of the extent and impact of weeds is limited, but there are many significant sites that are impacted on by weeds. In some places, access to the Fitzroy River is restricted by the increasing occurrence of Noogoora burr, Mimosa bush and Parkinsonia, (Doupe&Pettit 2002; WRC 2003).

Current Weeds of National Significance (WONS) in the Kimberley are:

- Lantana (*Lantana camara*)
- Mesquite (*Propolis spp.*)
- Parkinsonia (*Parkinsonia aculeate*)
- Prickly Acacia (*Acacia nilotica*)
- Rubber Vine (*Cryptostegia grandiflora*)
- Salvinia (*Salvinia molesta*)
- Mimosa bush (*Vachellia farnesiana*)

Other regionally significant weeds in the Fitzroy Catchment are:

- Belly-ache bush (*Jatropha gossypifolia*) – (West Kimberley)
- Noogoora burr (*Xanthium occidentale*)
- Neem (*Azadirachta indica*)
- Leucaena (*Leucaena leucocephala*)
- Calotropis (*Calotropis procera*)

Impacts of invasive weeds in the Fitzroy Catchment include the fact that they compete with, and sometimes choke, native species, change habitat structure, and provide fuel for fires. The INFFER workshops, as well as several previous FitzCAM workshops, have suggested that weed control management, particularly of Noogoora burr, is essential in protecting the catchment's natural resources. Much work is currently underway in terms of educating the community about the importance of weed control. Additionally, many community groups are undertaking 'hands on' programs to control and manage weeds. Even though DAFWA has stressed that Noogoora burr is so difficult to control along the river that efforts are almost futile, such work needs to continue and be built upon to ensure that all possible effort is made to control the threat of weeds to the Region's natural resources. Work needs to be done to address weed seed spread, including identification of the primary sources, vectors and strategies for mitigating the problem

## **FERAL ANIMALS (A)**

Although the Fitzroy Catchment is home to a wide range of Indigenous wildlife, increasing numbers of feral animals, either accidentally or deliberately introduced are, in some places, beginning to threaten native ecosystems. The following were identified as problem feral animals during the INFFER workshops:

- pigs
- camels
- cats
- donkeys
- wild dogs
- horses
- cattle
- feral fish

Many of these feral animals were deliberately introduced for domestic or agricultural purposes and, at first, posed little problem. However, as some were allowed to run wild, they produced large numbers

and have now become a significant environmental threat. Cattle, for example, are a valuable agricultural asset, and their impacts can be managed more sustainably so long as they are restricted to agricultural properties, by fenced boundaries, and their numbers are controlled. Land degradation is particularly severe when they are allowed to run wild and to graze in an unrestricted manner. Currently, feral camels seem to be one of the major problems with anecdotal evidence suggesting that there may be as many as 900 000 in the Kimberley.

Feral fish are an on-going concern because many people keep pet fish in aquaria or ponds and some of the most aggressive species are sold locally. During flooding, pond fish are sometimes washed into rivers and, in addition, excess fish from aquaria are sometimes deliberately discarded into waterways. Some of these exotic fish species may compete with, or even eat, native species. Although there is currently no evidence of exotic fish in the Fitzroy River or its tributaries, authorities need to be vigilant to ensure that they are not introduced and, in general, any attempt to introduce fish species from the eastern states for fishing or aquaculture should be prohibited.

Cane Toads have not yet been found in the Fitzroy Catchment, but are present in other parts of the Kimberley. They were deliberately introduced into Queensland in 1935, in an attempt to control grey backed cane beetles. Since then they have spread steadily across Australia and have now become a real threat to biodiversity in some parts of the Kimberley. With the seemingly inevitable arrival of the cane toad, the management of this invasive species is becoming a high priority.

To deal with feral animals, some type of controlled culling program is necessary. There are already several culling programs operating in and around the catchment and, although sometimes controversial, a controlled culling program is probably the only realistic option to control many of the problem animals.

## **OVER-GRAZING / OVERHARVESTING (G)**

The pastoral industry is accepted as an important and desirable activity in the Fitzroy catchment. Significant work has been done over the past few years (principally through DAFF) to improve land management practices and to achieve sustainable grazing levels. On well-managed pastoral leases, cattle numbers are regulated to levels appropriate to carrying capacities of the land. The view was expressed, however, that there are still some areas of the catchment where land management could still be improved and that, in such areas, the industry should ensure that cattle are maintained at sustainable numbers, and that they are restricted to identified pastoral lands. Where clearing of native vegetation for agricultural activities is proposed on pastoral lands, this should be assessed within existing vegetation /biodiversity management plans for the region, taking into account any broader regional impacts. Broadscale land clearing is already prohibited under the pastoral permit system. Over-grazing can lead to changes in the structure of grasslands, sometimes resulting in invasion by feral weeds and should, therefore, be avoided. In addition, removal of too much ground-cover can lead to erosion, loss of productive soils and sedimentation into waterways. Fragmentation of natural habitats, and the potential of chemical pollution from agricultural activities, were also identified as potential threats.

Many of the natural resources of the Fitzroy catchment are harvested for human consumption (e.g. bush-tucker). A fear was expressed, however, that with increased access to the catchment for non-traditional users, the potential exists for things such as natural fruits, fish, and animals (e.g. turkeys and goanna) to be over-exploited.

## **SILTATION, SEDIMENTATION, FLOODS & EROSION IMPACTS ON WATERWAYS (S)**

During the summer monsoon, from February to April, the Fitzroy River can rise dramatically as the catchment is deluged by more than 80% of its annual quota of rain. This is seen by the local Indigenous community as an important natural event that cleans and revitalizes the river. It also provides essential recharge of the water supplies for pastoral and agricultural businesses as well as the right conditions for the procreation of many river species. The values associated with tropical rivers have changed and diversified over time with growing societal awareness of the contribution made by unregulated, healthy river systems to human wellbeing and cultural identity (Jackson, S. et al 2008). This is epitomised in the case of the Fitzroy River with the community campaigns to prevent dam and canal proposals from proceeding.

Where man-made structures have been built, sediment accumulation has sometimes been noted, an example being upstream from Camballin. In addition, uncontrolled access to the river by cattle has already been shown, in some regions, to disrupt the natural bank structures and increase sedimentation rates into the river. Uncontrolled fires also lead to increased sedimentation. The environmental impact of barriers to natural sediment flow patterns, such as the Fitzroy River barrage, should be fully evaluated. Pilot programs to reduce cattle access to the river – such as the installation of off-stream watering points – should be explored

## **DAMS / POSSIBLE FUTURE WATER EXTRACTION -Surface water and Groundwater(D)**

The most significant barrier to flow on the Fitzroy River is the Camballin Barrage, located on the lower reaches of the Fitzroy River. The barrage is a 140-metre long concrete structure that stands approximately 2.6m above the riverbed. The 17 Mile Dam (located on Liveringa Station) and the Camballin barrage were constructed at Camballin in the early 1970's to provide water for irrigation. Since then, consideration has been given to the possible construction of larger water impoundment and irrigation enterprises along the river.

Assessments of the groundwater resources associated with the river suggest a significant resource, however, there has been little work done to confirm this. Previous exploratory and geotechnical drilling across the floodplain at Willare, Fitzroy Barrage and Gogo, have confirmed the presence of an alluvial aquifer comprising a 20-30 m thick layer of gravels and sands, overlain by approximately 10m of silts and clays. This aquifer could contain a significant amount of groundwater however further investigations are required. The alluvial aquifer is represented on the Hydrogeological Map of WA (1989) and in part on the Derby 1:250 000 hydrogeological map (1992).

Surface water flow in the river and flood plain recharges the alluvium through the river bed during the wet season. During the dry season, river flow is initially maintained by groundwater discharge, until declining levels drop below the river bed. Permanent pools in the river bed are maintained by groundwater from the alluvium.

The salinity of dry season river flows indicates the groundwater salinity is generally less than 500 mg/L, however salinity of 500-800 mg/L in a stretch centred on Noonkanbah, corresponding to outcrop of shaley Noonkanbah Formation, indicates that a considerable portion of the alluvial

aquifer is brackish. The alluvium receives groundwater discharge from the regional Canning Basin aquifers, which vary in salinity.

Participants in the workshops identified that, with dams, come a number of potential threats. In particular, identified potential threats included, flooding of existing ecosystems, alteration of natural flow regimes, loss of cultural sites and restricted access for fish passage. Some workshop participants would like to see further action taken on the recommendations of the two recently-released fishway reports (AECOM 2009 & Scott and Keenan 2009).

There is evidence of conflict over perceptions of abundance and inter-basin transfer to meet southern Australia's growing water demands. The WA Government has ruled out a pipeline or canal to take Fitzroy River water to Perth. Respondents at the Derby focus group challenged the perception that tropical water is being wasted when it flows to the sea, arguing that it is being used by the river systems and serves the needs of the local population. Over-extraction of ground-water, for future agricultural activities, was also identified as a potential threat.

## **UNCONTROLLED TOURISM AND UNRESTRICTED HUMAN ACCESS TO SITES (T)**

Like the rest of the Kimberley, the Fitzroy Catchment, offers a wide variety of outdoor recreation for tourists. The main tourism activities include four wheel drive and camping safaris, scenic flights, fishing and boating, wilderness and bird-watching camps, and adventure tours. Many pastoral enterprises are now involved in eco-tourism ventures, further increasing the accessibility of previously unvisited areas.

Cultural tourism is emerging as a prominent draw card to the region and has potential for significant growth in the future, particularly as it offers employment and business opportunities for traditional owner groups. Aboriginal perspectives of the environment and their physical manifestations, such as rock art sites, are a highly popular tourist experience. A danger is that the loss of Indigenous languages impacts on the integrity and sustainability of cultural tourism. Tourism is by far the fastest developing industry within the Kimberley. As such it has the potential to provide both significant advantages and disadvantages to the sustainability of ecosystems. A rapid improvement in the accessibility of many remote areas is leading to a significant increase in the number of people visiting the region. Ensuring that tourist sites are maintained, and appropriately managed, was identified, during the INFFER workshops, as a crucial challenge facing the Region's natural resources.

Impacts of tourism can include vehicle tracks that lead to erosion, degradation of cultural sites (particularly where people camp outside of designated areas), and over-utilization of resources. There is evidence of conflict between tourism and local uses of favoured riverine sites. Although the use of rivers by the tourism industry is largely non-consumptive, some types of tourism clearly degenerate other values. An additional threat that occurs as a result of uncontrolled tourism is the deposition of rubbish in and around tourism and camp sites and, in some cases, deliberate vandalism that reduces the cultural value of such sites.

Currently there is little coordinated management of tourism in the region. Management plans and strategies will need to be developed in the near future to ensure appropriate protection of sites and to encourage sustainable future tourism development. Collaboration with Aboriginal tourism industry representative bodies and Traditional Owner groups is required to ensure the environmental and cultural impacts of tourism are properly managed

## **MINING (M)**

Mining activity in the Kimberley has a long history, commencing with the discovery of gold near Halls Creek in 1885. In the 1980s, diamonds and zinc/lead deposits were discovered. Mineral assets in the catchment include diamonds (Ellendale Mine is currently operating), coal, uranium, phosphate, zinc and lead (ACIL Tasman, Worley Parsons, 2005). The Kimberley Region's total mineral and petroleum production was valued at \$660.6 million in 2004/05 (KDC 2006), which represented 2.5 per cent of the State's total. Zinc and lead mining on the Lennard Shelf, near Fitzroy Crossing, was valued at \$120.7 million, though the mine has since closed.

Potentially, mining could have some positive spin-offs for the region, one of which might be the provision of jobs for local people. Experience has shown, however, that the number of permanent local jobs, provided by mining, is usually fairly small. A number of potentially negative impacts were identified. These included the disturbance of local vegetation and habitat during land-clearing, the danger of seepage of contaminants from tailing dams, the disturbance of cultural sites, and the over-use of water for industrial purposes. Many of the region's mines are concentrated in areas that have relatively unproductive aquifers and/or little perennial surface water. This places considerable pressure on scarce water resources, since much of a mine's use of both surface water and ground water is consumptive or degenerative. The potential and actual impacts of mining on groundwater resources must be properly assessed, monitored and managed.

Mining was seen, by some groups, as a positive activity in the region, but only so long as the associated activities are carefully managed and monitored, particularly in relation to ensuring that no cultural sites are unnecessarily impacted or damaged. Generally, however, conservation groups are opposed to mining in the region because mining is not in accordance with the principles of appropriate development. An additional threat is the overwhelming focus on English for employment purposes, rather than multilingualism. For many Aboriginal peoples in the Kimberley the national and state dependence on mining activities has direct implications to the impairment of maintaining cultural and law obligations, as well as linking relationships to creation stories that promote caring for country

## **LOSS OF INDIGENOUS AND/OR NON-INDIGENOUS KNOWLEDGE (K)**

The lack of consistency in recording the history of the region points to the potential for loss of the stories from the inhabitants of the catchment country. These stories are mostly passed on by word of mouth so that once the older people have moved or died, it is likely that stories would be lost unless they are recorded and accessible. In addition, the value of the stories is diminished when they are not passed on in language. It is also important to do everything possible to increase the oral transmission of this knowledge. As Evans (2010) observes the complexity of knowledge contained in oral languages is not possible to capture in its entirety simply through recording parts of the knowledge. There needs to be a balance of focus on documenting and transmission to avoid the documented materials becoming all but useless for future generations.

## **EXCLUSION OF TRADITIONAL OWNERS FROM SITES (E)**

Although local agreements are usually in place to ensure that Traditional Owners are given access to sites on pastoral leases, there are some instances where there is a serious, on-going threat for Traditional Owners where access might be denied to specific sites. Limited or spasmodic access to country for ceremony, hunting and recreation has hindered the continuation of stories and subsequent education for younger people about site-specific stories and events.

The irresponsible behavior of some community members in accessing country in some areas has led to an inconsistent range of access arrangements. Communication and education between land managers and Traditional Owners have been suggested as ways to alleviate these tensions and build mutual respect between all parties.

## **LACK OF NRM CAPACITY (N)**

Community participation through the process of formulating the NRM Plan for the Kimberley has contributed to the vision of a future for the region by 2050, in which the land is largely unmodified with large areas and species protected, and damaged areas restored. The people of the Kimberley value traditional land uses and cultural knowledge alongside scientific knowledge and land uses such as tourism, pastoralism, cropping and grazing (Rangelands NRM Coordinating Group 2004).

In 2002, community participation in the development of the WA Sustainability Strategy within the Kimberley region identified common core concepts of respect for people and country, and for local ownership and empowerment. The need for more employment for local people, more employment for young people, better health, education and housing, and more social and economic opportunities emerged as key to the vision for the future. An important point, however, is that whilst there are some NRM funding initiatives offered for local community groups, they often do not support the direction that the community wishes to follow. In particular, Caring for Our Country identifies some Targets that are not necessarily regarded as priorities by the local community, especially when dealing with water resources.

Although Indigenous people in the region have been engaged in NRM and research through various avenues, concern was expressed during the INFFER workshops that NRM capacity is still insufficient in the Fitzroy region, and this was seen as a potential threat to future participation in NRM projects by local people. A move towards improving NRM capacity has been the initiation of a State NRM-funded “Waterways Education Program”. This project is a joint program of the University of Western Australia and the Department of Water and is focused on the Kununurra region and the Fitzroy Catchment.

Another key factor that is limiting NRM capacity is access to infrastructure such as vehicles that are necessary to carry out on ground works that will be prioritized under this plan. The Kimberley Ranger Initiative is providing this support however the extension of their existing programs will require substantial increases in current funding to be able to carry out work programs.

