NATURAL RESOURCE MANAGEMENT IN THE PILBARA
DISCUSSION & ISSUES PAPER


De Grey River


Roebourne


Stuart Desert Pea


Boat Beach, Wickham


Indigenous Land Management Workshop

For additional information on the development of the Rangelands NRM Strategy and the Pilbara NRM Discussion & Issues Paper please contact:

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MOVING FORWARD

This paper is about increasing our understanding and appreciation of the Pilbara Regions wealth and ecosystem diversity, and starting to define what we want for the natural resources of the Pilbara now and into the future.

From this shared understanding, we will move forward to develop a natural resource management (NRM) plan for the Pilbara that maintains the health of the natural environment (land, water, coastal & marine, air and biodiversity and supports sustainable industries whilst enhancing enjoyment and a sense of stewardship for the communities of the Pilbara.

This discussion paper covers key areas for natural resource management, they are;

- AIR
- WATER
- COASTAL & MARINE
- BIODIVERSITY
- INDIGENOUS
- LAND

This discussion paper provides a broad overview of NRM and does not prioritise or weigh any issues more highly than others. The discussion paper is designed to stimulate and capture feedback from stakeholders on the breadth of issues concerning the community for input into the draft Pilbara NRM Plan. A comprehensive, technical paper is being developed and will be available on request in the 2005.

Feedback from the paper will be used to develop targets at a series of thematic working group workshops (pastoral, tourism, conservation, fisheries, mining, regional planning) to be held from January to February 2005. These workshops will prioritise sets of resource condition targets and management action targets which will form the starting point of the Pilbara NRM Plan.

Your contributions are vital to the successful development of the strategy. To assist with providing feedback we have incorporated question boxes at the end of each paper; please detach and return to us by 7th January 2005. To:

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To register your interest, ask any questions relating to the discussion paper or process and for more information about the Rangelands NRM Strategy and Pilbara NRM Plan please contact:

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Further copies are available: hardcopy, CD, Email and on the web at http://www.rangelands.wa.info (as of 2nd Dec 2004) and www.pdc.wa.gov.au

INTRODUCTION

This report provides a brief overview of the natural resource assets of the Pilbara including coastal & marine, biodiversity, water, and land and considers Indigenous aspects of NRM. It outlines some challenges that have been identified that impact on the sustainable use of these resources and identifies those with management responsibilities for the challenge to the resource.

The Rangelands Region of Western Australia is made of four sub-regions; the Pilbara, Gascoyne-Murchison, Kimberley and Nullarbor-Goldfields make up the. The Pilbara covers more than 5000,000 square kilometres and is bordered by the Gascoyne region in the south, the Kimberley Region in the North, the Indian Ocean to the West and the Northern Territory border to the east. The Region is both geologically and biologically unique to Australia.

The region can be separated into three distinct geographical formations, a vast coastal plain, breath-taking inland ranges and an arid desert region extending into Australia's dry centre.

The population of the Pilbara totalled 39,529 in 2003, with the majority residing in the western third of the Region predominately in the coastal areas. Most residents live in the Region's towns of Karratha, Roebourne, Paraburdoo, Onslow, Port Hedland, South Hedland, Newman, and Tom Price. The Pilbara Region makes up 7.5 per cent of regional Western Australia's population and 2.0 per cent of the State. Pilbara comprises four local government authorities; the Shires of Ashburton, East Pilbara, Roebourne and Town of Port Hedland.

The Pilbara's economy is dominated by the mining and petroleum industries and is considered Western Australia's primary mining region. In 2001/2002 the Pilbara contributed 56 per cent of the value of Western Australia's mineral and petroleum production. The pastoral, retail, trade and tourism industries also contribute the region's economy.

The three major commercial fisheries in the Pilbara are the Nickol Bay Fishery, the Onslow Prawn Fishery, and the Pilbara Fin Fish Trawl Fishery. Diving for pearl oyster is also carried out. Established fishing operations are located at Onslow, Dampier, Point Samson and Port Hedland.

Some of the Pilbara's most popular natural attractions are the Karijini and Millstream/Chichester National Parks and the 45 Islands of the Dampier Archipelago. The region is also well known for its heritage assets and especially for Aboriginal rock art, of which there are spectacular examples throughout the Pilbara. Tourism is a small but valuable contributor to the Pilbara's regional economy.

BIODIVERSITY IN THE PILBARA

The draft National Strategy for the Conservation of Australia's Biological Diversity (ANZECC Task Force on Biodiversity 1996) defines biodiversity as:

> The variety of all life forms – the different plants, animals and micro – organisms, the genes they contain and the ecosystems of which they form a part.
>
> (Definition: Ecosystem - a dynamic complex of plant, animal, fungal and micro-organism communities and associated non-living environment interacting as an ecological unit).

That is, biodiversity is the diversity of life through three levels:

- Species diversity: the variety of plant and animal species in a given region,
- Genetic diversity: the variety of genes within species; and
- Ecosystem diversity: the variety between and within ecosystem types.

The overarching goal for biodiversity conservation is:

> To protect, conserve, and where possible, restore the natural biodiversity of the Pilbara sub-region of the Rangelands, within functional natural ecosystems and habitats'– a broad goal that aims to address the diversity of species and ecosystems (including ecosystem processes).

Biodiversity assets can be quantified at many levels: genes, species, populations, communities and ecosystems. The diagram below (Figure 1 - Diagrammatic representation of the hierarchy of biodiversity assets) represents the hierarchy of biodiversity assets that is considered for the conservation of biodiversity within the Pilbara NRM region. Most discussion on biodiversity conservation for the Strategy is at the broader levels of ecosystem diversity and communities. These levels cover ecosystem processes as well as encompassing species and genetic diversity. Individual species are not specifically listed as assets in the Strategy, and it is intended that species diversity will be addressed through identified management actions for threatened and priority species as well as through sustainable ecosystem management.