## **CLIMATE CHANGE (C)**

Although climate change was identified at the workshops as a potential future threat to the catchment, it was accepted that this may be an over-arching threat to the whole of the region, which is probably best dealt with at a national level. Nevertheless, it was felt that potential effects of climate change should be considered when planning future developments in the catchment. The possibility that changing soil temperatures may dictate the types of crops that could be grown in the future is one example that was mentioned. The Australian Government’s Annual Climate Change report from the Bureau of Meteorology (BOM, 2009) states, that “there is an apparent shift in Australia’s climate from one characterized by natural variability to one increasingly characterized by a trend to warmer temperatures”. Potential climate change impacts on rainfall in the Fitzroy region are discussed in CSIRO (2009) where it is suggested that ‘The recent (1996 to 2007) climate record is statistically significantly

wetter than the historical (1930 to 2007) record. Rainfall was 31 percent higher; runoff was 53 percent higher. It is likely that future (~2030) conditions will be similar to historical conditions, and future runoff and recharge will also be similar to historical levels, but lower than the recent past’.

Green et al (2010) discussed the impacts of climate change on Indigenous communities, such as Yakanarra, in the region. They made a number of recommendations to incorporate climate change issues into regional planning processes. The study concludes that each community has specific concerns and that there is no ‘one size fits all’ approach to reducing vulnerability. According to Green et al (2010), “The literature to date on vulnerability of many of these communities to climate change is in dire need of more in-depth and empirical research. Moreover, in appreciating that ‘one size will not fit all’ in regards to developing resilience and adaptation strategies for these communities, it would be recommended that a number of regionally specific, in-depth studies be conducted. It is expected that by adopting such a regionally-specific approach, the varying needs of remote communities would be captured. In addition, Indigenous communities should be consulted and fully engaged in climate change studies and associated decisions concerning their communities. Climate change will have major flow-on implications for the livelihoods of Indigenous communities, but also presents an opportunity to undertake income-generating NRM activities. The role of people in the landscape helping to manage climate impacts will be crucial and presents a significant opportunity for Indigenous livelihoods. Economic opportunities arising from climate change for Indigenous people living on land may include the need to better manage and restore ecosystems, and the pursuit of carbon mitigation and sequestration activities”.

## **LEGISLATION (L)**

The catchment regions are managed by various instruments and legislation to provide consistency in catchment management. Equally, for Indigenous peoples in the Kimberley the environment is regulated under Aboriginal law and an Indigenous management regime that expects both cultural and other responsibilities on country are implemented. In state legislation in Western Australia, water for example, is managed under the Rights in Water and Irrigation Act 1914, Country Areas Water Supply Act 1947 and Waterways Conservation Act 1976. Until the passing of the Water Resources Management Bill (WA) and the implementation of Indigenous water rights under the proposed Bill, the catchment operates under a patchwork of dated legislation.

As the protection of the environment is a global responsibility in catchment management, there are various international instruments that guide a national, state and local framework to policy and legislation. Treaties such as the 1992 UN Framework Convention on Climate Change, 1992 UN Convention on Biological Diversity, 1992 UN Rio Declaration (principle 15; to prevent environmental degradation), and various precautionary principles to protect the environment have been incorporated into Australian law as a result of international agreement.

Environmental principles internationally and in Australia identify the importance in law to ensure communities have an expectation to ‘intergenerational equity’, that is, ‘equity is a fundamental concept to sustainable development to meet the needs of future generations’ (Beder 2006). In the same way that water is considered a ‘human right’ in global terms, the case law in Australia has recognized that the principles of intergenerational equity are taken into account. The catchment, for example, has threats in “water mining” (Barlow 2007), that is, ‘the poorly regulated’ management in the over extraction of groundwater; where some consider it is a finite resource. The catchment is not only a local asset as the unfettered use of poor management practices has global consequences.

## The Identified assets

During the various workshops, a total of 122 individual assets were initially identified, ranging from over-arching assets (such as the river as a whole) and including cultural and linguistic assets, ecological assets, agricultural assets, water resources, and tourism/ recreational assets. Since the workshops, additional assets have been identified during on-site visits. Where possible, comparative values were assigned to each asset. In addition, the type and level of threat to each asset was categorized. In examining assets, it is acknowledged that in many cases, assets will fall into more than one asset class. As was expressed at the Derby Workshop (2006), ecological assets are often also cultural assets and so, at that workshop, some assets are referred to as *eco-cultural assets* as they cannot be assigned as either type. Examples of eco-cultural assets given were fish, the black water goanna (Merton's Water Monitor- *Varanus mertensi*) and the water rat (Golden Backed Tree Rat - *Mesembriomys macrurus*) because there are traditional stories associated with them. Riparian vegetation, such as pandanus and freshwater mangrove, was classified as an eco-cultural asset because not only does it play an important ecological role in the river's health, but it is an important source of bush tucker, bush medicine and bush tools.

As there exists a huge range of different types of assets, the following method of dealing with different asset categories was adopted. Firstly, all assets will remain on the list as all are already acknowledged as "valuable". All will be dealt with in the CMP, but the process to deal with them may differ between asset types. Assets have been separated into the following themes.

Theme 1 - The big, over-arching assets (e.g. the whole of the river)

Theme 2 - Water resources

Theme 3 - Biodiversity (including threatened species)

Theme 4 - Agricultural assets

Theme 5 - Cultural and Recreational assets (including tourism)

In all cases, the full INFFER Asset Identification Table, as generated in the workshops, will be presented in Appendix 4. In the text of each chapter, descriptions of the assets and threats will be included, particular attention being paid to the assets with highest priorities, or those that were considered to be under the highest level of threat. An exception to this is the chapter dealing with cultural assets where difficulty was experienced in comparing relative values of assets, this being largely a matter of opinion of the individual workshop participants. To deal with this, all of the cultural assets were considered to be of high value, with no attempt being made to differentiate between them on the basis of value. Cultural assets were, however, differentiated on the basis of the level of threat.

Having identified and quantified assets and threats, the CMP will list a number of **Catchment Targets**, **Management Action Targets** and **Priority Investment Strategies**. These are defined as follows:

### ***Catchment Targets***

Catchment Targets provide a statement on the desired condition of the resource at some specified time in the future (e.g. in 10 years from now). A Catchment Target should provide a broad statement to indicate the desired future status of catchment health. Catchment Targets should be achievable, technically feasible and realistic. There may be more than one Catchment Target for each theme.

### ***Management Action Targets***

Management Action Targets refer to actions that are required to address identified threats to specific assets or groups of assets. For this CMP, MATs have a time frame of five years or less, and they are intended to be useful in identifying the level of on-ground work needed. MATs should be specific, measurable, relevant and achievable within five years or less.

### ***Priority Investment Strategies***

It is acknowledged that, with the limited availability of funding, it will not be possible to fund all Management Action Targets immediately. Priority Investment Strategies, therefore, list actions that were identified during the various workshops as requiring the most urgent actions and investment. Priority Investment Strategies will be listed at the end of each section, and a summary PIS table will be included at the end of the report.

## **Theme 1 - Big, over-arching assets**

When asked to identify assets during the INFFER workshops, many stakeholders suggested that in designing a management plan for the catchment, certain of the large, over-arching assets should be considered as a whole, rather than being broken down into their component parts. For example, although a single river pool on the Fitzroy River might be considered individually in terms of required management actions, there is also an advantage in considering the river as an integrated system thus reflecting a range of views that take in the system as a whole.

A number of these large, over-arching assets have, therefore, been separated into a group and these are listed in Table 2, Appendix 4a. In this section, no attempt will be made to list the main threats because, in almost every case, every type of threat is applicable somewhere within each asset area.

### **Catchment Target (CT1)**

**To retain the wilderness values of the Fitzroy River and its catchment and sub-catchments in a region that is attractive to local communities and tourists whilst, at the same time, providing opportunities for employment for Indigenous and non-Indigenous people in NRM activities and in appropriate industries such as pastoralism, tourism and natural/cultural resource management.**

To achieve the above objective, a “whole-of-catchment” approach will be needed so that specific Management Action Targets contribute towards this catchment-wide vision. No specific Management Action Targets will be listed for this theme because they will form part of the recommended actions in subsequent sections. In all cases recommended MATs should be designed so that they help to achieve the overall vision outlined in CT1. In addition, in order to implement recommended MATs, some type of local management body will be required to carry out the types of functions that FitzCAM has in the past. It will be suggested, therefore, that a body such as FitzCAM will need to be funded in the future.

## Theme 2 - Water

Water, and more specifically water quality, was identified by the FitzCAM reference groups as a core issue that they wanted to address. For Indigenous people, water is sacred and the obligations to maintaining spiritual health in water resources is inherent in kinship. This was reinforced during the INFFER workshops, where water resources were identified as extremely important to the region. The importance of a long-term water management plan that encompasses all categories of water resources, was emphasized. The fact that we still do not completely understand the interactions between the different categories of water resources, (e.g. ground water, alluvial water, surface water) was identified as an important knowledge gap. It was emphasized that, until such interactions have been investigated and are fully understood, a precautionary approach to the allocation of water rights should be adopted. In addition, the existence of a relatively unregulated water flow was identified as an important asset that helps to maintain a healthy river system through annual cleansing during floods. Aboriginal people in the Kimberley have always understood the cultural and environmental balance that is restored as the result of flooding waters. Much of the following water resource information has been obtained from Lindsay & Commander (2005), Department of Water (2009) and from direct DOW input to this CMP process.

The Fitzroy River is one of Australia's largest virtually unregulated rivers characterized by braiding channels within a wide floodplain and significant lower floodplain storage. Annual river discharge measured at Fitzroy Crossing varies between 300 GL (1992) to 25,000 GL (2000) with most of the flow being during the Wet, between December and March. The river usually dries up around July or August, leaving a series of disconnected permanent pools which are recharged by alluvial groundwater during the dry season (Lindsay & Commander, 2005).

The Fitzroy has many tributaries including the Margaret River, Christmas Creek, Hann River, Sandy Creek, Geegully Creek, Little Fitzroy River, Collis Creek, Adcock River, Cunningham River, Yeeda River, Mudjalla Gully and Minnie River.

There is strong interaction between the surface and groundwater hydrology at the catchment scale but little is known at a more localised scale. Further investigation is planned through a project funded by the National Water Commission into the groundwater and surface water interactions in the lower Fitzroy River catchment, downstream of Fitzroy Crossing.

Water resources of the Fitzroy River have long been utilised by people in the catchment. Indigenous stakeholders have reiterated their dependence on the Fitzroy and its water as central to their lives, culture and sustenance (Toussaint *et al.*, 2001). Local people's dependence is rooted deeply in the water cycle with wet season flushing, dry season pools, and surface-groundwater interactions being critical in supporting the pools and billabongs during the dry season. Pastoral and tourism enterprises have relied on water in the Fitzroy for many years.

The water resources of the river have been diverted by a barrage for irrigation at Camballin, and a number of other dam sites have been investigated. Previous studies concluded that the cost of bringing surface water to the south west of the state could not compete with alternatives, and there are severe environmental constraints on damming the river. Assessments of the groundwater resources associated with the river suggested a significant resource, however, there has been little work done to confirm this.

Previous exploratory and geotechnical drilling across the floodplain at Willare, Fitzroy Barrage and Gogo, have confirmed the presence of an alluvial aquifer comprising a 20-30 m thick layer of gravels and sands, overlain by approximately 10 m of silts and clays. This aquifer could contain a significant amount of groundwater however further investigations are required. The alluvial aquifer is represented on the Hydrogeological Map of WA (1989) and in part on the Derby 1:250 000 hydrogeological map (1992).

Surface water flow in the river and flood plain recharges the alluvium through the river bed during the wet season. During the dry season, river flow is initially maintained by groundwater discharge, until declining levels drop below the river bed. Permanent pools in the river bed are maintained by groundwater from the alluvium.

The salinity of dry season river flows indicates the groundwater salinity is generally less than 500 mg/L, however salinity of 500-800 mg/L in a stretch centered on Noonkanbah, corresponding to outcrop of shaley Noonkanbah Formation, indicates that a considerable portion of the alluvial aquifer is brackish. The alluvium receives groundwater discharge from the regional Canning Basin aquifers, which vary in salinity.

Although ecological water requirements have yet to be determined, it is expected that constraint on the consumptive use of the alluvial aquifer will be the need to maintain dry season river flows and permanent pools, which will limit allowable drawdown at the river bed.

Some of the key water management issues that have emerged over discussions with stakeholders through a range of projects, consultations and forums in the Fitzroy over the past 2 years include:

## **1 Water regimes in the Fitzroy River**

**Dams on the Fitzroy** - There has been significant public opposition to any further impoundment of the Fitzroy River, as highlighted when the WAI proposal was being investigated and more recently when talking to stakeholders through the Kimberley Water for Perth process (Beckwith Environmental, 2006). Natural flow regimes have been identified by most stakeholders as important.

**Camballin barrage (at Liveringa)** - There are mixed opinions about the Camballin Barrage with some community members wanting the structure removed to restore fish passage and others wanting it retained for commercial purposes and because it is a good fishing spot. There is a project being carried out at the moment to investigate the feasibility of a fishway on the barrage which includes stakeholder views on the barrage.

**Inter-basin transfer of water from Fitzroy to Perth or other states** - An analysis of stakeholder input to the recent proposal to transfer water from Fitzroy to Perth found that Kimberley people were not receptive to the concept. There was particular opposition to any significant impoundment (damming) of the Fitzroy River.

**Maintenance of flow regime** - The Fitzroy River has very high peak flows in the wet season and the surface water ceases to flow every year in the dry season when the river dries up into a series of pools. This seasonal fluctuation is considered critical for the maintenance of ecological, social and cultural values associated with that flow regime.

**Groundwater** - The groundwater associated with the Fitzroy River alluvium has significant connectivity to the surface water influencing the patterns of pool formation expressed at the surface. It is important to understand the way this works so any impacts on abstraction of groundwater can be managed.

## 2 Development and Land use impacts

**Water use for agricultural development within the catchment (scale and type)**- Development of agricultural enterprises in the region is generally accepted by community but the scale and type needs to be appropriate to the environment and region (Kimberley Appropriate Economies Roundtable, 2005; DAFWA, 2007; NALWT, 2009).

**Weeds and waterway management** - Invasive weeds along the Fitzroy River (such as Noogoora Burr) limits peoples access to the river and is an issue for livestock management in the Fitzroy catchment.

**Erosion of river banks** (through road maintenance activity, grazing, and clearing) -Erosion issues within the Fitzroy floodplains has been identified as an issue by local people over the years, particularly at nodes of development such as clearing for infrastructure and at the Camballin barrage.

**Access to the river** (tenure and weedy riverine environment) - Pastoral leases, other special leases and modified or degraded environments have, in some places, restricted public and traditional owner access to the river. This is a significant issue for Fitzroy people.

**Water Quality** - Maintenance of good water quality is raised as a key issue for people on the Fitzroy River.

## 3 Water Management and Planning

**Water Licenses – what is a license, why are there licenses?** - Communities require simple information about licensing, for example: Will stock and domestic use require a license in future; Does community water supply require licences?

**Future water allocation** – How will water be allocated for future use and in particular how will Indigenous people be included in water resource development. The Department is responding to emergent discussion about ensuring that Indigenous people have equitable access to the water market, particularly in context of water market reforms. Development of policy on Indigenous access to water for economic futures is required.

**Engagement in policy, planning and legislative reform** - There is a growing expectation for good water planning, and new policy and legislation to incorporate community values and aspirations. Therefore engagement in these processes is important. People also need information about water and its management.

Participants in the INFFER workshops suggested that, before specific management actions could be recommended, a number of questions should be put to the Department of Water. The official responses from DOW are recorded in Appendix 5.

In addition to the above, the Department of Water is undertaking the “Kimberley Regional Water Plan”, which will be released for public comment in late 2010. FitzCAM has been involved in this since the initial stages and the reference group has been one of the key consultation groups over the past 2 years. At a recent Water Dialogue, the WA Water Minister, Graham Jacobs, released the *Discussion Paper on*

*Water Resource Management Options* which discusses the benefits for modernizing water resource management legislation.