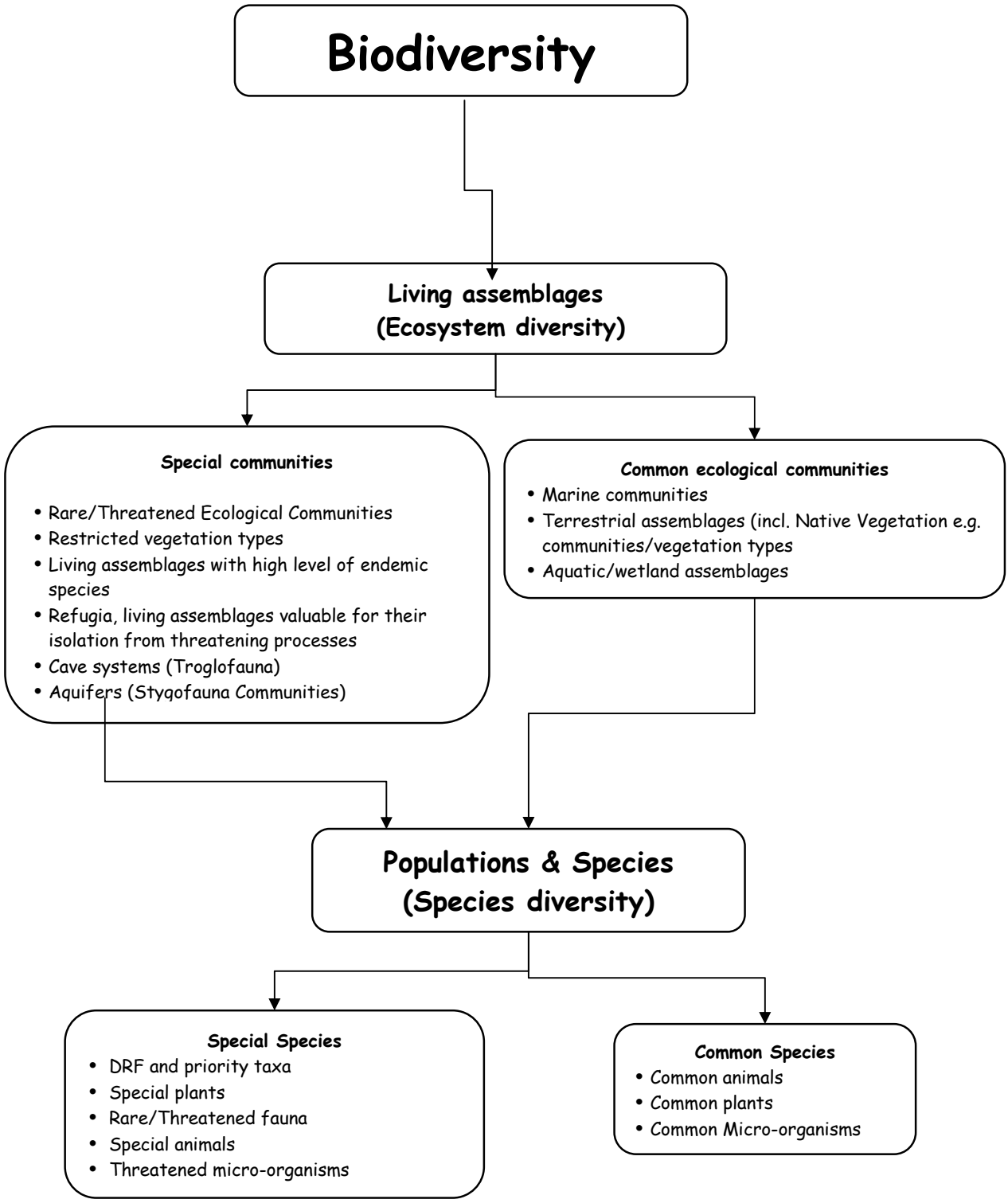

Figure 1: Diagrammatic representation of the hierarchy of biodiversity assets

Terrestrial and Aquatic Biodiversity

The Hamersley-Pilbara area was identified by the Department of Environment and Heritage as one of 15 biodiversity hotspots within Australia. This is because it provides habitat for a number of threatened, endemic and fire-sensitive species and communities, for example, the ghost bat, mulgara and spectacled hare-wallaby. In addition, the coastal islands are refuges for species that are vulnerable or extinct on mainland Australia, as well as being important breeding sites for turtles and seabirds. There are many endemic reptile species and the aquifers support endemic and rich stygofauna communities.

The Pilbara NRM Region has been further divided through the Interim Bio-Regionalisation of Australia (IBRA) into bioregions and sub-regions that describe broad areas of similar vegetation/soil/landscape associations. There are 7 IBRA bioregions (Pilbara, Great Sandy Desert, Little Sandy Desert, Gibson Desert, Gascoyne, Carnarvon and Dampierland) and 14 sub-bioregions that occur either wholly or partly within the Pilbara NRM.

- Within these sub-bioregions, there are:
    - **Numerous landscapes** such as catchments, ranges, coastal plains, (dry) cave systems. Across these landscapes there are a total of 116 vegetation associations, of which 61 (i.e. 53 %) occur only within the Pilbara NRM regions. The representation of vegetation associations on conservation estate is poor;
    - **Waterscapes:**
        - drainage basins;
        - Rivers and permanent pools: large (Ashburton, Fortescue and De Grey), medium (Maitland, Robe, Nickol and Harding), and small river systems with permanent pools of high ecological value;
        - Wetlands - seasonal, intermittent and permanent, that are important water sources and refuges for migratory birds and other wildlife. The only RAMSAR listed wetland in the Pilbara NRM is the very southern edge of Eighty Mile Beach. There are 15 wetlands of National Significance and 33 wetlands of subregional significance in the Pilbara;
        - Aquifers (groundwater) –from which ground water is extracted. The Pilbara aquifers support endemic stygofauna communities;
    - One **Threatened Ecological communities**, and a second – Dragon Tree Soak, in the Great Sandy Desert just north of the NRM boundary. In addition, 57 communities that are **considered at risk**, and 14 communities that act as **refugia**;
    - Rare Flora: two Declared Rare Flora (DRF), thirty Priority 1 and twenty three Priority 2;
    - Seven Schedule 1 mammals; two Schedule 1 birds; One Schedule 1 reptile, and Five Schedule 4 fauna.

Marine Biodiversity Assets

There are 4 regional ecosystems classified through the Interim Marine and Coastal Regionalisation for Australia (IMCRA) that occur wholly or partly in the region: (PIlbara nearshore; Pilbara offshore; North West Shelf; and a small part of Eighty Mile Beach). These habitats include:

- Discrete mangal systems that contribute significantly to marine nutrient resources;

- Intertidal mud and sand flats supporting abundant and species-rich invertebrate faunal communities that are important food sources for the migratory birds;
- Seagrasses & algal beds that support a diverse fauna of herbivorous fish, turtles and dugong;
- Well developed and species-rich coral reefs;
- Important nesting sites for turtles and seabirds;
- Important marine species include: five species of sea turtles; dugong, whale shark; vulnerable species of marine mammals; invertebrate communities, including endemics, seabirds and waders/shorebirds; fish; and marine reptiles; rare species are included in counts listed above.

It is important to note that there has been very little comprehensive survey and research work done on the marine ecosystems in the Pilbara and hence there are significant knowledge gaps.

Challenges to Biodiversity

There are a number of challenges to achieving the stated goal for biodiversity in the Pilbara. These challenges relate to two of the key areas identified for natural resource management namely land and water. These challenges and explanations of them are depicted in Table 1: Challenges to achieving the goal for biodiversity and the resource user groups that have management responsibilities.

Table 1: Challenges to achieving the goal for biodiversity and the resource user groups that have management responsibilities

Challenges to Biodiversity Conservation	Explanation of Challenge	Management Responsibilities
Physical disturbance Inappropriate fire regimes	Refers to the frequency, seasonality and intensity of fire. In recent history there has been an increase in the frequency of large, intense fires. This fire regime is different to earlier fire practices where there were more frequent smaller fires producing a patch-burn mosaic. There is a lack on knowledge on the effects of the change in fire regimes on biodiversity and how to best manage fire, e.g. a prescribed burning system that creates heterogeneity in burn history and vegetation structure across landscape.	Conservation, Pastoral, Indigenous, UCL, Tourism
Inappropriate total grazing pressure in regards to total carrying capacity	Refers to the effect on vegetation structure and composition as well as soil condition; This also includes the difficulties in predicting appropriate carrying capacity given variability in climate. This is also an area requiring more knowledge.	Pastoral, Indigenous, Conservation
Spatial pattern of grazing practices	Refers to the spatial pattern of grazing pressure as influenced by the location of watering points and the effect of intense grazing pressure on species composition around these watering points (including effect on riparian vegetation). Both historical and current grazing management practices are relevant to consider here.	Pastoral, Indigenous, Conservation
Vegetation clearing	Refers to the physical removal of vegetation by human means.	Mining, Industry, Regional Infrastructure, Tourism, Pastoral
Sedimentation of water	This is the process of silt and soil entering water bodies leading to a decrease in the ability of the basin to retain water, increased turbidity and subsequent reduction in the amount of natural light, photosynthesis and primary production. This is a risk in the marine environment, on reefs and seagrasses, as well as sponges and benthic communities, by dredging and other physical disturbance. Natural physical disturbance events such as cyclones and floods also have a large impact on sedimentation. There is a risk of sedimentation of rivers and wetlands associated with overuse by stock and exotic herbivores around riparian areas and permanent pools – the effect on the stability of river banks and increased sedimentation.	Mining, Indigenous (particularly pastoral leases), Pastoral, Conservation,

Challenge to Biodiversity Conservation	Explanation of Challenge	Management Responsibilities
Altered Hydrology	Refers to changes in natural flows of water across the land and within natural drainage systems (creeks, wetlands). It also includes the effects of erosion from reduced water infiltration from a lack of vegetation cover. Changes to hydrological regimes in rivers and wetlands can lead to changes in species composition and assemblages. Specific practices that alter hydrology: • infrastructure (across rivers & flat terrain) – creating drainage shadow, ponding • groundwater extraction to lower water table for mining activities; also for water usage in mining processing; • discharge of excess water into rivers and aquifers – creates to a water dependent ecosystem, source for weeds, further use by stock, changes to water quality; • effect of salinised water in mining voids entering aquifers – water table returns and fills void but is more saline, creating problems when the water then enters the aquifers.	Mining, Regional Infrastructure, Recreation and Tourism (as it relates to erosion from roads), Pastoralism (as it relates to erosion from areas of reduced vegetation cover)
Habitat degradation	This refers to habitat degradation from direct damages, for example: • Voids left behind after mining and capacity for biodiversity to be replaced in rehabilitation processes; also impact on water table – habitat for stygofauna; • Land reclamation e.g. building on mangrove habitat • Infrastructure (land and marine) • Bottom trawling – effect on marine habitats • Human recreational activities - Impact of high human visitation in certain areas and 4WD access to previously inaccessible areas. Examples include: impact of 4WD, camping at popular camping spots along rivers and permanent pools –effect on river bank stability, vegetation and water quality; human interaction on turtle and seabird nesting sites; powerlines and birds.	Mining, Regional Infrastructure, Recreation and Tourism, Conservation, Commercial Fishing,
Harvesting of Native fauna and flora Overfish of individual fish stocks	This refers to the overfishing of individual fish stocks in the local area in the fishing industry. It refers to both the commercial fishing industry and Recreational fishing which targets particular species, and especially higher order consumers (Mackerel), and important schooling (red emporer) and sedentary species (coral trout, cod). Also highlighted is the need for more fisheries staff to regulate existing regulations.	Commercial fishing, Recreation and Tourism,
By-catch	This refers to accidental catch of animals e.g. fish, invertebrates, turtles and mammals, through commercial fishing activities	Commercial Fishing, Recreation/Tourism; Pearling

Challenges to Biodiversity Conservation	Explanation of Risk	Management Responsibilities
Harvesting (cont'd)		
Flora Harvesting	• Seed collecting • Flora harvested for Aboriginal/cultural purposes • Bio-prospecting	Industry, Indigenous, Conservation
Introduced plants, animals and organisms Exotic plants (weeds) - competition	Refers to the competition from non-native plants. Sources include escaped garden species, new agricultural species, agricultural weed species and marine flora from ship hulls and ballast water. These plants include Nationally listed weeds (e.g. Parkinsonia, Mesquite) and environmental weeds – e.g. buffel grass, kapok bush, Ruby dock. Also includes the further introduction of non-native plants as well as links between weed establishment and nutrients, fire and other disturbances.	Pastoralism, Conservation, Indigenous, Regional Infrastructure, Mining, Recreation & Tourism
Exotic animals - competition	Refers to the competition from non-native animals for food, water and habitat. It is relevant for terrestrial (e.g. feral herbivores - rabbit, camels, donkeys, horses and increase in total grazing pressure; rats and mice) and marine systems (e.g. invasive exotic shellfish).	Pastoralism, Conservation, Indigenous, UCL, Regional Infrastructure,
Exotic animals – other damage	Refers to other direct and indirect damage from exotic herbivores to resources – eg fouling of water bodies; camels are known to extensively damage pastoral fences.	Pastoralism, Conservation, Indigenous, UCL
Exotic animals – predation	Refers to the predation of feral carnivores (e.g. foxes, cats and wild dogs) on native fauna, particularly critical weight range species. It also refers to exotic marine predators. Also includes the further introduction of exotic predators.	Pastoralism, Conservation, Indigenous, UCL, Regional Infrastructure
Marine organism disease	These are diseases that are detrimental to native marine species. The source of these diseases can include ship hulls and ballast water, disease carried by aquaculture and pearl stock and by marine aquarium fish released into the ocean.	Mining, Aquaculture, Commercial Fishing
Freshwater organism disease	These diseases are detrimental to native freshwater species. Sources can be aquaculture stock & diseases carried by aquarium fish released into the inland waters.	Aquaculture
Terrestrial animal disease	These are diseases that are detrimental to native terrestrial species. Sources can include reintroduction of non-quarantined animals, domestic stock, migratory animals.	Pastoralism, Conservation,
Terrestrial Plant disease	These are diseases that are detrimental to native plants. Examples include dieback and palm blight.	Pastoralism, Conservation,
Problem native species Genetic Provenance	This refers to the introduction of non-native genotypes as a consequence of poor taxonomic knowledge particularly in mine rehabilitation but also in amenity plantings and rangeland rehabilitation programs.	Industry, Mining, Conservation

Challenges to Biodiversity Conservation	Explanation of Risk	Management Responsibilities
Problem native species Cont Un-natural fluctuations of native animals	Refers to fluctuations of native animal populations that have increased beyond naturally occurring numbers. For example, increase in water points leads to increased kangaroo numbers leading to overly high numbers and increased pressure on native vegetation. Also includes plants that increase because of grazing pressures and changes in fire regime - woody weeds eg Bardi bush.	Conservation, Pastoral, Indigenous, UCL
Pollution Oil/Fuel	Refers to spills of oil or fuel in areas where it is likely to affective native flora, fauna on land or in the marine environment. For example, the potential for spills at oil-loading facilities at Barrow Island, Varanus Island, and Thevenard Islands.	Mining and other industries (including oil/gas)
Saline intrusion into groundwater	Refers to the intrusion of saline waters into freshwater ground water aquifers as a result of mining voids.	Mining
Waste disposal – mine tailings & ore-burden	Refers to disposal of mine tailings that can leach hazardous chemicals leading to adverse affects on native flora and fauna & ecological processes (Acid Mine Drainage).	Mining
Waste disposal – infill (refuse)	Refers to infill rubbish tips and associated effects on the natural receiving environment e.g. leachates from infill sites.	Regional Infrastructure, Mining, Pastoralism
Waste disposal -water	This refers to the disposal of contaminated water and its effects on the natural environment e.g. use of process water in mining operations	Mining,
Sewerage/waste water	This refers to the effects of sewerage that has been released into the natural environment. It also includes sullage –the release of sewerage from marine craft on the environment	Regional Infrastructure, Recreation/Tourism, Mining, Fishing, Recreation/Tourism
Waste disposal - chemical	This refers to issues related to chemical waste from industries and includes the burning of fossil fuels at petrochemical plants and the effect of the resulting acidification of the environment on sensitive organisms. It also refers to chemical spills & accumulations in the environment e.g. copper concentrate.	Mining, Industry
Waste disposal – ballast water	This refers to the release of ballast water from ships that may release contaminants or marine organisms and diseases (included in exotic species)	Mining, Shipping (including Mining),
Anti-fouling products	These refer to the effect of these products on the environment when they are applied to infrastructure.	Recreation/Tourism, Shipping (including Mining), Fishing
Noise - marine	Refers to the excessive levels of noise in marine environments from seismic exploration associated with oil & gas industries, as well as inboard/outboard engines on marine craft that potentially disturb animals that rely on sonic communication and navigation.	Mining, Fishing, Recreation/Tourism,

Challenges to Biodiversity Conservation	Explanation of Risk	Management Responsibilities
Altered biogeochemical processes **Altered carbon/nutrient cycles**	This refers to the altered levels of carbon/nutrient cycles in the soil and water bodies that effect flora and fauna that are adapted to specific levels and are sensitive to changes. For example, an increase in nutrients from aquaculture industry leads to epiphytic growth of algae and impacts on seagrasses.	Aquaculture industry;
Increased Salt from **saline intrusion into groundwater**	Refers to the intrusion of saline waters into freshwater ground water aquifers as a result of mining voids following mining operations.	Mining
Climate Change	This refers to changes in climatic conditions that could result in higher rainfall in summer that evaporates and creates a water deficit, increases in temperature and catastrophic events (eg cyclones, flooding). These changes will have a dramatic effect on biodiversity.	