[www.water.wa.gov.au/Managing+our+water/State+water+resource+management+and+reform+program/Water+resources+management+options/default.aspx](http://www.water.wa.gov.au/Managing+our+water/State+water+resource+management+and+reform+program/Water+resources+management+options/default.aspx)

The development of water policy that strikes a balance across the interests of all stakeholders is currently being pursued from a number of different directions. The DOW is developing regional water plans in accordance with WA State Legislation and their commitment under National Water Initiative (NWI). The Indigenous Water Policy Group (IWYP) through the North Australian Indigenous Land and Sea Management Alliance (NAILSMA), also funded through the NWI, was initiated in 2006 to enhance Indigenous water policy outcomes across state and territory jurisdictions.

On the 24<sup>th</sup> March, 2010, they launched the Indigenous Water Policy Statement which makes four key declarations:

Indigenous peoples' traditional ownership must be fully recognised in Australian law.

Water legislation and government policies must allocate Cultural Flows owned by Indigenous peoples to ensure equity and Indigenous cultural rights.

The Consumptive Pool in all water plans must include an equitable Indigenous allocation for commercial purposes.

Governments and water agencies must join with Indigenous Traditional Owners and native title groups to develop water plans and management.

The IWPG supports the recognition of Indigenous Rights to ownership, management and use of water for commercial purposes in response to current commonwealth and state policies and reform agendas, specifically the National Water Initiative. Indigenous Water Policy Statement included as Appendix 6.

Table 3, Appendix 4b, summarizes the water resource assets identified during the stakeholder workshops.

In view of the answers given by the DOW to the questions posed during the stakeholder workshops, and in view of the current actions that are being taken by the DOW, and also taking into account the recommendations made during stakeholder workshops, the following Catchment Target and Management Action Targets are recommended, and these are based on the following major threats that were identified:

**Main threats to water resources:**

**Dams and possible future water extraction**

**Siltation and sedimentation**

**Uncontrolled tourism**

**Over-use of water for mining**

**Catchment Target (CT2)**

**To ensure that the hydrological (SW/GW) processes maintain the ecological integrity of the Fitzroy Catchment**

**Management Action Target (MAT1)**

**To achieve an appropriate level of understanding of SW/GW interactions to allow sustainable resource management.**

**Management Action Target (MAT2)**

**To ensure that natural river flows are maintained to sustain environmental, social, cultural and economic values**

Any proposal which could potentially change the natural river flow should be subject to a full, independent, unbiased study, where it would have to be rated against agreed sustainability criteria. The wider community, particularly Indigenous and conservation groups, have historically expressed strong opposition to dams on the Fitzroy River or any of its tributaries.

**Priority Investment Strategy – water (PIS1)**

**Priority investment will be required to:**

**understand and document the interactions between the various categories of water storage resources of the Fitzroy Catchment**

**in the long term, to give any appropriate input to assist DOW to produce equitable water management plans that include maintaining natural river flows**

## **Theme 3 - Biodiversity**

Biological diversity is defined as the variety of life forms, including various plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they are a part (Biodiversity Unit 1994, DEST State of the Environment Advisory Council 1996). Broadly, biodiversity is considered at three levels: genetic diversity, species diversity and ecosystem diversity. Aboriginal peoples of the Kimberley have understood and protected biodiversity in the traditional practice of caring for country

There is also a link between biodiversity and linguistic diversity. The Kimberley is high on the list of linguistically diverse regions in the world and is an acknowledged region of high diversity. There is growing research and evidence (c.f. Nettle and Romaine, 2000) which demonstrates that Indigenous languages contain undocumented knowledge about caring for country. Crucial information about maintaining biodiversity is on the verge of being lost. Since the languages are so diverse and they connect specifically to certain areas of land there is an urgency to finding ways to both transmit and record this knowledge across all the language groups of the Kimberley, with the full and meaningful involvement of Aboriginal peoples in the region.

Great difficulty arises in establishing a level of protection for biodiversity so that its maintenance is guaranteed. However, where ecosystem functioning is largely intact, biodiversity values are more likely to be maintained. This can be done by developing a more comprehensive network of protected areas in the catchment, including Indigenous Protected Areas. Ideally, protection should be that level that guarantees the future evolutionary potential of species and ecosystems. All development is likely to cause some loss of the genetic component of biodiversity, to reduce overall populations of some species, and to interfere with the ecosystem processes. Protecting biodiversity means ensuring that these factors are reduced as far as possible. It should be recognized that a bio-security group, that is currently active in the region, is important in helping to protect biodiversity.

In the case of the Fitzroy River Catchment, this region forms part of one of the few large remaining natural areas on earth – the tropical savannas of Northern Australia. Most of the naturally flowing rivers that remain in Australia are in the north (Woinarski, et.al, 2007) The Fitzroy River falls within the Fitzgerald Botanical District, Central Kimberley region, Northern Botanical Province. The area contains rainforest patches that are particularly important to invertebrates such as Camaenid land snails and annelids. Camaenid land snails have a large number of endemic species and some endemic genera show strongly localised patterns of endemism. All the rainforest patches studied to date have endemic earthworm species associated with them.

Sandstone communities in the Central Kimberley bioregion may provide areas of high species and ecosystem diversity. Rainforests are defined by their vegetation associations and are resource centres for a variety of faunal taxa e.g. fruit pigeons and flying foxes. Limestone associated plant endemics in the Fitzroy Trough sub-bioregion include *Eucalyptus pedimontana* and *Triodia pascoeana*

Brooking Gorge is considered significant as it contains aquatic species not represented elsewhere in the ranges. This is due to it being a smaller water course, where flooding is less intense. It is the only known location of the waterlily - *Nymphaea immutabilis* subsp. *kimberleyensis*. (Sutton, 1998 cited in Storey, et al 2001).

The riparian vegetation along tributaries characterised by lower flow rates, and in sections of the river that have been regulated (e.g. Camballin), has a younger population structure, higher weediness factor and increased livestock disturbance compared to unregulated sections of the river (Storey, A. et al 2001). The Fitzroy River is recognised as a stronghold of the Purple-crowned Fairy-wren. Although not a waterbird it is restricted to understorey riverine vegetation and its occurrence partly reflects health of the riparian zone. The riparian areas are also highly significant traditional and cultural landscapes for Aboriginal peoples of the Kimberley

Mornington Sanctuary, which covers 320,668 ha in the upper Fitzroy River Catchment, is home to 33 mammal, 202 bird, 76 reptile and 22 amphibian species. There are at least 13 species of threatened wildlife including: Red Goshawk, Purple-crowned Fairy-wren, Gouldian Finch, Freshwater Crocodile, Peregrine Falcon, Grey Falcon, Australian Bustard and Northern Quoll. Mornington Sanctuary is also home to at least 600 plant species including at least 10 rare or threatened species including: *Acacia gloeotricha*, *A. manipularis*, *Echinochloa kimberleyensis*, *Triumfetta hapala*, *Eucalyptus ordiana*, *E. mooreana*, *Grevillea latifolia*, *Jacksonia remota*, *Livistona victoriae*, and *Olax sparteae*. ( Australian Wildlife Conservancy, 2009). The plant and animal species are significant to Aboriginal peoples' creation story and in retaining a relationship to kinship.

The King Leopold, Mueller and Durack Ranges provide habitat for a number of (fauna) species considered rare, endangered, vulnerable, priority or of special concern. Mammal species include Black-flanked Rock Wallaby, Scaly-tailed and Rock Ringtail Possum, and Brush-tailed Phascogale. Bird species include Gouldian Finch, Red Goshawk, Grey Falcon, Square-tailed Kite, Masked Owl and White-browed Robin.

Geike Ranges support a large number of endemic land snail and cave dwelling invertebrates. Geike Gorge is important habitat for the Purple-crowned Fairy-wren.

The Fitzroy Catchment contains a number of important wetlands. Wetlands and swamps of the floodplain are numerous, yet apart from the well known Camballin wetlands few other individual or aggregate swamps are noted or named in the literature. Other wetland types found within the catchment include swamps, lakes and lagoons, which are often ephemeral. Freshwater springs such as Udialla Springs and Honeymoon Springs are found throughout the lower Fitzroy catchment (Toussaint *et al* 2001). The GIS data shows that although such springs, swamps and semi-permanent wetlands dot the landscape, only a fraction of these occur in current literature.

The Directory of Important Wetlands lists three nationally important wetlands in the catchment (Environment Australia 2001):

Lake Gladstone - is on a travelling stock route adjacent to the NW boundary of Mornington. It is the largest permanent wetland in the Kimberley, and is listed as wetland of national significance in the "Directory of Important Wetlands in Australia" (DIWA database). The area provides critical habitat for many species of plants and animals, including threatened species like the Red Goshawk and Gouldian Finch, and some migratory bird species (e.g. pratincoles, phalaropes, dotterels and sandpipers), all of which are protected under the Environment Protection of Biodiversity and Conservation Act of 1999.

Camballin Floodplain (Le Lievre Swamp System) - extensive floodplain system of lakes and swamps of outstanding cultural significance within Nyikina and Mangala traditional lands, a significant bird refuge nominated to the Register of the National Estate, and which plays an important ecological and hydrological role in the natural functioning of the system, refuge containing endangered or vulnerable species

Geikie Gorge – permanent river section of outstanding historical and cultural significance

Within the Fitzroy catchment boundary are a number of culturally and socially important, yet little known wetlands near Derby, e.g. Munkayarra Swamp. These wetlands also provide seasonal habitat for a wide variety, and sometimes high number of waterbirds and are formed by runoff from adjacent sand dunes, with the water lasting until July or August. When full they teem with birdlife, with some species such as Australasian Grebe and Brolga noted breeding there. One site is also a refuge for a priority listed waterlily, *Nymphoides beaglesensis*

Diverse and numerous fish species (24 freshwater species and 16 marine species) have been recorded in the river system, some of which are listed as threatened by the IUCN, including the Northern River Shark (*Glyphis* sp. C) (Critically Endangered), Freshwater Whipray (*Himantura chaophraya*) (Vulnerable), Freshwater Sawfish (*Pristis microdon*) (Endangered), Dwarf Sawfish (*Pristis clavata*) (Endangered), Greenway's Grunter (*Hannia greenwayi*) (Data Deficient) and the Barnett River Gudgeon (*Hypseleotris kimberleyensis*) (Near Threatened/Lower Risk).

Northern Australia may soon represent the only geographical region in the world where viable populations of Freshwater Sawfish persist. This decline has subsequently led to *P. microdon* being listed as endangered (IUCN Red List 2003) throughout the world, and as vulnerable (Environment Protection and Biodiversity Conservation (EPBC) Act 1999) in Commonwealth waters of Australia (Thorburn, et al 2004). Freshwater Sawfish are widespread throughout the Fitzroy River (it has been recorded in Margaret Gorge) and they use the river as a nursery. New born juveniles are known to enter the river in the wet season (January to April) with higher survival or recruitment correlating with years with high late wet season flows. The Lesser Salmon Catfish appears to account for a large part of the diet of the

juvenile sawfish (Thorburn et al 2004). The larger juvenile Freshwater Sawfish leave the relative safety of the river once they reach approximately 2.5m for males and 2.8m for females, and enter King Sound. Studies have shown that the Camballin Barrage is a barrier for fish passage, including the passage of juvenile sawfish upriver (Morgan et al 2005).

In terms of Stygofauna, a new species of stygal flabelliferan isopod (*Tainisopus* sp. Wilson and Ponder) was recorded from Lullangarra Cave; two species of cave cockroach (*Nocticola* spp.), a planthopper (Fulgoroidea), and a number of ostracods and cyclopoid copepods were also recorded from caves in the Fitzroy River catchment area (Storey, A. et al 2001)

There is little known about the number and distribution of priority taxa in the riparian vegetation of the Fitzroy River. Sutton(1998) mentions a new species, *Acasia gleotricha*, that has recently been identified from the vicinity of Dimond Gorge. It's distribution outside that area is unknown, and it is listed on the CALM Declared Rare and Priority Flora List as a Priority Species. Other listed flora in the same area are *Fimbristylis sieberiana* and *Grevillea miniata*. Listed flora in the vicinity of the Margaret River include *Maireana prosthocochaeta* and *Triumfetta hapala*.

Ecosystems considered to be "at risk" by the National Land and Water Resources Audit include:

- Livistona palm forests and fire sensitive vegetation (such as *Pandanus*, *Terminalia* spp., figs and other rainforest elements) are found in gullies and along some permanent creeks where they are protected from fires

- Savanna communities of which *Callitris intratropica* is a component

- Herbfields of sandstone pavements

- Plant assemblages of sand plain seepage areas between/near sandstone ridges

- Flora and fauna assemblages of Gladstone Lake

In general, the available data are inadequate to assess the real status of many rare or locally distributed species that may warrant gazettal as threatened. There has been no systematic biodiversity survey of an entire Kimberley bioregion or subregion, and no detailed plant or animal surveys of savanna ecosystems on the alluvial plains of the Fitzroy Trough and South Kimberley Interzone Subregions (DEC, 2009). Survey effort has generally focused on DEC managed lands and a considerable proportion of specimens (and thus species information) has been collected along roads, further biasing the information. A report by Burbridge, McKenzie and Kenneally (1991) did, however, detail some of the features of declared and planned conservation reserves in the region and made a number of recommendations concerning future reserve planning. The central and south-eastern Kimberley remains largely unexamined. Better maps of vegetation, soil and environmental geology are needed to provide better resolution of patterns in biodiversity for conservation planning (DEC, 2009). Within the limits of currently available knowledge, however, the DEC provided information about rare, priority and threatened species, as well as about nature reserves and conservation areas in the catchment. These rare illustrated in Figures 8 and 9.

**Note:** 2015 pastoral exclusions relate to certain areas, which have been identified by Government several years ago, with particular historical, conservation or public values, which will be vested to the State in 2015, the year in which pastoral leases are due for renewal. Across the State this represents approximately 2% of the total area of pastoral leases in WA.





Table 5, Appendix 4c, summarizes the biodiversity assets identified during the stakeholder workshops.

Taking into account the recommendations made during stakeholder workshops, the following Catchment Target and Management Action Targets are recommended, and these are based on the following major threats to biodiversity that were identified:

**Main threats to biodiversity**

**Fire – uncontrolled, dry-season fire**

**Weeds, particularly Noogoora burr, Parkinsonia and rubber vine**

**Feral animals – particularly camels, donkeys and pigs**

**Over- grazing and over-harvesting of some natural resources**

**Siltation and sedimentation that threatens aquatic habitats and organisms**

**Uncontrolled tourism**

Based on the information presented above, and on recommendations made during the stakeholder workshops, the following Catchment Target and Management Action Targets are recommended

**Catchment Target (CT3)**

**To develop a strategy by which the highest priority terrestrial and aquatic threatened plant and animal species, and threatened ecosystems, will be managed for conservation, and populations of animals and plants that are important for cultural, food, or recreation purposes are maintained.**

**Management Action Target (MAT3)**

**To maintain and improve the populations and diversity of all of the threatened flora and fauna species, and/or threatened ecosystems, listed by the DEC (Figure 9) and to protect the knowledge and language transmission that is associated with this biodiversity.**

Effort will be initially targeted to managing the major threats to biodiversity that have been identified by the DEC and during stakeholder workshops (see below). Priorities will be determined by the feasibility of managing specific risks to sites, landholder and community support, opportunities for collaboration, number of species to benefit and scale of works required. Aboriginal peoples in the Kimberley should retain control over their associated intellectual property.