BIODIVERSITY FEED BACK PAGE

This page is for you to provide feedback to us. Please detach and mail to

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Name:	
Organisation:	
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Are there any issues you would like to add? Please state

What condition do you want the natural resources of the Pilbara to be in in 50 years time? In other words what do you want to leave behind for your children (50 year targets)? We will call these Aspirational Targets. Please state

What condition do you want the natural resources of the Pilbara to be in in 10 to 20 years time? We will call these Resource Condition Targets. Please state

What do you think we need to do in the next 1 – 5 years to work towards how you want the natural environment of the Pilbara to look in 10-20 years time? We will call these Management Action targets. Please state

Are there any general comments you would like to add? Please state:

WATER IN THE PILBARA

Water assets in the Pilbara include rivers, wetlands and groundwater.

The Pilbara Rivers are unique. There are four wild rivers in the Pilbara (Tanberry Creek, Upper Robe River, Savory Creek and Rudall River). River flow is highly variable and dependent on rainfall from cyclonic activities. Rainfall events bring much needed rejuvenation to river pools, which experience deteriorating water quality during extended periods of no flow.

The Pilbara Rivers, as a whole, are generally in good condition. Except for changes to flow regimes, natural characteristics generally have a stronger influence over river condition than human impacts superimposed over these. Poor water quality is strongly correlated to the time since the last river flow, salinity is variable ranging from fresh to brackish and the fringing vegetation is in reasonable condition. There is some deterioration in vegetation health due to climate, erosion, fire, historical overgrazing and spread of noxious weeds (including Date Palms, Parkinsonia and Mesquite).

The Pilbara has a combination of seasonal, intermittent and permanent wetlands. The majority of the wetlands are located on or associated with a river and sustained by groundwater. Given the Pilbara's arid environment, wetlands (including permanent river pools) have extremely high ecological value. Preliminary studies suggest Pilbara wetlands show very high biodiversity value. One Ramsar wetland, Eighty-Mile Beach which is a coastal wetland, falls within the Pilbara region. The inland wetlands of the Hamersley Ranges, Fortescue Marsh, Weeli Wolli Springs, Millstream and many of the mangrove wetlands are assessed as Internationally Significant due to their unique cultural, social and ecological values. Like the rivers, impacts on wetlands are greatest during periods of drought.

Groundwater in the Pilbara is abstracted for town water supply, mining and pastoral activities. The volume of water abstracted for pastoral use is small in comparison to the other uses. The Pilbara groundwater aquifers support many endemic stygofauna communities. The Fortescue system, particularly the Millstream Aquifer, has many identified stygofauna 'hot spots'. The Pilbara groundwater supports many ecosystems, river pools and wetland systems. As such groundwater abstraction must consider impacts to the environment.

The following table provides a brief summary of water issues and discussion in the Pilbara.

Risk to Water Assets	Explanation of risk	Management Responsibility
Water Supply		
Growth & demand	▪ The Pilbara coast is one of the most significant growth areas in the State due to the expansion of the natural gas and iron ore industries. ▪ The cumulative impact of increasing water demands could potentially constrain industrial and residential growth in the Pilbara or compromise environmental needs. ▪ Many of the groundwater sources, which supply potable water to coastal towns, are under increasing pressure to provide water to meet the demands of the expanding Iron Ore Industry and associated dust management practices to meet social values. ▪ The Millstream aquifer is a unique system that supports one of the most significant wetland ecosystems in the Pilbara. It has the potential to be impacted by over abstraction. ▪ The Yule and De Grey water sources are also under increasing pressure to meet the demands of new industry projects coming on line and the rapid growth in water demand for dust management at Port Hedland. ▪ Planning for future water supplies (including the expansion of existing sources, establishment of new sources) linked to future industrial developments is urgently required.	Department of Environment (DoE) Water Corp Industry PIEC
Water use efficiency	▪ Residential and Industrial water users must continue to improve water use efficiency to help relieve pressure on existing bore fields. ▪ Poor water use efficiency is often linked to the lack of economic value placed on water and lack of awareness of potential ecosystem impacts at the source.	Water Corp DoE Industry Residents
Meeting ecosystem requirements & maintaining cultural values	▪ Any increases in water supply needs to be properly planned and assessed in the context of environmental water requirements and the cultural and social values of the water sources as well as the economic and social drivers. ▪ There is limited baseline information available on key ecological functions to guide development proposals. ▪ Contingency strategies (alternative short term water supply options) should be developed to minimise risk of ecosystem impact during extended periods of drought.	DoE Water Corp CALM Industry

Water & Industry		
Dust management	▪ Management of dust and water at ore-loading facilities is an important environmental and social issue in the Pilbara. ▪ Community dust concerns have triggered high use of potable water supply to manage dust levels. ▪ There is often a poor understanding of the connection between the use of water for dust management and pressure this additional usage may have on the ecosystems where the water is abstracted. ▪ In recognition of increasing water supply pressures and the projected mining expansion the mining industry must consider alternative best practice dust management options and properly consider water supply availability and water use efficiency measures. ▪ A balance is needed between the management of dust and the optimal use of scarce water resources. ▪ Ongoing liaison (non-regulatory) with industry and community is required to bring dust levels down as much as is reasonable for the Pilbara.	Industry DoE Water Corp LG
Voids & changes to groundwater	▪ Open cut mining has resulted in massive mine voids that extend below the watertable. As groundwater levels recover, artificial lakes form in the mine void. ▪ Mine voids may impact on local groundwater systems as the groundwater levels recover. It is difficult to determine the potential impact that a final void lake may have on the final groundwater system and groundwater dependent ecosystems. ▪ Pits become point sources of hypersaline water which may contaminate local groundwater sources. ▪ It is not known how voids may impact on the connectivity of stygofauna populations. ▪ Mining companies must consider, in their post mine closure management plans, the impacts of mine voids and how they will be managed.	Mining DoE EPA DPI
Dewatering & ecosystem impacts	▪ Dewatering may impact on local groundwater systems that support groundwater dependent ecosystems. ▪ Impacts on endemic stygofauna populations are not known. ▪ The mining industry uses Pilbara rivers and creek lines to discharge excess water obtained when dewatering a mine pit. ▪ The cumulative impacts of this practice have the potential to impact on the ecological values and functions of waterways as the ecosystem changes from a groundwater dependent ecosystem to one that is dependent on surface water. ▪ The artificial surface water system created will be more susceptible to weeds and provide additional drinking sources for feral animals. ▪ The quality of groundwater water discharged is often different to the waterway it is being discharged into. Due to the lack of baseline information the effect on downstream ecosystems and fish stocks is unknown. ▪ The new ecosystem created may develop a new set of environmental or social values, which cannot be maintained after discharge ceases. ▪ Consideration needs to be given to the cumulative scale of potential change, and whose responsibility it is to manage the ecosystem post mine closure or rehabilitate the artificial system back to the natural state.	Mining DoE EPA DPI

Water & Industry Cont		
Infrastructure & surface water effects	▪ Infrastructure (roads, bridges, culverts, railways, pipes and power lines) associated with mining and mining towns has a cumulative impact on river morphology by altering natural flow regimes. ▪ The number of river/creek crossings should be reduced and/or consolidated with other infrastructure to reduce disturbance to bed and banks and impacts to landscape values. ▪ Overtime gauging infrastructure and operation has decreased. Flow information is important to shaping development proposals, planning for infrastructure, water availability and in some cases manage environmental flow requirements to protect ecological values and functions. Gauging information is also used opportunistically to provide a flood warning service.	LG DoE Industry CALM DPI MainRoads
Pastoral Land Use		
Diversification & water use	▪ Nearly all diversification activities rely on some form of water use. Water requirements and management need to be identified early in the process.	DoE Leaseholders PLB
Riparian health & biodiversity	▪ The Pilbara rivers and wetlands are often sources of drinking water for stock. The riparian land (land adjacent to the river) is viewed as the best grazing country and often considered paramount to a pastoralist's livelihood. ▪ On some pastoral properties, livestock have uncontrolled access to the rivers. Where cattle are concentrated over a period of time this may impact on the riparian vegetation, stability of the riverbanks, increase sedimentation and reduce water quality. ▪ Controlling access to riparian areas is difficult as the cost of constantly repairing fences due to the impacts of wide spread floods must also be considered. ▪ It is also debated that the impact of cattle on riparian areas is not as great as that of fire, floods or drought. There is limited data available to determine which impact is greatest. ▪ Wetlands are susceptible to grazing pressures particularly during extended periods of drought. In addition to natural factors contributing to poor water quality and algae outbreaks stock may foul water and cause them to disappear through a combination of trampling (sedimentation) and consumption. ▪ Some pastoralists have sought funding, generally NLP or NHT, to help contribute to the costs of fencing off sensitive areas and create new off stream stock watering points. Avenues for funding should continue to be actively disseminated throughout the Pastoral community. ▪ Woody weeds such as Mesquite and Parkinsonia threaten the productivity of pastoral leases and the ecosystem integrity of riparian areas. ▪ There is limited access to initiatives such as the EMU project that link environmental management with productivity.	Pastoralists DoE CALM PLB LCDC's

Pastoral Land Use Cont		
Groundwater usage	▪ Groundwater usage by the pastoral industry is minor when compared with mining and town water supply. ▪ There is increasing use of groundwater to establish off stream stock watering points. ▪ Pastoralists have used free flowing artesian bores in the Canning Basin opportunistically for many years. Although essential for economic viability, the current situation is no longer justifiable or sustainable due to the environmental problems they create, nor is it consistent with artesian water management goals across Australia. However rehabilitation and establishment of new watering sites is costly and requires subsidisation. The DoE, Shire of East Pilbara, DeGrey LCDC and the Rangelands NRM Coordinating Group are working in collaboration to secure funding.	Pastoralists LCDC's LG DoE
Tourism and Recreation		
Ecosystem impacts	▪ Increasing costs of caravan parks and the shortage of available camping/caravan sites in some towns has placed additional pressure on alternative river camping spots especially roadside travel stops. ▪ Recreation and tourism focus intensive activity into small locations – particularly river crossings and permanent river pools compromising banks stability, vegetation, water quality and aesthetics. Examples include Miaree Pool (Karratha) and Chinaman's Pool (Marble Bar) where active management is now needed. ▪ Given the Pilbara's dry semi arid environment, permanent river pools and wetlands are highly valued recreational and tourism attractions. These sites often coincide with areas of significant ecological or cultural values. ▪ Most visitors are not aware of the environmental and cultural significance of these sites. Signage may help. ▪ Attractions may also be located on pastoral properties that are often powerless to actively manage visitor impacts. ▪ The increased use of 4WD's and the establishment of drive trails have also lead to opening up previously inaccessible areas. ▪ Vehicles access to close to the river causes riverbanks to erode and become unstable, soils are compacted and riparian vegetation is destroyed. ▪ The remoteness of many places makes maintenance such as signage, facilities (toilets) rubbish collection and camp fee collection often impractical. Alternative management options need to be considered.	Tourism WA MainRoads LG DoE CALM Tour Groups Visitor Centres Visitors

Indigenous land and water management and enterprises		
	▪ Aboriginal people in the Pilbara have a strong spiritual connection to many of the Pilbara Rivers & wetlands with rituals and lore business conducted along many of the Pilbara Rivers and wetlands. ▪ Excessive use of riparian areas or extensive infestations of weeds such as Parkinsonia and Mesquite impact on the survival and regeneration of riparian vegetation, which may be used for ceremonies, bush tucker or bush medicine. ▪ Permanent pools, often essential to replenish drinking water supplies, may be impacted by stock, groundwater usage or alteration of natural flow regimes. ▪ More support is needed to help local community groups' document cultural values along Pilbara Rivers and wetlands. ▪ The ability to still maintain culture along Pilbara waterways is a strong indicator of ecosystem health and therefore management of environmental and cultural values is inextricably linked. ▪ Enterprises currently being explored include cultural and bush tucker tours.	Regional Councils DIA Language Groups DoE CALM Leaseholders

WATER FEED BACK PAGE

This page is for you to provide feedback to us. Please detach and mail to

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LAND RESOURCES IN THE PILBARA

Pastoralism is intrinsic to the social, economic and environmental fabric of the Australian Rangelands. The Pilbara Pastoral industry was established in the early 1860's based on wool production with a few cattle. Currently 4 pastoral leases run sheep in conjunction with cattle. All remaining leases run cattle, driven predominantly by economics, sheep mortality rates caused by predation and minimal wool production.

Pastoral Stations occur throughout the western third of the Pilbara Region (Indicators of Regional Development in Western Australia. Department of Local Government and Regional Development 2003) covering some 14.6 million ha representing about 28% of the Pilbara land area. The median lease area in the Pilbara is 198,000ha (Gascoyne Muster II). Currently there are 55 pastoral enterprises in the Pilbara. Over the years, the number has decreased from 65, due to the amalgamation of leases. Thirteen stations are run in conjunction with farming operations in the agricultural area.

The Pilbara pastoral industry is well situated for access to a variety of markets. Live export through Port Hedland is well established to provide cattle to Malaysia and Indonesia. Stocks are also in demand by southern feedlotters, graziers and exporters. Further advancements in genetics, significant investments made in infrastructure, new technologies for water delivery and an ongoing commitment to sustainable management have only strengthened the long-term viability and stability of this well-established industry.

2000/2001 Estimates on Pilbara Livestock Numbers

Pilbara Livestock	(000 head)
Cattle Numbers	250
Cattle Sales	70
Sheep & Lamb numbers	49
Sheep & Lamb sales	15

Source: Department of Agriculture Western Australia (DAWA) (2002a)

In 1999/00 agricultural production was valued at $27 million in the Pilbara. Livestock disposals contributed $25.3 million and wool production was valued at $1.7 million.

Stock rely on the native vegetation present although the introduction of buffel and birdwood grass species 70 years earlier has definitely enhanced the productivity of the rangelands for pastoralists. The actual grazing value and appropriate stocking of a particular pasture at any time vary enormously with seasonal conditions, fire history, perennial pasture condition and degree of recent use (Payne & Mitchell 2002).

Pastoralists value highly the natural assets upon which their industry is based.
Grazing management strategies, monitoring sites, drought strategies, training, research and development are all common components of the modern pastoral industry. There is a greater awareness amongst pastoralists of the need for 'pre-emptive' management in response to seasonal variations and an enhanced capacity to implement actions.

Lease information for the Pilbara

Family & Company		*Aboriginal*		*CALM*		*Mining*		*Special*	*VCL*
No.	*Area ('000 ha)*	*No.*	*Area ('000 ha)*	*No.*	*Area ('000 ha)*	*No.*	*Area ('000 ha)*	*Area ('000 ha)*	*Area ('000 ha)*
43	9907	10	1687	3	552	9	2291	3114	2874

Source: Department of Agriculture Western Australia (DAWA) (2002a)

There are currently 10 indigenous pastoral leases in the Pilbara.