**Management Action Target (MAT4)**

**To identify and implement actions to increase the recovery of significant terrestrial and aquatic populations that are under threat.**

This target focuses on species that were identified by stakeholders as being particularly significant or under threat (e.g. Barramundi, Sawfish, Gouldian Finch, Bilby, Freshwater Prawns, Saltwater mangroves, shorebirds). Such species (including migratory bird species) may not necessarily have legislative protection, but may be considered to be at risk on a regional scale. Often, such plant and animals species are important for cultural, food, or recreational purposes. Management actions should include reduction of defined threats (see below), control of over-exploitation, and restoration and/or improvement of specific habitats. The Indigenous values held by the Traditional Owners will form an equitable component to identify and implement any proposed actions on country.

**Management Action Target (MAT5)**

**To protect important wetlands (e.g. Le Lievre Swamp, wetlands near Derby) and to restore wetland habitat and integrity where necessary.**

This target focuses on wetlands that have been identified as important habitat for species such as migratory birds and significant fish species. Management actions should include reduction of identified threats (see below),

**Catchment Target (CT4).**

**To reduce the occurrence and impact of intense, uncontrolled, dry-season, fires.**

Although it is recognized that many regions of the catchment and, in particular, many of the pastoral leases, already have adequate and well-planned fire management protocols in place, there are still some areas of the catchment where fire management is not sufficiently coordinated. A more inclusive, catchment-wide, fire management protocol is needed so that such areas can be brought up to the standards already achieved by some of the better-managed pastoral leases. Many pastoralists have worked in conjunction with organizations such as FESA to design and implement extremely good fire management plans, and there is no reason to suggest any changes to them. However, where investment is now needed is to extend these good fire management practices to areas of the catchment where fire management is less well developed.

**Management Action Target (MAT6)**

**To adopt an acceptable, and less destructive, fire management system throughout the catchment and to initiate on-ground actions to implement the plan.**

Given that there is widespread agreement that many of the late dry season fires occurring today are harmful, this target seeks to reintroduce more traditional methods of fire management to sustain biodiversity. Extension of the current EcoFire program to other areas of the catchment is one possible way to do this, but other fire management systems, already successful on some of the pastoral leases, may also be appropriate. It is suggested that an initial action could be to run a fire management workshop to involve all sectors of the community

**Catchment Target (CT5).**

**To manage and restrict the occurrence and distribution of priority pest animals and environmental weeds**

Feral plant and animal species compete with Indigenous species, reduce biodiversity and reduce agricultural production values. Uncontrolled cattle grazing reduces biodiversity, spreads weeds, erodes river banks and increases sedimentation rates. This target aims to improve coordination of effort and information sharing to reduce the impacts of uncontrolled grazing on biodiversity and agriculture, throughout the catchment. The management of priority pests and weeds will include Aboriginal management and methodology.

**Management Action Target (MAT7)**

**Based on an Integrated Weed Management Strategy, to prioritize actions designed to manage and control identified environmental weeds**

Currently, the catchment is poorly mapped and documented in terms of weeds, and the true extent of WoNs is not known. Investment is needed to survey, as well as control, environmental weeds. The areas impacted by WONS are symptomatic of greater pressures operating in terms of grazing and fire management. It is important to note that WONS, though problematic in the northern landscape, are accompanied by many other weeds that fail to make national lists because of the remoteness of the region and the consequential poor mapping and documented knowledge about their impact. It is important that weed activities be comprehensive and not single species focused. A whole of landscape approach is required. Work needs to be done to address weed seed spread, including identification of the primary sources, vectors and strategies for mitigating the problem. Weed control should be integrated in its approach and, besides attempting to control the weeds themselves, must also address poor land management practices that promote the weeds in the first place. Investment will be required to design and implement such an approach. Once an appropriate weed management strategy has been agreed on, investment will be required for specific weed eradication programs. An Integrated Weed Management Strategy needs to be designed so that it can be applied over a wide range of land tenures, including privately owned land. Work needs to be done to address weed seed spread, including identification of the primary sources, vectors and strategies for mitigating the problem.

**Management Action Target (MAT8)**

**Based on an integrated plan to manage feral animals throughout the catchment, to reduce the occurrence and control the spread of identified, problem feral animals.**

This target will coordinate efforts across all land tenures, and will prioritize on-ground works designed to control the most important feral animals that were identified during the stakeholder workshops, particularly pigs, camels, donkeys and wild dogs.

**Catchment Target (CT6).**

**To conserve particularly important species and biodiversity sites**

**Management Action Target (MAT9)**

**To conserve populations of animals and plants that are important for cultural, bush-tucker, and recreational purposes, and to protect the associated local knowledge and languages, possibly in Indigenous Protected Areas (IPA).**

Some animals and plants (e.g. barramundi, sawfish, freshwater prawns) are important for cultural reasons and many are used for food and recreational purposes. Some are under threat from over-exploitation and require management plans to maintain viable population levels. Manpower to police such management plans will also be required. The potential for Indigenous Protected Areas (IPAs) to contribute to the sustainable management of the catchment should be acknowledged, encouraged and supported, as should the need for adequate funding of IPAs within the catchment area.

**Management Action Target (MAT10)**

**To improve rainforest patches so that they are better protected into the future**

On-ground work is required to remove weeds and feral animals from these environmentally important habitats. Areas need to be fenced and lost vegetation rehabilitated. Aboriginal Rangers should be included in the provision of on-ground work.

**Management Action Target (MAT11)**

**To improve the condition of Geikie Gorge**

Although Geikie Gorge is already a declared nature reserve, it is considered to be under threat from a number of factors. Feral weeds already make access to some parts of the gorge difficult and unregulated grazing by cattle has degraded some parts of the natural vegetation. There have been unsubstantiated reports of possible sightings of rubber vine in Geikie Gorge, but past experience has shown that such reports are often based on incorrect identifications of similar vine species. It is possible that the sighting may actually have been of rubber bush (*Calatropis*) and not rubber vine. Even if rubber vine was not found, however, action will be required to remove and control other invasive feral weeds, and some sections of the gorge may need to be fenced to prevent access by cattle and other feral animals. The inclusion of Aboriginal peoples in the management of this area should be ensured



**Figure 10. Geikie Gorge**

**(photo. Karen Dayman)**

**Management Action Target (MAT12)****To improve the condition of Brooking Gorge**

This environmentally sensitive habitat is regarded as being exceptionally important from a biodiversity and tourism point of view. Although access is currently limited, future on-ground works may be required to restore the gorge to pristine condition and to maintain it as a healthy and resilient environment. The inclusion of Aboriginal peoples in the management of this area should be ensured.

**Management Action Target (MAT13)****To improve the condition of permanent pools along the Fitzroy River**

Permanent pools are regarded as important refugia for aquatic organisms during the dry season and are also important for the provision of recreational and bush-tucker resources. Many have been degraded and on-ground works are required to restore them to better condition, e.g. by fencing some off from cattle and re-vegetation with endemic species. Pilot projects to reduce cattle access to the river, particularly into permanent pools, should be implemented

**Management Action Target (MAT14)****To conduct the necessary research, design, economic costing and community consultation work that will enable a final investment decision to be made about the possible construction of a fishway at the Fitzroy River Barrage.**

Following a recommendations of the Fitzroy River fishway technical report (AECOM 2009) and the fishway community consultation report (Scott and Keenan, 2009), it is suggested that this is an important NRM issue that should be supported, especially because, in 2009, the WA Government announced additional funds to continue investigating the viability of the fishway option. An alternative management action to address barriers to fish passage could be to assess the practicality and costs of removal of the Fitzroy River barrage, as an alternative to the installation of a fishway at the barrage.

**Management Action Target (MAT15)****To ensure there is no decline in the distribution and abundance of the Freshwater mangrove over time.**

MAT15 should be supported by vegetation mapping of the distribution and abundance of this important cultural resource. This work should be undertaken by the Nyikina Mangala Traditional Owners as it is a key cultural resource and will be necessary to inform the development of a Sustainable Wild Harvest Management Plan for Freshwater mangrove.

**Priority Investment Strategy – biodiversity (PIS2)****Priority investment will be required to:**

- design and implement an acceptable, and less destructive, fire management system throughout the catchment and to initiate on-ground actions to implement the plan.**
- undertake actions to manage and control identified environmental weeds, based on an Integrated Weed Management Strategy**
- reduce the occurrence and control the spread of identified, problem feral animals throughout the catchment**

**improve the condition of Geikie and Brooking Gorge by removal of environmental weeds and, possibly, by fencing some sections to prevent access by feral animals and cattle  
conserve populations of animals and plants that are important for cultural, bush-tucker, and recreational purposes**

## **Theme 4 – Agricultural Resources**

The Fitzroy sandplains are covered with deep red sands and some yellow sandy earths. Self-mulching cracking clays and red/brown non-cracking clays are found on the alluvial plains, along with yellow sandy earths and some loamy duplexes. Stony soils are the most common soils of the hills and ranges, though red loamy earths are also present. Yellow loamy earths, red loamy earths and stony soils are found on the sandstone and shale outcrop plains, while on limestone country there are calcareous loamy earths, calcareous shallow loams and self-mulching cracking clays. Shallow gravels are associated with lateritic plateaux and remnants. Tidal soils are found on the coastal flats (Tille, P. 2006)

The Fitzroy Floodplain is underlain by the alluvial deposits of the Fitzroy River and its tributaries. The floodplain is characterized by broad levees, plains of heavy cracking clays (black soil) with gilgai and active and relict watercourses. (Lindsay, & Commander, 2005)

The major soil of the Camballin irrigation area is described as deep, strongly cracking greyish-brown to brown clay with variable small occurrences of lime and gypsum. The Camballin clay shows a marked similarity to the Cununurra clay of the Kimberley Research Station near Kununurra in the East Kimberley region. The intensive pattern of deep cracking makes this soil highly permeable when dry, but very slowly permeable when wet. The soil is quickly dispersed in water and is not suited to earthworks for anti-erosion purposes. The nitrogen content of the soil was relatively low (Department of Agriculture 2001). In general the soils in the West Kimberley are of low fertility as they are highly weathered. The most fertile soils are the darker coloured self-mulching cracking clays and alluvial soils (Speck, et al, 1964)

During the stakeholder workshops, land with high pastoral values, and land suitable for irrigated agriculture, were identified as high priority assets within the catchment (Figure 11). The Department of Agriculture releases regular reports on the condition of pastoral leases and, in the 2006/2007 report, Van Vreeswyk and Thomas (2008) reported that much of the northern rangelands still predominantly produce cattle for the export market, but that some local problems (e.g. feral animals) have resulted in a diversification of product in some cases. Although some concern was expressed over the level of knowledge of these assets, the areas were considered to be under threat from a range of problems, the principle ones being fire, weeds, feral animals and unmanaged grazing. The view was expressed that pastoralists need to be made aware of the latest developments in land management practices. An additional problem, caused partly by poor land management is that of soil erosion which can contribute significant amounts of sediment and nutrients to waterways. Solutions will involve engineering and land management practices to rehabilitate and stabilise these lands.

**Main threats to agricultural assets:**

**Fire – uncontrolled, dry-season fire**

**Weeds - a wide range of feral weeds on agricultural lands**

**Feral animals – particularly camels, donkeys and pigs**

**Unmanaged grazing and over-grazing in some areas**

Table 5, Appendix 4d, summarizes the agricultural assets identified during the stakeholder workshops.

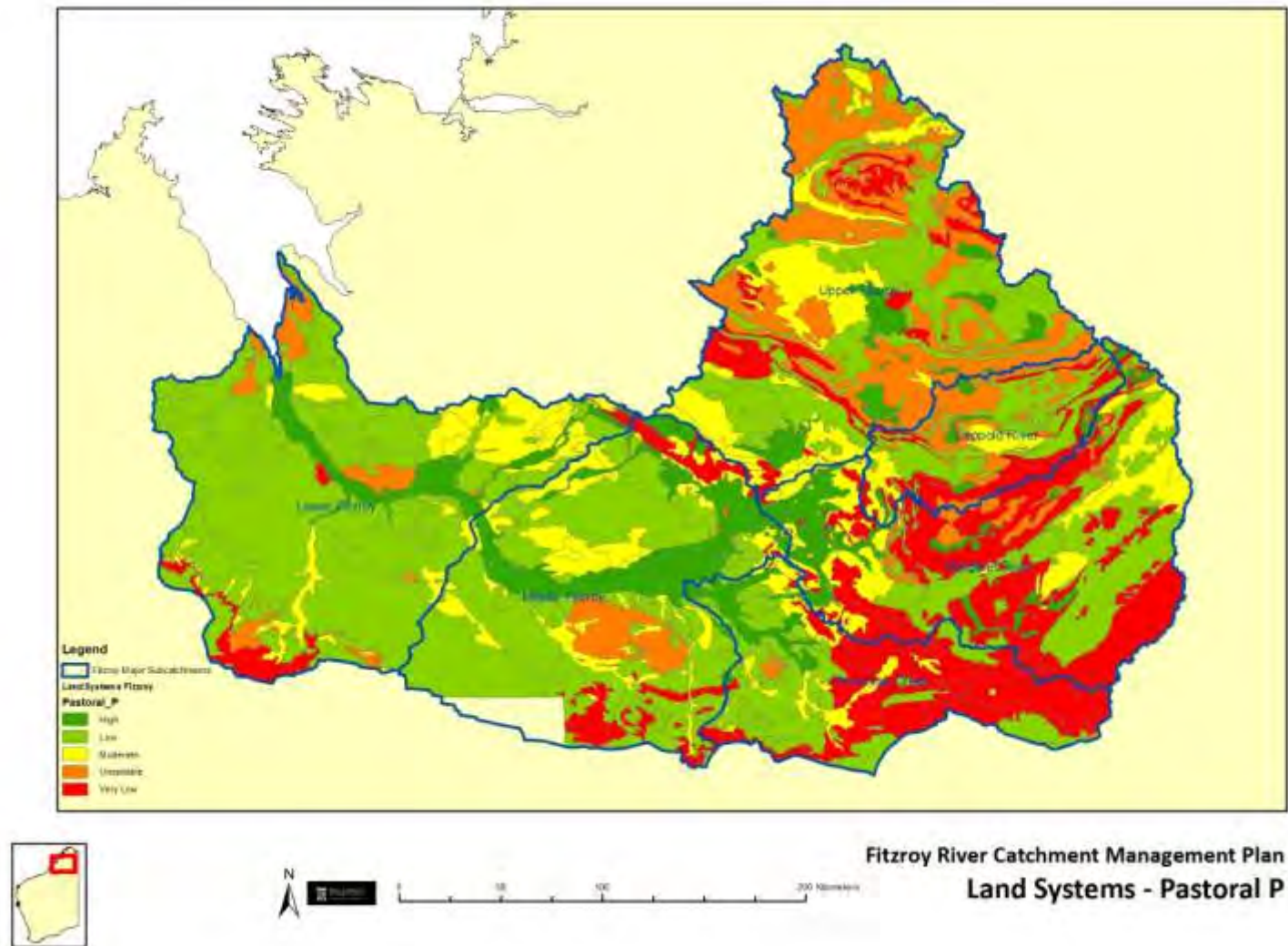


Figure 11. Agricultural land systems

Based on the information presented above, and on recommendations made during the stakeholder workshops, the following Catchment Target and Management Action Targets are recommended

**Catchment Target (CT7).**

**To decrease soil erosion and to improve soil health and land management practices on all agricultural lands so that productivity is improved, and threats such as feral animals and weeds are removed.**

Healthy soils are essential for sustainable agriculture, and best management practices help to produce the best results from such soils. This target addresses soil health across the agricultural and pastoral leases of the catchment to reduce soil loss and degradation and to promote the adoption of better soil and stock management practices across grazing lands. Property and landscape planning processes help to educate land managers to implement better land management practices. Landscape or subcatchment planning encourages people to work together with a long term commitment to both agricultural productivity, and to NRM.