1. Coongan (Strelley Pastoral Co.) Cattle
2. Strelley (Strelley Pastoral Co.) Cattle
3. Kangan Cattle
4. Ullawarra
5. Mt Divide
6. Mt Welcome
7. Peedamulla-cattle
8. Pippingarra-cattle
9. Robertson Range (Jigalong Community)-destocked
10. Walagunya

Pastoral-Mining Leases include

1. Boodarie (BHP) sheep and cattle
2. Ethel Creek (BHP) cattle
3. Marilana (BHP) cattle
4. Hamersley (Hamersley Iron Pty Ltd) cattle
5. Juna Downs (Hamersley Iron Pty Ltd) cattle
6. Karratha Station (Hamersley Iron Pty Ltd) cattle
7. Rocklea (Hamersley Iron) cattle
8. Sylvania (BHP) cattle
9. Yalleen (Robe River Mining Co Pty Ltd)
10. Yarraloola (Robe River Mining Co Pty Ltd)

The following table has been compiled with the information provided at the Land Conservation District Committee meetings held in November and December in 2003 and via comments from Pilbara Pastoralists. The issues obtained from the LCDC meetings were presented at the December District Consultative Meeting held in Port Hedland. Pastoralists were invited to make comments on the issues and additions where necessary. Not all Pilbara pastoralists were able to attend their respective LCDC meetings and/or the DCM, therefore the issues were summarised in the December issue of the Northern Rangelands Pastoral Memo and were open to feedback.

A more comprehensive document is available on request, which outlines current management practices and some of the actions required in the future to manage the land resource. The comprehensive document will be sent out to all pastoralists before the December 2004 District Consultative Meeting, allowing Pastoralist to review the document and make comments and provide input on future direction.

Risk to Pastoral Land	Explanation of Risk	Management Responsibility
1. Weeds –non native	• Introduction of new species • Mesquite (spread over 150,000 ha of Mardie Station-single largest infestation in Australia) Weed of National Significance • Parkinsonia-Weed of National Significance. Exists on Ashburton, Robe, Fortescue, Maitland, Harding and De Grey Rivers • Ruby dock	Leaseholders, PMMC, DAWA, NPBMC
2. Weeds-Native/Naturalised	*Acacia victoriae/*Bardie Bush/Prickly Acacia, *Acacia farnesiana/*Mimosa Bush *(introduced to Australia prior to European settlement)* increasing and out competing other plants	Leaseholders
3. Legislation	Inappropriate polices introduced to protect the environment throughout the state without taking into account the diversity between regions. E.g. the clearing legislation is aimed at agricultural areas in the South West of the State, but has been applied statewide and does not acknowledge the differences between Rangeland and agricultural land. I.e. increasing native/naturalised plants difficult to manage and need to contact the PLB for approval.	Leaseholders, Local Government,
4. Diversification	Limited ability to use the natural environment for things other than pure pastoralism eg tourism	Leaseholders, Pastoral Lands Board
5. Fires	Two perspective's for fire management; • State and Local Govt laws, responsibilities, attitude to firebreaks, wildfire procedures, control and prevention • Used as a land management tool by landholders, regimes that are appropriate to vegetation and required outcome.	Leaseholders, Local Government, FESA
6. Soil erosion	• Via wind and water • Exacerbated during drought, cyclones and on burnt country where vegetation is absent or scarce. • Areas previously overgrazed (by past practices) become susceptible to erosion • Dust can be an issue associated with soil erosion particularly where it blows across a town or highways. • An apparent lack of local knowledge in planning/design of infrastructure creates problems with water flow, plant loss and soil erosion eg road and bridge construction.	Leaseholders, Main Roads, Rail
7. Vertebrate Pests	• Wild dogs- consume native fauna and can maim or kill domestic livestock • Feral Camels, Donkeys and horses compete with native herbivores and domesticated stock for feed. Increasing grazing pressure as feral animals move out of the desert areas (ie Great Sandy Desert). Management of Crown land is inadequate due to lack of resources (Comments from East Pilbara LCDC	Leaseholders, DAWA, CALM

	meeting 2003)	
8. Access	• Increasing population seeks new recreational areas and with 4wds seek to go anywhere unrestricted. • Fires lit indiscriminately have an environmental impact, possibly long term, depending on type of vegetation burnt and time of year. This then flows on to become an economic impact particularly where the damage to vegetation is such that it can take many years to recover depending on the rainfall received. • The access issue should not be under estimated as it goes to the heart of viability and the ability to conduct a business in a multi-user system of land use. In theory the rights of all stakeholders should be protected and as much as possible, outcomes sought to accommodate others but the practicalities would seem to dictate that at some point where those rights conflict on pastoral held land the rights of the pastoralist should prevail. • Also place infrastructure at risk – buildings, fences,etc and unbalance pastoralists fire regimes • spread of weeds • theft and damage of infrastructure • rubbish in and around waters • Camping at water points preventing stock from coming in to drink • Gates not attended to appropriately & fences cut • There is a lack of responsibility for problems that are caused • No entity managing tourist access other than pastoralists • Not enough designated areas and tourist pathways. • Lack of information/ direction available to tourists on where they can and can't go.	Leaseholders, Local Government, Pastoral Lands Board
9. Infrastructure	• roads Diverting the course of water and causing ponding leading to the death of some plants • Roads leading to bridges (i.e. Maitland Bridge) hold back water in cyclonic events, causing flooding across plains until the bridge or road give way acting as a "plug". Soil is washed into adjacent rivers as the "plug" and subsequent pressure is released. • Management of Artesian bores and water flows.	Main Roads, Local Government, Leaseholders
10. Education	• Education for station staff is difficult to access • recognition of prior (on the job experience) learning not readily approved due to lack of accreditation of individuals performance • high turnover of staff • lack of community awareness of the pastoral industry and management of the rangelands	Leaseholders, TAFE, PGA
11. Status of Productive pasture species	• *Eg accepting buffel grass as a naturalised species.*	Leaseholders, DAWA

12. Invertebrate Pests	• Locusts: difficult to control and result in reduced amount of feed for cattle due to damage of vegetation	Leaseholders
13. Land Tenure Lease renewals in 2015	• Leading to unviable pastoral leases	
14. Reduced pastoral access	• Land exclusions=loss of grazing rights, removal of infrastructure. Productive pieces of country excluded from grazing.	
15. Native Title	• Vegetation rehabilitation process drawn-out because of approvals and clearances required. • Claims for land management and unrestricted access	Leaseholders, Native Title Claimants

LAND FEED BACK PAGE

This page is for you to provide feedback to us. Please detach and mail to

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COASTAL & MARINE RESOURCES IN THE PILBARA

The Pilbara coast is characterised by deltas, barrier islands, and associated lagoons with extensive development of mangroves (mangals), backed by wide supra-tidal flats and long stretches of sandy beach in the eastern section. The deltas may be active or inactive and the barrier islands are remnants of eroded shoreline. Thus, this sector of the coast is undergoing considerable change, with both depositional and erosion processes presently operating, the resulting geomorphologic variability crates a variety of coastal habitat types, each characterised by distinctive community structure.

Marine assemblages are often defined by physical environmental influences, substrate type and dominant marine biota. Some of the major marine habitats in the region include assemblages of corals, macro algae, seagrasses, intertidal and subtidal rocky reef platforms, sand/silt shoals and mangrove/ salt marsh communities. The Pilbara waters also contain high conservation status species such as: Turtles (green, loggerhead, flat back hawksbill and leatherback), dugongs and whale sharks all inhabit Pilbara waters. The EBPC Act lists these species as vulnerable.