**Management Action Target (MAT16)**

**To reduce soil erosion by improving overall groundcover on agricultural lands across the catchment**

Experience has shown that soils from which vegetation has been removed (e.g. by fire or overgrazing) are more prone to soil erosion than fully vegetated land. Groundcover protects soil from wind and water erosion and compaction. Pastoral land managed for minimal disturbance where grasses are perennial and nutrient levels are monitored have improved soil structure, greater water use efficiency, better nutrient cycling and are less prone to erosion and compaction. This target aims to increase pastoral land managed for optimal groundcover to protect the soil resource.

(Note: MAT17, MAT18 and MAT19 are very similar to MAT5, MAT6 and MAT7, except that they are applied specifically to agricultural lands.)

**Management Action Target (MAT17)**

**To adopt an acceptable, and less destructive, fire management system for agricultural lands and to initiate on-ground actions to implement the plan.**

**Management Action Target (MAT18)**

**Based on an Integrated Weed Management Strategy, to prioritize actions designed to manage and control identified environmental weeds on agricultural lands**

**Management Action Target (MAT19)**

**Based on an integrated plan to manage feral animals on agricultural lands, to reduce the occurrence and control the spread of identified, problem feral animals.**

**Priority Investment Strategy – agriculture (PIS3)**

**( note: some identical to PIS2)**

**Priority investment will be required to:**

**design and implement an acceptable, and less destructive, fire management system throughout the catchment and to initiate on-ground actions to implement the plan.**

**undertake actions to manage and control identified environmental weeds, based on an Integrated Weed Management Strategy**  
**reduce the occurrence and control the spread of identified, problem feral animals throughout the catchment**  
**reduce soil erosion by improving overall groundcover on agricultural lands across the catchment**

## **Theme 5 – Cultural, recreational and tourism assets**

This section of the CMP deals with the cultural, linguistic and historical assets that have been identified by the FitzCAM reference group members, and during the stakeholder workshops, as significant and warranting protection, promotion or on-going care.

The assets included in this section of the plan provide a valuable trigger for catchment residents to recognize, promote and protect their cultural and historical places. It allows each group to deal with the preservation of their heritage in appropriate and locally relevant ways. In relation to the ten traditional owner groups, despite this cosmological continuum of the Rainbow Serpent myths, each group has retained their individual laws and customs that are played out through ceremony and song, over very specific tracts of land and water. This has strong implications for the development and implementation of the CMP as each group can only be responsible for their tract of traditional lands. The workplans that are developed from this plan will continue to reflect these demarcations.

Several of the ten groups have emerging ranger initiatives that could pick up their section of the assets list and expand and develop these with their relevant elders, as discrete culturally focused and directed land management plans that would address very specific local land management targets. This process similarly could be followed by any of the interest and / or industry groups that have agency in the catchment.

It should be noted that mapping of the assets is not complete. While every effort has been made within the scope of the workplan to record a balanced set of assets across the catchment, this should not be read as definitive. As stated above, it is intended that the list provides a trigger for groups to develop their own local plans within the appropriate forums or to add to this draft, those assets that are deemed to have been overlooked. In many cases residents are disinclined to list significant places on their cultural estates and landholdings as they fear a surge of tourism and trespass that they feel is not conducive to the preservation of the environment.

The inclusion of the cultural and linguistic assets as a discrete section of the management plan is a strong indication of the importance of the assets locally. In many cases, they are so local, that they are confined in significance to only a handful of individuals and in others have universal appeal. It is a strong indicator of the strength and adaptability of the INFFER planning process, that such a divergent range of assets have been recognized and retained as integral elements.

Table 6, Appendix 4e, summarizes the cultural, recreational and tourism assets identified during the stakeholder workshops.

**Note: Because of the complexity of dealing with a large range of cultural and historical assets which are subject to very different types of threats, a list of identified threats will be included in Table 6.**

### **Cultural assets**

The Fitzroy Catchment is a rich and diverse cultural landscape, containing many places of cultural, spiritual and historical significance for both Indigenous and non-Indigenous people. Many of the people living in the area have considerable local knowledge in relation to NRM that needs to be incorporated into the CMP for the area. Many of the cultural and linguistic assets have been identified as significant and warranting protection, promotion or on-going care. It has been suggested that the foundation of a CMP should be formed by the stories for the country over which the plan will operate but it is recognized that there is no one definitive text that relates the breadth of the stories that underpin the catchment landscape. It will be important, therefore, to preserve local knowledge in relation to these cultural assets, in addition to undertaking on-ground works designed to protect them from over-exploitation and degradation. The Indigenous cultural assets of the Fitzroy Catchment should be managed by Aboriginal peoples who 'speak for country', and any proposed impact on Indigenous cultural assets should be communicated to Traditional Owners at the earliest opportunity. There are various international and domestic instruments of law that confirm the unique position of Indigenous peoples to determine their human rights. The federal government's endorsement of the UN Rights of Indigenous Peoples underpins the significance of Aboriginal management of cultural assets.

### **Catchment Target (CT6)**

**To catalogue, record and preserve the stories that underlie the cultural assets of the region, to protect those assets from over-exploitation and degradation and, in order to achieve this, to preserve the local languages of the area, to ensure the transmission of local knowledge, and to improve the NRM capability of the local population.**

The main issues that inhibit adequate protection of the cultural assets of the region, and restrict use of those assets by the local population, are:

- A lack of access to traditional lands
- Inability for TO groups to speak for anyone else's country
- Insufficient local employment in projects concerning cultural assets
- Loss of traditional Indigenous and non-Indigenous historical knowledge
- A history of the region that is nationally significant yet barely recorded
- Several distinct methods of land management that do not always sit logically alongside each other
- Inadequate link between the land and the lives of people who live on country as distinct from those who make laws and policy that affect development in the region
- Altered fire regimes that negatively impact on cultural sites
- Increased numbers of feral weeds and animals that negatively impact on cultural sites
- Inadequate NRM capability of local people

These issues lead to the following Management Action Targets:

**Management Action Target (MAT19)**

**To develop communication mechanisms and instigate projects that increase the contact that TOs have to their traditional lands.**

There are very few Indigenous people who are in a position to make and / or affect NRM decisions across the catchment. Education and extension projects need to be instigated to improve this.

**Management Action Target (MAT20)**

**To encourage TO groups to develop discrete on-ground workplans for their own country and to support all groups across the catchment in developing workplans from the CMP.**

**Management Action Target (MAT21)**

**To work closely with CDEP organisations, TAFE, KLC through the Kimberley Ranger Initiative, land managers and TOs in developing positive employment outcomes for all local people, especially in relation to projects associated with cultural assets.**

**Management Action Target (MAT22)**

**To support groups who want to record historical accounts and traditional knowledge and to preserve local languages.**

**Management Action Target (MAT23)**

**To support cluster groups that bring managers, TOs, government agencies and others together to develop plans that are cross jurisdictional and respectful of differing approaches and constraints.**

**Management Action Target (MAT24)**

**To develop a mentoring and management support network between managers and Indigenous workers who demonstrate leadership.**

**Management Action Target (MAT25)**

**To support the public display and distribution of historical accounts of catchment residents, events and stories.**

**Management Action Target (MAT26)**

**To develop stronger links between local land managers, government ministers and staff.**

**Management Action Target (MAT27)**

**To support the development of cooperative fire planning projects that take into account on-ground methods of annual burning.**

**Management Action Target (MAT28)**

**To support the employment of local people in projects to control the degradation of cultural sites by feral animals and weeds. . Increased resourcing for Aboriginal Ranger groups should be supported.**

**Management Action Target (MAT29)**

To develop targeted programs to educate local people in NRM, possibly by extension of programs similar to the Waterways Education Program currently being run in the Kimberley by UWA and the Department of Water

**Management Action Target (MAT30)**

To support Indigenous communities to develop sustainable natural resource-based industries, especially for bush foods and medicines, through support for case studies, trials, resource mapping and the development of wild harvest management plans.

**Priority Investment Strategy – cultural, historical and linguistic (PIS4)**

Priority investment will be required to:

- improve the NRM capability of local people by developing targeted education programs that will assist them to develop work plans directed towards the preservation of cultural assets
- fully catalogue and record cultural assets. This work should be undertaken by the appropriate individuals or groups
- carry out on-ground actions to protect specific cultural assets from further degradation by use of appropriate fencing, signage, access control, removal of feral weeds, fire protection.

**Tourism and recreational assets**

Tourism is the fastest developing industry within the Kimberley and has the potential to provide both advantages and disadvantages to the sustainability of the region. The natural values of the region are increasingly being recognised, and remote Kimberley destinations are attracting both domestic and international tourists. A rapid improvement in the accessibility of many remote areas near the Fitzroy River is leading to a significant increase in the number of people visiting the area. In 2002 there were 325,000 domestic and international visitors to the Kimberley. Total overnight domestic visitor expenditure for 2002 was estimated at \$237 million compared to \$203 million in 2001. Whilst these figures refer to the whole of the Kimberly region, the Fitzroy Catchment is also seeing an increase in tourist numbers. The region of the Fitzroy Catchment offers a wide variety of outdoor recreation including swimming, exploring, fishing, camping and some of Australia's best Barramundi fishing. The main tourism activities include four wheel drive and camping safaris, scenic flights, fishing, wilderness camps and adventure tours. Cultural tourism is also emerging as a prominent draw card to the region and has potential for significant growth in the future. A small number of pastoral enterprises are now involved in eco-tourism ventures further increasing the accessibility of previously unvisited areas. Mornington is the largest area currently involved with tourism. There are a few other sites where very small scale tourism is occurring on leases. These include:

- Mimbi / Mt Pierre – day tours to Mimbi caves
- Larawa – currently trying to set up a caravan park
- Quanbun – looking at housing tourists in the homestead
- Biridu / Leopold Station – Bungoorlie Tours a family owned business located on a community that is exercised from the pastoral lease. Leopold is Indigenous owned.
- Nyikina Mangala tours / Mt Anderson

The Kimberley Sustainable Tourism Strategy - a new plan developed in partnership with key organisations - outlines recommendations for sustainable tourism. Recommendations include the

development and promotion of environmental awareness, and developing Indigenous tourism and industry participation.

During the INFFER stakeholder workshops, a large number of tourist sites were identified, ranging from the spectacular features of Geikie Gorge and the Mimbi Caves, to the numerous tourist campsites along the river at the lower end of the catchment. The main threat to the tourist industry was considered to be uncontrolled and unmanaged access to tourist sites which, with the increasing numbers of tourist expected in the future, could destroy the very “wilderness” experience that such tourists are seeking. Ensuring that this attraction is maintained and appropriately managed is considered to be one of the most crucial challenges facing the region. Currently there is little co-ordinated management of the increasing number of tourists accessing remote areas in the region. Interagency discussions have recently started to develop a Gibb River Road Management Plan, but additional plans, strategies and policies will need to be developed in the near future to ensure appropriate protection of the important natural resources that underlie the attraction of tourist sites.

**Catchment Target (CT7).**

**To design catchment-wide strategies to protect the natural assets that underlie the attraction of tourist sites and to develop local management plans to control and manage access to, and use of, individual tourist sites.**

**Management Action Target (MAT31)**

**To develop individual, local management plans for each of the listed (Table 7) tourist sites, taking into account local knowledge and experience.**

Experience has shown that management of tourist sites is best achieved by the use of local people, who have intimate knowledge of, and connections with, individual sites, and who have a vested interest in ensuring the sustainability of such sites. Often, however, such people lack the experience and knowledge to develop and implement appropriate management strategies and so this target seeks to introduce training to local populations that will assist them to develop and implement appropriate strategies. In some cases, strategies will need to be site-specific in order to deal with specific threats at a particular site and, for this reason, the most urgent actions may differ from site to site. For example, some sections of the Geikie Gorge may need to be fenced off to prevent access by cattle, whilst the most important action at the Mimbi Caves may be the erection of appropriate signage. In areas of high conservation values, access may have to be restricted

**Management Action Target (MAT32)**

**To collaborate with Aboriginal tourism industry representative bodies and Traditional Owner groups to ensure the environmental and cultural impacts of tourism are properly managed, and to support the development of protocols to guide tourist operators on cultural awareness issues.**

**Priority Investment Strategy – tourism (PIS5)**

**Priority investment will be required to:**

- **develop individual, local management plans for individual tourist sites**
- **collaborate with Aboriginal tourism industry representative bodies and Traditional Owner groups to ensure the environmental and cultural impacts of tourism are properly managed**
- **support the development of protocols to guide tourist operators on cultural awareness issues**



**Figure 12. Sunset over Geikie Gorge**

**(photo. Karen Dayman)**

**Table 2 - Priority Investment Strategies - Summary**

<b>Objective</b>	<b>Investment Strategy</b>	<b>MAT No.</b>
<b>WATER</b>		
Understand interactions between water resources	Understand and document the interactions between the various categories of water storage resources (e.g. surface, alluvial, underground)	MAT 1
Water management	To give any appropriate input to assist DOW to produce equitable water management plans, that include maintaining natural river flows	MAT 2
<b>BIODIVERSITY /AGRICULTURE</b>		
Fire Management	Run a fire management workshop to involve all sectors of the community to develop catchment-wide Fire Management Protocols	MAT6 MAT 17
Fire control	Fund on-ground works in high risk regions to carry out work appropriate for Fire Management Protocols (e.g. controlled burns)	MAT 6 MAT 17
Weed mapping	Fund the mapping of occurrence of environmental weeds	MAT 7 MAT 18
Weed Management	Fund the development of an Integrated Weed Management Strategy, to prioritize actions designed to manage and control environmental weeds, in particular, Noogoora burr, Mimosa bush and Parkinsonia	MAT 7 MAT 18
Weed control	Fund on-ground works (e.g. by Ranger Groups) to undertake weed eradication programs.	MAT 7 MAT 18
Feral animal plan	Fund the development of an integrated plan to manage feral animals throughout the catchment	MAT 8 MAT 19
Feral animal control	Fund on-ground works (culling programs) to control identified problem animals such as camels, pigs, donkeys and wild dogs, at specific locations	MAT 8 MAT 19

<b>Conservation of important plants and animals</b>	<b>Fund programs to preserve and enhance populations of animals and plants that are important for cultural, bush-tucker, and recreational purposes</b>	<b>MAT 9 MAT 30</b>
<b>Improve the condition of Geikie Gorge</b>	<b>Fund on-ground works, such as appropriate fencing, removal of feral plants and animals, in Geikie Gorge</b>	<b>MAT 11</b>
<b>Improve the condition of Brooking Gorge</b>	<b>Fund on-ground works, such as appropriate fencing, removal of feral plants and animals, in Brooking Gorge</b>	<b>MAT12</b>
<b>Soil erosion</b>	<b>Fund programs to reduce soil erosion by improving groundcover on agricultural lands across catchment</b>	<b>MAT 16</b>
<b>CULTURAL / TOURISM</b>		
<b>Catalogue cultural assets</b>	<b>Fund work to catalogue and record cultural assets. This work should be undertaken by the appropriate local individuals or groups</b>	<b>MAT 22</b>
<b>Protect cultural assets</b>	<b>Fund on-ground actions to protect specific cultural assets from further degradation by use of appropriate fencing, signage and access control.</b>	<b>MAT 27</b>
<b>Manage tourist sites</b>	<b>Fund collaboration with Aboriginal tourism industry representative bodies and Traditional Owner groups to develop appropriate individual, local management plans for individual tourist sites.</b>	<b>MAT31 MAT 32</b>
<b>NRM</b>		
<b>Local NRM capacity</b>	<b>Develop targeted education programs to assist local people to develop NRM work plans directed towards the preservation of cultural assets</b>	<b>MAT 29</b>
<b>Advisory body</b>	<b>Fund a local advisory body to undertake the types of functions that FitzCAM carried out in the past.</b>	<b>CAT 1</b>

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## Appendices

### Appendix 1 - Key stakeholder groups in the Fitzroy region

Fitzroy Stakeholders	Involvement in Fitzroy
Bunuba Inc.	Indigenous organisation in Fitzroy Crossing.
Centre for Appropriate Technology (CAT)	Sustainable livelihoods for communities of Indigenous people through appropriate technology. CAT provides information, knowledge and practical services across a range of areas including energy, housing and infrastructure, water, waste, telecommunications, transport and technical skills development.
Department of Agriculture and Food WA (DAFWA)	New opportunities for Tropical and Pastoral Agriculture (NOTPA): facilitating pastoral diversification and development opportunities; Indigenous pastoral support program: assistance to develop and run pastoral enterprises.
Department of Environment and Conservation (DEC)	Joint Mgmt of Geikie Gorge w Bunuba; Administers the EP Act (vegetation clearing and pollution licensing), the CALM Act, the Wildlife Conservation Act.
Department of Environment, Water Heritage and the Arts (DEWHA)	Commonwealth Government department responsible for National Heritage listing process
Department of Fisheries	Develop all policy for fisheries management including fishing licences, aquaculture, bag limits, reserve management.
Department for Planning and Infrastructure (DPI)	Structure planning in communities
Department of Water (DOW)	Leads State Govt. water planning and management program as well as waterways management, water information, water licensing and some involvement in water service to remote communities.
Environs Kimberley (EK)	Non-profit environmental advocacy group.
Indigenous Land Corporation (ILC)	Assists Indigenous people acquire and manage and develop land; also been involved in the DAFWA Indigenous pastoral support program.
Indigenous water policy group (IWPG)	Supported by NAILSMA to bring together Indigenous people to contribute to water policy and planning and keep abreast of water reform. They have launched an Indigenous Water Facilitators network.
Kimberley Aboriginal Law and Culture Centre (KALACC)	The „culture arm“ of KLC. Their objective is to “To assist and promote the ceremonies, songs and dance of Kimberley Aboriginal people, to encourage and strengthen their social, cultural and legal values and ensure their traditions a place in Australian society”.
Kimberley Aboriginal Pastoral Association (KAPA)	Association to represent Indigenous pastoralists in the Kimberley (there is about 30% of pastoral stations owned and managed by Indigenous people).
Kimberley Development Commission (KDC)	The Kimberley Development Commission is a statutory authority of the government of Western Australia. Its role is to promote the economic and social development of this magnificent region of Australia.
Kimberley Language Resource Centre (KLRC)	Supporting the transmission of language and culture for maintenance of cultural heritage and connection to country.
Kimberley Land Council - Land and Sea Unit	Represents Traditional Owners and facilitates Indigenous

(KLC-LSU)	engagement.
Kimberley Regional Fire Management Project (KRFMP)	Now defunct NHT project getting people out on country for fire management. Another fire project has replaced this one.
Kimberley Sustainability Project	KDC and KLC – commonwealth funded
Lingiari Foundation	The Lingiari Foundation is a non-government Indigenous organisation that undertakes research on the development of Indigenous rights in Australia, and the relationship between that movement and the international struggle for Indigenous rights. Led by Pat Dodson.
Lower Fitzroy Management Group	For management of unauthorised camping, fishing and access to lower Fitzroy
North Australian Indigenous Land and Sea Management Alliance (NAILSMA)	Peak Indigenous NRM group for northern Australia.
Pastoral and Graziers Association (PGA)	Active in the Biosecurity group, FitzCAM and LCDC's
Pastoral Lands Board (PLB)	Administers the Land Admin Act 1997 for Pastoral Leases and pastoral diversification.
NRM Rangelands Coordinating Group (RCG)	Administers NHT funds and the implementation of the Kimberley NRM Strategy.
Shire of Derby West Kimberley	Local Government Authority governing the western part of the Fitzroy catchment.
Shire of Halls Creek	Local Government Authority governing the eastern part of the Fitzroy catchment.
West Kimberley Agricultural Association	A newly formed group of horticulturalists, irrigators and pastoralists engaged in diversified activities.
West Kimberley LCDC	This pastoral-based landcare group has had various periods of activity.
World Wildlife Fund for Nature (WWF)	Kimberley Wetlands Program - Helping identify significant wetlands with community involvement

**Appendix 2a – FITZCAM MEETING Date: 6<sup>th</sup> – 7<sup>th</sup> October 2009 Venue: DEC/  
Broome**

MEMBERS	MEMBERS	MEMBERS	MEMBERS
<b>BUNUBA</b> Mary Aiken	<b>GOONIYANDI</b> Mervyn Street	<b>NGARINYIN</b> Rosita Shaw	<b>NYIKINA MANGALA</b> Linda Nardea
<b>WANGKAJUNGA</b> Alan Lawford	<b>NYKINA</b> Anne Poelina	<b>WALMAJARRI</b> Edna Cherel	<b>BUNUBA / TOURISM</b> Mary Aiken
<b>MINING</b> Rochelle Sweeney	<b>DEPARTMENT OF AGRICULTURE</b> Sandra Vanvreeswyk Kevin May	<b>DEPT OF WATER</b> Dean Matthews	<b>SHIRE DERBY WEST KIMBERLEY</b> Peter Kneebone
<b>AUSTRALIAN WILDLIFE CONSERVANCY</b> Richard Kingswood	<b>IRRIGATORS</b> Phillip Hams	<b>ENVIRONS KIMBERLEY</b> Martin Pritchard	<b>NYIKINA MANGALA RANGERS</b> Names to be advised
<b>OBSERVER</b>	<b>INTERPRETER</b>		
<b>NRM RANGELANDS</b> Fiona Tingle	<b>INTERPRETER</b> Ronnie Jimbidie		
<b>APOLOGIES</b>	<b>APOLOGIES</b>	<b>APOLOGIES</b>	<b>APOLOGIES</b>
<b>PATORALISTS /PGA</b> Jim Motter	<b>DEPARTMENT OF ENVIRONMENT &amp; CONSERVATION</b> Sharon Ferguson	<b>NGARINYIN</b> Betty Walker	<b>KIJA</b> Sammy Walker Wallace Midmee
<b>KIMBERLEY LAND COUNCIL</b> Gary Kairn	<b>JARU</b> Rosemary Carey	<b>MANGALA</b> David Banjo	<b>RECREATIONAL FISHING</b> Redbeard Joe Duncan

## Appendix 2b - FITZCAM MEETING

Date: Monday 9<sup>th</sup> – Tuesday 10<sup>th</sup> November

Venue: Marra Worra Worra

MEMBERS	MEMBERS	MEMBERS	MEMBERS
<b>BUNUBA</b> Mary Aiken	<b>GOONIYANDI</b> Mervyn Street	<b>WANGKAJUNGA</b> Alan Lawford	<b>WALMAJARRI</b> Edna ChereI
<b>RECREATIONAL FISHERS</b> Redbeard	<b>DEPARTMENT OF AGRICULTURE</b> Sandra VanVreeswyk	<b>DEPT OF WATER</b> Rob Cossart Adam Maskew	<b>SHIRE DERBY WEST KIMBERLEY</b> Peter Kneebone
<b>PGA</b> Jim Motter	<b>IRRIGATORS</b> Philip Hams		
OBSERVER	OBSERVER	COMMUNITY MEMBERS	INTERPRETER
<b>NRM RANGELANDS</b> Fiona Tingle John Silver	<b>DEPARTMENT OF WATER</b> Clare Taylor	June Davis Helen Malo Joy Motter	<b>INTERPRETER</b> Ronnie Jimbidie
APOLOGIES	APOLOGIES	APOLOGIES	APOLOGIES
<b>JARU</b> Yvonne Birrell	<b>NYIKINA MANGALA</b> Anne Poelina	<b>NGARINYIN</b> Betty Walker	<b>KIJA</b> Wallace Midmee Sammy Walker
APOLOGIES	APOLOGIES	APOLOGIES	APOLOGIES
<b>ENVIRONS KIMBERLEY</b> Martin Pritchard	<b>DEPARTMENT OF ENVIRONMENT &amp; CONSERVATION</b> Sharon Ferguson	<b>MINING</b> John Mitchell	<b>BUNUBA / TOURISM</b> Dylan Andrews

**OTHERS PRESENT:** Lauren Pike / KLC media staff member, Jenni Metcalfe / TRaCK media consultant, Kate Golson / TRaCK Coordinator, Geoff Parks and Peter Cook / INFFER workshop presenters

## Appendix 3 – INFFER

### Appendix 3a - Outline of the INFFER process

The Investment Framework For Environmental Resources (information from [www.INFFER.org](http://www.INFFER.org) )

The Investment Framework For Environmental Resources (INFFER) is a tool for planning and prioritising public investments in natural resources and the environment. The core aim of INFFER is to help investors to achieve the highest value environmental and natural resource outcomes that are possible with the available resources. INFFER is intended to be used for projects that have a clear focus on protecting or enhancing specific natural assets. The INFFER process identifies, elicits and integrates the required information to rigorously prioritise potential investments in alternative environmental interventions.

Although the full INFFER process can include seven steps in all, development of the Fitzroy CMP required only the first few stages of the process in order to identify and prioritize the natural assets of the catchment. These stages were:

1. To develop a list of significant natural assets in the region
2. To apply an initial filter to the asset list, using a simplified set of criteria (including threats to the assets)
3. To define projects and on-ground works that might be appropriate to the high priority assets

The number of natural assets that are potential candidates for investment is extremely large. Even limiting the focus to assets of high significance (in step 1 of the process) still leaves a long list of possibilities. Working with regional natural resource management bodies in Australia (e.g. Catchment Management Authorities), the INFFER team has typically found that the list of significant assets in a region includes 100 to 300 items.

The budget available for investment in natural assets is sufficient for only a small proportion of the significant natural assets (perhaps 5 percent). Thus, prioritisation and targeting of effort is an unavoidable reality.

Different projects for investing in significant natural assets vary widely in their cost-effectiveness (i.e. value for money). Thus, prioritisation and targeting of effort is essential to produce the most valuable natural resource outcomes for the investment.

The process of filtering does not have to be exact or highly sophisticated. It just has to provide a transparent and efficient method for eliminating most of the significant assets from consideration, so that the remaining list consists of relatively good investment prospects

In the development of the Fitzroy CMP, identification and prioritization of assets was achieved through a number of INFFER Stakeholder Workshops and by on-ground visits to others who were unable to attend workshops. Community consultations was designed, as far as possible, to be consistent with the Protocol for Community Engagement of the Bilateral Agreements to deliver the extension of NHT and NAP. Every effort was made to meet the Protocol's requirement to include:

- Local government; State and Commonwealth agencies; Indigenous communities and organizations ; key industry, environmental and community development groups; relevant NRM community

groups; the relevant academic/ scientific community, as well as the general public and individuals with an interest in NRM in the Region.

### **Appendix 3b.- INFFER Asset Identification Recording Sheet**

#### **Background**

This sheet is a recording system which will need to be completed for each asset that is identified on the maps.

Recording information about the identified asset will help the NCCMA understand why this particular asset was chosen and what is special about it.

#### **Instructions**

***Fill out one sheet per asset.*** The sheet has a number of sections, as follows:

**Name of group or person nominating the asset:** This will identify who we can contact if need further information or clarification about the asset.

**Name of asset:** This should be something that you can easily associate with the asset.

**Location:** Include a simple description of the location of the asset; and include a town name and any nearby landscape features as reference point. For example,

**Description of asset:** Include the type of asset (e.g. river reach, wetland, etc), the estimated length/width or area of asset (if known), and the tenure (if known) of the asset.

**Current condition or state of the asset:** Describe what the asset is like now relative to its original condition. For example, pristine, intact or near natural; good condition; highly modified or degraded etcetera.

**Community/social value:** Describe what makes the asset significant to you in terms of, for example, amenity, recreational, philosophical or spiritual values.

**Environmental value:** Describe the environmental values the asset has. For example, habitat for threatened species; intact vegetation; or threatened vegetation type.

**Economic value:** Describe the economic values the asset has. For example, water for drinking or agriculture; tourism; timber production; or other productive uses.

**Threats to asset:** List all of the threats that you've noticed that impact on the condition of the asset. For example, salinity; rabbits; weeds; erosion; poor water quality; over-grazing; barriers to fish migration; and so on.

**Other discussion notes:** This section is to capture any additional information about the asset which may be useful for future reference.

<b>Name of asset</b>	<b>Asset Number</b>	<div>Official Use Only</div> <div>Polygon Number:</div> <div>Date entered:</div>	
<b>Location</b>	<b>Description of asset</b>	<b>Current condition or state of the asset</b>	
<b>Community/social values</b>	<b>Environmental values</b>	<b>Economic values</b>	
<b>Threats to the asset</b>	<b>Other discussion notes or information sources for the asset</b>		

**Table 3 - Appendix 4a – INFFER asset table – Big over-arching assets**

Big, over-arching assets		Significance	Threat level	Current condition/state of the asset	What is the goal?
Asset name	Asset type	E=Exceptional, VH=Very High, H=High	VH=Very High, H=High, M=Moderate, L=Low	VH=Very High(excellent) H=High (good), M=Moderate, L=Low	A clearly expressed statement that relates to the condition/extent of the asset
Fitzroy River	Water, cultural, biodiversity, tourism	E	H	M	Clean water with fish and other water life for future. People educated about rubbish, feral cattle and pigs and introduced plants. Removal of introduced weeds. Reduction of sedimentation and erosion. Maintain habitats for flora and fauna. An environment that is healthy, well protected, well-managed, resilient and provides essential ecosystem services in a changing climate.
The Fitzroy River Catchment	Biodiversity, cultural, water, agricultural, tourism	VH	VH	H / M	A catchment that is not subject to too frequent and too intense fires. Implementation of better land management that includes pastoral activity but with better control of stock grazing. Reduce overgrazing to allow rehabilitation. Removal of feral animals and weeds. Repair fences.
The Fitzroy River floodplain	Vegetation/ agriculture	VH	M	M	Floodplains that are stable, not eroding and free of weeds and pests. Pastoral management to produce high yielding, productive land that is adequately fenced. Fire management to prevent inappropriate fire regimes.

Riparian vegetation along the Fitzroy River	Biodiversity, cultural	VH	VH -H	M	Banks that are stable, not eroding, free of weeds and pests, and protected from introduced grazers and excessive public access, and in which fire is controlled. Impact areas should be identified, and management strategies undertaken.
King Leopold, Mueller and Durack Ranges	Geological, biodiversity, tourism	E	H	H	An area that is protected from fire and ferals. Maintain integrity and values.
Geike Range	Geological, biodiversity, tourism	E	H	H	An area that is free of weeds and is protected from introduced grazers (cattle, horses etc) and pests (pigs, foxes, cats). People who are educated about rubbish removal. An environment in which current condition and values are maintained and that is healthy, well protected and well-managed.
The Margaret River (and catchment)	Biodiversity, agriculture, Cultural sites of Goonyandi people	VH	H / VH	M / L	Improvement of current poor condition through sustainable land management practices and weed and pest removal to produce an environment that is healthy, well protected and well-managed and in which erosion is reduced, fences are repaired, and people are educated about removal of rubbish.
Loris Range / through Quanbun and Jubilee pastoral leases	Biodiversity, agriculture	—	—	—	—

**Table 4 - Appendix 4b – INFFER asset table – Water Resources**

Water resources	Significance	Threat level	Current condition/state of the asset	What is the goal?
Asset name	E=Exceptional, VH=Very High, H=High	VH=Very High, H=High, M=Moderate, L=Low	VH=Very High(excellent), H=High (good), M=Moderate, L=Low	A clearly expressed statement(s), that relates to the condition/extent of the asset
Water resources	E	M	H	Maintain equilibrium, ensure precautionary principle applies. Quantify all types of water storage and investigate interactions between them. Develop long-term management plans (currently being addressed by DOW)
Alluvial aquifer	E	H	VH	Maintain equilibrium, ensure precautionary principle applies. Quantify all types of water storage and investigate interactions between them. Develop long-term management plans (currently being addressed by DOW)
Ground Water resource	E	M	VH	Obtain more information to fill knowledge gaps to prove availability for commercial use. Maintain equilibrium, ensure precautionary principle applies. Quantify all types of water storage and investigate interactions between them. Develop long-term management plans
Unregulated flow regime of surface water	H	M	H	Protect the resource from over exploitation and reduce silting. Reduce erosion, sedimentation and infiltration.

**Table 5 - Appendix 4c – INFFER asset table - Biodiversity**

<b>Biodiversity</b>	<b>Significance</b>	<b>Threat level</b>	<b>Current condition/state of the asset</b>	<b>What is the goal?</b>
<b>Asset name</b>	<b>E=Exceptional, VH=Very High, H=High</b>	<b>VH=Very High, H=High, M=Moderate, L=Low</b>	<b>VH=Very High(excellent), H=High (good), M=Moderate, L=Low</b>	<b>A clearly expressed statement(s), that relates to the condition/extent of the asset</b>
Threatened ecological communities and priority threatened species (including fish species)	VH	H	M	To preserve and protect existing populations by public education and by restoring and improving threatened habitats. In the case of fish, to increase breeding areas and habitat by installation of a fishway.
Wetlands, e.g. The Camballin floodplain area (Le Lievre Swamp System) and wetlands near Derby	E - VH	M	M	Areas that either support wildlife sanctuaries or support highly profitable, intensive agriculture. Need to be kept free of weeds - this is a private benefit/used for fodder production. Le Lievre Swamp and Derby Wetlands should be protected and used for wildlife habitat. Minimise late season and high intensity fires, manage grazing. Maintain values. First class farming operation. Maintain hydrological process for flood plain connectivity over 20yrs.
Waterbirds on floodplains	VH	M	M	Agriculture activity has encouraged a wide range of bird life due to irrigation. Minimise late season wildfires, manage grazing. Maintain the hydrological process for flood plain connectivity over 20yrs.
Rainforest patches, various locations	VH	VH	M	Rainforest patches that are free of weeds and pests and are protected from weeds, pests and adverse fire regimes. Areas should be fenced, and lost vegetation restored to improve current condition.
Brooking Gorge	E - VH	H	M	An environment that is healthy, well protected, well-managed, resilient and provides essential ecosystem services in a changing climate. Improve hydrological process over the next 10yrs
Mudflats at mouth of the Fitzroy River	H - VH	H	H	An area that is not damaged by uncontrolled public access, multiple fires. Manage farms, mining and cattle as they have effects down river. Establish baseline data if coal mining at

				Liveringina happens. Maintain hydrological regimes over the next 20yrs
Permanent pools – various locations – e.g. Telegraph Pool	VH	VH - M	M	Implementation of better land management practices within the catchment. To manage tourists and locals (not to stop them but to create toilets & rubbish bins). Halt sedimentation filling up the pools. Prevent erosion to preserve and protect permanent water holes. Improve hydrological regime and connectivity over the next 5yrs.
Groundwater dependent ecosystems e.g. mound springs, Udialla Springs and Honeymoon Springs	VH	H	L	Prevent access by exotic animals and manage weeds
Freshwater prawns including <i>Macrobrachium rosenbergii</i> (Cherabun) and <i>Caridina</i> shrimps	E - VH	H	M	To maintain a sustainable population of prawns for recreational, food and ecosystem purposes, by educating people not to take excessive numbers. Research needed to determine sustainable numbers and levels of exploitation.
Shorebird habitat	H	M	H	Maintain integrity and manage vehicle access. Establish baseline data if coal mining at Liveringa happens.
Saltwater mangroves	VH	L	H	Maintain integrity of mangroves (accepting that mangrove erosion is a natural process). Establish baseline data. Remove exotic weeds.
Logue Creek Edgar Range	H	H	M	Remove exotic animals and weeds to return area to pristine values. Maintain fringing and remnant vegetation, water quality, and corridor effect. Protect from fire.
Barramundi	VH	VH	M	Maintain optimal level of fish stocks through education and enforcement. Research (e.g. tag and release) needed to define stock levels and fish movements.
The Freshwater Sawfish	E	H	M	Restore to natural levels. Increase the breeding area and habitat for migratory fish. Remove barriers to fish passage.
Gouldian Finch	VH	H	M	Reduce bushfire events through on-ground fire management. Protect habitat and food source from fire and cattle.
Bilby	VH	H	M - P	Improve and manage habitat conditions through fire management, limited access to habitat, safe movement between areas to limit roadkill. Use Rangers to fence off some critical habitat.

Linguistic diversity	VH	VH	L	Collaborative strategies to increase oral transmission of knowledge including through languages as well as Aboriginal community management of recording the knowledge in ways that are immediately accessible to them as well as researchers if required
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**Table 6 - Appendix 4d – INFFER asset table – Agricultural assets**

<b>Table 5 - Agricultural</b>	<b>Significance</b>	<b>Threat level</b>	<b>Current condition/state of the asset</b>	<b>What is the goal?</b>
<b>Asset name</b>	<b>E=Exceptional, VH=Very High, H=High</b>	<b>VH=Very High, H=High, M=Moderate, L=Low</b>	<b>VH=Very High(excellent), H=High (good), M=Moderate, L=Low</b>	<b>A clearly expressed statement(s), that relates to the condition/extent of the asset</b>
Land suitable for irrigated agriculture	H	L – M	H	Areas that can be used for profitable intensive agriculture with institutional assistance improved. Need more science and field studies to fill knowledge gaps. Enhance opportunities through diversification.
High Pastoral-value land	VH	M	M	Maintain or improve condition of high pastoral-value land through good land management practices

**Table 7 - Appendix 4e – INFFER asset table – Cultural, recreational and tourism**

Threats: F=Fire, W=Weeds, A= Feral animals, G=Unmanaged grazing, S=Siltation, D= Dams, T=Uncontrolled tourism, M=Mining, K= Loss Indigenous knowledge, E= Exclusion from sites, N= Lack of NRM capacity

<b>Table 6 - Cultural, recreational and tourism assets</b>					
<b>Asset name</b>	<b>Asset type</b>	<b>Threat level</b>	<b>What are the main threats?</b>	<b>Current condition/state of the asset</b>	<b>What is the goal?</b>
		VH=Very High, H=High, M=Moderate, L=Low	(see text for symbols)	VH=Very High(excellent), H=High (good), M=Moderate, L=Low	A clearly expressed statement(s), that relates to the condition/extent of the asset
<b>Cross regional cultural assets</b>					
The Margaret River (and catchment)	Biodiversity, agriculture, Cultural sites of Goonyandi people	H / VH	F,W,AG,S,D,K,R	M/L	Improvement of current poor condition through sustainable land management practices and weed and pest removal to produce an environment that is healthy, well protected and well-managed and in which erosion is reduced, fences are repaired, and people are educated about removal of rubbish.
Mary Pool and surrounding area	Cultural / central meeting area for Kija, Jaru and Gooniyandi	VH	W,A,G,T,K	M	To find money to fence off burial sites, sacred sites, Dreamtime places.To keep feral animals and unmanaged stock out. To keep tourism at current levels – no more facilities than what is there now.
Diamond gorge – Junction F.R. and King Leopold Range	Cultural, Recreational, Biodiversity,	M	D	VH	Maintain integrity and natural values and ensure it is not dammed. Create an area where Traditional Owners are trained

	aesthetic				and employed. Maintain hydrological characteristics of Gorge for environmental reasons.
River country and ecosystem knowledge	Cultural, Historical	H	K,E	VH	Working with the whole catchment community in maintaining an environment that is healthy, well protected, well-managed, resilient and providing essential ecosystem services in a changing climate.
Dream Time stories for sites within the catchment	Cultural	H	E,K	H	Comprehensive recording of stories and languages that are under threat of being lost, to assist in keeping the stories circulating.
Songs that describe the river and surrounding country	Cultural	VH	K	H	Comprehensive recording of songs and languages that relate to the catchment country.
River Floods	Cultural	H	F,G,D	M	Prevent restrictions that reduce river flow and spread (levees). To protect all flood plains from fire/cattle. Minimise late season and high intensity fires.
Floodplain inundation	Cultural, ecological	H	F,G,D	M	Must be maintained to provide land augmentation processes. Minimise late season fires, manage over grazing.
Punparringar-ri / fresh water mussel Officer Spring	Cultural				
Freshwater mangrove	Cultural / food	L	W,D	G	Remove exotic vines and weeds - needs biological or spray control. Maintain natural levels and distribution.
Rock art sites from the Hann	Cultural	M	F,W,A,G,K,E		To assist TO groups in developing sound

River to the bottom of Dimond Gorge, and the remainder of the river system					management plans and to monitor tourism activities to ensure the preservation of rock art sites throughout the catchment.
Lake Gladstone West of Anne River	Biodiversity, Food and water source	–	–	–	–
Stock Routes			K		To develop sections as riding and / or walking tracks and to preserve the history of the drovers who used them.
Receiving yards and dinner camps for droving			K		To develop signs that tell the story of the main droving camps.
WW2 support sites at Noonkanbah and Leopold					To record the stories for the involvement of catchment residents in the WW2 war effort and to mark the sites with plaques.
Network of independent community schools throughout the catchment	Historical				Record history of development of the independent education services. Many of the schools offer a broader cultural, land based education to community members.
Tourist sites (see text for examples)	Tourism	Sliding scale - VH - M	F,W,A,D,M,N	Sliding scale - H -M	More on site management and access control. Control rubbish, erosion, pollution, fires - manage to protect. Well managed facilities employing Traditional Owners that promote cultural awareness and a deeper understanding of the natural environment.
<b>Bunuba</b>					
Geikie Gorge	Cultural, Tourism, Important community cultural	H	W,G,A,D,T,R	H	Educate people to remove rubbish. Control feral cattle/pigs, and introduced plants. Maintain integrity and current

	site				condition. Implement management plan
Moanampi Spring upstream from Geikie Gorge	Cultural, Geological, Spring that is linked to Moanampi spring on GoGo Station near Old Cherrabun Homestead	M	W,A,G,S,T,K	M	To protect the site from degradation through controlled access
Brooking Gorge	Cultural, recreation, Community cultural site	H	W,G,A,K,R	M	To educate about rubbish taken away, feral cattle/pigs, and introduced plants.
Carpenter's Gap	Cultural, Historical, Archeological, site used internationally as a reference point of global migration of humans	H	T,K,R	M	Preserving the site for its international significance
Tunnel Creek	Cultural, Historical, Geological, Archeological	H	W,A,S,T,K,R	M	To maintain the site, the stories and the songs about Jandamarra for Bunuba people. To highlight the national significance of the story of the Bunuba resistance.
Lillimilura	Cultural, Historical	H	W,A,T,R	L	To arrest further decay of the structure and to highlight the story of the Police, Jandamarra and the Bunuba resistance
Rock art sites	Cultural, Historical,	H	F,T,K	M	To keep the stories and knowledge of the sites strong.
Old Town Precinct – Fitzroy Crossing	Cultural, Historical Built late 1930's	H	T,W,B,V	L	To be renovated and established as a cultural precinct

Post Office and, old lock-up and Sergeant's house					
Hospital monument	Cultural, Historical, Site of the Australian Inland Mission Hospital	H	W,V	M	To be cleaned regularly and repaired when necessary to keep the monument in good order
Old Crossing	Cultural, Historical	L	B,	M	To maintain the structure in good order, to erect signs that give the history of the low level crossing
Crossing Inn	Cultural, Historical, site of the original Oscar homestead		B,		
Pioneer Cemetery	Cultural, Historical	H	B,L,K	L	To stabilize the area to minimize the erosion.
Old Leopold Downs Homestead	Cultural, Historical	H	W,A,T,B,V	M	To preserve the stories of the old homestead and to stop the current decline in the condition of the buildings
Beef Road Project monument	Historical, painted rock and plaque to commemorate the opening of the new bridge, Fitzroy Crossing in 19??	M	W,R,B,V	M	To keep the paintings and plaques clean and to keep the weeds down around the monument
<b>Gooniyandi</b>					
Mimbi Caves	Cultural	M	W,A,T,R	VH	To keep the caves in good order and to maintain existing local tourism initiatives in order to keep local people employed in strong cultural tourism initiatives An area that is attractive to tourists but well

					managed by rangers, with appropriate campsites, etc. so that current values are maintained.
O'Donnell valley, Lumbarty Gorge, Juljuljuar water hole, Blue Bush Junction	Cultural, Recreation, Food, Bush tucker, Bush medicines	M	D	VH	To look after country with Rangers, including camping and painting sites. Maintain values by keeping the stories alive. Continue to use these places as quiet camping and fishing areas for families and kids.
A stretch of the Margaret River including - Gidamore spring, Ngalinggi (on Margaret river), Ngulumarra waterhole, Mungingoa water hole, Wurraangi	Cultural, Recreation, Fishing, dreaming sites,	M	F,W,A,G,M,	M	Pastoral/community working together on country for the future. To make sure that the stories are kept alive and to let people know who are the right people for the right areas.
Old Cemetery and burial sites close to Louisa Downs Homestead / the graves of old people who worked on the station.	Historical, cultural	M	F,A,M,G,K	M	To protect the places where old people are buried and to continue to maintain the old cemetery.
Millingooduru / meeting place for everyone in the DreamTime and source of particular ochre for ceremony and painting	Cultural	M	E,K	H	To continue to visit the site and to collect ochres.
Tiya Tiya / a big hill, home of the mud lark	Cultural, Biodiversity	M	F,T	M	Maintain fire management through ranger program
Mingalkala / permanent spring	Cultural, Biodiversity	M	F,G	M	Rangers working to maintain the spring and families to keep stories alive.

Pineapple bore Larrawa station	Cultural (personal)	VH	F,A,G,T,K,E	L	Ranger/pastoralists working on country to get access to look after and keep country healthy. Need to negotiate access to visit. Feral pigs are common.
Bohemia Downs along Christmas Creek – Black Bream dreaming site that has the last remaining water in the dry.	Cultural	VH	F,W,K,L	L	To restore and maintain the riparian zone.
Donkey Gorge - Turkey dreaming	Cultural / Burial Site	VH		M	To restore and maintain
Bohemia Downs –Gunudu cultural site, Joongali dreaming	Cultural, Historical	H	G,W,L	M	Sites to be monitored and maintained
Burial sites on Margaret River	Cultural	VH	K,E	L	Look after burial sites to be included in on-ground community workplans
Bulka Station – red finch breeding areas and section of the Two Dog dreaming story	Cultural, Historical, Biodiversity	VH	F,K	H	On-going access and to put a fence around the hill where the birds breed?
McDonald spring Bulka Stn.	Cultural, Historical, Biodiversity	VH	F,A	H	To be able to continue to visit the site.
Darngu, Bulka Stn.	Cultural, Historical, Biodiversity	M	A,K	M	To fence the waterholes to protect the site. To tell the stories and to negotiate access for camping.
Ngumpan spring	Cultural	H	F,G,T,M	L	Clean and fence the area, free from cattle, clean the scrub and bulrushes annually and to maintain the stories. To monitor the use of the water as main roads us this as a source for water for

					roadworks.
Paddy's Valley	Cultural, Historical, Archeological, site of GoGo fish fossils	H	D,T,M	M	Site is to be protected from land clearing as the fossils are of highly significant internationally
<b>Nyikina / Mangala</b>					
Mijirrikan - Point that divides river	Cultural	VH	W,G,T,K	M	To keep the stories alive for younger people by supporting elders in transferring their knowledge. Better protection of the wetlands in this area from cattle grazing and Tourism management, Weed control
Livingbirri Upper Liveringa	Cultural	VH	W,G,T,K	M	Better protection of the wetlands in this area from cattle grazing and Tourism management Weed control. Extremely significant site that needs protection
Camballin Barrage	cultural / historical	M	B,	H	To maintain the barrage structure or assess the practicality and costs of removal of the Fitzroy River barrage as an alternative option to installation of a fishway
Noonkanbah Station / major site for wool production & the story of the dispute over mining access to sacred sites	Cultural, Historical,	H	B,K	M	To record stories of the wool production at Noonkanbah.
Ooloobudah	Cultural	VH	W,G,T,K	M	Better protection of the wetlands in this area from cattle grazing and Tourism management Weed control. Extremely significant site needs

					protection
Jarlmadangah Mt. Anderson	Cultural	VH	G,	M	Protection of sites. Support Jarlmadangah community to undertake vegetation mapping and develop a Sustainable Wild Harvest Management Plan for Freshwater mangrove
Mudflats mouth of the river		VH		M	Monitoring and protection of site and research relating to the ecosystem.
Broken Wagon Pool	Cultural	H	A,G,T,K,E	L	Prevent access by exotic animals and control of people/vehicle use of area. To protect the site.
Goola Goolaboo – Lulugai Station	Cultural	H	G,K	M	To monitor the development to avoid broadacre farming. To look after burial sites and the homestead
Marngarda Geeguly Creek	Cultural, recreational, biodiversity	VH	A,W,T,K	M	Protect against exotic animal and weed damage. Look after Springs to restore story for that place
Paradise Hot Springs	Cultural, recreational	VH	A,W,K	M	To be protected
Oongalkada Udialla Spring & Manguel Creek	Cultural, recreational, biodiversity	H	A,G,K	M	Exclude exotic animals to return area to pristine value
Yigi Yigi Springs	Cultural, biodiversity	VH	A,G,M	M	Monitor the site, songs and stories to be maintained
Logue Spring Edgar Range - Jabiya Spring	Cultural, Biodiversity	VH	G,K	M	Fence Spring – protection from cattle
<b>Worrowa</b>					
NO SITES YET RECORDED					

<b>Ngarinyin</b>					
Hann River	Cultural	L	A	VH	To stop feral pigs
Gudboongardi / Manning Gorge	Cultural	L	T,K,E	H	Maintain/restore to pristine condition, to keep the stories strong
Bell Creek	Cultural	M	A	VH	To keep turtle numbers up by removing the feral pigs that squash the eggs around the banks
Adcock River	Cultural	M	A	VH	To be the same in ten years. To keep feral animals and cattle away from the river.
<b>Kija / Andajin?</b>					
Emu Flat on Mornington Station	Cultural	L	F,A	H	
Bulgundi / Saddlers jump-up on Tablelands Station	Cultural	L		H	
Tullewa Hill / DreaMATime site	Cultural, Biodiversity	L		H	
Jarrambamilitia / Fitzroy Bluff / Cherrabun increase site	Cultural	M		VH	
Walalay / Barramundi Rock / point where barramundi stop, none are found further upstream	Cultural				
Warlumilitja / Fitzroy Bluff falls	Cultural				Important place for rain ceremony to be monitored and protected
Wulungunadispararni / rock python site	Cultural				
Kumpuny / storm bird egg	Cultural				

Mornington main camp to the west of Home Creek / Gowaja	Cultural, Historical				To record the stories for TOs and the establishment of Mornington Station
Patariny / Nimbirrimbin	Cultural				Site to be monitored and not to be disturbed
Springs on the Fitzroy up from Little Fitzroy junction	Cultural	M	F,T,	VH	Spring waters to be kept in pristine condition as only water supply for a small community.
Purungul / sugar bag site North of the Mornington camp off Annie Creek	Cultural		K		
Jurnamilija / MAT Leake	Cultural		K		
Punparringarri / fresh water mussel Officer Spring	Cultural		K		
Idle Hole nth of Baulk face, nth of junction with Tablelands track	Cultural, Biodiversity		A,T,H	VH	To keep the site in pristine condition
Umpirta / MAT Brennan	Cultural	L	K	H	
Tharringbun / Maggie Springs / seep feeding Roy Creek	Cultural, Biodiversity		K		
Walwal spring on Tablelands track / spring that feeds waterholes along the creek / important for spirit tracks	Cultural		K		
Cemetery site west of Mornington camp / old station cemetery?	Cultural, Historical		K		
Ballaray Junction Between the Adcock and Cadjeput	Cultural		K		

Nowingwilingini / Junction of Roy Creek & Fitzroy River	Cultural		K		
Moola Bulla	Cultural, Historical	H	K,E,B	H	To maintain contact with the sites on the station, to be able to care for the country culturally.
Glenroy Meatworks	Historical	H	K,B	L	To photograph the meatworks site, research and record the stories.
<b>Jaru</b>					
Mary River	Cultural / Owl Dreaming site	VH	A,G,K	L	To keep the stories alive and to maintain the site, cleaning weeds and fencing
Spring waters and soaks	Cultural / ephemeral waters that Jaru and Gooniyandi people know how to find when the country is drying	VH	S,D,K,E	M	To gain access to visit places where access has been denied for some time. Fence off the main springs to maintain water quality.
Willy Willy Creek	Cultural, Historical	VH	F,G,E	M	To be able to visit. Site of the first mission where Jaru people met up with Kija and old people from everywhere, before Moola Bulla was set up.
Emu hunting grounds at Fish Hole and Snake Creek	Cultural, Biodiversity	H	W,K,I,E,A,U	M	To be able to continue to hunt emu; identify and protect the breeding area in quieter areas towards Fish Hole.
Fish Hole – important hunting and fishing area for old people, big spring	Cultural, Biodiversity	H	W,K,I,E	L	Clear the area of Turpentine bush

<b>Walmajarri</b>					
Kajina Hill	Cultural	L	F,A	M	Not to be disturbed, to keep the stories of Kajina circulating
Pulany St Georges Range	Cultural, historical, Biodiversity	M	F,G,A,W	M	Massacre site - not to be disturbed. To keep the area pristine - Fresh water all year, fishing for freshwater groper and large eels
Bangangoo / Lizard site on new Cherrabun Station with many bird species nesting here	Cultural, Biodiversity	VH	F,K	M	To monitor the site regularly and to maintain the stories.
Parnany hill At entrance to Yakanarra community, home of the rock pigeon Spinifex pigeon? And major dreaMAtime site	Cultural, biodiversity	L	F,K	M	To keep the stories alive to maintain the site by restricting access.
Moanampi Swamp, Big Mona Spring, main feeding, watering and breeding area for all birds – emu, brolga, turkey; DreamTime places	Cultural, biodiversity	VH	A,G,T	M	To restore and maintain. To fence the cattle off from the main spring
Parakapun / Old Cherrabun Station	Cultural, historical, Biodiversity	VH	G,T,B,K	M	To restore and maintain. To photograph the old buildings and remains of the camp and yards and to record the stories.
Lumpu Lumpu Southern boundary of catchment on Cherrabun Station	Cultural	VH	F,A,G,R,K	M	To erect a plaque near the site, this is where desert people came in to station country. To take photographs of the area. To maintain the songs.
Beefwood Station	Cultural	VH	F,G	M	To regain on-going contact with the

					county.
Jintangu spring waters and soak on the side of the St George Range near the Fitzroy river	Cultural, Recreation, Biodiversity	H	A,G	M	To restore and maintain the condition of the spring
Wunurru / burial site for old people near Pulany	Cultural, Biodiversity	VH	F,G	M	To monitor and look after the area as people from the St George Range consider this as part of their homeland and a reserve area
Pulkartujarti	Cultural	L	F,T	VH	Site to be monitored and not to be disturbed
<b>Other locations</b>					
Lucks Bore		VH		?	Get access to, look after the country
Mount Broome	Remnant rainforest				

## Appendix 5. – Department of Water

Participants in the INFFER workshops suggested that, before specific management actions could be recommended, the following questions should be put to the Department of Water. The official responses from DOW are recorded below:

1. **Question:** Is it correct that DOW has ruled out building dams on the main channel of the Fitzroy River ?

**DoW Answer:** *The water regimes and climate that characterise the Kimberley mean that surface water capture and storage is difficult and evaporation losses are significant.*

*The WA Government has no plans to invest in dam infrastructure on the Fitzroy River. The current Premier of Western Australia has publicly stated that there will be no dams on the main channel of the Fitzroy River. The DoWs policy position supports this.*

2. **Question:** Are there plans for dams on any of the other Fitzroy tributaries?

**DoW Answer:** *The Department of Water is not aware of plans to build dams on any tributaries of the Fitzroy river, from the WA Government or other private proponents. Any proposals for dams would require impact assessment that considers ecological, social, economic and cultural impacts. The Department's position is that alternative water supplies would need to be investigated before damming is considered.*

3. **Question:** Is it correct that DOW does not consider that the Fitzroy catchment is suitable for any type of inter-basin water transfer ?

**DoW Answer:** *An independent review was carried out in 2006<sup>1</sup> that assessed the potential of transferring water from the Fitzroy river to Perth. That review found that it was uneconomical to transfer water this distance. Further studies<sup>2</sup> have confirmed that the Kimberley is a water limited environment and that there might not be surplus water to transfer outside of the region as previously thought. Any proposal for inter-basin transfer would be subject to assessment with consideration of ecological, social, economic and cultural impact. There would have to be clear and demonstrated social benefits for any future proposals to be considered.*

4. **Question:** Does DOW consider that some of the Fitzroy water resources may be suitable for some future water trading scheme?

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<sup>1</sup> Appleyard *et al* (2006) Options for bringing water to Perth from the Kimberley: an independent review, Commissioned by Department of the Premier and Cabinet.

<sup>2</sup> CSIRO (2009a), Water in Northern Australia: Summary of reports to the Australian Government from the CSIRO Northern Australia Sustainable Yields Project, CSIRO, Australia

**DoW Answer:** *Water trading is a mechanism that would only come into effect once a water resource is fully utilised and thus water is scarce. The scarcity drives a demand for water and then drives the need for water trading. A 'water trading scheme' is not established unless there is a need and a driver (competition) for one.*

*Under the current WA legislation (the Rights in Water and Irrigation Act 1914) there are provisions for trading. There are proposals through water reforms such as the National Water Initiative for water trading to be improved.*

*Any sort of water trading is unlikely to come into effect in the Fitzroy area for a very long time, as currently the level of commercial water use is very low and therefore there is not the competition for water resources required to drive trade.*

5. **Question:** Does DOW have future projections for population growth in the Fitzroy catchment and, if so, what plans are there for supplying water to future populations and, specifically, what water resources can be used in the future without requiring the river to be dammed ?

**DoW Answer:** *Future demand projections have been carried out in order to assist with planning for water resource availability. As part of the Kimberley Regional Water Plan an assessment of future water demands has been made in relation to water availability at a broader sub-regional scale. Planning for specific water supplies is primarily the responsibility of the Water Corporation, who is the key service provider for the larger towns.*

*Currently there are issues with increasing the water supply at Halls Creek and the Water Corporation have put in place a range of water efficiency measures and a significant investigation process to establish a further supply.*

## **Appendix 6 - The Indigenous Water Policy Statement**

### **Recognition and reaffirmation**

The NAILSMA Indigenous Water Policy Group (IWPG) maintains, in accordance with Article 19 of the United Nations Declaration on the Rights of Indigenous Peoples that,

*'states shall consult and cooperate in good faith with the Indigenous people concerned through their own representative institutions, in order to obtain their free, prior and informed consent before adopting and implementing legislative or administrative measures that may affect them'.*

The IWPG expects the Australian Government to be responsive to the rights of Indigenous peoples in accordance with the United Nations Declaration, specifically:

- to maintain and strengthen their spiritual relationship with their traditionally owned territories and waters (Article 25); and,
- to approve the commercial use and development of water on their traditional territories. (Article 32.2)

The Australian Government indicated its formal support for the United Nations Declaration in April 2009. Preceding this, the Commonwealth, State and Territory governments of Australia committed to policies to 'close the gap' in socio-economic status between Indigenous peoples and the broader community.

The IWPG states that recognising and enhancing Indigenous cultural and commercial rights in the ownership, management and use of water is fundamental to facilitating Indigenous economic development and reducing Indigenous disadvantage.

The recognition of native title in Australia has been a significant advance in the position of Indigenous peoples. Indigenous rights to land and waters are recognised within the Native Title Act (1993). The nondiscriminatory protection of native title is a recognized human right.

It is therefore important to Indigenous peoples to build upon the rights recognised under the Native Title Act to ensure all Indigenous peoples can benefit from the commercial use of waters on their traditional lands.

Furthermore, Indigenous people are ready to engage and contribute to the Council of Australian Governments (COAG) water policies and the National Water Initiative. The NWI requires significant improvement with respect to the recognition of Indigenous rights and interests.

The Garma International Indigenous Water Declaration (2008) acknowledges that water is essential for life and that access to clean water is a human right. First Nation peoples, the Indigenous people of Australia, have maintained sovereignty over their lands and waters from which they obtain their spiritual and cultural identity, life and livelihoods.

The IWPG maintains in accordance with the Mary River Statement (2009) that the Indigenous peoples of northern Australia are the Traditional Owners and custodians of the land and waters of the region. Water land and Indigenous people are intrinsically entwined.

The IWPG advocates for the recognition of Indigenous rights to the ownership, management and use of waters for both customary and commercial purposes. Its advocacy for commercial rights is a pragmatic response to the Council of Australian Governments Water Reform Agenda, specifically the NWI, and the sudden pace of development in the north of Australia.

## **The NAILSMA Indigenous Water Policy Group States that:**

### **1. Indigenous peoples' Traditional Ownership must be fully recognised in Australian law.**

- The Native Title Act should be enhanced to provide for Indigenous rights to be recognised in the modern economy regardless of legal proof of native title. This is consistent with the Federal Government's native title policies which seek to encourage agreements that recognise both native title and non-native title outcomes for Indigenous peoples.

### **2. To ensure cultural rights and the equitable use of the consumptive, commercial allocation of water, water legislation and policy must include:**

- an allocated Cultural Flow, (in accordance with Articles 8, 25-28 of the United Nations Declaration on the Rights of Indigenous Peoples UNDRIP).

Cultural Flows are water entitlements that are legally and beneficially owned by Indigenous peoples and are of sufficient and adequate quantity and quality to maintain the spiritual, cultural, environmental, social and healthy livelihoods of Indigenous peoples of northern Australia (refer to the MLDRIN 2008 Echuca Statement).

### **3. Any water plan in tropical Australia must, irrespective of historical allocation, include an equitable Indigenous allocation from the consumptive pool for commercial purposes.**

- An Indigenous guaranteed entitlement to water in tropical north Australia from the consumptive pool for commercial purposes.
- For any commercial use of water, a negotiated revenue stream should be incorporated to be payable to Indigenous Traditional Owners and native title groups (in accordance with Articles 3, 5, 23, 26-28 UNDRIP).
- The establishment of an Indigenous Water Fund (or similar) that underwrites the Indigenous purchase of an equitable allocation of existing consumptive pools where it is otherwise unavailable; and in cases where compensation is entitled (in accordance with section 17 of the Native Title Act).

**An Indigenous Water Fund** is an Indigenous managed construct to be used for the benefit of those Indigenous peoples currently unable to access a commercial allocation and its generated incomes (in accordance with Articles 4, 18, 20 & 23 UNDRIP).

- An Indigenous entitlement to waters should be temporarily tradable, especially on a negotiated leasehold basis that will avoid the longer-term alienation of water property rights from the Indigenous owners (in accordance with Articles 5, 23 & 26 UNDRIP).

### **4. The planning and ongoing management of water resources will be done jointly with Indigenous Traditional Owners, native title groups and State and Territory water agencies** (in accordance with Articles 8, 18, 19, 23, 26-29 & 32 UNDRIP).