The marine and coastal environments have high biodiversity and conservation values, sustain productive fisheries, aquaculture and provide grounds for recreational activities for both permanent and transitory residents. Identifying the major threats to the environmental values of the Pilbara is the first step towards managing the area for sustainable use, for future generations to enjoy and appreciate.

Coastal and Marine Asset Values and Uses in the Pilbara

Pastoral

- Small social and economic use - leases on coastal areas – to pastoral groups.
- Access for public/ tourists through these leases – 'manage' access

Tourism/ Recreation

- *High social, cultural and economic benefit*
    - *Localised coastal island/land-based activities, such as (walking, rock climbing, shell collecting, scenery.), camping and 4WD activity, boating, indigenous*
- *Marine: Non-extractive: diving, snorkelling and Extractive: recreational fishing and other collection of organisms*

Industry

- High economic value
- Mining, petroleum, salt production, fisheries and aquaculture
- Initiated development of port facilities in the region: Dampier, Port Walcott (Cape Lambert) and Port Hedland.
- Petroleum: oil-loading facilities at Barrow Island, Varanus Island and Thevernard Island.

Indigenous

- High social and cultural value
- Protection and access to sacred sites
- Food and recreation – traditional activities

Conservation

- High cultural and social value (potential economic)
- CAR system – coastal reserves few, Marine Reserves Planning process – Wilson Report
- Numerous marine habitats and assemblages, species' with high conservation status – the value of conservation is also outside of these reserves.

Risk	Explanation of Risk	Management Responsibility
WATER QUALITY		
Direct threats:		
Shipping	One of the biggest concerns raised in the PWQ workshops was the threat of introduced marine pests being released from ballast/bilge water. Other issues included oil spills/ accidents, the loading/ washing down practises and antifoulants (e.g.Tributyl tin (TBT)) used on ships.	Port Authority, Planning & Infrastructure
Ports	The dredging associated with maintenance of the port channel facilities has serious effects on the water quality: widespread, increased siltation, altered water flow and the addition of 'foreign' spoil banks to localised areas of marine habitat.	Port Authority, Planning & Infrastructure
Point sources – Industry and domestic	The discharges from both industry sources e.g. bitterns and from domestic sources, e.g. grey water – have a localised effect. Even though these are 'watered – down' in the ocean, these wastes may have cumulative effects e.g. Cu.	Department of Environment, Local Council
Aquaculture	Pollution – nutrients, risk of introduced marine pests	Fisheries
Catchment runoff – stormwater and river catchments	Determination of effects from catchments – increased erosion and siltation – lack of information.	Department of Environment
Other	General rubbish from other commercial and recreational user groups	Local Council
MARINE BIODIVERSITY		
Direct threats:		
Commercial fishing activities	The by-catch/ entanglements of non-targeted marine species (e.g. turtles, birds), ecosystem effects from trawling of nursery areas (river mouths, mangroves). Altered benthic contours can also affect the distribution of some species (e.g. prawns)	Fisheries
Shipping/ port activity	Dumping of ballast water risk of introduced marine pests. These are a threat to other species. Port development also disturbs natural breeding areas – inshore areas/ beaches (e.g. bird and turtle nesting) and dredging has ongoing ecosystem effects – due to the disturbance of habitat and the permanent changes in water flow and sea benthic contours.	Port Authority, Planning & Infrastructure, CALM
Recreational activities/fishing	4WD activity, lighting, boating activities, human interactions on islands coasts impact on the species directly and on feeding, nesting, mating activities.	Local Councils
Introduced species - land (e.g. rats, mice, foxes etc.)	Particularly are a threat in coastal and island area nesting sites - (e.g. birds and turtles) prey on adults, eggs and young.	DAWA, CALM, AQUIS,
Indirect threats:		

Pollution	e.g. boat pollutants, oil pollutants and other point sources – domestic and industry) essentially any pollutants may be harmful – food chain effects.	Port Authority, Planning & Infrastructure, Local Councils
Risk	**Explanation of Risk**	**Management Responsibility**
Shipping	Ballast water – IMPs and downstream effects of these. Dredging – and the siltation effects, water flow effects and long terms effects on ecosystems and species of spoil banks.	Port Authority, Planning & Infrastructure, Department of Environment
Rubbish	Debris, entanglements – from various sources	CALM,
Lack of knowledge	Outlined in Wilson Report – many areas are lacking information on the variety of geomorphology, habitats, flora and fauna in Pilbara. This is needed for CAR set of reserves system. Information predominantly on Dampier Archipelago/ Cape Preston and Barrow/ Montebello Island areas.	
MARINE HABITATS		
Direct removal/ damage of habitat:		
Commercial trawling fisheries	Benthos is disturbed with trawling activity for prawns.	Fisheries
Shipping – dredging	Benthos is removed for shipping channels and put elsewhere as 'spoil.'	Port Authority, Planning & Infrastructure,
Industry/ Coastal developments	Encroachment of urban development and industry onto coastal areas, often leading to infill or land reclamation - e.g. mangrove/ salt marsh. Even if not directly damaged, runoff from these activities may have indirect effects e.g. rubbish, pollution.	Local Councils, CALM, DoE
Indirect damage:		
Dredging	In the process of dredging, huge amounts of sediment become suspended in the water column and these may settle some distance from the original dredge site (e.g. siltation of reef/ corals environments)	Port Authority, Planning & Infrastructure,
Lack of knowledge	**NOTE:** there is a general lack of knowledge of the benthos in some areas of the Pilbara. CSIRO/ DoE joint study – access to information. The effect of cyclonic events on marine habitats is also relatively unknown.	
COAST/ SEASCAPES		
Coastal Access	Liability of access/ use, Informal roads used: gates open or shut, stock movement, making new tracks, cutting fences, Spread of weeds, fire Hygiene/ litter in areas Theft/ damage to property	Local Council

Risk	Explanation of Risk	Management Responsibility
Access on the coast	Wheel ruts and sand compaction - turtles Direct damage – dune areas Collection/ trampling of shells/ reef.	Local Council
Fire	Frequency and intensity of burn Type of vegetation being burnt Associated accompanying wind damage Lack of awareness and education – tourists?	CALM, Local Council
Weeds	Coastal and Island spread Examples: buffel grass (*Cenchrus ciliaris*), kapok bush (*Aerva javanica*) and palms (*Cocos nucifera*), mesquite, prickly pear, thistles, ruby dock etc.	CALM, Local Council
Feral Animals	Effects on Island (and coastal area) ecosystems • Examples of introduced animals include the house mouse on Dixon Is. (*Mus musculus*), and the European red fox (*Vulpes vulpes*) and feral cat (*Felis catus*).	DAWA, CALM, Local Council
Indigenous Ownership and Joint Management	Pastoral concerns – access and uncertainty with Native title claims. Many benefits: fulfil their responsibilities to their country under aboriginal law, and will address more contemporary needs such as training, employment and a stake in the economic development that is moulding the Pilbara Natural Resource Development.	DAWA, CALM, DoE, DIA, PNTS
Coastal Planning - General	Need for overarching regional plan: A regional plan will set broad direction for coastal and marine usage and/ or management requirements of the area. This would provide: a framework for decision making; allows for better decision making in the area; allows for all members of the community and other interested parties to have their say; creates a prioritised action plan that can be implemented and provides a basis for the allocation of financial services.	Local Council
FISH RESOURCES		
Traditional Indigenous Fishing	Some of the issues have been addressed in the Aboriginal fishing strategy; however issues regarding coastal access also need to be examined.	DIA, PNTS, CALM
Commercial Fishing	• By-catch (in predominantly trawling and long line activities) • 'Community perception' of commercial component of fisheries	Fisheries

Risk	Explanation of Risk	Management Responsibility
Recreational Fishing	• Coastal access – and management • 'Unregulated' recreational component – estimates only of the actual 'catch' taken by recreational component – difficult to model/ manage for the future. • Targeted species/ higher order consumers (e.g. Marlin), longer-lived, aggregation spawners etc.	Fisheries
General – Fish resources o Protection of breeding areas	Various species breed in particular habitat types and locations, e.g. mangroves, seagrass beds etc. Protection of these habitats is therefore essential in fisheries management.	DoE, CALM, Fisheries
• Fisheries officers – staffing in the Pilbara	Increased staffing for large regions (Pilbara) and high recreational fishing component – require 'presence' and education.	Fisheries
• Perceived recreational vs. commercial fisheries		Fisheries
• Introduced marine pests	IMPs could have a direct or indirect effect on fisheries – depending on the pest.	AQUIS, DPI, Port Authority

COASTAL & MARINE FEED BACK PAGE

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INDIGENOUS NATURAL RESOURCE MANAGEMENT FOR COUNTRY IN THE PILBARA

The region's Aboriginal population of about 5200 people, living in towns and 37 scattered communities, is 12 per cent of the total Aboriginal regional population the third highest proportion of Aboriginal people in the State.

Aboriginal people in the Pilbara have a very strong spiritual connection to the Pilbara Land. Their culture and history are written in the land.

Their cultural belief system stems from the Dreaming when it is believed that the landscape and all geographical features within it, including water and all species of flora and fauna, were formed by Dreamtime beings or Dreamings. Today all of these features are important to Aboriginal people in a variety of cultural, social and economic ways.

The ability to still maintain culture is a strong indicator of ecosystem health and therefore management of environmental and cultural values is inextricably linked.

Employment of Aboriginal people has traditionally been in the pastoral industry, particularly on one of about 22 Aboriginal pastoral leases in the north of the State. Efforts are being made to increase Aboriginal employment in the mining industry, particularly through contract work such as earthmoving, road works, gardening and catering.

A small Aboriginal tourist operation has operated for some years in the Karijini National Park, new and growing 'bush tucker' and tourism industries based on natural resource management also has promise.

The Indigenous Land Corporation "Pilbara Regional Profile and Western Desert Regional Profile" documents identified Regional environmental services and programs involved directly in services relating to the natural resources. These include:

CALM (Karratha)

Waters and Rivers Commission (Karratha)

Natural Heritage Trust

Department of Environment and Heritage (Commonwealth)

Indigenous Land Management Facilitator Program

Department of Agriculture WA (Karratha)

Pastoral Lands Board

Shire Councils

Pilbara Development Commission

Local Conservation District Committees

ATSIC Regional Council

Pilbara Native Title Service

Ngaanyatjarra Council Aboriginal Corporation (Native Title Unit)

The same report also identified the following needs of Aboriginal people

- Restore and protect natural and cultural resources
- Improving water quality, weed control, dust and erosion control, pollution control, vehicles damage, feral animal control, loss of native plants and animals, degradation of land, salinity
- Capacity building and resources for land and wanter management
- Management of public and tourist access to environmentally and culturally sensitive areas
- Greater co-operation between Aboriginal groups and mainstream agencies to address environmental issues and priorities

A number of opportunities were identified including:

- Aboriginal lands provide a strong basis for management of natural resources
- Cultural and biodiversity surveys and monitoring
- Management of national parks, conservation areas, tourism operations, fisheries, re-vegetation, fire control
- Bush foods
- Bush Medicines
- Horticulture
- Eco-tourism, visitor education
- Protection of threatened species and feral animal control
- Ranger programs
- Partnerships between Aboriginal and mainstream agencies.
- Partnerships between Aboriginal and Non Aboriginal Land Managers
- Access to Natural Heritage Trust Funding

An Indigenous Land Management Workshop was help in Port Hedland in October 2004. The aim of the workshop was for Aboriginal people to come together and talk about what's important for looking after land and sea country.

By the end of the workshop, participants had talked about:

- the best way to refer to areas of country in terms of looking after country;
- what makes country healthy; how you know when country is not healthy; and what should be done in the next five to ten years for land and sea management; and
- how Pilbara Aboriginal people can work with government, industry and community people for looking after country.

The following tables outline the discussions had at the workshop.

HOW DO YOU KNOW WHEN COUNTRY IS HEALTHY?	
Free to do hunting	Plentiful (bush turkeys & kangaroos)
Smell of Environment	Sweet, you can smell the plants, ocean & winds
Plants are healthy	You feel good in your heart "Feel good" (heart), you can see that it is good and talk and sing to it
When people are on country	NO sick animals, no carcasses, the beaches are clean
Seasons	Fishing Fish don't taste good and worms in them Cyclones Seasons Speak to Country first Catch fish Barramundi come after the first rains
	• Kangaroos vomit, Kangaroo and bush turkey season
	November onwards Salmon
	Fishing (February to August/September) Sand / Land
No rubbish	No more impact on sacred sites
Meaningful employment	
Risks	**Explanation of Risks**
Aerial baiting	• No more • Domestic dogs • Children • Residential areas
Tenure rights and interests	Local Government • Pastoral leases (2015) • Indigenous involvement and coordination
Fishing and wasting fish	• Over fishing • Exceeding limits

Shell Collection	Starfish & Cowrie and other shell collection – professionals & recreational need to limit live collection
Rubbish	Washed up (Some locations only) Tip – so little dumps
Fire	• Camping leaving fires • Respect on both sides
Introduced Plants	No buffel grass or weeds
Introduced Animals	Cats (Kill wildlife) , Camels, cattle, horses (ruin water supply) Damage to waterhole by cattle
Lack of awareness, signage & enforcement	Networking with owners for access One road in - GOOD
Species Loss	Targeting species People driving on beaches Breeding & nesting sites Stop Walk only areas Reproduction Destroy / crush Sand erosion, Compression Kills Hermit crabs Bush tucker disappearing birds disappearing, don't hear white cockatoos brown pigeons (used to be around homestead) not as many kangaroos anymore; don't see emu and turkey anymore, don't see so many goanna and echidna anymore; bush fruits; Bees, no more bush honey, bush onions (sweet potato) or tomatoes.
Access	Permission to access the beach, Tourists need permission Too many vehicles driving everywhere

Mining	no respect for culture and where it causes sick people, through digging up country; – erosion and sediments; – pollution; Bush tucker disappearing People Dust Water usage Land disturbance Poisons and toxins. Dewatering Effects on fish Hole in ground dust affects wheat for damper, (mixed with iron ore dust
Water	towns taking water country drying up salt from planted date palms getting into freshwater systems
Sacred Sites	grave sites are not protected got to abide by CALM rules when we go to Millstream (where we can and can't walk, timeframes, Millstream before white man came, was an oasis to people living there; Destroying sites and removing artefacts rain making sites water sources rock holes Tourists and miners are destroying sites and removing artefacts from sites.
Tradition Practices lost	not allowed to make bough sheds at Millstream
	want to go back to country to live free but not allowed (locked up in white man's country; locks on gates); Millstream made into a National Park without consultation with tribal people; the senior people in National Parks are still white people, NOT traditional people;
water out of Harding Dam spiritual, – livelihood;	
Four wheel drives and quad bikes	affect native flora and fauna cause erosion

INDIGENOUS FEED BACK PAGE

This page is for you to provide feedback to us. Please detach and mail to

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Name:	
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Are there any issues you would like to add? Please state

What condition do you want the natural resources of the Pilbara to be in in 50 years time? In other words what do you want to leave behind for your children (50 year targets)? We will call these Aspirational Targets.

What condition do you want the natural resources of the Pilbara to be in in 10 to 20 years time? We will call these Resource Condition Targets.

What do you think we need to do in the next 1 – 5 years to work towards how you want the natural environment of the Pilbara to look in 10-20 years time? We will call these Management Action targets.

Are there any general comments you would like to add? Please state: