



# DARWIN HARBOUR REGIONAL PLAN OF MANAGEMENT

NOVEMBER 2003

Our vision for the Darwin Harbour region

A biologically rich and diverse marine and terrestrial environment  
for our use and enjoyment today, and for our children tomorrow...

# Darwin Harbour Regional Plan of Management

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## FOREWORD

### ***MESSAGE FROM THE CHAIR***

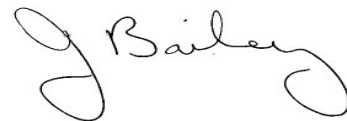
The Darwin Harbour Advisory Committee (DHAC) was appointed by the Minister for Lands and Planning, the Honourable Kon Vatskalis in August 2002. The DHAC was charged with the duty of overseeing the development and implementation of the Darwin Harbour Regional Plan of Management.

Territorians clearly revere their harbour and want to see it well managed for future generations to enjoy. The Regional Plan of Management provides a framework for managing and enhancing our valuable harbour and catchment into the future. It also provides a basis for achieving an integrated decision making process and planning outcomes consistent with the Marine and Coastal Management Policy and National Strategy for Ecologically Sustainable Development.

The Darwin Harbour Advisory Committee's role is strategic in nature. A range of issues have been identified in the Plan, with actions to address these allocated to relevant agencies, organisations and/or community groups. This Plan of Management will be a 'living' document, updated annually to provide us with an adaptive framework for management. The framework is intended to be responsive to changes in technical information, community and stakeholder needs, and to improvement in our understanding of our ecosystems and the way we monitor and report on them.

The Plan provides us with an exciting opportunity to participate in the management and protection of our waterways. Releasing this plan will I hope prompt further public comment prior to the plan's formal endorsement by Government. The Darwin Harbour Advisory Committee acknowledges that active involvement by the community is one of the greatest resources available in managing the region and encourages further public comment on the plan.

I trust that the Darwin Harbour Regional Plan of Management will generate a real enthusiasm in Government, industry and community to continue to work cooperatively to implement actions and achieve the vision for Darwin Harbour and its catchment.



***Mr John Bailey***  
***Chair - Darwin Harbour Advisory Committee***



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## EXECUTIVE SUMMARY

The Darwin Harbour Advisory Committee (DHAC) was appointed in August 2002, and charged with the duty of overseeing the development and implementation of the Darwin Harbour Regional Plan of Management. The role of the DHAC is strategic in nature, operating collaboratively with Government agencies, stakeholders and the community. The DHAC comprises government and community representatives, who have provided an ongoing conduit for community values and issues to be recognised in the formulation of the Plan.

This Regional Plan of Management provides us with a vision for the future and a framework for managing, protecting and enhancing our valuable harbour and catchment. The Plan addresses critical issues for management and builds on the achievements of the past.

While the harbour and its catchment encompass a range of distinctive and special environments that require protection, the region is subject to pressures and conflicts of use, which present a major challenge to government, industry and community. There is a strong desire for the harbour and its catchment to remain biologically productive, water quality and habitats to be protected, and recreational opportunities and the region's tropical character to be maintained. The community also acknowledges that the harbour is a working port, servicing not just Darwin but northern Australia. Striking the balance between the conflicting uses and values, and addressing the complexities of planning in the region, is the central intent of the Plan. The Darwin Harbour Regional Plan of Management offers an adaptive, coordinated and integrated approach to management and planning within the harbour and catchment.

The Northern Territory Marine and Coastal Management Policy is currently under review. The policy's main objective is to enable an integrated approach to the management of the coastal and marine zones in the Northern Territory, based upon the sound principles of ecologically sustainable development. According to the policy, a range of regional plans will be developed, the Darwin Harbour Regional Plan of Management is the first of these.

Five goals have been identified within the Darwin Harbour Plan of Management for sound management of the conflicting uses and values of the Darwin Harbour region. For each goal, there is a range of outcomes, which the plan will aim to achieve. Section 3 of the Plan lists strategies and actions to achieve the Plan's outcomes and overall goals. An introduction to the plan (Section 1) and background information about the region (Section 2) precede Section 3.

The five goals of the plan are:

### **GOAL 1. To maintain a healthy environment**

Maintain and improve water quality and ecological health of the marine, freshwater and terrestrial environments in the region. Improve our understanding of our environment, through research and monitoring, to inform management.

**GOAL 2. To support recreational use and enjoyment of the environment**

Manage and enhance the quality of our leisure time, and promote community pride through the maintenance of our scenic values and the region's unique character.

**GOAL 3. To encourage ecologically sustainable development**

Sustain and manage the demands and impacts of tourism, transport, aquaculture, horticulture, urban development and other commercial uses of the harbour and catchment.

**GOAL 4. To protect cultural values and heritage**

Maintain and protect cultural uses, and sites of cultural and heritage value. Acknowledge indigenous interests, values and concerns and indigenous people's innate connection with the Darwin Harbour region.

**GOAL 5. To foster community ownership and participation in management**

Engage the community in the development and implementation of the Plan. Inform the public of current management and monitoring actions, issues, and the health of the environment.

A range of key strategies and actions has been developed to realise the vision for the harbour and its catchment. These include:

- ❑ Actions to improve our understanding and knowledge of the region's environment, notably monitoring and research;
- ❑ Protecting and enhancing freshwater, estuarine and marine water quality through a range of management measures;
- ❑ Protecting the health and functioning of ecosystems and conserving biodiversity;
- ❑ Importantly, identifying and managing significant species and ecosystems;
- ❑ Protecting and enhancing recreational amenity and opportunity;
- ❑ Promoting ecologically sustainable harvesting and fishing. Improving our knowledge of recreational and traditional fishing activities and fisheries to ensure sustainability;
- ❑ Protecting the diverse range of aesthetic values of the region;
- ❑ Effectively planning and managing future development, and enhancing public participation in the process;
- ❑ Supporting ecologically sustainable development;
- ❑ Promoting ecologically sustainable use of freshwater in the Darwin Harbour region;
- ❑ Managing sites of cultural, spiritual and heritage significance. Managing cultural, spiritual and heritage values, and promoting these values as part of our rich cultural diversity and lifestyle;
- ❑ Improving public awareness of Darwin Harbour regional values, issues and management, and improving public participation in the management and monitoring of the region.

Mechanisms to enable the implementation of the Darwin Harbour Regional Plan of Management and to enhance the role of the Darwin Harbour Advisory Committee have been explored in Section 4. Several recommendations have been provided in this section to facilitate adaptive integrated management through the Darwin Harbour Advisory Committee in the longer term.

Ongoing evaluation of the implementation of the Darwin Harbour Regional Plan of Management will be vital. The Plan sets out a number of key performance indicators (KPI's) which will allow the DHAC to oversee the implementation of actions, to assist in achieving designated outcomes. Understanding the environment is also a key outcome area of the

Darwin Harbour Regional Plan of Management. A number of actions describe new initiatives for ecological monitoring and research in the region. This work will strengthen our knowledge of the harbour and catchment, evaluate our success in managing our environment and inform management of the region into the future.

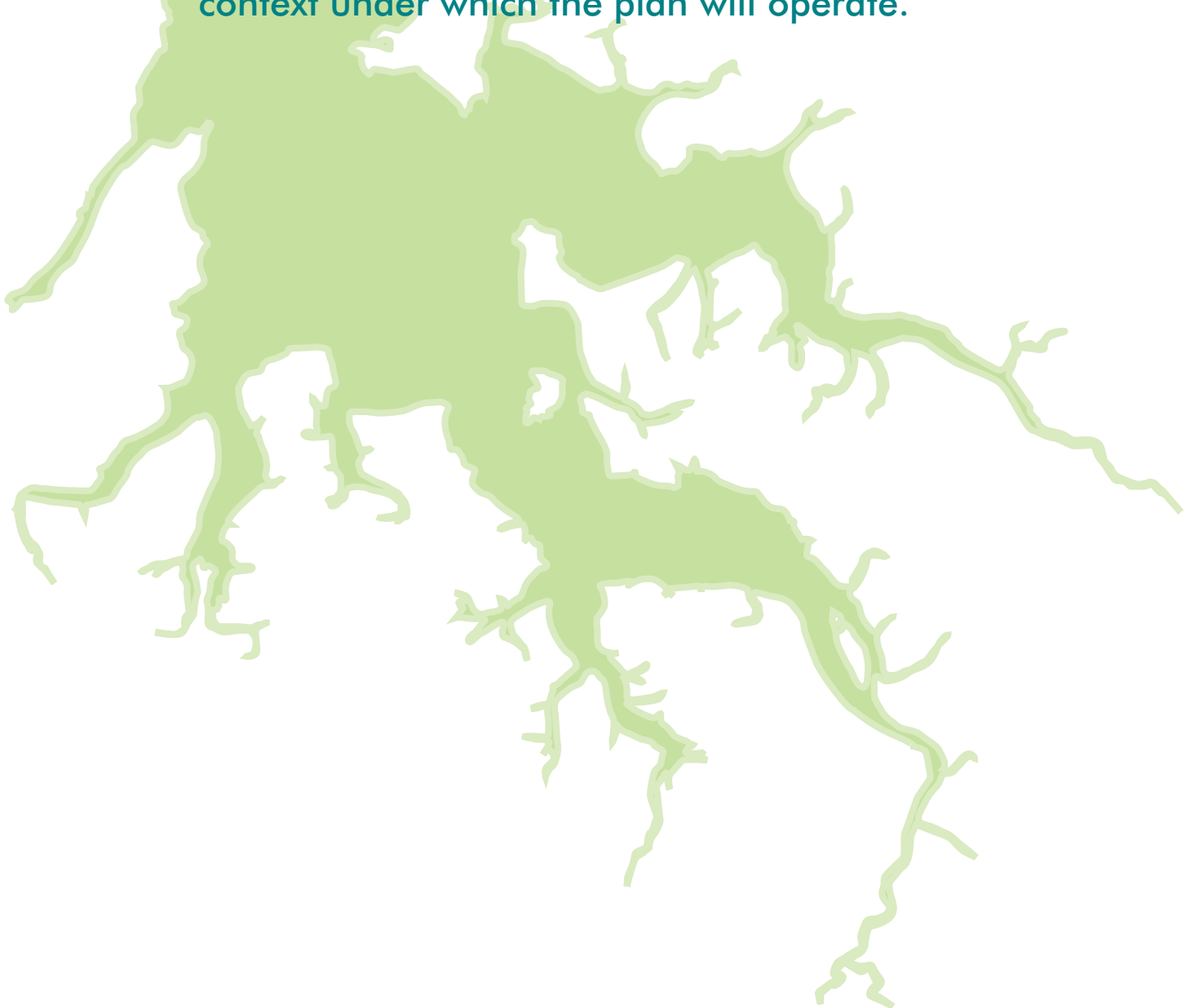
Community involvement is essential to ensure the Darwin Harbour Regional Plan of Management reflects the interests and activities of all stakeholders in the long term. Identifying issues, priorities and developing and endorsing appropriate strategies in partnership with the community is imperative. Community aspirations and values are important underpinning principles in developing a sound framework for management. The ongoing role of the Darwin Harbour Advisory Committee will focus primarily on community involvement, ensuring that participation in the planning and management of the Darwin Harbour region continues.



# SECTION 1

## Introduction

This section provides an overview of the Darwin Harbour Regional Plan of Management, including the vision, goals, outcomes and scope of the plan. It also outlines the values of the Darwin Harbour region and the planning and legislative context under which the plan will operate.





The Darwin Harbour region plays a central role in the economy, lifestyle and character of the Top End of the Northern Territory. The area supports the largest concentration of the Northern Territory population, is home to most Territorians and encompasses the foremost intensity of industrial and commercial operations in the region.

The Darwin Harbour region:

- ❑ Provides our drinking water;
- ❑ Offers a range of recreational opportunities;
- ❑ Is an important transport hub for road, rail, shipping and air travel;
- ❑ Features significant Indigenous and European cultural heritage, especially for the Larrakia people;
- ❑ Supports a diverse range of marine, estuarine, freshwater and terrestrial environments;
- ❑ Is an important tourist destination;
- ❑ Supports primary industries; and
- ❑ Offers a range of lifestyles, from rural to city living.

Supporting these uses, whilst maintaining the values of the region, is a challenge for all; the community, industry and Government. The Darwin Harbour Regional Plan of Management aims to provide a coordinated integrated approach to managing the Darwin Harbour region's values and uses.

#### *Integrated catchment management*

*Integrated catchment management (ICM) is the sustainable and balanced use of all land, water and biological resources in a catchment. It provides a continuous and dynamic process for decision making and fosters cooperation and coordination between landholders, community, government agencies and other natural resource users and managers.*

## **VALUING OUR REGION**

Territorians greatly value Darwin Harbour and its catchment. The wide range of environmental, cultural, commercial and recreational values generate employment and revenue in addition to providing a source of pleasure and enjoyment for those who live here and visit the region.

The foundations of the Darwin Harbour Regional Plan of Management are the values reflected by Territorians who contributed to the development of the Plan.

The Darwin Harbour region has inherently high conservation values by virtue of its diversity of biological resources, its productivity and pristine condition. Protecting these values is important to the community, as highlighted throughout the consultation process.

The region also possesses great cultural significance to indigenous people. There are mythological areas, spiritually significant sites and places used for hunting, fishing and shellfish gathering.

Recreational fishing is of high importance in the Darwin region with 40% of residents pursuing this activity each year. The harbour's scenic waterways are also the focus of a range of other recreational activities including boating, swimming, bird-watching, diving and cycling to mention a few. Territorians clearly cherish the lifestyle and social opportunities that the Darwin region offers.

Darwin Harbour and its catchment also comprises a working port and a growing industry base. Sustaining livelihoods remains an important aspect of any major city. Enhancing the economic viability of the region to achieve a strong, diverse and vibrant economy to provide jobs for our children will continue to play a vital role in our future.

The community has expressed a range of important values relating to the region and its use. These include:

- Freshwater, estuarine and marine water quality and quantity;
- Groundwater quality and quantity;
- Air quality;
- Ecological health and biodiversity;
- Flora, fauna and habitats of conservation significance and cultural/social significance;
- Ecosystem function and processes;
- Indigenous environmental values;
- Economically and ecologically sustainable industry;
- Viable communities and cities;
- Aesthetics and amenity;
- Indigenous and cultural heritage;
- Spiritual values;
- Heritage values;
- Lifestyle and recreation;
- Human health;
- Community capacity for participation;
- Public awareness and education;
- Access to the environment.

## THE VISION

A long-term strategic vision has been developed for the Darwin Harbour region which reflects, coordinates and integrates the range of values and the actions required to manage Darwin Harbour and its catchment.

### *Vision for the Darwin Harbour region*

*"A biologically rich and diverse marine and terrestrial environment for our use and enjoyment today, and for our children tomorrow..."*

*The Plan of Management for the Darwin Harbour region will ensure development is in line with the protection of ecosystems, and the maintenance of the harbour's value as a recreational, cultural, commercial and scenic resource.*

In October 2002, the DHAC invited contributions from the community to assist in devising the vision. Through the consultation process, a number of terms and statements were provided and considered in formulating the overarching vision.

The process of consultation, which has accompanied the preparation of this Plan, has shown that there is strong desire for the harbour and its catchment to remain productive, water quality and habitats be protected and the amenity and tropical character to be maintained. The community has also recognised that the harbour is a working port, essential in the economic future of the region. Achieving the balance between the conflicting uses and values, and addressing the complexities of planning and management in the region, remains the foremost objective of the Plan.

## THE PLAN IN BRIEF

The plan encompasses 5 sections:

**Section 1. Introduction** - *Provides an overview of the Plan's scope, vision and goals and the region's values.*

**Section 2. Context and background information** - *Presents cultural, social, economic and environmental information about the region, and lists the management issues.*

**Section 3. Managing the Darwin Harbour region** - *Outlines the strategic goals, outcomes, actions and key performance indicators to achieve the vision. This section also lists current activities being undertaken.*

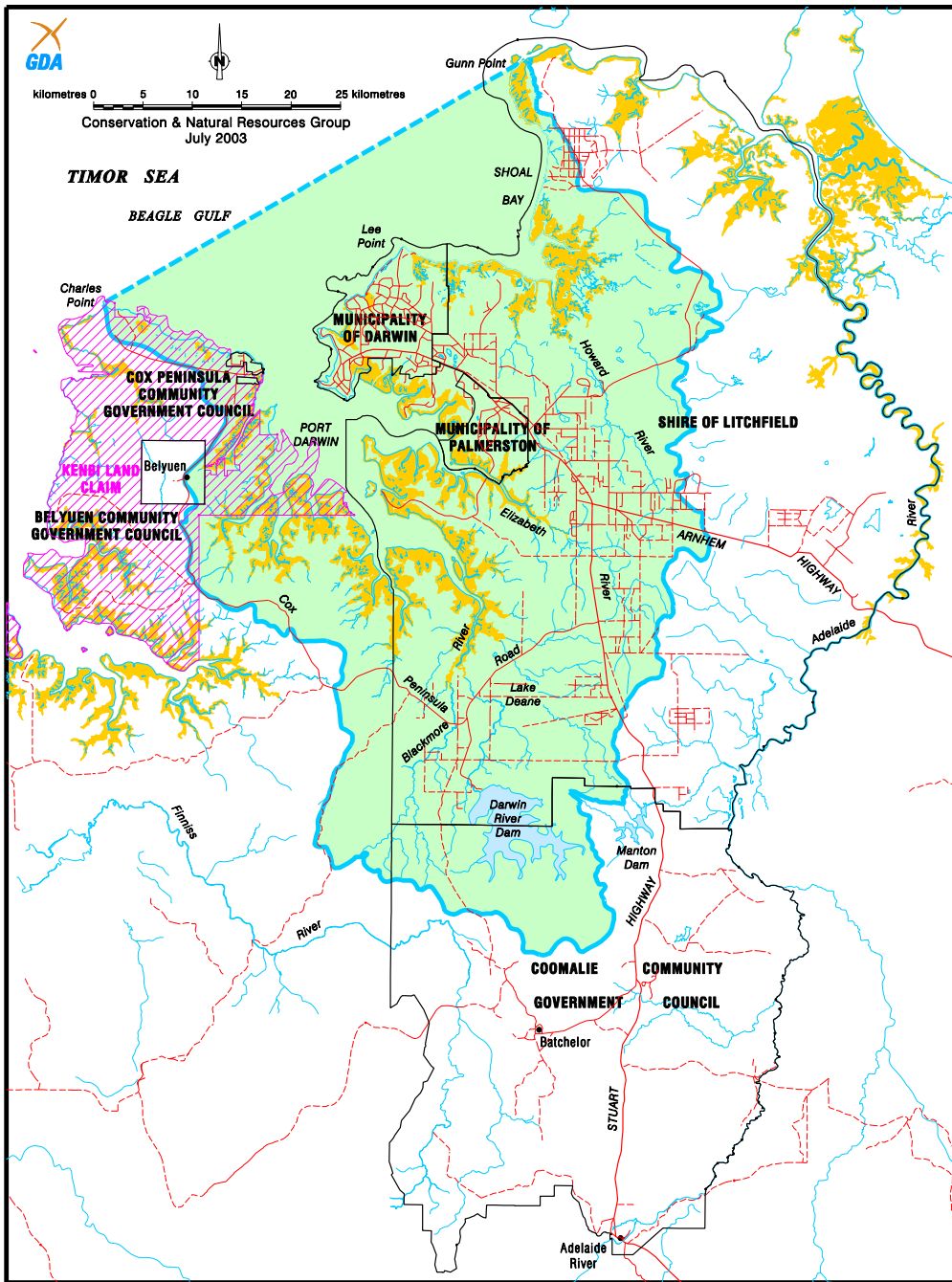
**Section 4. Integrated management and implementation** - *Provides recommendations for the effective implementation of the Plan.*

**Section 5. Appendices** - *Includes supporting documentation, references and acknowledgments.*

## THE DARWIN HARBOUR REGION


The Darwin Harbour Regional Plan of Management area covers Port Darwin, Shoal Bay and their catchments. This area (referred to as the Darwin Harbour region) covers 3 227 square kilometres and extends from Charles Point to Gunn Point including the estuarine areas and tributaries of Woods Inlet, West Arm, Middle Arm, East Arm, the Howard River and all of the land that drains into these waterways. The total area of land within the Darwin Harbour region is 2 417 square kilometres.

Six local governments are contained within the Darwin Harbour region. These are the Darwin City Council, Palmerston City Council, Litchfield Shire Council, Cox Peninsula Community Government Council, Belyuen Community Government Council and the Coomalie Community Government Council.



**LEGEND**

- Municipal, Shire or Local Government Boundary
- Major Road
- - - Minor Road/Track
- River or Creek
- Darwin Harbour Catchment Charles Point to Gunn Point
- Mangroves


**Northern Territory Government**  
 Department of Infrastructure, Planning and Environment  
**DARWIN HARBOUR REGIONAL PLAN OF MANAGEMENT BOUNDARY**

*The Darwin Harbour region*

*The area for the Darwin Harbour Regional Plan of Management is bounded by Charles Point in the west, Gunn Point in the east, and the catchment boundaries of rivers and streams that flow into Darwin Harbour. It includes Port Darwin and Shoal Bay, as well as the Howard River, Elizabeth River and Blackmore River.*

## GOALS AND OUTCOMES

Five goals have been developed for the Darwin Harbour Regional Plan of Management. For each goal, there are accompanying outcomes. Each outcome has one or more strategies, and each strategy has a number of actions. This hierarchy of vision, goals, outcomes, strategies and actions is presented in Figure 2. The goals and their outcomes are listed below.

### **GOAL 1. To maintain a healthy environment**

*Maintain and improve water quality and ecological health of the marine, freshwater and terrestrial environments in the region. Improve our understanding of our environment, through research and monitoring, to inform management.*

Outcome 1.1. Improved understanding and knowledge of the region's environment.

Outcome 1.2. Protection and enhancement of freshwater, estuarine and marine water quality.

Outcome 1.3. Protection of the health and functioning of ecosystems and conservation of biodiversity.

### **GOAL 2. To support recreational use and enjoyment of the environment**

*Manage and enhance the quality of our leisure time, and promote community pride through the maintenance of our scenic values and the region's unique character.*

Outcome 2.1. Protection and enhancement of recreational amenity and opportunity.

Outcome 2.2. Ecologically sustainable harvesting and fishing.

Outcome 2.3. Protection of the diverse range of aesthetic values of the Darwin Harbour region.

### **GOAL 3. To encourage ecologically sustainable development**

*Sustain and manage the demands and impacts of tourism, transport, aquaculture, horticulture, urban development and other commercial uses of the harbour and catchment.*

Outcome 3.1. Effective planning and management of future development.

Outcome 3.2. Support of sustainable economic development.

Outcome 3.3. Ecologically sustainable use of fresh water in the Darwin Harbour region.

### **GOAL 4. To protect cultural values and heritage**

*Maintain and protect cultural uses, and sites of cultural and heritage value. Acknowledge indigenous interests, values and concerns and indigenous people's innate connection with the Darwin Harbour region.*

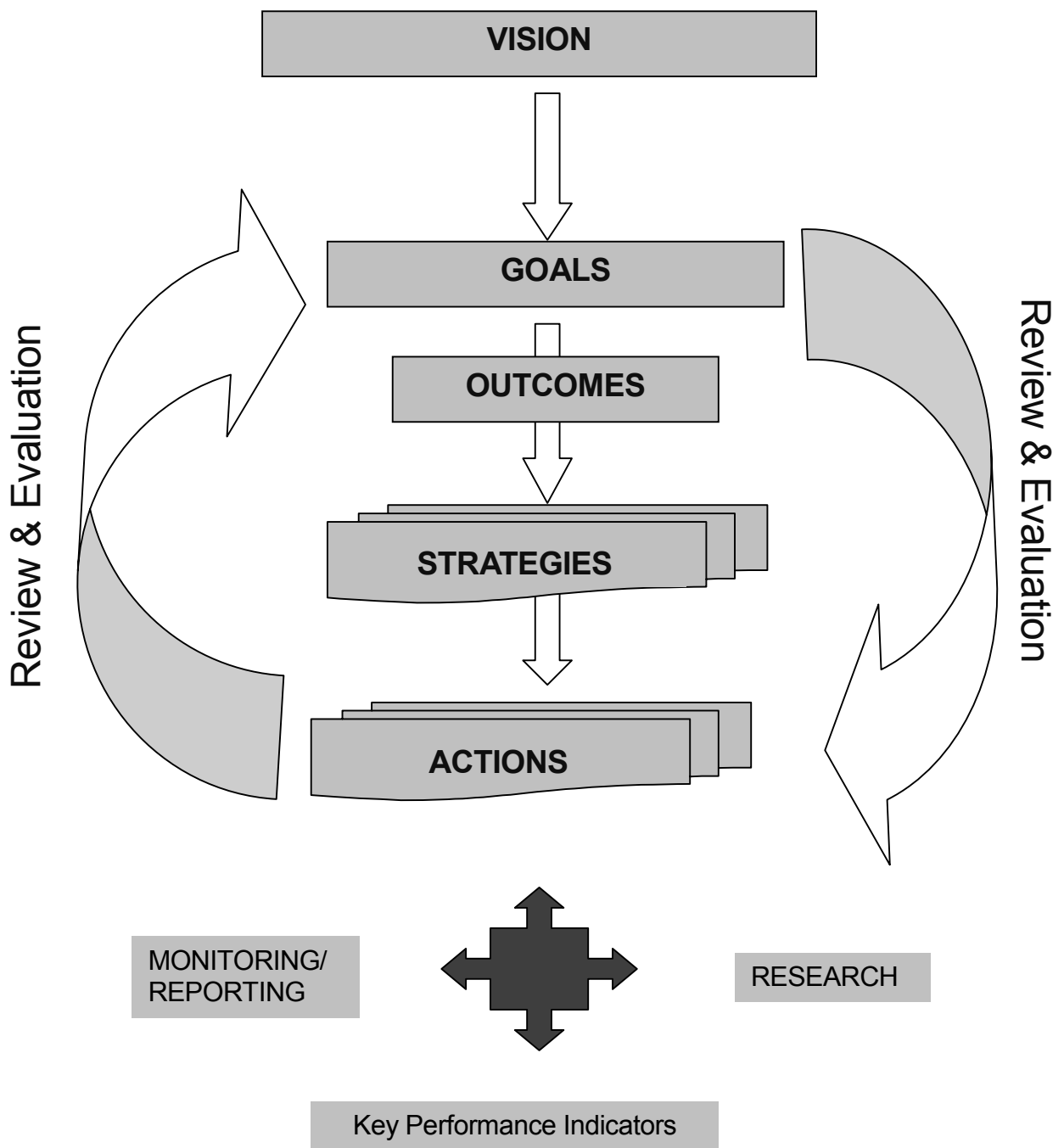
Outcome 4.1. Management of cultural, spiritual and heritage values.

### **GOAL 5. To foster community ownership and participation in management**

*Engage the community in the development and implementation of the Plan. Inform the public of current management and monitoring actions, issues, and the health of the environment.*

Outcome 5.1. Increased public awareness and communication of environmental, social and economic values and issues.

Outcome 5.2. Improved public participation in management and monitoring.



**Figure 2.** Management framework.

## THE SCOPE OF THE PLAN

The Darwin Harbour Regional Plan of Management presents a framework for the management of environmental, social, cultural and economic values and uses. It reflects the desire of the community, industry and government to work in partnership, to ensure outcomes are achieved for the region's waterways and catchments.

This Plan does not replace or duplicate other plans, policy or legislation, nor is it intended to be a detailed document for managing catchment land use. Rather, it provides a strategic and integrated overview to guide the decision-making process regarding development and natural resource management. As well as being a plan in itself, it is also a document that should be used as a reference and guide for management.

The Darwin Harbour Advisory Committee is working on improved management arrangements to help realise the vision and outcomes for the region's future. In Section 4, a number of recommendations for the implementation of the Darwin Harbour Regional Plan of Management are proposed. These have been formulated as a result of lengthy public and stakeholder consultation.

In fulfilling the outcomes for the future of Darwin Harbour and its catchment, the DHAC aims to ensure that:

- ❑ Management by government, industry and the community is well coordinated and integrated;
- ❑ Implementation is underpinned by effective management arrangements; and
- ❑ Arrangements are established which over time allow for current issues, anomalies and conflicts to be addressed and responsibilities rationalised. In short, the plan should be flexible and adapt to future change.

## NORTHERN TERRITORY MARINE AND COASTAL MANAGEMENT POLICY

The Northern Territory Marine and Coastal Management Policy, initially developed in 1985, is currently under review. The policy sets out a number of guiding principles for Marine and Coastal Management in the Northern Territory. These principles acknowledge that people value and use the marine and coastal zones in different ways that reflect the cultural, biological and economic diversity of the Northern Territory. Recognising that opinions within the community differ over the appropriate uses of marine and coastal resources, such uses should be undertaken according to the policy's founding principles.

These principles are:

- ❑ Integrated management and protection of the marine and coastal zone is the responsibility of all sectors in the community;
- ❑ Natural and cultural values of the marine and coastal zones will be protected;
- ❑ Management of the marine and coastal zones will be according to the principles of ecologically sustainable development;

- Environmental, economic, cultural and social considerations will be considered in order to achieve equitable management outcomes.

According to the policy, a range of regional plans will be developed, the Darwin Harbour Regional Plan of Management is the first of these. The guiding principles of the Northern Territory Marine and Coastal Policy were adhered to throughout the development of the Darwin Harbour Regional Plan of Management.

*Ecologically Sustainable Development*

*Ecologically sustainable development is referred to as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Our Common Future, World Commission on Environmental Development, 1987).*

*The Northern Territory Government endorsed the National Strategy for Ecologically Sustainable Development in 1992.*

## **CURRENT LEGISLATIVE FRAMEWORK FOR THE DARWIN HARBOUR REGION**

The Northern Territory Government has the primary responsibility for coastal planning and management in the Territory. This is articulated through the Northern Territory Marine and Coastal Policy, discussed above, and implemented through various legislation, policies and strategies listed in Section 5 - Appendices.

Although day-to-day management of issues relating to the coastal zone is within Northern Territory and Local Government jurisdictions, Commonwealth Government legislation, policies and initiatives are relevant to management of the Darwin Harbour region. Australia is also a signatory to more than 80 international agreements, of which about half are related to marine, environmental and fisheries issues.

To adequately plan for the future, the current legislative framework for land use planning of the region needs to be acknowledged. The *Planning Act 1999* provides for the appropriate and orderly planning and control of the use and development of land. The Act provides for a single integrated NT Planning Scheme consisting of land-use objectives (policy), development provisions (planning controls) and incorporated documents (assessment criteria and guidelines).

A consolidated draft Planning Scheme has recently been released for public comment and is expected to be formally exhibited later this year. Should this draft be adopted, it will present a Scheme that rationalises, integrates and consolidates the provisions of various planning instruments that presently form the Planning Scheme. The framework identified by the Scheme, either in its current form or as proposed by the consolidated draft, determines the direction of future growth in the region and establishes control of the use and development of land.

Current components of the existing Planning Scheme (which will be integrated under the proposed consolidated Planning Scheme) which are relevant to the Darwin Harbour catchment include: Darwin Regional Land Use Structure Plan 1990; Gunn Point Land Use

Structure Plan 1990; Murrumujuk Land Use Concept Plan 1990; Cox Peninsula Land Use Structure Plan 1990; Mandorah Land Use Concept Plan 1990; Central Darwin Planning Concepts and Land Use Objectives 1999; Coomalie Planning Concepts and Land Use Objectives 2000; Finniss Planning Concepts and Land Use Objectives 2002; and the Litchfield Planning Concepts and Land Use Objectives 2002.

Development provisions within the existing Scheme relevant to the catchment include Darwin Town Plan 1990; Litchfield Area Plan 1992; Palmerston Town Plan 1982; Darwin Rural Area Plan 1983 (Cox Peninsula and south of Harbour) and the East Arm Control Plan 1998.

## **COMMUNITY CONSULTATION**

Public consultation was undertaken to ensure that sufficient information and opportunities were provided to community members to enable their participation in the development of the Darwin Harbour Regional Plan of Management. Identifying issues and values, and developing and endorsing appropriate strategies in partnership with the community is considered imperative. Community aspirations and values remain the keystone to developing an integrated framework for management.

The first round of community consultation in conjunction with the development of the Plan provided an ideal opportunity to inform the public of the proposed Plan framework, the role of the Darwin Harbour Advisory Committee and to highlight the importance of the Darwin Harbour region. The first round of public consultation was initiated on November 29 2002 and concluded on April 7 2003. A second phase of consultation sought response to the draft plan. The document was released on August 21, 2003. Submissions closed on September 30, 2003 and the plan was subsequently revised based on feedback from the community.

To enable as many opportunities for community input as possible, several consultation activities were undertaken. Each event was publicised through the media, posters, notice boards, the DHAC website, and by direct correspondence.

The community consultation activities undertaken were:

□ **Written Submissions**

The DHAC received written submissions from the public on the Darwin Harbour Regional Plan of Management between November 29 2002 - March 31 2003 and August 21 - September 30, 2003.

□ **Public Presentations**

A series of public presentations were provided by various scientists, managers and stakeholders outlining current knowledge of the region:

Darwin Harbour Marine and Estuarine Environments - February 11 2003;

Darwin Harbour Freshwater and Terrestrial Environments - February 19 2003;

Darwin Harbour Social and Economic Context - February 26 2003.

□ **Technical Workshops**

A series of technical workshops to discuss values and issues were undertaken:

Darwin Harbour Marine and Estuarine Environments - February 12 2003;

Darwin Harbour Freshwater and Terrestrial Environments - February 19 2003;  
Darwin Harbour Social and Economic Context - February 26 2003.

❑ **Public Forums**

Members of the public addressed the DHAC in a series of open meetings:

Darwin - March 4 2003;

Palmerston - March 6 2003;

Litchfield - March 11 2003;

Cox Peninsula - March 13 2003.

❑ **Public Hearings**

Fourteen members of the public presented their submissions formally to the DHAC:

Parliament House - April 7 2003.

Reports outlining the outcomes of each of these Public Consultation events were prepared, published, and are available on the DHAC website and at public libraries. Further information and reference to consultation publications can be found in Section 5.

To keep the community informed of the development of the Darwin Harbour Regional Plan of Management, information has been made available on the DHAC website, with an e-mail address also provided to facilitate ongoing correspondence with the DHAC. A newsletter, outlining progress in the development of the Plan, was regularly posted on the website, with this portal remaining a focal point for information about the Plan during consultation and development phases.

## **COMMENT ON THE PLAN**

If you would like to comment on the Darwin Harbour Regional Plan of Management, would like further information, or to be kept up to date with the Plan's development, contact the Darwin Harbour Advisory Committee Secretariat on (08) 8999 4473 or:

- Write to us at the following address:  
The Chairman  
Darwin Harbour Advisory Committee  
C/O PO Box 30  
PALMERSTON NT 0831;
- Send us a fax on: (08) 8999 4445;
- E-mail us at: dhac@nt.gov.au; or
- Visit our website: [www.ipe.nt.gov.au/divisions/dhac](http://www.ipe.nt.gov.au/divisions/dhac).

## SECTION 2

### Context and background information

This section briefly describes the history of the Darwin Harbour region and the environmental, cultural, social and economic values and uses of the region. It also outlines the key issues that the Darwin Harbour Regional Plan of Management will seek to address.





## HISTORY OF THE DARWIN HARBOUR REGION

Long before the arrival of the first Europeans on Northern Territory shores, Aboriginal people presided as custodians over land and sea (see Larrakia Perspective within this section). Archaeological evidence and oral histories show that prior to European settlement, Aboriginal people had been living in the region for tens of thousands of years. Early European survey ships often encountered Aboriginal people on the coastal fringes of the Darwin Harbour region. Between 1700 and 1800, Macassan fishermen sailed their vessels to the north coast of Australia and fished for trepang and collected pearl shell<sup>1</sup>. Stories about Macassans and objects from their material culture possibly spread to 'Larrakia' people, the language group name for Aboriginal Traditional Owners of the region. The resource rich and intact ecosystems of Darwin Harbour remain the centrepiece of the Larrakia people's traditional estate.

Larrakia lands extend up to 50 kilometres inland in some areas, and traditional boundaries cover most of the Cox Peninsula, Shoal Bay, Darwin and Palmerston Cities, and much of Gunn Point. Cultural status as Custodians of the Darwin area has always been accepted by neighbouring countrymen; language groups such as the Wagait, Wulna, Tiwi and Kungarrakan people. Equally, the earliest explorers (mid - late 1800's), such as Litchfield and Foelsche never questioned the status of Larrakia people as traditional owners. These and other pioneers were kindly assisted by immediate ancestors of the Larrakia people, sharing knowledge, food and water resources<sup>1</sup>.

Port Darwin was named by Lieutenant John Stokes on September 9 1839 during an exploratory voyage around the coast of northern Australia in the HMS Beagle. The name honours scientist and naturalist Charles Darwin, who had earlier sailed with Lieutenant Stokes on the HMS Beagle. Stokes made his first landing at Talc Head and described a fine harbour, but was not impressed by the harbour foreshores that became the location for Darwin<sup>2</sup>. During this survey, Stokes and Wickham met a group of Larrakia people and recorded their language.

### *Stokes' first impressions of Port Darwin*

*While Lieutenant Stokes was pleased with Port Darwin as a potential harbour, he was not impressed by the countryside, describing a "most thirsty looking" bushland, with a monotonous mangrove lined shore and clouds of mosquitos.*

At the time of the HMS Beagle surveys, the only European settlement in the Northern Territory was the short-lived settlement at Port Essington on the Cobourg Peninsula. Between 1824 and 1868, four unsuccessful attempts were made to establish a settlement on the northern coastline of Australia. Three of these attempts were made by the British Government at Fort Dundas on Melville Island, Raffles Bay and Port Essington on the Cobourg Peninsula, with one attempt made by the colony of South Australia at Escape Cliffs near the mouth of the Adelaide River. The failure of these settlements has been attributed collectively to isolation, poor soils, discord, disease, poor relations with the Aborigines and ultimately to ignorance of the Top End's environmental conditions<sup>3</sup>. Aboriginal people of the region were also severely affected

by disease. In the 1860s with the arrival of Europeans came a smallpox outbreak that resulted in great losses to the aboriginal population of the Darwin Harbour region<sup>1</sup>.

Port Darwin was chosen as the location for the fifth attempt at settlement in 1869. The settlement initially known as Palmerston was established by the South Australian administration under the leadership of *George W. Goyder*. It was not until 1911, when South Australia ceded control of the Northern Territory to the Commonwealth, that Darwin was adopted as the official name of the town.

A year after *Goyder's* landing, Palmerston had just 43 settlers, and given the area's poor soils and remote location, few prospects for the establishment of economically sustainable industries<sup>2</sup>. In 1870, it was decided to establish Palmerston, now known as Darwin, as the landfall for the undersea telegraph cable between Britain and Australia. The subsequent establishment of the Overland Telegraph Line from Darwin to Adelaide and influx of personnel required to establish and maintain the valuable communications link, assured the permanency of settlement at Port Darwin.

During the construction of the Overland Telegraph Line between 1870 and 1872, line workers uncovered alluvial gold near Pine Creek, some 200 kilometres south of Darwin. Rumours of successful gold explorations between Port Darwin and Pine Creek spread rapidly along the telegraph line and attracted thousands of prospectors to the region. The township of Southport, located near the "Tumbling Waters" on the Blackmore River served as the gateway to the goldfields and for a time Southport was bigger than Darwin<sup>2</sup>. The influx of immigrants to Darwin brought with it the threat of disease, particularly smallpox, leprosy and cholera. In response, quarantine stations were established for smallpox at Point Emery and for leprosy on Channel Island. In 1931 another quarantine station was established at Quarantine Island in the East Arm of the harbour.

Pearl shell suitable for the manufacture of buttons was discovered in Darwin Harbour in 1884 and provided a short-lived boom for Darwin until the harbour's stocks were depleted<sup>3</sup>. While pearl shell buttons are less common today, the pearling industry now focuses upon the production of cultured pearls and is an important industry along the Northern Territory coastline.

Historically, Larrakia people of the region had moved about their country, hunting and fishing according to custom and seasonal change. However, pursuing subsistence living and cultural practices became increasingly difficult for Aboriginal people in the region, faced with a changing landscape, and with access for hunting and gathering limited by European settlement. In 1892, several aboriginal reserves were established in the Northern Territory, with the Larrakia reserve representing the smallest allocation of land, occupying some 20 square miles of country near the Manton and Adelaide Rivers, on the border of Larrakia country. This land was far from traditionally used resources and town employment opportunities<sup>1</sup>. In latter years, further reserves in Larrakia country were proclaimed, including those for the protection of sacred and archaeological sites throughout the region.

The establishment of Port Darwin as an export facility was initially hampered by its distance from the mining and pastoral areas to the south, and the difficulties in maintaining serviceable jetties owing to strong tidal currents and destructive wood-

boring teredo worms<sup>3</sup>. To improve efficiency and encourage trade, a rail-link was completed in 1889 between Darwin and the pastoral and mining areas. Live cattle exports to Asia began in the 1880s and have continued sporadically to the present day. Between 1917 and 1920, the British company Vestey's operated a meatworks at Bullocky Point in Darwin<sup>3</sup>.

The 1920s saw little development or growth in Darwin or the catchment. Darwin was principally an administrative centre, with agricultural activity limited largely to market gardens and water supplies for the region obtained from wells. Fishing was conducted principally to meet local demands although a small export industry of dried fish to Asia and had operated since the 1880s<sup>3</sup>.

World War II saw a dramatic period of change for Darwin. Through the 1930's and 1940's, the military presence in Darwin was bolstered, with the need for dependable supplies leading to dramatic improvements in civil infrastructure<sup>4</sup>. In 1941, Manton Dam within the Adelaide River catchment was built and supplied water for Darwin until the construction of the Darwin River Dam in 1971. Other notable developments included the sealing of roads and drainage, new wharf facilities, improved power facilities, a modern airport and the construction of the Stuart Highway. In the early 1940s, Darwin's population had reached approximately 2 000.

Aboriginal people in the region were particularly important in aiding the development of infrastructure, greatly contributing to the labour force in the Darwin Harbour region. More notably, Larrakia people comprised a significant portion of the labour required for the military during World War II. Many Aboriginal people (of full descent from within the region) were sent to camps established by the Army in Koolpinyah, Adelaide River, Katherine and Mataranka<sup>1</sup>.

Between 1942 and 1943, Darwin was attacked 65 times by Japanese aeroplanes. Many vessels and over 50% of Darwin's buildings were destroyed in the air raids. Some of the larger World War II shipwrecks are now prominent features of Darwin Harbour. So too are the military facilities, war refuse and plane wrecks that can be found on the harbour foreshores and within the catchment<sup>2</sup>.

#### *The bombing of Darwin*

*On February 19 1942, mainland Australia came under attack for the first time, with two Japanese air raids on Darwin.*

*Approximately 188 attack aircraft and 54 land-based bombers were involved in the two raids, which killed 243 people and destroyed 20 military aircraft, 8 ships at anchor and numerous civil and military facilities.*

Following World War II, Darwin underwent a substantial period of re-building and development. New buildings were constructed to replace those destroyed in the war and considerable changes were made to the street layout and roads. In 1947 the population of Darwin was 2 538.

During the post-war period, the Commonwealth government increased scientific research into the Northern Territory's resources, particularly its mineral and agricultural resources. By 1955, mining was the major source of income for the Northern Territory. Several attempts were made to establish softwood forestry plantations in the Darwin area, particularly near Howard Springs and Gunn Point<sup>5</sup>, however due to poor productivity and damage from Cyclone Tracy, these commercial forestry operations ceased in the 1970s. Areas with productive soils near Howard Springs and Berry Springs were identified and subsequently cleared for agriculture. The Stokes Hill Wharf was constructed in 1956 to accommodate increased shipping.

By 1961, there were 15 477 people living in the greater Darwin area. The residential area of the city had expanded northwards from Parap to the northern suburbs, Nightcliff and Rapid Creek, and Winnellie was established as a light industrial area. The population continued to expand rapidly and by 1974 there were 46 565 people living in the Darwin area.

In December 1974, the city and catchment were devastated by Cyclone Tracy. The cyclone destroyed much of Darwin and large expanses of mangroves and woodlands were defoliated by high winds. In the aftermath of Cyclone Tracy, an extensive program of reconstruction was undertaken<sup>6</sup> and in the following years, Darwin's population growth and expansion continued, due in no small part to the transfer of military resources to Darwin.

In 1978, the Northern Territory achieved self-government and in 1981, Palmerston was resurrected as the name for a new town 20 km south of Darwin. During the 1980s and 1990s industrial facilities, including the Channel Island power station, were established at Middle Arm and East Arm.

In the 1990s, Darwin's port facilities were upgraded with the construction of the modern East Arm Port. At present, the East Arm Port is the only container facility in northern Australia. Development of Darwin's port and industrial facilities is currently continuing with the construction of the Wickham Point liquefied natural gas facility at Middle Arm.

At present more than 110 000 people live in the greater Darwin area<sup>7</sup>, with further expansion anticipated on completion of the Alice Springs to Darwin railway and proposed industrial developments.

### **Cultural and historical sites in the region**

There are a number of cultural and historical sites throughout the region.

Archaeological sites are protected under the Heritage Conservation Act of the Northern Territory. Sites termed 'Prescribed archaeological places and objects' under the Act include Aboriginal or Macassan sites such as stone scatters, artefacts, shell middens and mounds, stone and ochre quarries and rock art. The most common types of sites found around the Darwin Harbour are shell scatters, middens, mounds and artefact scatters.

There are a number of places in and around Darwin Harbour that have been declared heritage places and objects, under the Heritage Conservation Act. These sites include the Channel Island Leprosarium and reefs, SS Ellengowen, World War II shipwrecks, Quarantine AA Battery, East Point fortifications and the RAAF Explosives Storage Area, together with places in the Darwin CBD such as the Town Hall Ruins, Brown's Mart, Myilly Point precinct, Government House and the Darwin Cenotaph. There are also a number of nominated and proposed heritage places including other shipwrecks, aircraft wrecks, the wharf and World War II sites.

Aboriginal Sacred Sites are protected under different legislation - the *Northern Territory Aboriginal Sacred Sites Act 1989*. Responsibility for management of legislated protection regimes currently in place in the Northern Territory in relation to Aboriginal sacred sites rests with the Aboriginal Areas Protection Authority. It is charged with the legislative responsibility of maintaining a register of Aboriginal sacred sites, conducting consultations with aboriginal custodians in relation to development proposals, issuing permission for works and making registers available to the public.

#### Issues

- A number of historical and culturally significant sites exist in the catchment area. These sites require ongoing management to ensure their protection.
- Further survey work in the region will identify archaeological and historical sites. This would further support the protection and management of such sites.
- Communicating our rich cultural heritage to the wider public and visitors to the region is important.

# THE LARRAKIA PERSPECTIVE

*Information for this component was kindly provided by Donna Jackson - Larrakia Nation Aboriginal Corporation, June 2003.*

## **Introduction**

The Larrakia Nation Aboriginal Corporation (LNAC) was formerly incorporated in 1997. LNAC acts as an umbrella organisation for all of the extended Larrakia family organisations and individuals, and is the peak representative Larrakia group, acknowledged by neighbouring Aboriginal people, the Northern Land Council (NLC) and the Northern Territory Government.

Larrakia people in the area today number over 1600, and are made up of eight major family groups, which are composed of a number of interrelated individual families.

Darwin Harbour, and its effective long-term management, has been a topic of debate for many years, and the Larrakia people have been actively involved in this deliberation. In the past, the Larrakia have been frustrated by the lack of recognition regarding 'custodial rights'. However, encouraging is the more inclusive approaches now being adopted, with a growing awareness and respect for the Larrakia's status as traditional owners.

Whilst there are innumerable aspects of the Harbour that all agree need maintaining and protecting, such as the flora, fauna, and water quality, there are also competing future land uses where conflict about management issues will no doubt arise.

## **Land claims and Native Title claims in the Darwin Harbour region**

Land claims and Native Title claims are addressed under two complex and intricate pieces of legislation - the Aboriginal Land Rights (Northern Territory) Act 1976 and the Native Title Act 1993 respectively. The Larrakia people have lodged claims under both of these Acts. The Larrakia people await the ratification of the Land Commissioners recommendation in December 2000, to hand over 600 square kilometres of the Cox Peninsula, under the Kenbi Land Claim<sup>1</sup>. Meanwhile, the Larrakia people's Native Title claim to Vacant Crown Land in Darwin and surrounds is currently before the courts.

### *"Kenbi Dreaming Track"*

*Kenbi is a word from the neighbouring Wagait language meaning Drone pipe and/or tunnel. An underground sacred dreaming track, shared by the Larrakia, Wagait and others, is known as the 'Kenbi Dreaming Track'. It runs through a large section of the claimed area, hence the title of the claim.*

The Kenbi (Cox Peninsula) Land Claim<sup>1</sup>, is one of the oldest Land Claims in Australia, and it is yet to be finalised. The claim was originally lodged on behalf of the Larrakia people in 1978, by the NLC. Approximately 1 600 Larrakia (Kenbi) claimants will benefit from the recommendation to hand over title of the claimed area. A small number of individuals

were found to meet the strict criteria of the Land Rights Act regarding primary spiritual affiliation, although Justice Gray found that all 1600 claimants had some traditional rights in relation to the land.

In 1996, LNAC lodged a Native Title claim to available Vacant Crown Land in Darwin and some areas of the Litchfield Shire and this case is still before the Federal Court. These Larrakia claims, with a few notable exceptions (Darla, Wickham Point, etc), are generally small patches of Vacant Crown Land in the Darwin and rural areas. Some of these Vacant Crown Land areas include parks, nature strips and beaches. If successful in Native Title claims, it is intended that free and continued access to these public areas would not be hindered in any way.

Most of the remaining land within the Larrakia traditional estate is not available to be claimed, under either the Aboriginal Land Rights (Northern Territory) Act, or the Native Title Act. Much of the tenable land within the estate is now designated as freehold or similar 'non-claimable' private, commercial or government land tenure.

LNAC, with the assistance of the NLC, has successfully negotiated several Native Title agreements with the Northern Territory Government and commercial developers, thus negating the need for long and costly court battles. A number of multi million dollar projects have been able to proceed, such as the Darla Subdivision and the Wickham Point LNG Plant, as a result of these out-of-court agreements. Larrakia people are acutely aware of the need to expand in the region, as growth is inevitable. However, the Larrakia are also conscious of the need to balance expansion with their need to maintain Larrakia cultural heritage, a heritage which is intrinsically linked to the health and vitality of the land and sea.

### **Cultural and spiritual significance of the Harbour and catchment**

There are currently over 120 named and registered Larrakia Sacred Sites, in Darwin Harbour and its catchment<sup>1</sup>. In the Northern Territory, Sacred Sites are registered by the "Aboriginal Areas Protection Authority" and protected under the Northern Territory Aboriginal Sacred Sites Act 1989. Many of the sites recorded names and stories are from the Larrakia (formerly Gulumirrgin) language. However, some of the names are from the Wagait language due the close proximity and ongoing kinship relationships. Information referring to each site was meticulously collected by anthropologists, at various times, during the 25 years of the Kenbi Land Claim. Sites may refer to dreaming animals such as dugong or sea turtles (both sites near Talc Head), or may be important points along the sacred 'Kenbi Dreaming Track', such as Woods Inlet.

Equally Larrakia archaeological heritage is very rich and diverse, including hundreds of 'shell middens' dotted along the mangrove fringes of the harbour coastline<sup>2</sup>, including artefact scatters, historical campsites and gathering places. The abundance of these sites in the region indicates that generations of people lived within this resource rich environment for many thousands of years.

Larrakia people are now carefully conserving their knowledge for their children and their personal cultural and intellectual inheritance. Some of this knowledge will form a basis to write future strategic plans and management policies. When produced, people can appropriately seek Larrakia permission to access this information.

## Natural resource use - Larrakia land and sea management

Larrakia 'country' consists of both land and sea. Tidal mudflats and mangrove lined waterways, lagoons, floodplains, woodland and the sea itself comprise a variety of plant, animal and marine resources which are managed, harvested, hunted and fished by Larrakia people.

Larrakia people have oral traditions and written documentation of their unbroken relationship to their land, sacred sites, stories and resources. Larrakia remain active in mainstream land and sea management, via involvement with the NLC's Caring for Land and Sea Country Units, the Beagle Gulf Aboriginal Fisheries Committee, Greening Australia and Natural Heritage Trust Bushcare Projects.

Larrakia people continue in their traditional use of natural resources in the Darwin Harbour region. In the recent past, Larrakia enjoyed everyday consumption of the bountiful food resources from the land and sea including mangrove worms (Darla), Long Bums (Danijarra), fish, mud crabs, ducks, magpie geese (Gakingga), wallabies, possums, goannas and turtle eggs.

Many marine animals, such as the saltwater crocodile, turtles and dugong, also have totemic importance for Larrakia people and other related countrymen. Whales and dolphins are also very significant - they are considered sacred and are not hunted (see 'Gunumitjanda Mija' - a poster designed by Larrakia showing 12 species of whales and dolphins of Darwin Harbour and the Beagle Gulf, based on traditional knowledge/art and Parks and Wildlife research).

### "Saltwater People"

*One of the reasons that Larrakia people are known as 'saltwater people' is because of their extensive harvesting of sea and marine resources.*

Historically the Larrakia people moved about their country, hunting and fishing in accordance with cultural requirements, seasonal patterns and availability of freshwater. The natural landscape since European settlement has seen extensive changes and the Larrakia people have had to negotiate these changing circumstances to ensure the survival of their culture. Clearing of natural vegetation for development by early settlers in addition to limited access to fresh water, not only affected Larrakia but also the bush and sea resources they relied upon. New settlers, also hunters, used their efficient weapons for both sport and food, soon diminishing or scaring off wallaby, emu, goanna, possum and geese from the Darwin area<sup>3</sup>. Today there is much less for Larrakia people to hunt and gather.

The waterholes and wetlands of the region are very important to Larrakia people, in some cases sacred, and need to be protected. Excessive development, industrial pollution, siltation and toxic wastes could have detrimental impacts on this important resource and consequently to the Larrakia people, whose traditional and cultural use of the region are innately tied to an intact environment.

The incredible value of the harbour's biodiversity is still being realised. Its flora, in particular mangroves and aquatic plants and internationally threatened or rare fauna, (ie. 12 species of whales and dolphins, numerous sea turtles, seahorses, dugong, fish, stingray, sharks, migratory birds, etc) present immense biological and cultural value to the region. Exploring opportunities to maintain these iconic species through the combination of traditional knowledge systems and scientific approaches to conservation is important.

*"Sweet Water Country"*

*Larrakia country is considered 'salt water country', but it is also 'sweet water country' in that the crystal clear water from the Top End is naturally filtered through sand, clay, rocks and plants giving it a delicious 'sweet' taste.*

### **Looking to the future**

The Larrakia people eagerly await the formal signing off of the 'Kenbi' documents by the Federal Aboriginal Affairs Minister.

The Larrakia people are well aware of the commercial interests in this particular section of land, along with its associated beaches, estuaries and islands. Following the expected return of this part of their ancestral lands, the Larrakia will seek to implement more culturally focussed land and sea management practises, such as continuing to monitor Sacred Sites (Larrakia Nation, pers.comm.). The Larrakia people wish to work alongside existing resource management organisations such as the Marine Enforcement Unit, monitoring illegal fishing and poaching activities. The Larrakia Nation has already begun work on their land and sea management plans and strategies. These documents will provide sound frameworks to appropriately engage and employ both Larrakia people, and the wider local community.

The protection of Sacred Sites is of highest priority to Larrakia people, and appropriate and sensible conservation of the largely unspoilt environment of the Cox Peninsula is integral to that. Effective management of the harbour is something that Larrakia are very concerned about, as demonstrated by their ongoing land rights struggle. Following the sanction of native title claims in the region, Larrakia people may also consider designating identified vulnerable habitats within the harbour - such as the seagrass beds near Talc Head - as marine reserves and parks.

Today, whilst Larrakia Nation's time and resources are still largely devoted to the ongoing land rights struggle, and maintaining their culture, they also seek practical and positive mainstream outcomes such as, economic development, employment and education.

Establishing innovative employment opportunities for Larrakia people in the region remains an important function of LNAC. Opportunities that focus on the "exercise and retention of distinct indigenous skills and knowledge related to sustainable use and management of country" <sup>4</sup> are considered essential.

Balancing cultural obligations and increasing public requests is a great challenge, and the Larrakia people remain dedicated to enhancing sustainable and equitable outcomes through traditional knowledge and management of their ancestral lands.

#### Issues

- Larrakia people, as traditional owners of the Darwin Harbour region, are awaiting ratification of the Kenbi Land Claim and a ruling regarding a Native Title claim to Vacant Crown Land in Darwin and some areas of Litchfield Shire.
- Larrakia Sacred Sites and archaeological sites are located throughout the region. These sites require management to ensure their protection.
- It is anticipated that further survey work in the region will locate more archaeological sites in the future. A dedicated survey program to locate sites would assist in preventing damage to or destruction of these sites.
- Traditional uses of natural resources by Larrakia people must be protected. These uses are threatened by activities such as land clearing, pollution and overfishing.
- Larrakia people have a broad and deep knowledge of ecosystems of the Darwin Harbour region that would enhance management of natural resources. Engaging Larrakia people in the management of the region will help preserve and utilise this extensive understanding.
- Enhancing opportunities for indigenous economic development is vital to ensuring equality and viable futures for indigenous people of the region.

# PEOPLE OF THE DARWIN HARBOUR REGION

## Population structure

Darwin, as the capital of the Northern Territory, represents the smallest capital city of the least populated state/territory in the country. Approximately 210 000 people live in the Northern Territory, with about 110 000 of these living in the Darwin region (Darwin, Palmerston and Litchfield)<sup>1</sup>.

### Low population density

*The Northern Territory comprises approximately 17.5% of the landmass of Australia, but is inhabited by only 1% of Australia's population.*

Despite its low population, in the five years to 2000, Darwin experienced the fastest average annual growth rate of any Australian capital city at 2.3%<sup>2</sup>. The Northern Territory as a whole experienced the highest average annual population growth rate of all states in Australia between 1996 and 2001 at 1.9%<sup>1</sup>. More recently however, the population of the Northern Territory has actually declined, with a negative growth rate of 0.1% in 2002<sup>3</sup>. Australian Bureau of Statistics projections of population report that by 2021, the population of Darwin could be between 126 500 and 184 500 and represent between 56% and 60% (currently 52%) of the Northern Territory population<sup>4</sup>.

The population of Darwin is relatively young, with a median age of 32 years, compared to a national median age of 35. Seventy two percent of the Darwin region population is under the age of 45 and only 5% of the population older than 65<sup>1</sup>. This is influenced somewhat by the comparative youth of the indigenous population. The population in general is however aging, with the median growth rate increasing over time.

### Issues

- Low population density limits regional funding and resources, and requires heavy reliance on transport.
- High population growth projections necessitate adequate planning for future urban, commercial and industrial development in the Darwin region.
- The low median age of the Darwin population requires adequate facilities for young people (recreational facilities, social facilities, childcare etc).

## Housing

The population of the Darwin region is primarily located in the cities of Darwin and Palmerston, with people also living in rural townships in Litchfield, Coomalie and Cox Peninsula Shires (see Darwin Harbour Regional Land Use later in this section). Much of the urban development in the region is situated on the Darwin Peninsula, with Darwin's Central Business District located on the edge of Darwin Harbour and residential development extending towards the north and east. The satellite city of Palmerston is

25 kilometres from the Central Business District of Darwin. The Litchfield region is primarily low-density rural residential development.

In 2001, Darwin residents were more likely than other Australian residents to be living in apartments or units, with the percentage of people living in houses lower than the national average (62% of dwellings are houses in Darwin, 75% of dwellings are houses in Australia). The majority of dwellings in Darwin (51%) were owned or being purchased, with 37% being rented<sup>1</sup>. The proportion of properties being rented was higher than the national average of 26%, possibly due to the youth of the Darwin population. The Darwin region also has a high percentage of public housing (14% of houses in 1997), as compared to the national average (5-6%)<sup>6</sup>.

The most common household situation was a two parent family with children (48%), with 33% of dwellings occupied by couples and 17% occupied by one parent families. The median number of people per household was 2.7<sup>1</sup>.

#### Issues

- Urban planning requires consideration of the proportion of houses and units required for the Darwin region, as related to the median household size.
- Home ownership rates in the Darwin region are comparatively low.
- The high percentage of public housing requires high levels of government funding.

#### **Employment structure**

Darwin's labour force comprised approximately 53 000 people in 2001, with the majority of the employed labour force working on a full time basis (69%) and a further 28% of the employed workforce in part time work. Some 6.9% of the population was unemployed, lower than the national average at the time of 7.4%<sup>1</sup>.

The Defence and Government sector employs 16% of the workforce; Retail and Trade 13.5% of the workforce and Property and Business 10.5% of the workforce in the region. This differs to the national trend, where Retail and Trade sector employs 14.6%, followed by Manufacturing (12.2%), Property and Business Services (11.1%), and Health and Community Services (9.7%). Government and Defence personnel comprised only 4.5% of the workforce of Australia<sup>1</sup>.

The majority of people in the Darwin region list their occupation as Professionals, Associate Professionals, Intermediate Clerical, Sales and Service Workers, or Tradespersons and Related Workers<sup>1</sup>.

The median weekly income is higher in Darwin than the Australian median income with the average Darwin household income was \$1 000-\$1 199 per week<sup>1</sup>.

#### Issues

- Unemployment rates in the Darwin region need to be addressed.
- The high proportion of defence personnel in the Darwin region means that the resident population is more transient and is relatively young.

- The large focus on retail, trade, property and business employment necessitates planning of related industries (eg tourism, commercial sectors) to ensure long term economic development and individual opportunity.

### **Cost of living**

Household expenditure statistics reveal that Darwin has a high cost of living, with households on average spending \$906 per week on goods and services, the highest expenditure of all Australian capital cities and well above the Australian average of \$747.18 per week. The high cost of living can be attributed to higher housing costs, high food, alcohol and tobacco costs; high fuel and power costs; and high transport costs<sup>5</sup>.

Darwin rental costs are also high compared to other capital cities at approximately \$250 per week for a three- bedroom house, and \$190 per week for a two-bedroom unit. In comparison, Hobart and Melbourne have average rental costs of approximately \$150 per week and \$200 per week respectively for a three-bedroom house. Median house prices are also higher than several other Australian capital cities, although they are lower than those in Sydney and Melbourne<sup>6</sup>.

### Issues

- The high cost of living in the Darwin region, without comparative increases in household income, reduces quality of life and the ability of individuals to prosper.
- High costs of food and fuel may be attributed to freight costs

### **Education**

The educational status of people in the Darwin region is similar to that in the rest of Australia, with approximately 37% of people having tertiary level qualifications in the 2001 census<sup>1</sup>. There are 181 schools in the Northern Territory. In Darwin and Palmerston alone, there are 11 high schools, 35 primary schools, and one university<sup>6,7</sup>. The student to teacher ratio is recognised as being low in the Northern Territory.

### **Human health**

Human health represents a major issue for the population of the Northern Territory. Statistics given in this section are for the Northern Territory as a whole, but are indicative of the Darwin region.

The life expectancy at birth for people in the Northern Territory (males - 70.3, females - 75.2) is lower than the national average (males - 76.6 and females - 82.0)<sup>8</sup>. Life expectancy at birth for indigenous Territorians (males - 57.7, females - 62.2) is considerably lower than non-indigenous Territorians (males - 74.6, females - 83.8) and the Australian population generally<sup>9</sup>. This highlights indigenous health particularly as an issue.

The population demography of indigenous Australians differs markedly from non-indigenous Australians. In 2001, the median age of the indigenous population was 21 years, compared to 36 years for the total Australian population. This is a result of high fertility and high mortality rate among the indigenous population.

The most common cause of death for Territorians between 1979 and 1995 was circulatory disease, with injury-related deaths most common in non-indigenous Territorians, reflecting in some part the youth of the population. For indigenous Territorians, respiratory disease was also a common cause of death<sup>9</sup>.

Health services in the Darwin region include public and private hospitals, health centres and community care centres, specialists, dentists, mental health services and services for people with disabilities.

#### Issues

- The indigenous population experiences low life expectancy and high incidence of certain diseases (eg respiratory diseases) as a consequence of poor living conditions.
- There is a high incidence of injury-related deaths (car accidents etc) and harmful behaviours (smoking, alcohol abuse), reflecting the youth of the population.

#### **Multiculturalism**

Darwin and the Northern Territory as a whole are recognised as being multicultural, with many different cultures present. More than 27% of Darwin people are not born in Australia, with those born in other countries primarily from the United Kingdom, New Zealand and the Philippines. English is spoken at home by 79% of people, with the most common other languages being Greek, Chinese languages and Australian indigenous languages. More than 40 indigenous languages are used in the Northern Territory<sup>1</sup>.

#### *A blend of cultures*

*In 1996, the proportion of Darwin residents who were born in Indonesia was 11 times the Australian average, with 3 times the average born in the Philippines and two times the average born in Greece<sup>10</sup>.*

The Northern Territory has the highest proportion of people of indigenous origin of all Australian states at 25.1% compared to 2.2% nationally. Only 9% of the population of the Darwin region are identified as being of indigenous origin<sup>1</sup>. This reflects higher likelihood of indigenous populations to live in remote areas, compared to the non-indigenous population<sup>2</sup>.

#### Issues

- Promotion of multiculturalism through festivals and marketing campaigns will enhance tolerance, quality of life and tourism.
- There is a need for support to overcome cultural and language barriers in the community.
- Infrastructure such as community centres and religious centres will enhance quality of life for people of different cultures.

## Lifestyle

The Darwin community boasts a variety of arts and cultural activities and facilities, with museums, art galleries, public libraries, entertainment centres, festivals and programs operating throughout the year. Facilities and organisations include the Museum and Art Gallery of the Northern Territory, Fannie Bay Goal Museum, East Point Military Museum, Darwin Entertainment Centre, Darwin and Palmerston Public Libraries, NT Library, Frog Hollow Centre, Darwin Theatre Company, ArtsMARK Aboriginal Fine Arts, Tracks/Ausdance NT, Coomalie Cultural Centre, NT Writers' Centre, Framed, Darwin Visual Arts Association, Browns Mart Community Arts Centre, Corrugated Iron Youth Arts, Darwin Theatre Company and the Darwin Symphony Orchestra.

The Darwin region also has a variety of restaurants, clubs, nightspots, shopping centres, markets, festivals, social activities and facilities to enhance lifestyle in the region. Regular festivals and activities include Greek Glenti, Chinese New Year, Italian Festival, Darwin Fringe Festival, NT Expo, Royal North Australian Show, Darwin Cup Carnival, Darwin Festival, Oktoberfest and numerous Christmas and New Year events. Markets are also held weekly at Rapid Creek, Parap, Nightcliff, Mindil Beach and Palmerston.

### Issue

- Promotion of arts, cultural and social activities and infrastructure is an ongoing activity that will improve the quality of life for Territorians and enhance tourism in the region.

## Recreation

A survey of Darwin residents revealed that residents visit the harbour itself more than once per week, primarily for the purposes of relaxing, walking, fishing and boating. Other uses include birdwatching, swimming, sailing, scuba diving, canoeing, cultural activities and cycling. Areas around the harbour that are frequently visited for recreation purposes include Stokes Hill Wharf, beaches, foreshore parks, jetties/rocks, walking and cycle tracks, rivers and creeks, mangroves and reef areas<sup>11</sup>.

Other recreational activities in the Darwin region include sporting activities (football, hockey, cricket, basketball, netball, softball, motor sports, target shooting), camping, bushwalking and swimming. Several sporting facilities are located in Darwin including the Marrara Sporting Complex, Hidden Valley Motor Sports Complex, Darwin Turf Club and Gardens Oval Complex, as well as numerous sports ovals, Olympic size swimming pools and golf courses. Sporting events for the region include the Arafura Games, Masters Games, Pacific School Games and the University Games, as well as school and sport specific events.

Public open space and conservation areas also provide opportunity for recreation. In the Darwin region, there are several large public open space and conservation areas including the Botanic Gardens, East Point Reserve, Casuarina Coastal Reserve, Charles Darwin National Park, Rapid Creek Water Gardens, Lake Alexander, Marlow's Lagoon, Fred's Pass Reserve, Leanyer Recreation Park, Howard Springs, and various coastal foreshore areas.

Darwin City Council maintains 230 suburban parks covering some 600 hectares<sup>6</sup>, while Palmerston City Council maintains 59 hectares of parkland and 23 hectares of bushland<sup>7</sup>.

### Recreational fishing

Recreational fishing is an important recreational activity in the Darwin region, with approximately 35% of the Northern Territory population (42 000 people) and 40% of the Darwin area population (32 000 people) fishing at least once each year. Approximately 6% of visitors to the Northern Territory also fish at least once during their stay<sup>12</sup>. Darwin residents spend approximately 233 000 days fishing per year, at an average of 7 days per year per fisher. Over one million hours of fishing, representing over 52% of all Northern Territory fishing effort, is undertaken by Darwin residents every year<sup>12</sup>.

Recreational fishing occurs throughout the Northern Territory, but 45% of all Territory fishing occurs in Darwin Harbour. Darwin residents are responsible for the majority of fishing effort in Darwin Harbour (79%). Within Darwin Harbour, 55% of fishing is undertaken from boats, with 45% undertaken from the shore. Around 18% of the population of Darwin owns a boat, with 83% of boats being powerboats, 9% being sailboats and 8% rowboats<sup>12</sup>.

#### *Fishing in the harbour*

*In total, some 800 000 fish are caught in Darwin Harbour per year.*

*The most commonly caught fish in Darwin Harbour are the snapper species, followed by catfish, whiting, mudcrabs, emperor, barramundi and shark.*

### Issues

- Access to waterways and the provision of areas and facilities for recreation is important to maintaining quality of life.
- Recreational fishing is a particularly important pursuit of Darwin region residents
- The natural environment is utilised for recreation and this needs to be considered in long term planning.

### **Aesthetics and character**

The aesthetic value of the Darwin Harbour region cannot be overlooked. This is a highly subjective value, with different aspects of the region appealing to different people. Natural ecosystems of Darwin Harbour have high visual amenity, with the harbour seascapes and mangroves highly valued by many residents. Coastal landscapes, including beaches, cliffs, dunes and mudflats represent areas of natural beauty, as do wetlands, creeks, rainforests and ranges further inland.

Alternatively, man-made attractions such as Cullen Bay Marina, the Stokes Hill Wharf precinct, the profile of the city and other developments are also valued. General landscaping, streetscapes and tropical building design also contribute to aesthetic appeal.

The intrinsic character of Darwin is something that is also often discussed, but rarely defined. Visitors from outside the region often reflect on the relaxed lifestyle, the tropical climate, natural beauty, the remoteness, multiculturalism, wide open spaces, depth of indigenous culture, the harsh climate and the friendly people.

Issues

- Aesthetic values (natural and man made) of the region need to be identified, promoted and protected when planning future development.
- The character of the region needs to be defined, promoted and protected in the long term to enhance quality of life and tourism.

## ECONOMY OF THE DARWIN HARBOUR REGION

The economy of the Darwin Harbour region is essentially a subset of the Northern Territory economy. The Darwin Harbour region represents the main centre for economic activity in the Northern Territory. Economic development in the region relies upon the use of the available natural resources to varying degrees, and this use must be managed to ensure sustainable economic growth into the future.

### Northern Territory economy

Key sectors in the Northern Territory economy include mining, tourism, defence, alumina production, construction and government services. The mining industry has provided the largest contribution to the Northern Territory's Gross State Product (GSP) for the past decade<sup>1</sup>. In 2000 - 2001, the Northern Territory Mining Industry accounted for 31% of the Northern Territory GSP, with production valued at \$4.36 billion. After mining, the largest industries are service orientated - Government administration and defence, property and business services and health and community services (Figure 3).

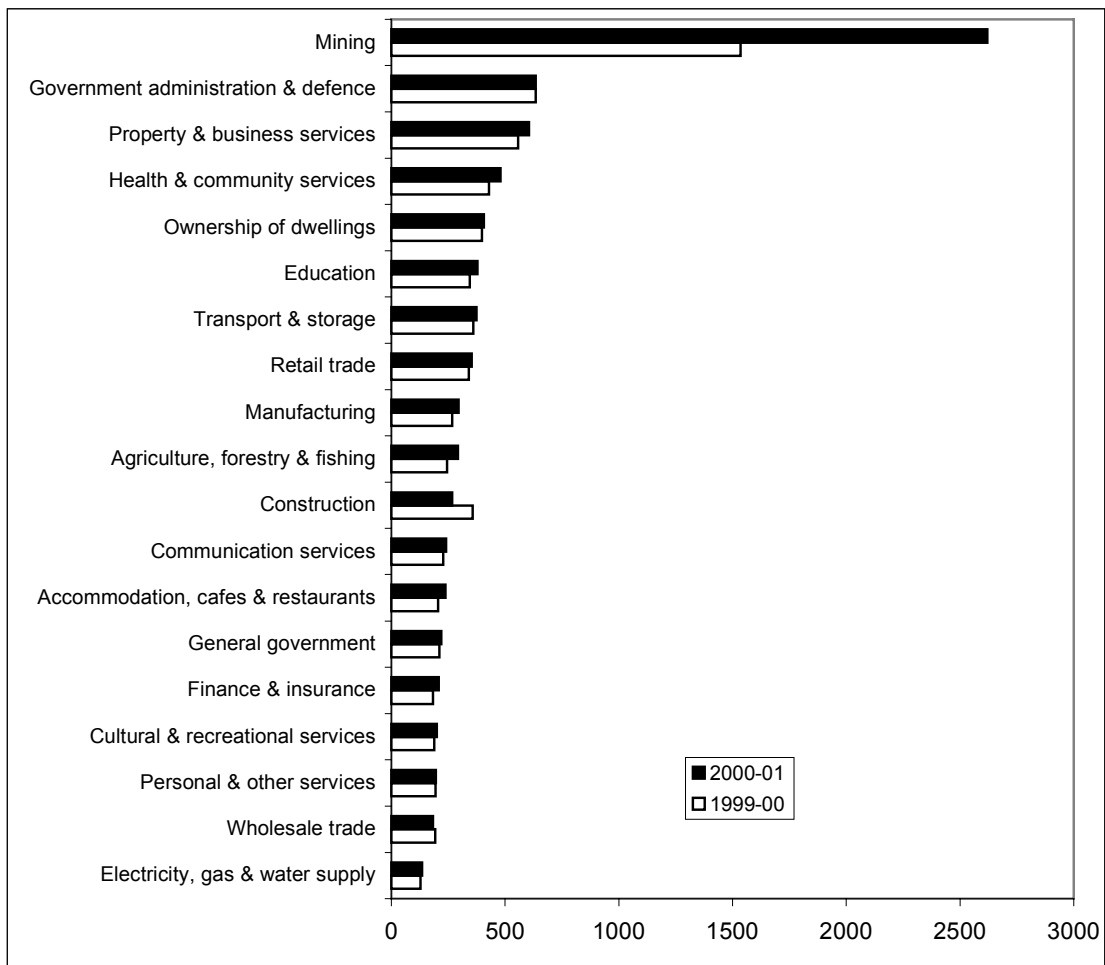


Figure 3. Contributions by Industry Sectors to Gross State Product (\$ million)

While tourism is not shown directly in Figure 3, it contributes to several of the sectors shown, including accommodation, cafes and restaurants, retail trade and transport. After mining, tourism is the second largest revenue earner in the Northern Territory. It is also the largest employer of Territorians, employing some 8 000 people directly and including indirect employment, provided some 14 287 jobs in the Northern Territory<sup>2</sup>. In 2001, visitors contributed \$973 million directly into the Territory economy and, including the indirect effects, was worth in excess of \$1.9 billion to the Northern Territory.

#### Tourism

*There were more than 1.58 million visitors to the Territory in 2001, with 703 000 people visiting the Top End. Visitors to the Northern Territory are primarily from interstate (46%) or overseas (36%), with the remainder being Territorian tourists.*

Defence related contracts continue to play a key role in the Top End economy, with the Darwin, Palmerston and Katherine supporting several Australian Defence Force bases. Total Defence expenditure in the Northern Territory was estimated at \$466 million in 2001 - 2002 and is expected to increase<sup>3</sup>. After tourism, Government administration and defence is the Northern Territory's highest employment sector and the defence community makes up almost 6.7% of the Northern Territory population<sup>3</sup>.

Primary industries continue to prosper and diversify throughout the Northern Territory. Rural industries in the Northern Territory comprise cattle and other livestock (including buffalo, crocodiles, poultry, pigs and camels), horticulture (fruit, vegetables, nursery and cut flowers) and crop production (field crops, hay and seed). Fisheries comprise wildstock harvesting, aquaculture and recreational fishing<sup>4</sup>. Rural industries and fisheries accounted for some \$470 million of production in 2000 - 2001<sup>2</sup>.

Public expenditure is also significant to the Territory economy. Key contributing factors are the developing status of the region, a sparsely distributed population, and higher than average cost of serving people in remote, predominantly indigenous communities<sup>1</sup>. Approximately 19% of businesses in the NT are in the retail sector, servicing public spending<sup>4</sup>. In 2000 - 2001, Retail and Trade sectors contributed 6.2% of the Territory's GSP<sup>3</sup>.

The Northern Territory's economy is widely divergent from the more mature economies of the other states and territories in Australia. Markets for Northern Territory products are still developing domestically, with growth dependent on the export of natural resources. To a lesser degree, tourism, defence, construction and other government services support the NT economy. The somewhat narrow base of the economy is a consequence of export orientation, minimal domestic demand and a reliance on financial assistance from the Commonwealth<sup>5</sup>.

## Darwin Harbour region economy

Although mining constitutes the largest industry sector across the Northern Territory, this sector is not well represented in the Darwin Harbour region. Only a limited number of extractive companies operate in the catchment. These ventures are typically linked with population growth and economic activity in general, and are closely associated with construction activities in the region.

Tourism is a key industry for the Darwin Harbour region, with visitor expenditure in the Top End (broader than the Darwin Harbour region) accounting for some 47% of the Territory's visitor expenditure, at \$457 million.

There is also a significant Defence Force presence in the Darwin Harbour region, which creates opportunities for development as a regional supply, service and distribution centre for both the Australian and international Defence sector.

### *Defending our country*

*The Darwin Region has a long history of supporting Australia's Defence Force. Defence bases in and around Darwin include Larrakeyah Barracks, Robertson Barracks, HMAS Coonawarra and the Darwin RAAF Base at Winnellie.*

Within the Darwin Harbour catchment, much of the primary industry product consists of fruit, vegetables, nursery and cut flower industries with some mixed farming operations. About 90% of production in the Darwin region is in the Darwin Harbour catchment<sup>6</sup>.

The Port of Darwin is also important to the economy of the Darwin Harbour region, handling 1 million tonnes of cargo per annum. The port is the supply, service and distribution centre for the rich Timor Sea oil and gas reserves. Future exploration and production activity in this region will see increased cargo volumes through the Port and respectively increased shipping movement on the harbour<sup>7</sup>. Trade through the Port of Darwin predominantly serves the following shipping industry markets:

- Livestock export;
- Offshore oil and gas rig services;
- Container and general cargo;
- Dry bulk;
- Petroleum and other bulk liquids; and
- Cruise and naval vessels.

Current studies being undertaken by the Department of Business, Industry and Resource Development indicate that 72% of Territory business entities are registered in the Darwin region (wider than and including the Darwin Harbour region). The Darwin region has average or above average representation in the manufacturing, construction wholesale, transport and storage, communication services, finance and insurance, and property and business services. Within the Darwin region over 43% of businesses are in

the construction, and property and business sectors while 31% are in the agriculture, manufacturing, retail, and transport and storage sectors.

The proportion of businesses in a region does not necessarily indicate the proportion a region contributes to the Territory economy. For example, large mining, pastoral and agricultural business operations in other regions will contribute proportionally more value to the NT economy. However, a conservative estimate is that the Darwin region contributes around 55-60% to the Territory economy.

### **Economic growth prospects**

The prospects for economic growth for the Northern Territory are presented in the 2003 Budget paper, Northern Territory Economy<sup>3</sup>. The short-term forecast is for growth in volume to be around 3.4% in 2003-04. This growth will, in all probability, be attributable to an increase in consumption expenditure, assisted by recoveries in tourism and housing, as well as population growth, employment growth and a rise in household income<sup>2</sup>.

Economic prospects for the Darwin Harbour region indicate strong growth in the next 5 years. However, this will be dependent on the degree of progress on major oil and gas projects, in addition to the completion of the AustralAsia Railway, which is now under construction. For the Darwin region (as elsewhere), the prime factors influencing economic growth are major projects, population and profitability. Major project developments for 2003-04 include the Bayu-Undan Stage 2 and Chinatown. Population growth is forecast to resume and an associated recovery is expected in residential constructions. Available evidence indicates that Territory business operations are, on average, equally profitable as business operations in the rest of Australia. Capital investment will continue to be attracted to new and existing enterprises with the perceived potential to return strong profits through greater competitiveness.

#### *Positive economic outlook*

*Several major projects are expected to boost the Territory's economy in the future. These include completion of the AustralAsia Railway, construction of the Wickham Point LNG plant and gas pipeline to shore, and relocation of the Army's 1<sup>st</sup> Aviation Regiment to Darwin.*

### **Strategic issues in economic growth and development**

The Northern Territory's Economic Development Strategy, 'Building a Better Territory', is the key strategy document guiding the economic development of the Northern Territory<sup>1</sup>. This strategy is based on building successful core business, while encouraging emergent industries and positioning the Northern Territory to take advantage of new economies and job opportunities for the future. Five theme outcome areas provide strategic direction, that includes sustainable regional development and new job opportunities. These outcome areas focus on:

- Core industries;
- Economic drivers;
- Emerging industries;

- Regional initiatives; and
- Economic support.

Most of the factors that drive and influence economic development in the Darwin Harbour region will operate largely independently of Darwin Harbour region resources. For example, the attractiveness of investment capital to particular enterprises and industries will be driven by the prospects of good investment returns. The role of government is to provide the optimal economic and business climate, infrastructure for economic growth and to limit, through regulations, inappropriate business practices.

Development in the region may however be constrained by the availability and cost of required resources (such as extractive minerals). Extractive mining in the Darwin Harbour region provides materials to enable construction and development activities. As deposits of extractive materials are not uniformly spread but are governed by geological factors, it is important that access to resources are maintained if they are to be available for future use.

Extractive minerals by nature are high-volume, low-value commodities. Increased transport distance adds substantially to the cost of the material to the consumer and therefore to building costs. It is important to reduce the distance of transport and to ensure that that utilisation of the available resources is optimised to enable sustained growth and development.

A wide range of factors operates to influence economic growth in the Darwin Harbour region (as elsewhere). Economic growth can be stimulated by:

- Increased investment;
- Construction and operation of major projects;
- Increased population generating increased demand for housing, goods and services;
- Inclusion of non-priced/non-market values (eg recreational fishing);
- Improved competitiveness and productivity;
- Increased labour supply, skills and mobility;
- Increased resource availability;
- Infrastructure developments;
- Increased trade.

#### Issues

- Sustainable economic growth requires trade-offs, including those between production and the environment.
- In order to support economic growth, development of infrastructure, sustainable access to natural resources, continued investment and increased population are required.
- Environmental regulations and voluntary environmental practices can reduce environmental impacts, but may act as a constraint to economic growth.
- Land Use Planning must take account of economic growth and provide adequate resources, land and infrastructure to support development.
- The requirements for growth of major industries (tourism, primary industries, defence) in the Darwin Harbour region need to be considered in Land Use Planning.
- Extractive mining provides resources that support development in the Darwin Harbour region and needs to be considered in Land Use Planning.

- Requirements for residential land to support population growth must also be considered.
- Quality information about economic, industry and business conditions must be provided to encourage effective long term planning of the Darwin Harbour region.

## ENVIRONMENT OF THE DARWIN HARBOUR REGION

The Darwin Harbour Regional Plan of Management area covers Port Darwin, Shoal Bay and their catchments. This area (referred to as the Darwin Harbour region) covers 3227 kilometres<sup>2</sup> and extends from Charles Point to Gunn Point including the estuarine areas and tributaries of Woods Inlet, West Arm, Middle Arm, East Arm, the Howard River and all of the land that drains into these waterways. The total area of land within the Darwin Harbour region is 2 417 kilometres<sup>2</sup>.

The Darwin Harbour region includes the cities of Darwin and Palmerston and extends as far south as Darwin River Dam, the outskirts of Humpty Doo, and the Cox Peninsula, covering the settlements of Belyuen, Mandorah and Wagait Beach.

The waterways of the Darwin Harbour region have a large tidal range, of up to 8 metres. The mean spring-tide range is 5.5 metres and the mean neap-tide range is 1.8 metres. Two high and two low tides are experienced daily and the tidal range fluctuates over a 28 day cycle. The daily inflow and outflow is 216 million metres<sup>3</sup> on a spring tide and 71 million metres<sup>3</sup> on a neap tide<sup>1</sup>. These flows represent 69% and 29% of the water in Darwin Harbour, respectively.

An important characteristic of the waterways of the Darwin Harbour region is their small catchment. The Darwin Harbour region's catchment area of 2 417 kilometres<sup>2</sup> is relatively small when compared to its estuary area of 810 kilometres<sup>2</sup>, with a catchment to estuary ratio of approximately 3:1. Ratios for other Australian estuaries are 14:1 for Moreton Bay, 10:1 for Port Jackson, and 5:1 for Port Phillip Bay. The low catchment to estuary ratio for Darwin Harbour region indicates that there is less potential for disturbance from runoff to the estuary than in estuaries with proportionally larger catchments.

The main channel of Port Darwin attains a depth of 36 metres. Channels which are 10 to 12 metres deep extend for 5 to 10 kilometres into the three major arms; East Arm, Middle Arm and West Arm. Mangroves and mud flats are the dominant shoreline features of the Darwin Harbour region. No mangroves occur below mean low water neap tide level (3 metres). Rocky foreshores, low cliffs and sandy beaches are prominent features in the lower reaches of Port Darwin, particularly near Wagait Beach and between Emery Point and Lee Point.

Each arm of Port Darwin is comprised of a deeper channel region with beds of coarse sand and gravel. The channels are fringed successively by sands, fine sands and extensive mud flats in the subtidal and intertidal environments. The major rivers flowing into Port Darwin are the Blackmore River and Elizabeth River. These river systems drain 586 kilometres<sup>2</sup> and 287 kilometres<sup>2</sup>, respectively.

Shoal Bay is a shallow embayment comprising sand and mud flats, with much of the bay exposed at low tide. The maximum depth of the bay is approximately 15 metres near Gunn Point. Sandy beaches are a prominent feature of the shoreline. The major river flowing into Shoal Bay is the Howard River. The catchment area for the Howard River is 497 kilometres<sup>2</sup>. Buffalo Creek, Mickett Creek and King Creek also feed into Shoal Bay.

### Issues

- While Darwin Harbour has naturally deep channels, the use of Darwin Harbour as a port necessitates dredging of harbour channels and mooring basins. Dredged material must be disposed of, either by side casting or disposal in specified areas in the harbour or onshore.
- Waters from the catchment drain into Darwin Harbour, meaning that catchment land uses may have impacts on harbour water quality and ecosystems.

### **Climate**

Darwin has a monsoonal climate that is characterised by a hot humid wet season (December-March), a relatively cool to warm dry season (May-August). The average annual rainfall for Darwin is approximately 1 700 millimetres with nearly all of this falling between December and March<sup>2</sup>.

The wet season is associated with the development of the monsoon trough over northern Australia. During the wet season there can be periods of heavy rainfall, occasional showers and lengthy dry periods. Periods of prolonged rainfall are associated with monsoon depressions and tropical cyclones. The wet season is characterised by long periods of heavy cloud cover and a low daily temperature range.

#### *A warm climate*

*Darwin has a warm tropical climate. In the wet season, weather conditions are hot and humid, with January's average daily air temperatures ranging between 25° C and 32° C, with an average 9am humidity of 81%. Temperatures in July are cooler, ranging between 19° C and 30° C with 62% humidity.*

The dry season extends from May to August with little or no rainfall recorded and cooler daily temperatures. Cloud cover during the dry season is low and restricted usually to high level cloud.

Two transition seasons occur prior to and following the wet season. Before the arrival of the monsoon trough there is a gradual rise in humidity in October and November. This period of the year, known locally as the 'build-up', precedes the wet season and is associated with hot and humid conditions and occasional thunderstorms. The reverse occurs during April when humidity gradually decreases indicating the onset of the dry season.

### Issues

- High rainfall in a short time frame necessitates adequate stormwater infrastructure.
- Stormwater inflow and infiltration to the sewer during wet season can significantly increase sewerage flows causing overflows
- In the dry season, the lack of rainfall increases the demand on water supply.
- Cyclonic winds, flooding and storm surge must be taken into account when undertaking building and development in the Darwin Harbour region.
- The region supports large populations of midges and mosquitoes that may carry disease. Land Use Planning and development assessment must take into account

mosquito breeding areas and potential risks.

- The heat and humidity in the Darwin Harbour region requires consideration and promotion of tropical building design, provision of adequate shade in public places, energy efficiency and provision of water based recreational opportunities.

### **Water quality**

Most of the rivers and streams that feed into Darwin Harbour flow during the wet season, and the early part of the dry season. These rivers then stop flowing, sometimes reducing to a series of temporary pools, which also dry out. A small number of waterways at the lower reaches of their tributaries, flow throughout the year, examples include the Howard River and Berry Creek. Nevertheless, more than 99% of river flow enters Darwin Harbour between January and April. For the remainder of the year, the estuaries of the Harbour are, for the most part, not influenced by river inflows. The region's rivers have naturally low concentrations of nutrients, sediment and metals owing to the low relief, and infertile soils<sup>3</sup>. Urbanisation, however, reduces water quality, increasing the amounts of nutrients, sediment and metals carried by rivers<sup>3</sup>. Pesticides have been rarely detected in rivers that drain the rural area. Dieldrin, a pesticide no longer in use but with a long lifetime in the environment, has been detected in storm water from the industrial areas of Darwin<sup>3</sup>.

The water quality of Darwin Harbour varies greatly. It varies with the tide (spring versus neap), with the location (inner versus outer harbour), and with the season (wet season versus dry season)<sup>4</sup>. Tides have a marked affect on the clarity of the harbour, with waters of neap tides being the clearest, whilst spring tides carry a lot of sediment from the fringing mangroves. The water quality of tidal creeks and estuarine reaches of the harbour are much more influenced by the mangroves and river inflow, than the outer parts of the Harbour which retain their marine character throughout the year. In the wet season, especially during periods of sustained heavy rainfall, river inflow reduces the salinity of the Harbour.

There is no evidence of widespread water or sediment pollution in Darwin Harbour<sup>4</sup>, although there is some localised pollution. For example, there are increased levels of nutrients in Buffalo Creek and metals in the sediments at Iron Ore Wharf<sup>4</sup> (near Fort Hill Wharf), however the ecological significance of these localised impacts is unclear. Additionally, there is no evidence of hydrocarbon or pesticide pollution in Darwin Harbour<sup>4</sup>.

The beaches and harbour waters are suitable for swimming during the dry season. In the wet season, however, concentrations of microbiological indicators of faecal contamination are higher because material is washed from the catchments to marine and estuarine waters<sup>4</sup>.

### **Issues**

- Water quality can be impacted by pollution from several sources within the Darwin Harbour region:
  - Secondary treated sewage is discharged from treatment plants at Leanyer (into Buffalo Creek), Palmerston (into Myrmidon Creek), Berrimah (into Bleasers Creek) and Ludmilla (into Ludmilla Creek), with macerated and

disinfected sewage from Larrakeyah released from the deepwater outfall into the harbour.

- Ludmilla treatment plant currently does not have the capacity to deal with large stormwater inputs in the wet season. At times of peak flow, some sewer flows bypass the treatment plant and are released directly into waterways.
- Stormwater from throughout the region washes contaminants, nutrients and sediments from various land uses into the harbour.
- Runoff from agriculture and horticulture can include fertilisers (nutrients), pesticides (contaminants) and sediments.
- Currently, industrial trade wastes are discharged to the sewer system and treated in conjunction with domestic sewage prior to discharge to waterways.
- Leachate from waste disposal sites, land fills and reclamation sites can be high in contaminants.
- Sediments and associated contaminants are dispersed during dredging and disposal of dredge spoil.
- Release of contaminants, nutrients and sediments can occur through accidental product spills when ship loading or during transport.
- Erosion and sedimentation commonly occur as a consequence of land clearing for development, as well as other changes in catchment hydrology and harbour hydrodynamics.
- Reclamation and development in low-lying coastal areas can lead to acid leachate from acid sulphate soils.
- Recreational uses of the environment (particularly swimming) require good water quality to be maintained.
- Ecosystems of the Darwin Harbour region rely on good water quality.
- Water abstraction from rivers and dams can alter natural freshwater flow regimes and therefore impact upon marine and estuarine environments.

## **Geology**

### Marine

The Darwin Harbour region is situated on a ria coast environment created by post-glacial marine flooding of a dissected plateau. The floor of Darwin Harbour can be divided into eight categories. These are alluvial fans, tidal flats, tidal creeks, spits, cheniers, rocky shores, subtidal channels and subtidal bays<sup>5</sup>.

Hard surfaces present in the Darwin Harbour region consist of coastal cliffs and cliff talus, rocky platforms and rock bars. Coastal cliffs and cliff scree are scattered along the northern coastline between Talc Head to Charles Point; and Stokes Hill to Lee Point. Weathered and laterised sandstones and conglomerates form the majority of intertidal rocky platforms (eg. Weed Reef, Channel Island Reef, Gunn Point Reef and Old Man Rock), intertidal rocky outcrops (eg. north of Middle Point), subtidal rocky outcrops (eg. Platter Rock, Stevens Rock and East Point sponge garden) and rock bars in the upper reaches and mouths of major tributaries. It is estimated that hard surfaces cover less than 20% of the intertidal and subtidal area of the Darwin Harbour region<sup>6</sup>.

Soft surfaces consisting of muds and fine sand are estimated to cover approximately 80% of the management area's sea-floor<sup>1</sup>. Soft surfaces comprising varying amounts of gravel and sand are found in the main channels, around reefs, on beaches and on spits and shoals near the mouth of the harbour<sup>3,7</sup>. The spatial extent of these surfaces is

sometimes difficult to determine because of the often gradual transition between muddy, sandy and coarser sediments.

#### Hydrogeology

Groundwater is an important resource within the Darwin Harbour region and accounts for approximately 10% of the region's municipal water supply<sup>8</sup>. The bedrock geology underlying the Darwin Harbour region consists of dolomite, carbonate rocks, sandstone, shale, siltstone, schist, granite and metamorphic rocks. The highest yielding bedrock aquifers are the dolomites and carbonate rocks. Lesser yielding aquifers are found in the fractured sandstones and siltstone. Schist, granite and metamorphic rocks are low yielding aquifers. Recharge to the regional aquifers occurs as a result of direct infiltration of rainfall.

#### Issues

- Water abstraction from rivers, dams and ground water bores throughout the catchment require monitoring of both surface water and ground water to maintain quality.
- Development reduces the infiltration of rainfall into the ground, thus increasing runoff and reducing ground water recharge.
- Water allocation plans and Land Use Planning need to consider the environmental requirements for surface and ground water as well as human requirements for surface and ground water to ensure long term sustainability of this resource.

#### Terrestrial

The geological environment of the Darwin Harbour region is particularly ancient and highly weathered. Consequently the soils are relatively infertile and the topography of the catchment is relatively low lying with most areas being less than 30 metres above sea level (ASL). Most of the catchment area comprises gently undulating plains and hills. The topography only exceeds 50 metres ASL to the south of the catchment near Darwin River Dam where spot elevations may exceed 120 metres ASL. The principal geomorphic units of the Darwin Harbour region are the alluvial plains, coastal plains, the Koolpinyah Surface and dissected foothills<sup>9</sup>.

Dissected foothills comprising rocky hills, boulder covered strike ridges, stony hillocks and occasional granite tors which rise above the Koolpinyah Surface are extensive to the south of Darwin Harbour. These hills are formed from metasedimentary rocks of the Proterozoic period that include quartzite, conglomerates and shales. In some areas there are high ridges that have rock-strewn slopes with 60 metre relief and slope gradients in excess of 20%. Soils of the dissected foothills are typically shallow and include extensive areas of surface stone. Soils in alluvial areas consist of shallow yellow and mottled soils.

The Koolpinyah Surface forms a level to gently undulating landform. It consists of sediments deposited in the late Tertiary period comprising gravels, sands, silts and clays that have been repeatedly weathered and redeposited. Following deposition these sediments have undergone intense weathering to produce a lateritic mantle. The Koolpinyah Surface dominates the Cox Peninsula, Darwin, Palmerston and Gunn Point areas where Tertiary sediments overlay lower Cretaceous sedimentary rocks. The soils of the Koolpinyah Surface range from massive red and yellow earths to shallow lithosols.

Alluvial plains are associated with the mid-reaches of the Elizabeth River, Howard River and Berry Creek. They are associated with terrain developed on Proterozoic and Tertiary rocks. The plains are seasonally inundated but are not aggrading as the peak floods of the rivers rarely break their banks. The thickness of the alluvium is variable and may reach 10 to 12 metres.

Coastal plains are a significant feature of the low-lying terrain inland of Shoal Bay. This terrain has formed in relatively recent geological times during the Quaternary. It consists of flat, poorly drained saline muds and clay plains that are extensive on the lower reaches of the water courses, particularly the Howard River, and fringe the coastline. Each wet season the inland plains are flooded by fresh water to depths of up to 2 metres for 6 to 8 months. Chenier dune systems parallel to the shoreline occur in areas facing the open sea, particularly in the area between King Creek and Mickett Creek. These dune systems are formed from broken shell material and coarse sands that accumulate during catastrophic storm events.

#### Issues

- Soil erosion and sedimentation occurs as a consequence of development and land clearing throughout the catchment.
- Low-lying coastal areas are prone to acid sulphate soils, which when exposed to air produce sulphuric acid that may then contaminate surrounding waterways and ecosystems.
- The Darwin Harbour region has deposits of certain minerals that are extracted via mining. The minerals include sand, soil, gravel and rock. Mining is not a large industry in the Darwin Harbour region, but needs to be considered in Land Use Planning to ensure adequate supply of minerals to facilitate development.
- The infertility of soils in the region leads to requirements for fertiliser use by primary industry to enhance the growth of crops. High levels of fertiliser use can lead to nutrient contamination of run-off.

#### **Terrestrial vegetation**

The Darwin Harbour region possesses a rich flora with 1 225 species of vascular plant being recorded within the area. Of these species, 26 are listed as endangered or threatened under the Territory Parks and Wildlife Conservation Act 2001. Major vegetation types are listed in Table 1, found at the end of this section.

##### Clearing of native vegetation

*Much of the natural vegetation of the Darwin Harbour region remains intact, with some eighteen percent of the region's native vegetation cleared<sup>10</sup>. Most of this clearing has taken place in eucalypt woodlands.*

Eucalypt woodlands occur in the upland parts of the management area and occupy approximately 60% of the region. The dominant species of these woodlands are typically Stringybark (*Eucalyptus tetradonta*) and Woollybutt (*E. miniata*), however, the canopy and understorey species composition varies with elevation and soil type<sup>11</sup>. Common understorey species include the Cycad (*Cycas armstrongii*), Sand Palm (*Livistonia humilis*) and Pandanus (*Pandanus spiralis*). The grass layer is frequently dense and usually dominated by annual species, particularly *Sorghum* spp. During the wet season there is a

general flush of vegetation growth, particularly of grasses that may reach a height in excess of 2.5 metres. In the dry season, when moisture is limiting, there is little growth of vegetation and fires frequently clear the understorey of dense and senescent grass. The alteration of fire regimes resulting in hotter, more frequent and more widespread fires than would otherwise occur has been associated with the establishment of introduced grasses<sup>12</sup>. These changes to the fire regime are a potential threat to property and biodiversity within the Darwin Harbour region.

Lowland vegetation includes rainforest patches, Paperbark (*Melaleuca* spp.) forest, grasslands and heathlands and is strongly influenced by the seasonal climate<sup>11</sup>. During the wet season, the alluvial plains are frequently flooded and covered with dense vegetation. During the dry season much of the vegetation dies or exists as underground tubers and the cracking clay soils dry out and shrink. The vegetation of alluvial plains and swamps is dominated by sedges and rushes, particularly *Eleocharis* spp., *Fimbristylis* spp., *Cyperus* spp and the grasses, *Pseudoraphis spinescens*, *Hymenachne acutigluma* and *Oryza meridionalis*. Common aquatic species present in permanent and semi-permanent wetlands include paperbark (*Melaleuca* spp.), *Cyperus* spp. and the water-lilies *Nymphaea* spp., *Nymphoides* spp. and *Nelumbo nucifera*. Better-drained soils on the floodplains frequently support rainforest thickets. Sandy heaths within the catchment support populations of rare and endangered species, particularly bladderworts of the genus *Utricularia*. There are 36 species found in the Northern Territory, 20 of which are endemic to Australia. Two of these endemic species have distributions concentrated largely in the Darwin Harbour catchment and an additional 3 threatened *Utricularia* species are known from the area. These species are potentially threatened by sand mining operations in their habitats.

Freshwater lagoons subject to permanent or seasonal inundation occupy 14 798 hectares (6.1 %) of the Darwin Harbour region. These wetlands are a prominent feature of the landscape in the Berrimah, Palmerston and Howard Springs areas. The vegetation and characteristics of these lagoons varies considerably and includes grassy swamps, Paperbark (*Melaleuca*) woodlands, floodplains and monsoon forest<sup>11</sup>. The endangered palm *Ptychosperma bleeseri* is known to occur at 3 wetland locations near Howard Springs.

#### Mangrove lined shores

*The Darwin Harbour region contains over 26,000 hectares of mangroves. Mangrove ecosystems contain an abundance of invertebrate fauna, as well as supporting several important harbour species providing feeding grounds and nursery habitats.*

Extensive tracts of mangroves occur on the tidal flats in the Darwin Harbour region. The mangroves of the region are floristically diverse, contain 36 species and comprise one of the largest tracts of mangrove forest in the Northern Territory<sup>13</sup>. The floristic composition and structure of mangrove stands is correlated strongly with tidal levels and geomorphology. The structure of mangrove communities can vary from narrow bands of trees only a few metres in height along tidal mudflats to dense closed forests with trees up to 20 metres in height in sheltered estuaries. Within a mangrove stand, species typically grow in zones, whose species composition reflects the length of tidal inundation and salinity. The seaward margin of mangrove communities is dominated by *Sonneratia alba*, the regularly flooded zone of mangroves inland of the seaward margin is dominated by the Stilt-rooted Mangrove (*Rhizophora stylosa*) and *Camptostemon schultzei*. The mid

to high tidal flats that are flooded only on spring tides are dominated by *Ceriops tagal*, *Avicennia marina* and *Aegialitis annulata*. Saltmarshes occur on the landward edge of tidal mudflats. Mangrove habitats in the Darwin Harbour region have been rezoned conservation through an amendment to the NT Planning Scheme. The rezoning of these important mangrove expanses means that more than 26,000 hectares of mangroves in Darwin Harbour are now protected.

#### Issues

- Uncontrolled bushfires late in the dry season can cause widespread disturbance to ecosystems. Early selective dry season burning is less harmful and limits the supply of fuel for wildfires later in the season.
- Land clearing and reclamation of coastal habitat leads to loss of native vegetation, loss of habitat for animals as well as potential soil erosion, increased runoff and weed invasion. Land clearing is particularly prevalent in eucalypt woodlands.
- Weeds can replace native flora and fauna and reduce biodiversity, as well as impact upon primary industry and waterways. Weeds are spread by wind, floods, domestic, feral and native animals, amongst grain, machinery, vehicles, and directly by people on their clothing.
- Introduced grasses in the Top End, such as Mission grass, produce a large flammable mass that dries off later in the dry season than native grasses. Thus, fire regimes can be altered to more intense late dry season fires.
- Rare and endangered species found in sandy heaths are potentially threatened by sand mining operations
- Wetlands, creeks, rivers and their associated flora and fauna are vulnerable to land clearing and development, changes to freshwater flows and changed water table levels as a result of water abstraction.
- Reclamation of mangrove habitats not only causes loss of habitat, but may also lead to acid formation and erosion.
- Mangrove communities are vulnerable to sedimentation and changes to freshwater flow regimes.
- Saltmarshes adjacent to mangroves may be affected by changes to freshwater flows and may be drained to reduce mosquito and biting midge populations. This can affect not only the saltmarsh flora and fauna, but also species that use these habitats intermittently as nursery or feeding areas.
- Access to sensitive ecosystems for recreational use can lead to impacts on flora and fauna.

#### **Fauna and flora**

##### Marine flora and invertebrates

The marine invertebrate fauna of the Darwin Harbour region is poorly known and is still being described. It is estimated that in excess of 3 000 marine invertebrate species occur within Darwin Harbour<sup>6, 14</sup>. Similarly, little is known about the marine flora of Darwin Harbour. Seagrass beds are known to occur near Casuarina Beach, Talc Head and Gunn Point but there is little knowledge of their composition or extent<sup>6</sup>.

Coral dominated rocky reefs are located in the lower intertidal to high subtidal areas within depths of 5 to 10 metres. These areas are characterised by strong currents where the sediment load is kept in suspension and light intensity does not fall below a

minimum value for coral and algal survival. Coral dominated rocky reefs occur at East Point Reef, Plater Rock, Stevens Rock and Gunn Point.

Where hard substrate is available and high sediment levels restrict light levels and consequently the growth of corals and algae, the fauna of these reefs is dominated by a wide range of organisms, including sponges, bryozoa, ascidians, and hydroids.

#### Darwin Harbour marine life

*Darwin Harbour supports in excess of 3 000 marine invertebrate species, including sponges, hard and soft corals, crabs, prawns, marine worms, seastars, jellyfish, mussels, marine snails, seasquirts and seawhips. These animals live on a variety of surfaces, including mud, sand, gravel and rocks and amongst seagrass beds and mangroves.*

#### Issues

- Species may be introduced to the marine environment via several mechanisms, including ballast water, hullfouling on ships, or as releases or escapes from aquaria or ponds. Introduced species may impact upon natural ecosystems and species, as well as marine industries and infrastructure.
- Hard marine substrates are often utilised for development as they provide a stable platform. These substrates naturally support diverse communities that may be lost if substrates are developed.
- Sediments entering the marine system as a result of dredging, disposal of dredged material, erosion and runoff from catchment development can impact upon marine ecosystems.
- Nutrients and contaminants entering the marine ecosystem (for example via point source discharges of treated sewage or runoff from the catchment) can have implications to flora and fauna.
- Changes to hydrodynamics and freshwater inflows in the harbour can impact upon ecosystems.
- Collection of shellfish, crustaceans and invertebrates for food or aquaria can cause impacts not only to the species collected but through collection methods (eg reef walking).
- Recreational boating and diving may impact upon marine species, for example by anchor damage and damage from fins.
- Water quality is of great importance to the marine environment, and can be impacted upon by several sources of pollution.

#### Fish

Twenty-four species of freshwater fish (not including species that move between fresh and marine waters) have been recorded from the Darwin Harbour region<sup>15</sup>. Five species of non-native fish species have been recorded from the area, however, only one, *Gambusia holbrooki* is currently present in the region and is restricted to a single isolated population. The marine fish fauna of the Darwin Harbour region is much richer than the freshwater fauna, with 415 species of fishes from 95 families being recorded<sup>16</sup>. The most species rich family occurring in Darwin Harbour is the Gobiidae (gobies) with 66 recorded species.

Of the fish species recorded from the Darwin Harbour region, fifteen species are classified as threatened under International Union for Conservation of Nature and Natural Resources (IUCN) classifications. However, only 3 species recorded from Darwin Harbour region are listed as protected or partially protected under Northern Territory legislation. Protected fish species occurring in the Darwin Harbour region are the Dwarf Sawfish *Pristis clavata*, Queensland Grouper *Epinephelus lanceolatus* (individuals >1.2 metres) and Estuary Rockcod *Epinephelus coiodes* (individuals >1.2 metres).

#### Issues

- Recreational fishing is prevalent in the Darwin Harbour region and has potential impacts to freshwater, estuarine and marine fish species if not appropriately managed.
- Commercial fishing is minimal in the Darwin Harbour region.
- Fish habitat loss through reclamation and development has the potential to impact upon fish species.

#### Marine mammals and reptiles

Many marine mammal and reptile species in the Darwin Harbour region possess high conservational status and cultural importance. The region supports a rich community of marine mammals<sup>17, 18</sup>. Three species of dolphin and the Dugong (*Dugong dugon*) are commonly encountered within the Darwin Harbour region. While the Dugong is not listed as threatened in Australia, this species is protected from any form of commercial or recreational exploitation under international convention. Large whales are rarely seen within the area, and the only recorded species are the Humpback Whale (*Megaptera novaeangliae*), Sperm Whale (*Physeter macrocephalus*) and Pygmy Sperm Whale (*Kogia simus*). Several species of medium sized cetaceans such as the False Killer Whale (*Pseudorca crassidens*) and Short-finned Pilot Whale (*Globicephala macrorhynchus*) have also been seen in the region. The Darwin Harbour region also supports a rich fauna of marine reptiles, particularly, sea turtles, sea snakes and estuarine snakes<sup>19</sup>.

#### Turtles on our beaches

*Six species of sea turtle occur within the Darwin Harbour area. The Flatback Turtle (Natator depressus) and Olive Ridley Turtle (Lepidochelys olivacea) nest on Casuarina Beach.*

#### Issues

- Marine mammals and reptiles may be impacted by shipping and boating activities both through boat strike or general disturbance to movement or feeding regimes.
- Changes to marine ecosystems will impact upon marine mammals and reptiles, particularly loss of seagrass beds and rocky reefs.
- Disturbance of turtle nests is an issue.

### Terrestrial fauna

The NT Fauna Atlas lists 482 species of terrestrial vertebrate within the Darwin Harbour region. This includes 22 species of amphibian, 105 species of reptile, 45 species of mammal and 310 species of bird. Over thirty of the terrestrial vertebrate species that have been recorded in the Darwin Harbour region are listed as threatened or vulnerable under the Territory Parks and Wildlife Conservation Act 2001.

Introduced species recorded on the atlas include 1 amphibian species, 1 reptile species, 6 mammal species and 3 bird species. The introduced cane-toad, *Bufo marinus*, while not abundant, has been recorded in the Darwin Harbour region. These records of the cane toad are likely to represent individuals that have arrived with shipments of goods. Cane toads are expected to spread into the region within the next five years. One species of vertebrate, the recently discovered Howard River Toadlet, *Uperoleia* sp., may be unique to the Darwin Harbour region.

### Issues

- Impacts to terrestrial ecosystems, as outlined previously, will also impact upon the terrestrial fauna (for example land clearing, fire, weeds).
- Introduced or feral species (such as cane toads, pigs, pigeons) can have implications to native terrestrial fauna, with these impacts often unknown.

**Table 1.** Major native terrestrial vegetation types within the Darwin Harbour region. (Source: Natural Systems Division, D.I.P.E.)

Name	Description	Area (ha)	% of Area
Eucalypt low open woodland	Low open woodland (5 to 8 m) cover 5 to 10%. May be dominated by <i>Eucalyptus miniata</i> , <i>E. polysiadia</i> or <i>Livistona humilis</i> . Ground layer mostly annual grasses.	28949	12.0
Eucalypt open woodland	Medium tall woodland (8 to 12 m), cover 5 to 10%, growing on poor soils (with rocks or impeded drainage).	22028	9.1
Eucalypt woodland	Medium tall woodland (height 10 to 15 m), cover 10 to 30%, growing on a wide range of soils. Other common species <i>Erythrophleum chlorostachys</i> , <i>Terminalia ferdinandiana</i> , <i>Planchonia careya</i> , <i>Petalostigma pubescens</i> . Ground layer mixed annual and perennial grasses	67671	28.0
Eucalypt open forest	Tall forest (to 25 m), cover 30 to 50%, growing on deep earths. Other common species <i>Erythrophleum chlorostachys</i> , <i>Cycas armstrongii</i> , <i>terminalia ferdinandiana</i> , <i>Planchonia careya</i> . Ground layer mostly perennial grasses.	19210	7.9
Mangrove forest	Closed forest of mangroves	26298	10.9
Drain low open woodland	Open woodland on clay soils with impeded drainage. Usually <i>Lophostemon lactifluus</i> , <i>Pandanus spiralis</i> , <i>Eucalyptus bella</i> or <i>Eucalyptus polysiadia</i>	15736	6.5
Riparian open forest	Mixed species forest, commonly dominated by <i>Lophostemon lactifluus</i> , <i>Melaleuca ssp.</i> or <i>Acacia auriculiformis</i> . Associated with rivers, creeks and the margins of rainforests.	9143	3.8
Coastal thicket	Mixed species semi-deciduous broadleaved forest (>70% cover), usually associated coastal sand.	1014	0.4
Jungle	Mixed species evergreen broadleaved forest (>70% cover), usually associated with permanent water.	195	0.1
Samphire	Salt pans with samphire, subject to tidal inundation. Usually fringing mangroves.	4515	1.9
Heath	Shrublands growing on very sandy soil. Dominated by <i>Grevillea pteridifolia</i> . Groundlayer sedges and also <i>Utricularia</i> species.	3718	1.5
Grassy swamp	Seasonally inundated grassland surrounding lagoons.	1619	0.7
Melaleuca swamp forest	Medium to tall (height 10 to 25 m) seasonally inundated forest (50 to 80% cover) of <i>Melaleuca</i> .	1506	0.6
Floodplain	Seasonally inundated grasslands	538	0.2
<i>Mimosa</i> forest	Floodplain dominated by <i>Mimosa pigra</i>	3	0.0

## DARWIN HARBOUR REGIONAL LAND USE

The Darwin Harbour region encompasses 6 local government areas: Darwin City Council, Palmerston City Council, Litchfield Shire Council, Belyuen Community Government Council, Cox Peninsula Community Government Council and Coomalie Community Government Council. The majority of development within the region is centred on Darwin and Palmerston, with a mix of commercial, residential and industrial land uses.

Seventy-four primary land-uses have been identified within the Darwin Harbour region<sup>1</sup> based on the Australian Land Use and Management Classification Scheme (Table 2). Details of the classification scheme are contained in the DIPE technical report, Land Use Mapping of the Northern Territory<sup>1</sup>. The primary land use is the use specified as the primary land-management objective of the land manager. The most extensive primary land uses in terms of area of the Darwin Harbour region occupied are remnant native vegetation cover (51.50 %), surface water supply (7.34 %), other conserved area (6.03 %) and rural residential (5.7 %). In terms of area, urban residential is a relatively minor land use that occupies only 1.2 % of the area but includes 22 272 separate holdings.

**Table 2.** Major land uses within the Darwin Harbour region.  
Source: Land Use Mapping of the Northern Territory<sup>1</sup>.

Land use	Holdings	Area (kilometres <sup>2</sup> )	Percentage of region (%)
Remnant native cover	2031	1147.18	51.50
Surface water supply	12	163.55	7.34
Other conserved area	21	134.41	6.03
Rural residential	3177	126.85	5.70
NT rural	1280	78.69	3.53
Defence	10	75.62	3.39
Roads	63	52.94	2.38
Quarries	29	51.45	2.31
Defence facilities	26	49.35	2.22
Reservoir/dam	5	40.75	1.83
Irrigated tree fruits	204	39.23	1.76
Traditional indigenous uses	15	31.49	1.41
Urban residential	22772	27.06	1.22
Other minimal use	454	22.53	1.01
Airports/aerodromes	6	17.10	0.77
Marsh/wetland - conservation	20	15.98	0.72
Landscape	9	14.73	0.66
Rehabilitation	23	12.83	0.58
Public services	183	12.52	0.56
Recreation and culture	203	11.60	0.52

## **DARWIN HARBOUR REGIONAL ISSUES**

Throughout this section, a number of issues for the Darwin Harbour region have been identified. A summary list of these issues follows. Several of these issues are outside of the terms of reference for the Plan of Management. The issues addressed in the Plan of Management (Section 3) are identified with an asterisk.

### **History of the Darwin Harbour region**

- Historic and culturally significant sites\*.

### **The Larrakia perspective**

- Native Title claims and Land claims.
- Traditional uses of natural resources.\*
- Utilisation and promotion of traditional knowledge about the environment.\*
- Engagement of indigenous people in management.\*
- Protection of sacred and archaeological sites.\*
- Inequity in indigenous economic opportunity.\*

### **People of the Darwin Harbour region**

- Need for transport networks.\*
- High population growth is predicted, requiring urban, commercial and industrial land provision.\*
- Low median population age.
- Low home ownership rates.
- High percentage of public housing.
- Unemployment.
- Transient population.
- High employment in retail, trade, property and business fields.
- High cost of living (high food, transport, housing costs).
- Low life expectancy and high incidence of disease in the indigenous population.
- High proportion of injury-related deaths and harmful behaviours.
- Multiculturalism can lead to cultural and language barriers.
- Need for promotion and support of different cultures.\*
- Need for promotion of Darwin region lifestyle.\*
- Access to waterways and provision of areas and facilities for recreation.\*
- Recreational fishing.\*
- Protection of aesthetic values and character of the region.\*

### **Economy of the Darwin Harbour region**

- Environmental regulations and voluntary environmental practices may act as constraints to economic growth.\*
- Land Use Planning must take account of economic growth and provide adequate resources, land and infrastructure to support development.\*
- Requirements for residential land to support population growth.\*
- Need for quality information about economic, industry and business conditions to inform effective long term planning.\*

### **Environment of the Darwin Harbour region**

- Dredging of harbour channels and disposal of dredged material.\*
- Cyclonic winds, flooding, storm surge.\*
- Mosquitoes and biting midges.\*
- Heat and humidity.
- Treated sewage outfalls to waterways and the harbour.\*
- Stormwater inputs into sewer systems causing overflows.\*
- Stormwater and associated nutrients, contaminants and sediments.\*
- Agricultural and horticultural chemicals and fertilisers.\*
- Industrial trade waste discharges to the sewer system.\*
- Leachate from land fill and waste disposal sites.\*
- Accidental product and oil spills associated with shipping.\*
- Erosion and sedimentation as a consequence of land clearing and development.\*
- Reclamation of low lying coastal areas and potential acid leachate.\*
- Recreational impacts on the environment. \*
- Water abstraction and prevention of infiltration can cause changes to groundwater.\*
- Extractive mining.\*
- Number and timing of fires (especially late dry season bushfires).\*
- Land clearing and development leads to loss of habitat and native vegetation.\*
- Weeds.\*
- Drainage of saltmarshes to control biting insects.\*
- Introduced or pest species. \*
- Changes to harbour hydrodynamics and catchment hydrography.\*
- Fishing and harvesting.\*
- Shipping disturbance to fauna.\*
- Loss of habitat and food sources for species as a result of development pressures.\*

These issues are further explored in the supporting documents to this plan:

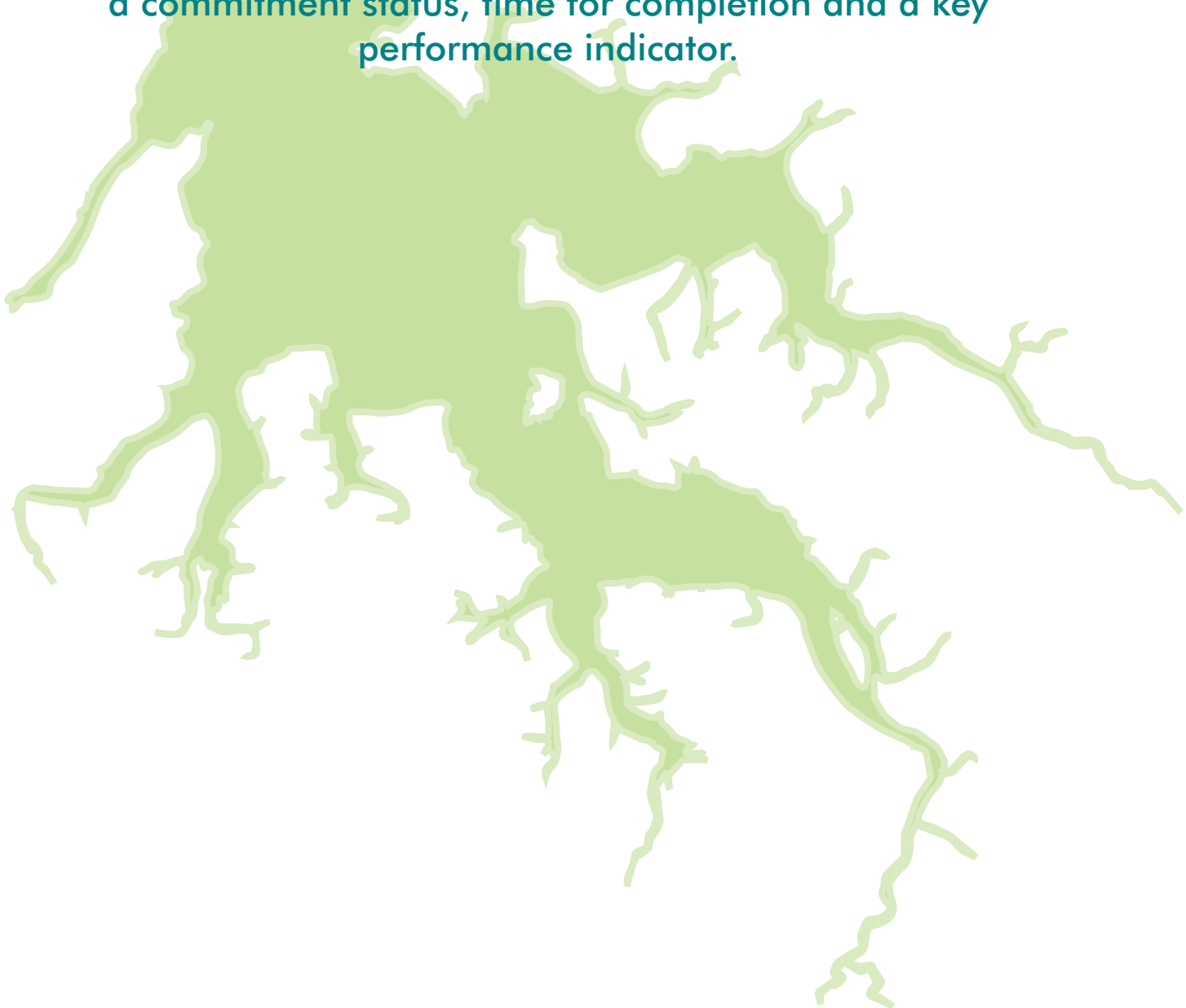
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## SECTION 3

### Managing the Darwin Harbour region

This section provides management strategies and actions to address the issues identified in Section 2, where not already being addressed by current management activities. Each action has nominated parties of key responsibility, potential partners, a commitment status, time for completion and a key performance indicator.





## INTRODUCTION

Focusing on key components of the vision, the Darwin Harbour Regional Plan of Management embraces five strategic goals.

This section establishes for each goal:

- Outcomes to be achieved;
- Activities currently undertaken to achieve outcomes; and
- Recommended future strategies and actions.

Current activities are listed at the start of each outcome area and explained fully in Section 5 - Appendices.

The goals and outcomes of the Plan of Management are as follows:

### **Goal 1. To maintain a healthy environment**

Outcomes to be achieved:

- 1.1 Improved understanding and knowledge of the region's environment;
- 1.2 Protection and enhancement of freshwater, estuarine and marine water quality;
- 1.3 Protection of the health and functioning of ecosystems and conservation of biodiversity.

### **Goal 2. To support recreational use and enjoyment of the environment**

Outcomes to be achieved:

- 2.1 Protection and enhancement of recreational amenity and opportunity;
- 2.2 Ecologically sustainable harvesting and fishing;
- 2.3 Protection of the diverse range of aesthetic values of the Darwin Harbour region.

### **Goal 3. To encourage ecologically sustainable development**

Outcomes to be achieved:

- 3.1 Effective planning and management of future development;
- 3.2 Support of sustainable economic development;
- 3.3 Ecologically sustainable use of fresh water in the Darwin Harbour region.

### **Goal 4. To protect cultural values and heritage**

Outcome to be achieved:

- 4.1 Management of cultural, spiritual and heritage values.

### **Goal 5. To foster community ownership and participation in management**

Outcomes to be achieved:

- 5.1 Increased public awareness and communication of environmental, social and economic values and issues;
- 5.2 Improved public participation in management and monitoring.

The tables that follow indicate for each strategy, the actions recommended to achieve the plan's goals. For each action, the party (or parties) assigned the 'key responsibility' for implementing the action is identified, along with 'partners' that would contribute to implementing an action.

Each action is assigned an 'A' or 'B' under a 'Commitment' category. 'A' signifies those actions that are currently committed to by a lead agency/organisation to undertake, with budget and resource allocation. Category 'B' actions are recommended with no budget or resources dedicated at this time.

A timeframe for completion is also indicated in addition to appropriate key performance indicators for each action. Key performance indicators enable all actions and the Plan's implementation progress to be evaluated. Most actions have been assigned a timeframe, however many are designated as ongoing.

Organisations are frequently referred to using acronyms in the following section. Section 5 - Appendices contains a full listing of the acronyms used throughout the Plan of Management.

# GOAL 1:

To maintain a healthy environment

- 1.1 Improved understanding and knowledge of the region's environment
- 1.2 Protection and enhancement of freshwater, estuarine and marine water quality
- 1.3 Protection of the health and functioning of ecosystems and conservation of biodiversity





# GOAL 1: TO MAINTAIN A HEALTHY ENVIRONMENT

## Outcome 1.1: Improved understanding and knowledge of the region's environment

### Current activities

#### **Management**

- Aquatic Pest Management Program
- Australian National Water Quality Guidelines
- Beneficial Uses (declared under the Water Act)
- Conservation Plan for Darwin Region
- Conservation reserves in the Darwin Harbour region
- Howard River Region Water Resource Strategy (in preparation)
- Mangrove Management in the Northern Territory
- National Pollutant Inventory
- Natural Resource Information Management Environment
- Parks and Wildlife Service Plans of Management
- Public education brochures and information
- Reuse and Recycling Directory
- Soil conservation program
- Strategic Plan for Beneficial Uses (Draft)
- Strategy for the Conservation of Marine Biodiversity in the Northern Territory of Australia
- Strategy for Conservation of the Biological Diversity of Wetlands in the Northern Territory of Australia
- Strategy for Waste Management and Pollution Control
- Wagait Beach Coastal Management Plan

#### **Monitoring**

- DBIRD Aquatic Pest Management monitoring programs
- DIPE monitoring programs
- Land Use Mapping of the Northern Territory
- Licence /permit monitoring programs
- Mangrove mapping and monitoring
- National Pollutant Inventory
- Waterwatch community based water quality monitoring

#### **Research**

- Darwin Air Emission Inventory
- Darwin River Dam monitoring
- Emissions to Darwin Harbour study

- Groundwater modelling of the Howard River catchment
- Habitat fragmentation research
- Hydrodynamic model
- Mangrove research
- Marine mapping and marine fauna inventory

### **Future activities**

#### **Strategies**

1. Improve understanding of the environment and potential impacts to it
2. Establish an integrated environmental monitoring program for the region
3. Manage and coordinate the region's environmental data
4. Disseminate information to improve public awareness and understanding of the region's environment.

**Outcome 1.1**

**Strategy 1: Improve understanding of the environment and potential impacts to it**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.1 1.1	Establish a Darwin Harbour Region Ecosystem Research Group (ERG) to direct and oversee strategic research	DIPE	Industry, Local gov, NT gov, Research organisations	B	June 2004	ERG established
1.1 1.2	Identify and evaluate the significance of knowledge gaps, at an ecosystem level	ERG	Industry, Research organisations	B	Dec 2004	Knowledge gaps identified
1.1 1.3	Expand knowledge of the Darwin Harbour region, by undertaking, for example: <ul style="list-style-type: none"> <li>• Habitat mapping</li> <li>• Developing species lists and mapping species distributions</li> <li>• Developing an inventory of freshwater wetlands</li> <li>• Determining ecosystem processes</li> </ul>	ERG	Industry, Research organisations	A/B	Dec 2005	Research programs developed to improve knowledge
1.1 1.4	Investigate options for incorporating indigenous knowledge into the Integrated Monitoring Program	ERG/IWG	DIPE, NLC, Larrakia	B	June 2006	Scoping study completed
1.1 1.5	Investigate options for incorporating local anecdotal knowledge into the Integrated Monitoring Program	ERG	DIPE, Community	B	June 2006	Scoping study completed
1.1 1.6	Use the hydrodynamic model to assess the impacts of various uses and developments in Darwin Harbour	DIPE	Power Water, DPC, Industry	A/B	Dec 2004	Model used to assess impacts

1.1 1.7	Further develop the hydrodynamic model to include water quality and extend coverage to Shoal Bay	DIPE	AIMS, Power Water, DPC,	A/B	Ongoing	Improved hydrodynamic model
1.1 1.8	Develop conceptual models to demonstrate processes and the impacts of threats on Darwin Harbour region ecosystems and water quality	ERG	DIPE, DBIRD, Industry, Research organisations	B	June 2005	Conceptual models of ecosystem processes and impacts
1.1 1.9	Evaluate current potential threats (risk analysis) to the environment of the Darwin Harbour region (see 3.2 3.1)	ERG	DIPE, DBIRD, Industry, Research organisations	B	Dec 2005	Potential threats evaluated
1.1 1.10	Develop predictive models to evaluate the environmental impact of future, notably incremental, developments and threats (see 3.1 3.9)	ERG	DIPE, DBIRD, Industry, Research organisations	B	June 2006	Predictive models developed to evaluate impacts of greatest significance

### Outcome 1.1

#### Strategy 2: Establish an integrated environmental monitoring program for the region

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.1 2.1	Establish a Darwin Harbour Region Ecosystem Monitoring Group (EMG) to oversee the development and implementation of an integrated environmental monitoring program	DIPE	Industry, Local gov, NT gov (DBIRD, MAGNT), Monitoring organisations	B	June 2004	EMG established

1.1 2.2	Initiate the development of a Darwin Harbour Regional Integrated Monitoring Program for the environment	EMG	Industry, Local gov, NT gov, Community	B	June 2005	Integrated environmental monitoring program initiated
1.1 2.3	Ensure the Integrated Monitoring Program facilitates community monitoring (see 5.2 1.2)	EMG	Industry, Local gov, NT gov, Community	B	June 2005	Community monitoring programs undertaken
1.1 2.4	Develop an annual reporting system for an Integrated Monitoring Program to provide recommendations for management	EMG	Industry, Local gov, NT gov, Community	B	Dec 2006	Reporting system developed

**Outcome 1.1**

**Strategy 3: Manage and coordinate the region's environmental data**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.1 3.1	Conduct an inventory of data management systems and data sources for water quality, flora, fauna and other relevant data, and evaluate data quality	EMG	Industry, Local gov, NT gov, Community	B	June 2005	Inventory complete
1.1 3.2	Develop a data management network (meta-database) which integrates the various data systems for the region and provide access to this network	EMG	Industry, Local gov, NT gov, Community	B	Dec 2005	Network developed and data accessible

1.1 3.3	Develop protocols for data sharing and access, intellectual property, data collection and data input from a range of data sources	EMG	Industry, Local gov, NT gov, Community	B	June 2006	Protocols developed
1.1 3.4	Encourage the use and regular updating of the data management network (see 5.1 2.12)	EMG	Industry, Local gov, NT gov, Community	B	Ongoing	Data management network promoted and regularly updated

#### Outcome 1.1

#### Strategy 4. Disseminate information to improve public awareness and understanding of the region's environment

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.1 4.1	Develop a reporting system to disseminate research and monitoring findings to the scientific and wider community (see 5.1 2.10)	EMG/ ERG	Industry, Local gov, NT gov, Community	B	Dec 2006	Reporting system developed and implemented (website established, reports produced, fact sheets developed, publications produced)
1.1 4.2	Undertake public presentations to provide information to the community and to facilitate improved understanding of the regions environment (see 5.1 2.11)	EMG/ ERG	Industry, Local gov, NT gov, Community	B	Dec 2006	Public presentations undertaken

# GOAL 1: TO MAINTAIN A HEALTHY ENVIRONMENT

## Outcome 1.2: Protection and enhancement of freshwater, estuarine and marine water quality

### Current activities

#### **Management**

- Australian Maritime Safety Authority
- Aquatic Pest Management Program
- Australian National Water Quality Guidelines
- Beneficial Uses (declared under the Water Act)
- Darwin Port Corporation
- Darwin Sewerage Strategy
- DIPE Marine Safety Branch
- Environmental Guidelines for Reclamation in Coastal Areas
- Guidelines for Dredging
- Guidelines for Siting, Design and Management of Solid Waste Disposal Sites
- Howard River Region Water Resource Strategy (in preparation)
- Land Clearing Guidelines for Broadacre Development, Linear Development and Subdivisions
- Land Clearing Guidelines Litchfield Area Plan
- National Pollutant Inventory
- Native Vegetation Clearing Controls
- Northern Territory Pastoral Land Clearing Guidelines
- Oil Spill Contingency Plan
- Planning Act and Scheme
- Public education brochures and information
- Reuse and Recycling Directory
- Sewerage Overflow Management Plan for the Darwin Region
- Soil conservation program
- Strategic Plan for Beneficial Uses (draft)
- Strategy for Cleaner Production
- Strategy for Waste Management and Pollution Control
- Trade Waste Management System and Trade Waste Code

#### **Monitoring**

- DBIRD Aquatic Pest Management monitoring programs
- DIPE monitoring programs
- Licence /permit monitoring programs
- National Pollutant Inventory
- Waterwatch community based water quality monitoring

## **Research**

- Darwin River Dam monitoring
- Emissions to Darwin Harbour study
- Groundwater modelling of the Howard River catchment
- Hydrodynamic model

## **Future activities**

### **Strategies**

1. Manage stormwater discharge to Darwin Harbour to minimise impacts on water quality
2. Manage sewage effluent discharge to Darwin Harbour to minimise impacts on water quality
3. Manage industrial and domestic waste to minimise impacts on water quality in the Darwin Harbour region
4. Manage the impact of primary industry on water quality in the Darwin Harbour region
5. Manage the impact of dredging on water quality in the Darwin Harbour region
6. Manage the impact of shipping and vessel activities on water quality in the Darwin Harbour region
7. Manage clearing and reclamation activities and protect coastal and riparian habitats to ensure water quality is maintained.

**Outcome 1.2**

**Strategy 1. Manage stormwater discharge to Darwin Harbour to minimise impacts on water quality**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.2 1.1	Develop a Stormwater Management Strategy and implementation plan	OEH	DIPE, Local gov	B	June 2005	Strategy completed
1.2 1.2	Monitor stormwater runoff from the catchment and different land-uses (urban and rural) to determine quality and quantity as long term performance indicators	DIPE		A/B	Ongoing	Reported as part of integrated monitoring program
1.2 1.3	Assess the fate of contaminants and nutrients in stormwater and the impact on the receiving environment	ERG	DIPE	B	June 2006	Fate and impact assessed
1.2 1.4	Implement public education programs to encourage reduction in contamination of stormwater and sewerage output (see 5.1 2.13, 5.1 2.15)	OEH	Local gov, DBIRD, DIPE	A/B	June 2005	Programs implemented

**Outcome 1.2**

**Strategy 2: Manage sewage effluent discharge to Darwin Harbour to minimise impacts on water quality**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.2 2.1	Upgrade the Ludmilla Sewage Treatment Plant	Power Water		A	Dec 2007	Treatment upgraded
1.2 2.2	Cease discharge of macerated sewage at Larrakeyah Macerator	Power Water		A	Dec 2008	Discharges ceased

1.2 2.3	Implement the <i>Sewerage Overflow Management Plan for the Darwin Region</i> to: <ul style="list-style-type: none"> <li>improve sewer system integrity</li> <li>improve public awareness about illegal connections</li> </ul>	Power Water	DIPE, DHCS	A	Ongoing	Instances of overflow reduced
1.2 2.4	Implement the <i>Trade Waste Management System</i> and the <i>Trade Waste Code</i> (see 3.1 3.3)	Power Water	NTCCI, Industry	A	Ongoing	Increased number of businesses participating
1.2 2.5	Model dispersion of effluent from outfalls in the harbour to improve understanding of impacts	Power Water	OEH, DIPE	A	June 2004	Dispersion modelling reported
1.2 2.6	Investigate economic and environmental feasibility of timed release of treated waste water from Leanyer and Sanderson Ponds into Buffalo Creek	Power Water	DHCS, OEH	A	June 2006	Feasibility determined and reported
1.2 2.7	Investigate options for the reuse of treated sewage and enhancing treatment systems to minimise impact. This may include exploring alternative sources of funding to implement options.	Power Water	DHCS, OEH, Local gov	B	Ongoing	Detailed evaluation of feasible options as they arise.
1.2 2.8	Monitor the impacts of sewage effluent discharge on water quality, sediment and harbour biota as part of the Integrated Monitoring Program	Power Water	EMG, OEH	A/B	June 2005	Annual monitoring reports

### Outcome 1.2

#### Strategy 3. Manage industrial and domestic waste to minimise impacts on water quality in the Darwin Harbour region

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.2 3.1	License industrial point source discharges to Darwin Harbour	OEH		A	Ongoing	Licences issued
1.2 3.2	Implement licensing programs for commercial waste contractors and existing landfills in the region. Monitor and audit compliance with license conditions	OEH	Local gov, Industry	A	Ongoing	Licences issued

1.2 3.3	Encourage industry to adopt codes of practice for handling, relocating, disposal of and storing industrial wastes and hazardous materials	OEH	Industry associations	A	Ongoing	Codes adopted
1.2 3.4	Identify suitable sites for secure landfill beyond the life of current facilities (see 3.1 1.7)	DIPE	DCDSCA Local gov, OEH	A/B	June 2005	Site(s) identified
1.2 3.5	Continue education and information programs to industry and community to facilitate improvements in waste handling, waste minimisation and recycling (see 5.1 2.13, 5.1 2.14, and 5.1 2.15).	OEH	Industry associations, Power Water	A	Ongoing	Education and information provided by factsheets and website

#### Outcome 1.2

#### Strategy 4. Manage the impact of primary industry on water quality in the Darwin Harbour region

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.2 4.1	Develop best practice guidelines for primary industries (including horticulture, agriculture and aquaculture) to reduce contaminants in runoff and discharge	DBIRD	DIPE, OEH Industry,	A/B	June 2005	Guidelines developed
1.2 4.2	Implement and review the effectiveness of guidelines for primary industry	DBIRD	DIPE, OEH, Industry	B	June 2006	Guidelines adopted by industry and effectiveness reviewed.
1.2 4.3	Assess the fate and ecological impact of primary industry contaminants	ERG	DIPE, OEH, DBIRD	B	Dec 2005	Report on the fate of contaminants
1.2 4.4	Ensure point source discharges from primary industry are licensed	OEH		A	Ongoing	Licences issued

**Outcome 1.2**

**Strategy 5. Manage the impact of dredging on water quality in the Darwin Harbour region**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.2 5.1	Develop a Darwin Harbour Dredging Management Strategy. The strategy will address: <ul style="list-style-type: none"> <li>Guidelines for Dredging</li> <li>Disposal of dredge spoil</li> <li>Monitoring requirements</li> </ul>	OEH	DPC	A	December 2004	Strategy completed

**Outcome 1.2**

**Strategy 6. Manage the impact of shipping and vessel activities on water quality in the Darwin Harbour region**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.2 6.1	Conduct regular exercises to test the effectiveness of the Darwin Harbour Oil Spill Contingency Plan (see 3.1 3.8)	DIPE/DPC	OEH, Police, Fire and Emergency Services	A	July 2004	Evaluation of exercises reported
1.2 6.2	Develop best practice guidelines to reduce product spillage related to ship loading	DPC	DIPE	B	June 2005	Guidelines developed
1.2 6.3	Assess risks associated with increased shipping activity (oil spill, pollution, sewage, product spills) in the port and identify management actions to reduce these risks (see 1.1 1.9)	DPC	DIPE	B	Dec 2005	Risk assessment completed
1.2 6.4	Review effectiveness of waste reception facilities in ports, marinas and mooring bays	OEH	DPC	B	Dec 2004	Audit reported

1.2 6.5	Develop codes of practice for commercial vessel maintenance operators to minimise impacts on water quality and ecosystems	Industry associations	OEH, DIPE	B	June 2005	Codes developed for operators
1.2 6.6	Implement a public awareness program on marine pollution in association with the Marine Pollution Act	DIPE		A/B	July 2004	Public awareness program implemented

### Outcome 1.2

#### Strategy 7. Manage clearing and reclamation activities, and protect coastal and riparian habitats to ensure water quality is maintained

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.2 7.1	Implement Land Clearing Controls throughout the Darwin Harbour region through the Planning Act/Scheme (see 1.3 3.1)	DIPE	Local gov, DCA	A/B	Dec 2004	Recognition in the Planning Act/ Scheme
1.2 7.2	Implement <i>Environmental Guidelines for Reclamation in Coastal Areas</i> throughout the Darwin Harbour region through the Planning Act/Scheme (see 1.3 3.2)	DIPE	DCA	A/B	Dec 2004	Recognition in the Planning Act/ Scheme

## GOAL 1: TO MAINTAIN A HEALTHY ENVIRONMENT

### Outcome 1.3: Protection of the health and functioning of ecosystems and conservation of biodiversity

#### Current activities

##### **Management**

- Aquatic Pest Management Program
- AQIS Australian Ballast Water Decision Support System
- Australian Ballast Water Management Requirements
- Conservation Plan for the Darwin Region
- Conservation reserves in the Darwin Harbour region
- Developing a Strategy for Northern Territory Greenhouse Action
- Environmental Guidelines for Reclamation in Coastal Areas
- Fire management strategy
- Fish Passage Requirements for Waterway Crossings
- Guidelines for Siting, Design and Management of Solid Waste Disposal Sites
- Land Clearing Guidelines for Broadacre Development, Linear Development and Subdivisions
- Land Clearing Guidelines Litchfield Area Plan
- Land for Wildlife
- Listing of "Weeds of National Significance"
- Medical Entomology Branch of the Dept of Health and Community Services
- National Pollutant Inventory
- National System for the Prevention, Emergency Management and Control of Introduced Marine Pests
- National Weed Strategy
- Native Vegetation Clearing Controls
- Northern Territory Pastoral Land Clearing Guidelines
- Northern Territory Weeds Management Strategy 1996-2005
- Parks and Wildlife Service Plans of Management
- Planning Act and Scheme
- Public education brochures and information
- Reuse and Recycling Directory
- Soil conservation program
- Strategic Plan for *Mimosa pigra*
- Strategy for Cleaner Production
- Strategy for the Conservation of Marine Biodiversity in the Northern Territory of Australia

- Strategy for Conservation of the Biological Diversity of Wetlands in the Northern Territory of Australia
- Strategy for Waste Management and Pollution Control
- Wagait Beach Coastal Management Plan

#### **Monitoring**

- DBIRD Aquatic Pest Management monitoring programs
- DIPE Monitoring Programs
- Land Use Mapping of the Northern Territory
- Licence /permit monitoring programs
- Mangrove mapping and monitoring
- National Pollutant Inventory
- Waterwatch community based water quality monitoring
- Medical Entomology Branch mosquito and biting midge monitoring

#### **Research**

- Darwin Air Emission Inventory
- Darwin River Dam monitoring
- Emissions to Darwin Harbour study
- Groundwater modelling of the Howard River catchment
- Habitat fragmentation
- Hydrodynamic model
- Mangrove research
- Marine mapping and marine fauna inventory

### **Future activities**

#### **Strategies**

1. Identify and protect significant species, ecosystems and biodiversity
2. Minimise the impact of pollution on ecosystems and biodiversity
3. Minimise the impacts of land clearing and development on ecosystems and biodiversity
4. Prevent, manage and control introduced species
5. Improve management of bushfires
6. Identify the impacts of global warming
7. Manage the impacts of recreation in the Darwin Harbour region
8. Minimise impacts on ecosystems and biodiversity from modified catchment hydrology and harbour hydrodynamics
9. Assess and monitor sources of air pollution to identify options for air quality management
10. Improve public awareness of ecosystems and species of significance and management measures to protect them

### Outcome 1.3

#### Strategy 1. Identify and protect significant species, ecosystems and biodiversity

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.3 1.1	Identify significant ecosystems in the Darwin Harbour region, using habitat mapping and characterisation (see 1.1 1.3)	DIPE	DBIRD	A/B	Dec 2005	Report detailing significant ecosystems
1.3 1.2	Identify the distribution and ecology of significant species (species of conservation status or of cultural significance) in the Darwin Harbour region	DIPE	DBIRD	A/B	Dec 2005	Report detailing significant species
1.3 1.3	Identify threats to significant species and ecosystems (see 1.1 1.9)	DIPE	DBIRD	A/B	Dec 2005	Report detailing threats
1.3 1.4	Identify significant ecosystems for protection	DIPE	DBIRD	B	June 2006	Recommendations developed
1.3 1.5	Provide recommendations to manage threats to significant ecosystems and species	DIPE	DBIRD	B	June 2006	Recommendations developed
1.3 1.6	Monitor significant ecosystems and species and incorporate into the Integrated Monitoring Program	EMG	DIPE	B	June 2006	Monitoring programs implemented
1.3 1.7	Encourage the participation of landholders in voluntary community-based programs to facilitate better 'off-reserve' management of land	DHAC	DIPE, Landholders, Land for Wildlife, Volunteer Groups, Community	B	June 2006	Promote incentives to landholders

**Outcome 1.3**

**Strategy 2. Minimise the impact of pollution on ecosystems and biodiversity**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.3 2.1	Assess the sources and impacts of pollution (including sediment, nutrients and contaminants) on biodiversity and ecosystems of significance (see 1.1 1.9)	ERG	DIPE	B	June 2006	Sources and impacts identified
1.3 2.2	Identify management measures to reduce pollution and its impacts on ecosystems and biodiversity	DIPE	DBIRD, Industry	B	Dec 2006	Management recommendations made
1.3 2.3	Evaluate effectiveness of management measures	DIPE	DBIRD, Industry	B	June 2007	Evaluation report

**Outcome 1.3**

**Strategy 3. Minimise the impacts of land clearing and development on ecosystems and biodiversity**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.3 3.1	Implement Land Clearing Controls through appropriate legislation throughout the Darwin Harbour region.	DIPE	Local gov, DCA	A/B	Dec 2004	Legislation in place
1.3 3.2	Ensure that riparian buffers are retained, wildlife corridors are incorporated and drainage lines or seasonally inundated areas are not cleared (see 1.2 7.1)	DIPE	Local gov, DCA	A/B	Dec 2004	Recognition in appropriate legislation
1.3 3.3	Implement the <i>Environmental Guidelines for Reclamation in Coastal Areas</i> throughout the Darwin Harbour region through the Planning Act/Scheme (see 1.2 7.2)	DIPE	DCA	A/B	Dec 2004	Recognition in the Planning Act/ Scheme

1.3 3.4	Retain and where appropriate protect natural drainage lines, distinctive landform features and stands of natural vegetation, when subdividing land (see 2.1 1.6	DIPE	Local Gov, DCA, Developers	A	Ongoing	Reflected in Planning Scheme
1.3 3.5	Determine the impacts of Extractive Mining in the Darwin Harbour region and take these into account in the decision making process	DBIRD	OEH, NT Minerals Council, Extractive Industry Association of the NT, Mining Industry, DIPE, ERG	B	June 2006	Ensure impacts are understood and taken into account during the authorisation processes
1.3 3.6	Update guidelines for operation and rehabilitation of Extractive Mining sites	DBIRD	NT Minerals Council, Extractive Industry Association of the NT, Mining Industry, DIPE, ERG	B	June 2006	Guidelines developed are taken into account during the authorisation processes
1.3 3.7	Implement the national <i>Fish Passage Requirements for Waterway Crossings</i> through the design of culverts and road crossings that facilitate fish movement	DIPE, DBIRD	Local gov	B	Dec 2005	Fish movement across waterways demonstrated

### Outcome 1.3

#### Strategy 4: Prevent, manage and control introduced species

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.3 4.1	Develop strategies for the management of high priority weeds	Darwin Regional Weeds Advisory Committee	DIPE Landholders, Local gov	A/B	Dec 2004	Strategies developed
1.3 4.2	Implement and evaluate these weed management strategies for the Darwin Harbour region	DIPE	Landholders	B	Dec 2005	Strategies reviewed
1.3 4.3	Implement the <i>Aquatic Pest Management Program</i>	DBIRD		A	Ongoing	Program implemented
1.3 4.4	Develop and implement a strategy for the prevention, control and management of introduced freshwater fish species	DBIRD	Landholders	B	June 2005	Strategy implemented
1.3 4.5	Participate in the <i>National System for the Prevention, Emergency Management and Control of Introduced Marine Pests</i>	DBIRD	DIPE, DPC, Industry	A	Ongoing	Active participation
1.3 4.6	Improve community awareness to assist in the prevention, management and control of introduced species	DBIRD, DIPE	DPC, Community groups, Landholders	B	June 2004	Community awareness program undertaken
1.3. 4.7	Evaluate feral animal threats to ecosystems and biodiversity and identify management options	DIPE	Landholders	B	June 2006	Evaluation report
1.3 4.8	Continue to monitor the impacts of cane toads, and investigate recovery methods for affected wildlife	DIPE		A	Ongoing	Impact and recommended recovery methods reported

**Outcome 1.3**

**Strategy 5. Improve management of bushfires**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.3 5.1	Provide recommendations to improve landholder participation in the <i>Fire Management Strategy</i>	DIPE	Bushfires Council, Vernon Advisory Committee, Landholders	B	Dec 2005	Increased landholder participation

**Outcome 1.3**

**Strategy 6. Identify the impacts of global warming**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.3 6.1	Identify the likely impacts of global warming	DIPE/OEH		B	June 2007	Impacts identified

**Outcome 1.3**

**Strategy 7. Manage the impacts of recreation in the Darwin Harbour region**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.3 7.1	Assess the impact of recreational uses of the Darwin Harbour region on biodiversity and ecosystems	ERG	DBIRD, DIPE	B	June 2006	Impacts identified
1.3 7.2	Develop management recommendations to address recreation impacts and provide, where appropriate, to relevant authorities	ERG	DBIRD, DIPE	B	June 2007	Recreational impacts addressed

1.3 7.3	Monitor recreational impacts and incorporate into the Integrated Monitoring Program	EMG		B	June 2007	Monitoring programs implemented
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### Outcome 1.3

#### Strategy 8. Minimise impacts on ecosystems and biodiversity from modified catchment hydrology and harbour hydrodynamics

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.3 8.1	Evaluate the impacts of modified catchment hydrology and harbour hydrodynamics on ecosystems and biodiversity	ERG	DIPE	B	Dec 2005	Impacts determined
1.3 8.2	Develop recommendations to address impacts on ecosystems and species from changes in catchment hydrology and harbour hydrodynamics	ERG	DIPE	B	June 2006	Impacts addressed
1.3 8.3	Allocate freshwater to sustain ecosystems and biodiversity (see 3.3 1.1, 3.3 1.3)	DIPE	DBIRD, Power Water, Stakeholders	B	June 2005	Effective water allocation

### Outcome 1.3

#### Strategy 9. Assess and monitor sources of air pollution to identify options for air quality management

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.3 9.1	Assess sources and the extent of air pollution in the region	DIPE, OEH	Industry, Bushfires Council, ERG	B	June 2005	Assessment completed

1.3 9.2	Undertake air quality monitoring (as required) in association with National Pollutant Inventory requirements and the Integrated Monitoring Program	DIPE, OEH	Industry, Bushfires Council, EMG	B	Ongoing	Monitoring results reported
1.3 9.3	Devise and implement management measures (where required and feasible) to minimise impacts of air pollution	DIPE, OEH	Industry, Bushfires Council, ERG	B	June 2006	Management measures devise/implemented

### Outcome 1.3

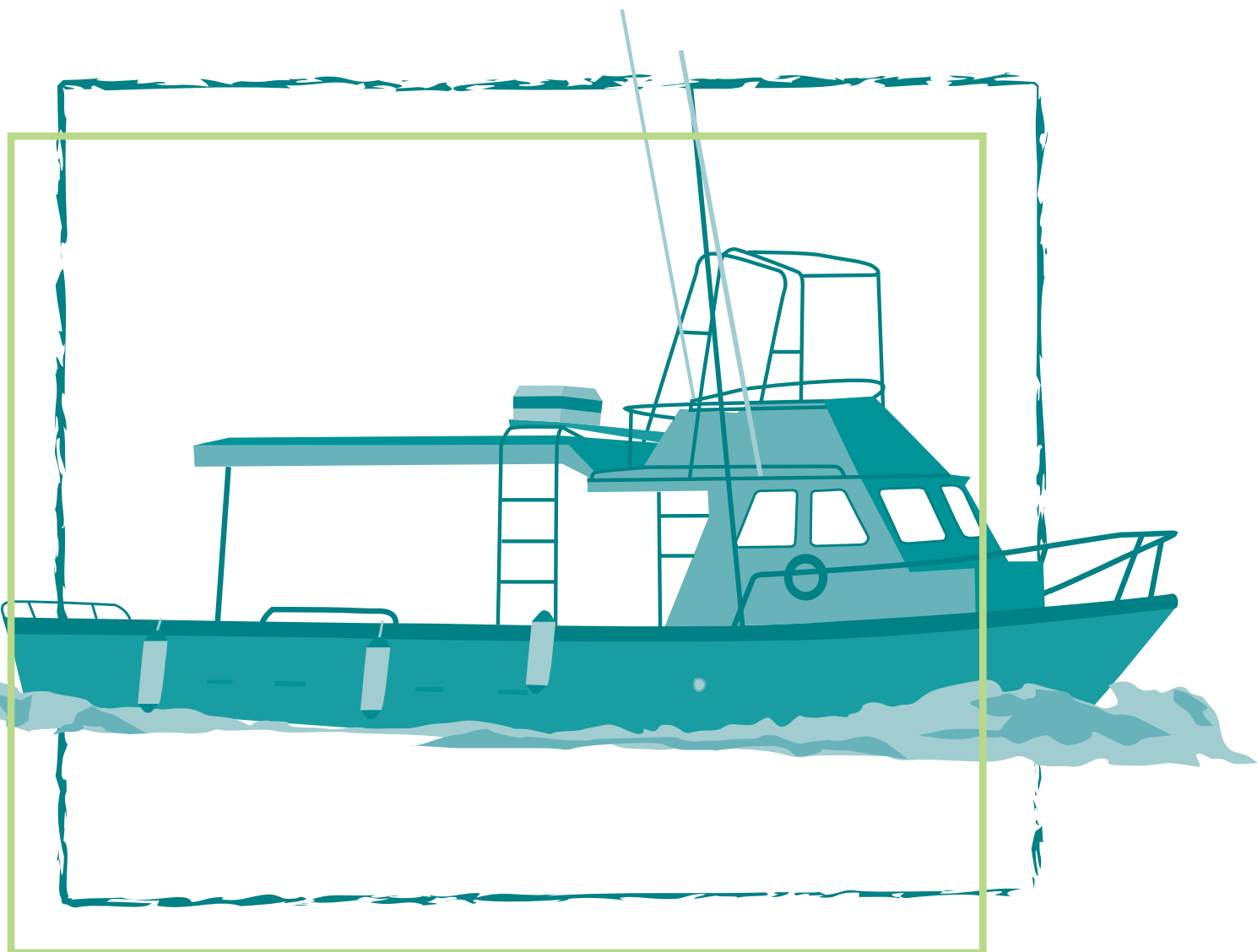
#### Strategy 10. Improve public awareness of ecosystems and species of significance and management measures to protect them

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
1.3 10.1	Implement public awareness programs to inform the community of ecosystems and species of significance, management measures and monitoring programs (see 5.1 2.15)	DIPE/ERG/ EMG	DBIRD	B	June 2006	Public awareness programs implemented

## GOAL 2:

To support the sustainable recreational use and enjoyment of the environment

- 2.1 Protection and enhancement of recreational amenity and opportunity
- 2.2 Ecologically sustainable harvesting and fishing
- 2.3 Protection of the diverse range of aesthetic values of the Darwin Harbour region





## **GOAL 2: TO SUPPORT THE SUSTAINABLE RECREATIONAL USE AND ENJOYMENT OF THE ENVIRONMENT**

**Outcome 2.1: Protection and enhancement of recreational amenity and opportunity**

### **Current activities**

#### **Management**

- Australian National Water Quality Guidelines
- Darwin City Council Recreation Strategy 2001-2004
- NT Planning Scheme
- Palmerston City Council Management Plan 2002/2003
- Parks and Wildlife Service Plans of Management
- Top End Regional Organisation of Councils Policy on the Protection of Darwin Harbour and its Coastline

### **Future activities**

#### **Strategies**

1. Enhance existing areas and provide new areas for recreation
2. Manage risks to enable water based recreation
3. Promote recreational opportunities to the community

## Outcome 2.1

### Strategy 1. Enhance existing areas and provide new areas for recreation

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.1 1.1	Maintain and improve infrastructure, safety and accessibility of areas currently used for recreation	Local gov	DIPE	A	Ongoing	Infrastructure maintained and enhanced
2.1 1.2	Provide new areas and enhance opportunities for appropriate recreation in the Darwin Harbour region	Local gov	DIPE	A/B	Ongoing	New areas provided
2.1 1.3	Plan for future recreational areas and opportunities throughout the Darwin Harbour region through the NT Planning Process and development of Local Government plans	DIPE/ Local gov		A/B	Ongoing	Reflected in Planning Scheme/Local gov plans
2.1 1.4	Undertake actions to enhance opportunities for appropriate recreation in gazetted parks and reserves	DIPE (Parks and Wildlife)		A/B	Ongoing	Reflected in park and reserve management plans
2.1 1.5	Retain Public Open Space, Organised Recreation and Conservation Zones in foreshore areas and around creeks, rivers and wetlands	DIPE	Local gov	A	Ongoing	Reflected in Planning Scheme
2.1 1.6	In residential subdivisions, retain and protect: <ul style="list-style-type: none"> <li>• Creeks and rivers</li> <li>• Wetlands</li> <li>• Distinctive landform features</li> <li>• Distinctive stands of natural vegetation (see 1.3 3.3)</li> </ul>	DIPE	Local gov, DCA, Developers	A	Ongoing	Areas retained and protected
2.1 1.7	Enhance opportunity for access to and along the foreshore, including the provision of infrastructure designed in an environmentally sensitive manner	DIPE	Local gov, Land owners, NT gov	B	June 2008	Improved access to and along the foreshore provided

**Outcome 2.1**

**Strategy 2. Manage risks to enable water based recreation**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.1 2.1	Identify and characterise current areas used for water based recreation in the Darwin Harbour region	DHAC	NT gov (DIPE, DHCS), Local gov	B	June 2008	Report by DHAC
2.1 2.2	Undertake a risk assessment at sites of water based recreation to determine risks/hazards (for example water quality, crocodiles, box jellyfish)	DHAC	NT gov (DIPE, DHCS), Local gov	B	June 2008	Risk assessment undertaken
2.1 2.3	Implement management measures to reduce the risks or inform the public of the risks	DHAC	NT gov (DIPE, DHCS), Local gov	B	June 2008	Measures implemented

**Outcome 2.1**

**Strategy 3. Promote recreational opportunities to the community**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.1 3.1	Promote recreational opportunities through various media (see 5.1 2.17)	DHAC	DIPE, DCDSKA Local gov, Tourism Industry	A/B	June 2005	Promotional activities undertaken
2.1 3.2	Facilitate festivals and events to promote aspects of recreation to the community (see 5.1 2.18)	DHAC	DIPE, DCDSKA, Local gov, Tourism Industry, Major Events	A/B	June 2005	Festivals/events undertaken

## **GOAL 2: TO SUPPORT THE SUSTAINABLE RECREATIONAL USE AND ENJOYMENT OF THE ENVIRONMENT**

### **Outcome 2.2: Ecologically sustainable harvesting and fishing**

#### **Current activities**

##### **Management**

- Aboriginal Fisheries Consultative Committees
- Aboriginal Subsistence Fishing
- Amateur Fishermen's Association of the Northern Territory
- DBIRD Fisheries Group
- DIPE Marine Safety Branch
- Education Strategy for DBIRD Fisheries Group
- Northern Territory Marine and Fisheries Enforcement Unit
- NT Fisheries Management Strategies (various)
- Strategic Plan for Fisheries Research and Development

##### **Monitoring**

- DBIRD Fisheries Group monitoring programs

#### **Future activities**

##### **Strategies**

1. Improve knowledge of recreational fishing activity and recreational anglers in the Darwin Harbour region
2. Obtain knowledge of biology and habitat requirements of key species, and develop ongoing monitoring programs for assessing fish stocks
3. Determine the impact on ecosystems of recreational fishing in the Darwin Harbour region
4. Improve understanding of the impacts of catch and release fishing
5. Determine the economic value of the recreational fishing industry within the Darwin Harbour region
6. Ensure sustainable recreational fishing in the Darwin Harbour region
7. Ensure the sustainability of subsistence fishing and harvesting in the Darwin Harbour region
8. Provide appropriate infrastructure to support sustainable recreational fishing in the Darwin Harbour region
9. Promote best practice recreational fishing

**Outcome 2.2**

**Strategy 1. Improve knowledge of recreational fishing activity and recreational anglers in the Darwin Harbour region**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.2 1.1	Enhance knowledge of recreational fishing in the Darwin Harbour region through the 5 yearly NT wide recreational fishing survey	DBIRD		B	June 2006	Report on NTwide survey completed
2.2 1.2	Assess recreational fishing activity in the Darwin Harbour region through <ul style="list-style-type: none"> <li>• a survey of boat ramp usage</li> <li>• aerial counts of angler boat activity in Darwin Harbour</li> <li>• surveys of aquatic resource users in Darwin Harbour</li> </ul>	DBIRD	AFANT, DIPE	B	June 2004	Surveys completed

**Outcome 2.2**

**Strategy 2. Obtain knowledge of biology and habitat requirements of key species, and develop ongoing monitoring programs for assessing fish stocks**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.2 2.1	Refine information on key species taken by recreational anglers	DBIRD	AFANT, Fishing Tour Operators	B	Jan 2004	Key species list
2.2 2.2	Compile current biological knowledge and habitat requirements for key species and identify gaps in this knowledge	DBIRD	Research agencies, ERG	B	June 2005	Gaps identified
2.2 2.3	Implement appropriate research to address knowledge gaps, in collaboration with the Ecosystem Research Group	DBIRD	Research agencies, ERG	B	June 2006	Research programs implemented

2.2 2.4	Develop, trial and implement monitoring methods and protocols for ongoing assessment of the status of identified key species	DBIRD	Research agencies, EMG	B	June 2005	Protocols developed and annual monitoring initiated
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### Outcome 2.2

#### Strategy 3. Determine the impact on ecosystems of recreational fishing in the Darwin Harbour region

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.2 3.1	Develop a conceptual model of the impacts on ecosystems of recreational fishing, based on current knowledge (see 1.1 1.8)	DBIRD	ERG	B	Dec 2005	Conceptual model developed
2.2 3.2	Undertake preliminary ecosystem modelling. Identify and address knowledge requirements to advance ecosystem models	DBIRD	ERG	B	Dec 2006	Preliminary model developed and gaps identified and addressed
2.2 3.3	Model the impacts on ecosystems of recreational fishing in the Darwin Harbour region to inform management	DBIRD	ERG	B	Dec 2008	Modelling undertaken

### Outcome 2.2

#### Strategy 4 Improve understanding of the impacts of catch and release fishing

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.2 4.1	Identify species that are at most risk from catch and release fishing	DBIRD	AFANT, Fishing Tour Operators	B	June 2005	Species and issues identified

2.2 4.2	Experimentally determine the impacts of catch and release on key species	DBIRD	AFANT, Fishing Tour Operators	B	June 2007	Impacts determined
2.2 4.3	Develop and implement strategies to manage the impacts of catch and release fishing at a sustainable level	DBIRD	AFANT, Fishing Tour Operators	B	June 2007	Strategies incorporated into Fisheries Management Plans

**Outcome 2.2**

**Strategy 5. Determine the economic value of the recreational fishing industry within the Darwin Harbour region**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.2 5.1	Develop an economic model to determine the value of recreational fishing within Darwin Harbour region	DBIRD	AFANT, NTSC, Fishing Tour Operators	B	Dec 2005	Economic value determined

**Outcome 2.2**

**Strategy 6. Ensure sustainable recreational fishing in the Darwin Harbour region**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.2 6.1	Ensure that future reviews of fishery management plans recognise the significance of Darwin Harbour region where appropriate and incorporate specific measures for management of the regions resources	DBIRD	AFANT, Fishing Tour Operators	A	Ongoing	Fishery management plans reviewed

2.2 6.2	Adapt current fishery management measures to ensure sustainability of all species, based on monitoring and modelling information	DBIRD	AFANT, Fishing Tour Operators	B	Ongoing	Management adjusted as required
2.2 6.3	Ensure protection of habitats that sustain significant fish species	DIPE/DBIRD	AFANT, Fishing Tour Operators	B	June 2005	Habitats protected

### Outcome 2.2

#### Strategy 7. Ensure the sustainability of subsistence fishing and harvesting in the Darwin Harbour region

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.2 7.1	Assess the use of the Darwin Harbour region for traditional use and subsistence living	DBIRD	DIPE, Aboriginal Consultative Committees, IWG, Community groups	B	June 2005	Assessment undertaken
2.2 7.2	Develop and implement management strategies to ensure subsistence living and traditional use can be sustained	DBIRD	DIPE, Aboriginal Consultative committees, IWG, Community groups	B	June 2006	Strategies developed and implemented

**Outcome 2.2**

**Strategy 8. Provide appropriate infrastructure to support sustainable recreational fishing in the Darwin Harbour region**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.2 8.1	Assess and advise on the infrastructure requirements for sustainable recreational fishing in the Darwin Harbour region	DBIRD	AFANT, DIPE Fishing Tour Operators, Local gov	A	June 2005	Assessment undertaken and advice provided
2.2 8.2	Provide recommendations for infrastructure and options for their provision	DIPE	DBIRD, AFANT Fishing Tour Operators, Local gov	A	June 2005	Recommendations provided

**Outcome 2.2**

**Strategy 9. Promote best practice recreational fishing**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.2 9.1	Provide education programs to improve public awareness of sustainability issues and practices for recreational fishing (see 5.1 2.19)	DBIRD	AFANT, Fishing Tour Operators, Tourist organisations	A/B	Ongoing	Education measures undertaken

## **GOAL 2: TO SUPPORT THE SUSTAINABLE RECREATIONAL USE AND ENJOYMENT OF THE ENVIRONMENT**

**Outcome 2.3: Protection of the diverse range of aesthetic values of the Darwin Harbour region**

### **Current activities**

#### **Management**

- NT Planning Scheme
- Palmerston City Council Management Plan 2002/2003
- Top End Regional Organisation of Councils Policy on the Protection of Darwin Harbour and its Coastline

### **Future activities**

#### **Strategies**

1. Improve, maintain and protect aesthetic values of the Darwin Harbour region
2. Identify specific areas of aesthetic value in the Darwin Harbour region and enhance opportunities for enjoyment of these areas

### Outcome 2.3

#### Strategy 1. Improve, maintain and protect aesthetic values of the Darwin Harbour region

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.3 1.1	Undertake aesthetic enhancement programs and increase the quality of existing public open space and parkland. Promote additional open space where there is demonstrated social, economic or cultural benefit	Local gov	DIPE, TTE, NTTC	A/B	Ongoing	Urban enhancement programs undertaken
2.3 1.2	Protect aesthetic values in the Darwin Harbour region through the Planning Process	DIPE	Local gov	A/B	Ongoing	Aesthetic values considered in NT Planning Scheme
2.3 1.3	Promote urban and building design which is climatically appropriate, energy efficient and contributes to the existing and future character and appearance of an area, through the Planning Process	DIPE	Local gov	A	Ongoing	Promoted through the NT Planning Scheme

### Outcome 2.3

#### Strategy 2. Identify specific areas of aesthetic value in the Darwin Harbour region and enhance opportunities for enjoyment of these areas

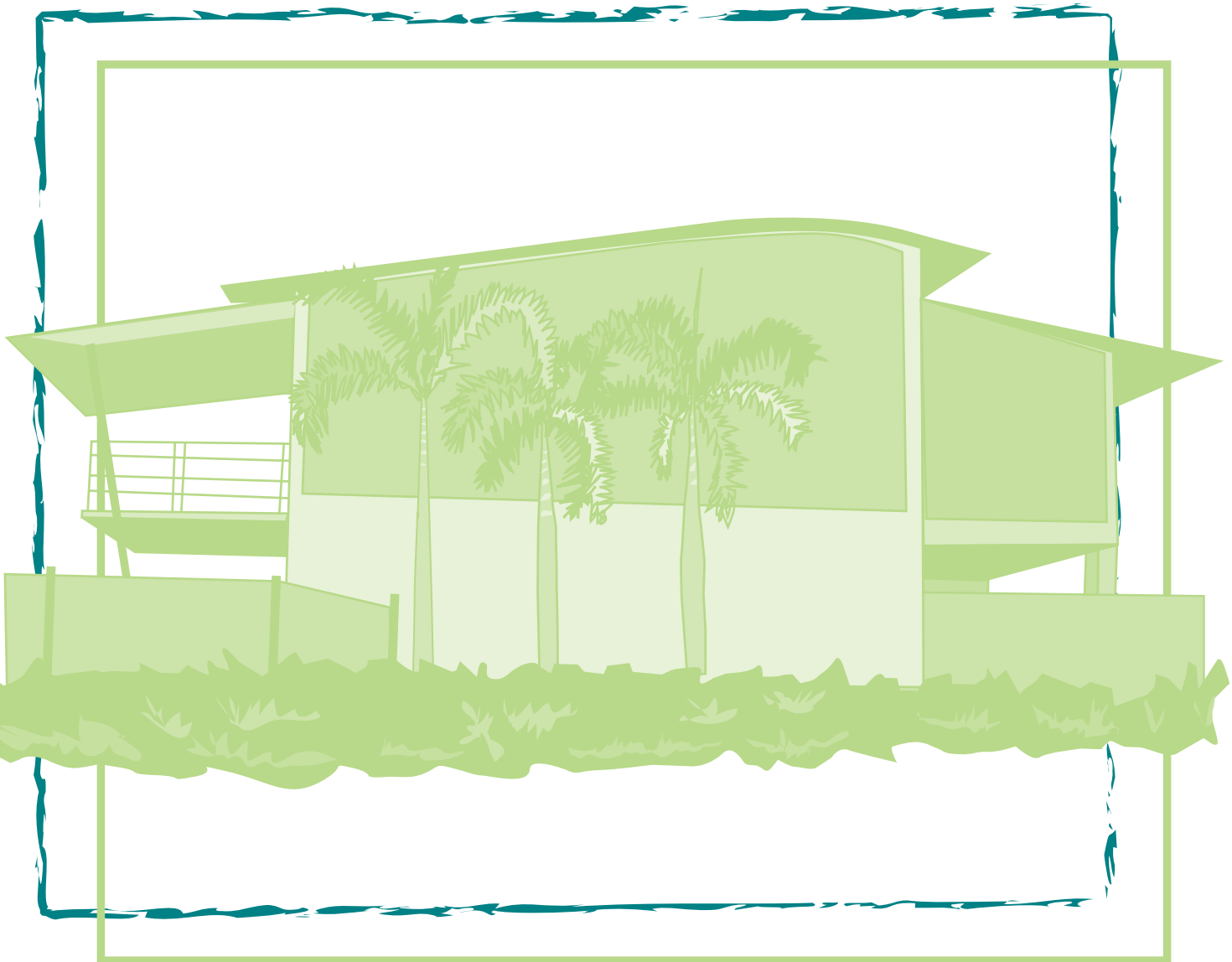
Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
2.3 2.1	Through consultation with the community, identify specific natural and man-made areas and features of aesthetic value in the Darwin Harbour region	DHAC	DIPE, Local gov, TTE, NTTC	B	June 2005	Report outlining features of aesthetic value in the Darwin Harbour region
2.3 2.2	Improve public facilities for enjoyment and access to areas of aesthetic value	DIPE	Local gov, TTE, NTTC	B	June 2006	Improved facilities and access provided



## GOAL 3:

To encourage ecologically sustainable development

- 3.1 Effective planning and management of future development
- 3.2 Support of sustainable economic development
- 3.3 Ecologically sustainable use of fresh water in the Darwin Harbour region





## **GOAL 3: TO ENCOURAGE ECOLOGICALLY SUSTAINABLE DEVELOPMENT**

### **Outcome 3.1: Effective planning and management of future development**

*Ecologically sustainable development is referred to as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Our Common Future, World Commission on Environmental Development, 1987). Development that supports sustainable environmental, economic, social and cultural outcomes.*

#### **Current activities**

##### **Management**

- Agricultural and Veterinary Chemicals (Control of Use) Bill
- Chemical usage and pest management in the horticulture industry
- Department of Defence Environmental Policy
- Environmental Management Plans
- Identification of horticultural areas
- Mining Management Plans
- NT Planning Scheme
- Oil Spill Contingency Plan
- Review of Public Consultation in the Planning Process
- Sustainable agriculture development
- Trade Waste Management System and Trade Waste Code
- Mosquito breeding control measures.

##### **Monitoring**

- Licence/permit monitoring programs
- National Pollutant Inventory

#### **Future activities**

##### **Strategies**

1. Ensure the legislative framework supports long term development within the Darwin Harbour region
2. Improve public participation in the Planning Process
3. Ensure effective environmental management of development

**Outcome 3.1**

**Strategy 1. Ensure the legislative framework supports long term development within the Darwin Harbour region**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
3.1 1.1	Ensure the Northern Territory Planning Scheme supports future regional growth and the infrastructure necessary to serve that growth	DIPE	DCA, Local gov	A	Dec 2004	Finalisation of integrated NT Planning Scheme
3.1 1.2	Optimise the use of natural resources of the region in a balanced and sustainable manner that considers multiple and sequential use	DBIRD/ DIPE		A	Dec 2004	Reflected in NT Planning Scheme
3.1 1.3	Ensure requirements for extractive minerals are taken into account in planning	DBIRD	Industry	B	Ongoing	Identification of extractive resource needs
3.1 1.4	Optimise opportunities for ecologically sustainable development of primary industry within the Darwin Harbour region	DBIRD	DIPE, NTHA	A/B	Ongoing	Ongoing review of constraints, opportunities and impacts
3.1 1.5	Facilitate regional infrastructure provision, including transport networks	DIPE		A/B	Dec 2004 ongoing	Protection of strategic transport corridors
3.1 1.6	Consider the risks of storm surge and flooding when undertaking planning and development	DIPE	DCA, Local gov	A/B	Dec 2004 ongoing	Reflected in the NT Planning Scheme
3.1 1.7	Develop a strategy for regional waste management (see 1.2 3.4)	OEH	DCDSCA,DIPE, Local gov	A/B	June 2005	Strategy developed

3.1 1.8	Ensure appropriate buffer zones between mangroves and developments are maintained (where appropriate) to minimise the impact of biting midges/mosquitoes	DIPE	DHCS, Developers, DCA	A	Ongoing	Continued referral of development proposals to DHCS
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### Outcome 3.1

#### Strategy 2. Improve public participation in the Planning Process

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
3.1 2.1	Effectively engage the public in the planning process	DIPE	Community	A	Dec 2004	Public consultation undertaken during review of the Planning Act
3.1 2.2	Ensure the planning process reflects community values and aspirations	DIPE	DHAC, Community	A	Ongoing	Community values and aspirations reflected throughout the Planning Process

**Outcome 3.1**

**Strategy 3. Ensure effective environmental management of development**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
3.1 3.1	Ensure effective environmental management through the implementation of environmental monitoring programs for new development and ongoing operations	OEH, DIPE, DBIRD	DCA, Industry	A/B	Ongoing	Monitoring programs implemented
3.1 3.2	Ensure the implementation of Environmental Management Plans for new development and ongoing operations	OEH, DIPE	DBIRD	A/B	Ongoing	Auditing of EMPs indicates implementation
3.1 3.3	Implement the <i>Trade Waste Management System</i> (see 1.2 2.4)	Power Water	NTCCI	A	Ongoing	Increased number of businesses participating
3.1 3.4	Implement the <i>Trade Waste Code</i> which establishes the criteria for approval to discharge trade waste to sewers (see 1.2 2.4)	Power Water	NTCCI, DIPE, Industry	A	Ongoing	Increased number of businesses complying
3.1 3.5	Implement requirements of the Mining Management Act, through Mining Management Plans	DBIRD	DIPE, Industry	A	Ongoing	MMPs implemented
3.1 3.6	Promote best practice in the management of primary industry, including chemical use and management of wastes	DBIRD	OEH, DIPE NTHA, Agricultural Industry, NTSC	A/B	Ongoing	Best practice measures implemented
3.1 3.7	Establish a process to liaise and cooperate with relevant Commonwealth agencies regarding environmental management of their activities and facilities in the Darwin Harbour region	DHAC	Federal gov	B	Ongoing	Process established

3.1 3.8	Conduct regular exercises to test the effectiveness of the Darwin Harbour Oil Spill Contingency Plan (see 1.2 6.1)	DIPE/DPC	OEH, Police, Fire and Emergency Services	A	July 2004	Evaluation of exercise reported
3.1 3.9	Ensure scientific understanding and predictive modelling of ecosystems informs planning and development in the Darwin Harbour region (see 1.1 1.10)	DIPE	DHAC, EMG, ERG, DCA	A/B	Ongoing	Scientific understanding/modelling considered in Planning Process

## **GOAL 3: TO ENCOURAGE ECOLOGICALLY SUSTAINABLE DEVELOPMENT**

### **Outcome 3.2: Support of sustainable economic development**

#### **Current activities**

##### **Management**

- Economic Development Strategy - "Building a Better Territory"
- Environmental Management Plans
- Indigenous Economic Forum - "Seizing our Economic Future"
- Mining Management Plans
- NTCCI Best Practice Management guidelines and Codes of Practice
- OEH Environmental Guidelines

##### **Monitoring**

- Licence/permit monitoring programs
- National Pollutant Inventory

##### **Other activities**

- Activities to enhance economic competitiveness

#### **Future activities**

##### **Strategies**

1. Provide quality information for economic development
2. Support continued economic and social vitality of our community
3. Ensure development is ecologically sustainable
4. Publicise ecologically sustainable development and practices

### Outcome 3.2

#### Strategy 1. Provide quality information for economic development

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
3.2 1.1	Ensure quality information about economic, industry and business conditions is provided to inform planning	DBIRD	DIPE,NT Treasury	B	Ongoing	Information available

### Outcome 3.2

#### Strategy 2. Support continued economic and social vitality of our community

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
3.2 2.1	Support economic development in the Darwin Harbour region through implementation of the Economic Development Strategy	NT gov		A	Ongoing	Economic development in the Darwin Harbour region
3.2 2.2	Recognise and support indigenous economic development in the Darwin Harbour region, through implementation of the Economic Development Strategy and strategies resulting from Indigenous Economic Forums	NT gov	IWG	B	Ongoing	Indigenous economic development in the Darwin Harbour region
3.2 2.3	Ensure that over the long term, the supply of land for residential development satisfies the demand for such land	DIPE		A	Ongoing	Continued urban development
3.2 2.4	Ensure the supply of industrial and commercial land is not an unreasonable impediment to business development and diversification	DIPE		A	Ongoing	Continued business growth

**Outcome 3.2**

**Strategy 3. Ensure development is ecologically sustainable**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
3.2 3.1	Evaluate current potential threats (eg. risk analysis) to the environment associated with development of the Darwin Harbour region (see 1.1 1.9)	ERG	OEH, DBIRD, Industry, DIPE	B	Dec 2005	Potential threats evaluated
3.2 3.2	Review legislation to determine whether economic activities with significant environmental impacts are not covered and provide advice to Government	DHAC	DBIRD, DIPE	B	Dec 2006	Advice provided to Government
3.2 3.3	Encourage the adoption of voluntary environmental impact controls through development and implementation of industry relevant guidelines, codes of practice, procedures and skills training	Various	Various	B	Ongoing	Voluntary environmental impact controls adopted

**Outcome 3.2**

**Strategy 4. Publicise ecologically sustainable development and practices**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
3.2 4.1	Publicise achievements in ecologically sustainable development and practices (see 5.1 2.16)	DBIRD/OEH	Industry	B	Ongoing	Achievements showcased

## **GOAL 3: TO ENCOURAGE ECOLOGICALLY SUSTAINABLE DEVELOPMENT**

**Outcome 3.3: Ecologically sustainable use of fresh water in the Darwin Harbour region**

### **Current activities**

#### **Management**

- Howard River Region Water Resource Strategy (in preparation)

#### **Monitoring**

- Ground water level monitoring
- Stream flow measurements

#### **Research**

- Ground water modelling of the Howard River catchment

### **Future activities**

#### **Strategies**

1. Allocate fresh water for ecologically sustainable use

### Outcome 3.3

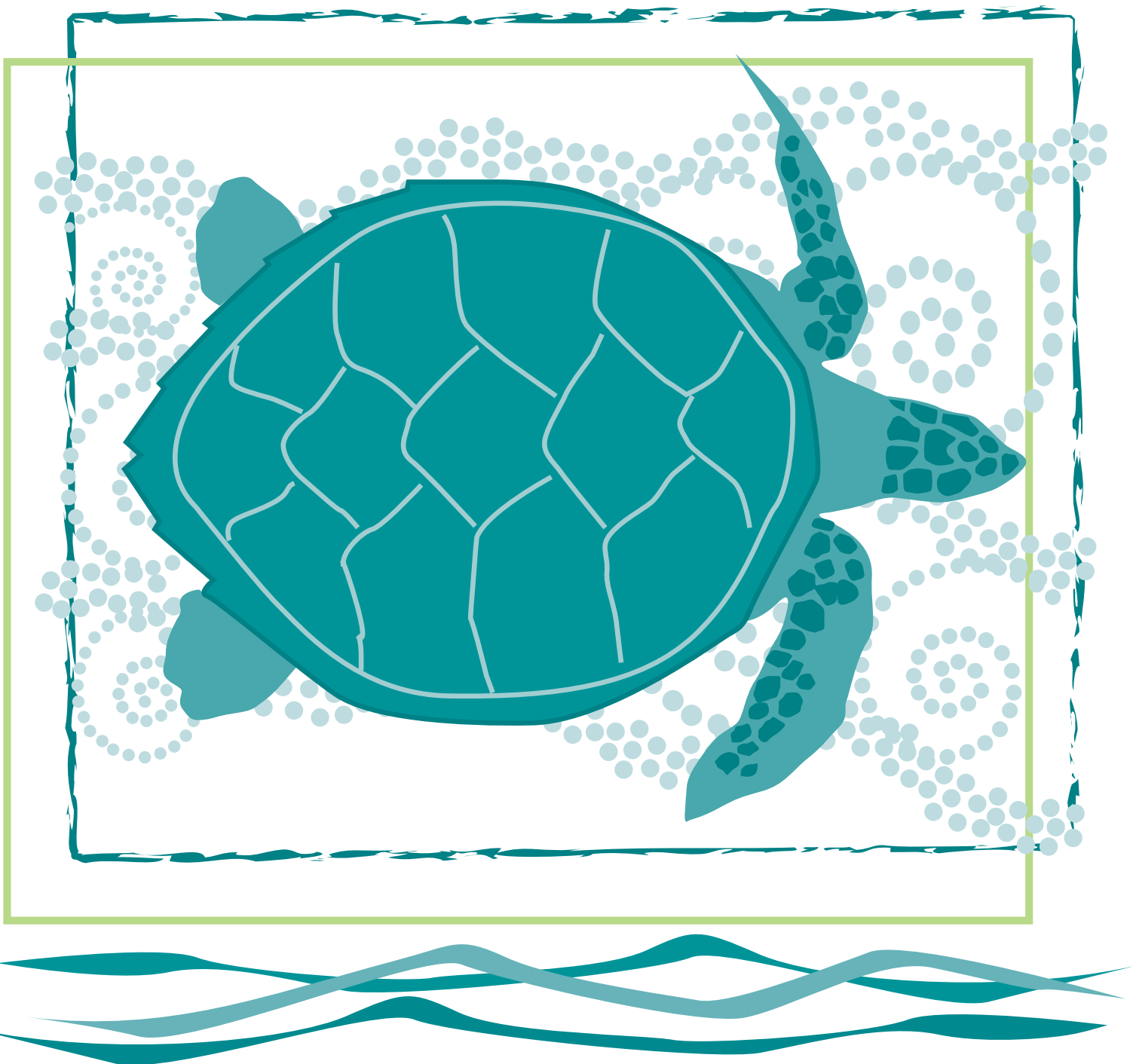
#### Strategy 1. Allocate fresh water for ecologically sustainable use

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
3.3 1.1	Develop, in consultation with the public, a water resource strategy for the Howard River region	DIPE	DBIRD, Power Water, Stakeholders	A	March 2004	Strategy developed
3.3 1.2	Implement the Howard River Region Water Resource Strategy	DIPE	DBIRD, Power Water, Stakeholders	A	Nov 2004	Strategy implemented
3.3 1.3	Develop, in consultation with the public, water resource strategies for the Cox Peninsula, and Blackmore and Elizabeth River regions	DIPE	DBIRD, Power Water, Stakeholders	A	Nov 2004	Strategies developed
3.3 1.4	Implement the water resource strategies for the Cox Peninsula, and Blackmore and Elizabeth River regions	DIPE	DBIRD, Power Water, Stakeholders	A	March 2005	Strategies implemented
3.3 1.5	Incorporate environmental monitoring for ecologically sustainable use of water into the Integrated Monitoring Program (see 1.1 2.2)	DIPE, EMG		B	June 2004	Monitoring programs undertaken
3.3 1.6	Promote water conservation and reuse by domestic, commercial, industrial, Local Government and NT Government users (see 5.1 2.20)	DHAC	Power Water, DHCS, DBIRD, DIPE	A/B	Ongoing	Public awareness programs implemented

## GOAL 4:

To protect cultural values and heritage values

### 4.1 Management of cultural, spiritual and heritage values





## **GOAL 4: TO PROTECT CULTURAL VALUES AND HERITAGE**

### **Outcome 4.1: Management of cultural, spiritual and heritage values**

#### **Current activities**

##### **Management**

- Draft Management Plan for Shell Middens
- Heritage Advisory Council Statements of Significance and Conservation Statements
- Heritage Conservation Act 1991
- Northern Territory Aboriginal Sacred Sites Act 1989
- Aboriginal Areas Protection Authority

##### **Monitoring**

- Surveys for archaeological sites

#### **Future activities**

##### **Strategies**

1. Manage sites of cultural, spiritual and heritage value in the Darwin Harbour region
2. Promote the cultural connections, diversity, lifestyle and heritage of the Darwin Harbour region

#### Outcome 4.1

##### Strategy 1. Manage sites of cultural, spiritual and heritage value in the Darwin Harbour region

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
4.1 1.1	Undertake a systematic survey to identify sites of cultural, spiritual and heritage value in the Darwin Harbour region	OEH,AAPA	IWG, Larrakia Nation, NLC, National Trust	B	June 2005	Preliminary survey initiated
4.1 1.2	Develop a management plan for cultural, spiritual and heritage sites in the Darwin Harbour region	OEH,AAPA	IWG, Larrakia Nation, NLC, National Trust	B	June 2005	Management Plan completed and implemented
4.1 1.3	Implement a monitoring program for declared heritage places in the Darwin Harbour region	OEH	MAGNT, IWG, Larrakia Nation, NLC, National Trust, Diving Associations	B	June 2004	Annual status report
4.1 1.4	Implement a monitoring program for cultural, spiritual and heritage sites identified in the Darwin Harbour region	OEH,AAPA	MAGNT, IWG, Larrakia Nation, NLC, National Trust	B	June 2004	Annual status report
4.1 1.5	Develop a public awareness and communication program for cultural, spiritual and heritage sites in the Darwin Harbour region (see 5.1 2.21)	OEH, AAPA	IWG, Larrakia Nation, MAGNT NLC, National Trust	B	2006	Awareness program developed
4.1 1.6	Ensure relevant developments contribute to the public awareness and communication program for sites of cultural,	DIPE	OEH, Industry, IWG, Larrakia	B	Ongoing	Interpretive displays provided

	spiritual and heritage value in the Darwin Harbour region		Nation, NLC, AAPA, MAGNT National Trust			by developers as required
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#### Outcome 4.1

#### Strategy 2. Promote the cultural connections, diversity, lifestyle and heritage of the Darwin Harbour region

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
4.1 2.1	Promote and encourage current festivals and events to celebrate the cultural connections, diversity, lifestyle and heritage of the Darwin Harbour region (see 5.1 2.22)	DHAC	IWG, Larrakia Nation, NT gov, Local gov, Industry, Community	B	Ongoing	Festivals and events continued and promoted
4.1 2.2	Promote and encourage the development of new festivals and events to celebrate the cultural connections, diversity, lifestyle and heritage of the Darwin Harbour region (see 5.1 2.23)	DHAC	IWG, Larrakia Nation, NT gov, Local gov, Industry, Community	B	Ongoing	New festivals and events developed
4.1 2.3	Recognise and promote local and indigenous knowledge of the Darwin Harbour region and its use (see 1.1 1.4, 5.1 2.24)	DHAC	IWG, Larrakia Nation, NT gov, Local gov, ERG, Industry, Community, Research Groups	B	Ongoing	Increased use of indigenous knowledge



## GOAL 5:

To foster community ownership and participation in management

5.1 Increased public awareness and communication of environmental, social and economic values and issues

5.2 Improved public participation in management and monitoring





## **GOAL 5: TO FOSTER COMMUNITY OWNERSHIP AND PARTICIPATION IN MANAGEMENT**

**Outcome 5.1: Improved public awareness of environmental, social, cultural and economic values and issues**

### **Current activities**

#### **Management**

- Charles Darwin University Symposia
- Darwin City Council public education program
- Darwin Harbour Advisory Committee public consultation program
- Environment Centre of the Northern Territory public education program
- Greening Australia community education and vegetation management program
- Keep Australia Beautiful public education program
- Landcare, Waterwatch, Coastcare community education programs
- Marine and Coastal Community Network public education program
- NT Government factsheets
- NTCCI Best Practice Management guidelines
- Palmerston City Council public education program
- Power and Water Corporation public relations and education program
- Waterwatch education kits

### **Future activities**

#### **Strategies**

1. Develop a Darwin Harbour regional communication and education strategy
2. Improve public awareness of the Darwin Harbour region, values, issues and management

**Outcome 5.1**

**Strategy 1. Develop a Darwin Harbour region communication and education strategy**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
5.1 1.1	Develop a Darwin Harbour region communication and education strategy to improve public awareness of the Darwin Harbour region, values, issues and management	DHAC	All stakeholders	B	June 2005	Strategy developed
5.1 1.2	Within the Darwin Harbour region communication and education strategy, investigate opportunities for corporate sponsorship, federal government funding and grants	DHAC	Federal gov, NT gov, Local gov, Industry	B	June 2005	Strategy reflects review of funding opportunities

**Outcome 5.1**

**Strategy 2. Improve public awareness of the Darwin Harbour region, values, issues and management**

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
5.1 2.1	Establish a point of contact for the community to obtain information regarding the Darwin Harbour region and the Plan of Management	DHAC	DIPE	B	June 2005	Point of contact established
5.1 2.2	Develop a database of stakeholders in the Darwin Harbour region	DHAC	All stakeholders	B	June 2005	Stakeholder database developed

5.1 2.3	Provide regular information on the Plan and regional management activities through a range of public media and mailing lists	DHAC	Media groups, all stakeholders	B	Ongoing	Articles, updates and information provided to media and mailing lists
5.1 2.4	Develop and undertake a program of communication with indigenous groups to disseminate information about the Darwin Harbour region and the Plan of Management	DHAC	Larrakia Nation, NLC, IWG	B	June 2005	Program developed and regular consultation undertaken
5.1 2.5	Develop and regularly update a stand alone Darwin Harbour region website which includes a GIS interface	DHAC	DIPE	B	June 2006	Website developed
5.1 2.6	Investigate the development of a Darwin Harbour Library Collection and reference database	DHAC	Public libraries	B	June 2006	Library system and database developed
5.1 2.7	Develop a regular regime of surveying members of the public to gauge community sentiment, needs, values and issues	DHAC	DIPE, Community	B	June 2006	Survey results reported
5.1 2.8	Promote the vision and values of the Darwin Harbour region developed in the Plan of Management to the community to create a sense of community pride	DHAC	Community	B	June 2006	Promotion of the vision/values
5.1 2.9	Promote conceptual models to the scientific and wider community through factsheets, publications and the website (see 1.1 1.8)	DHAC	ERG, EMG, DIPE, DBIRD, Research organisations, Industry	B	Dec 2005	Conceptual models promoted via factsheets, publications and website
5.1 2.10	Develop a reporting system to disseminate research and monitoring findings to the scientific and wider community (see 1.1 4.1)	EMG/ERG	Industry, Local gov, NT gov, Community	B	Dec 2006	Reporting system developed and implemented

5.1 2.11	Undertake public presentations to provide information to the community and to facilitate improved understanding of the regions environment (see 1.1 4.2)	EMG/ERG	Industry, Local gov, NT gov, Community	B	Dec 2006	Public presentations undertaken
5.1 2.12	Encourage the use and regular updating of the data management network (see 1.1 3.4)	EMG	Industry, Local gov, NT gov, Community	B	Ongoing	Database system promoted and regularly updated
5.1 2.13	Develop fact sheets and education kits to inform the wider community of issues affecting the Darwin Harbour region and management measures to address issues (see Outcome 1.2 and 1.3)	DIPE/OEH/ DEET/Power Water	NT gov (DBIRD, DIPE, OEH), Local gov, Environment groups, Research organisations, Industry	B	Ongoing	Fact sheets and education kits developed and available
5.1 2.14	Promote best practice environmental management guidelines (see Outcome 1.2, 1.3 and 3.2)	DHAC	OEH, DIPE, DBIRD, Federal gov, Local gov, Research organisations, Industry, NTCCI	B	Ongoing	Environmental guidelines promoted
5.1 2.15	Implement public awareness programs to inform the community of ecosystems and species of significance, management measures and monitoring programs (see 1.3 10.1)	DIPE/ERG/ EMG	DIPE, DBIRD	B	June 2006	Public awareness programs implemented
5.1 2.16	Publicise achievements in ecologically sustainable development and practices (see 3.2 4.1)	DBIRD/OEH	Industry	B	Ongoing	Achievements showcased
5.1 2.17	Promote recreational opportunities through various media (see 2.1 3.1)	DHAC	DIPE, DCDSCA, Local gov, Tourism Industry	A/B	June 2005	Promotional activities undertaken

5.1 2.18	Facilitate festivals and events to promote aspects of recreation to the community (see 2.1 3.2)	DHAC	DIPE, DCDS Local gov, Tourism Industry, Major Events	A/B	June 2005	Festivals/events undertaken
5.1 2.19	Provide education programs to improve public awareness of sustainability issues and practices for recreational fishing (see 2.2 9.1)	DBIRD	AFANT, Fishing Tour Operators, Tourist organisations	A/B	Ongoing	Education measures undertaken
5.1 2.20	Promote water conservation and reuse by domestic, commercial, industrial, Local Government and NT Government users (see 3.3 1.6)	DHAC/Power Water	DIPE, OEH	A/B	Ongoing	Public awareness programs implemented
5.1 2.21	Develop a public awareness and communication program for cultural, spiritual and heritage sites in the Darwin Harbour region (see 4.1 1.5)	DIPE	IWG, Larrakia Nation, NLC, AAPA, National Trust, MAGNT	B	2006	Awareness program developed
5.1 2.22	Promote and encourage current festivals and events to celebrate the cultural connections, diversity, lifestyle and heritage of the Darwin Harbour region (see 4.1 2.1)	DHAC	IWG, Larrakia Nation, NT gov, Local gov Industry, Community Groups	B	Ongoing	Festivals and events continued and promoted
5.1 2.23	Promote and encourage the development of new festivals and events to celebrate the cultural connections, diversity, lifestyle and heritage of the Darwin Harbour region (see 4.1 2.2)	DHAC	IWG, Larrakia Nation, NT gov, Local gov Industry, Community Groups	B	Ongoing	New festivals and events developed
5.1 2.24	Recognise and promote local and indigenous knowledge of the Darwin Harbour region and its use (see 4.1 2.3)	DHAC	IWG, Larrakia Nation, NT gov, Local gov, Industry, ERG, Community Groups, Research Groups	B	Ongoing	Increased use of indigenous knowledge

## **GOAL 5: TO FOSTER COMMUNITY OWNERSHIP AND PARTICIPATION IN MANAGEMENT**

### **Outcome 5.2: Improved public participation in management and monitoring**

#### **Current activities**

##### **Management and monitoring**

- Conservation Volunteers Australia
- Darwin Harbour Advisory Committee public consultation process
- Greening Australia community education and vegetation management program
- Keep Australia Beautiful public education program
- Landcare, Waterwatch, Coastcare community management and monitoring programs
- Land for Wildlife
- Review of Public Consultation in the Planning Process

#### **Future activities**

##### **Strategies**

1. Improve public participation in monitoring and research in the Darwin Harbour region
2. Provide opportunity for public participation in the Plan of Management for the Darwin Harbour
3. Improve public participation in legislation, policy, strategies and plans relevant to the Darwin Harbour region
4. Develop a management framework for indigenous involvement and participation in the monitoring, planning and management of the Darwin Harbour region

## Outcome 5.2

### Strategy 1. Improve public participation in monitoring and research in the Darwin Harbour region

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
5.2 1.1	Promote existing public participation in monitoring and research	DHAC	DIPE, Volunteer Groups, Federal gov	B	June 2005	Report on participation and achievements
5.2 1.2	Investigate new opportunities for public participation in monitoring and research programs	DHAC	DIPE, Volunteer Groups	B	Dec 2005	New public participation opportunities identified
5.2 1.3	Identify additional and ongoing funding/sponsorship for public participation in monitoring and research	DHAC	DIPE, Volunteer Groups, Federal gov, Industry	B	Dec 2005	Funding opportunities/ sponsorship identified
5.2 1.4	Encourage community groups to adopt scientifically valid methods that are consistent with the Integrated Monitoring Program (see 1.1 2.3, 1.1 3.3)	EMG	DIPE, Voluntary Groups, Community	B	June 2006	Methods and protocols disseminated to community groups
5.2 1.5	Ensure inclusion of community data into the data management network (see 1.1 2.3, 1.1 3.4)	EMG	DIPE, Voluntary Groups, Community	B	Dec 2006	Community monitoring data incorporated into the Integrated Monitoring Program data management network

5.2 1.6	Investigate options for incorporating anecdotal, local and indigenous knowledge into the Integrated Monitoring Program (see 1.1 1.4 and 1.1 1.5)	ERG	DHAC, IWG, DIPE, Larrakia Nation, NLC, Volunteer Groups, Community	B	June 2006	Scoping studies completed
5.2 1.7	Showcase achievements of community management and monitoring groups in the Darwin Harbour region	DHAC	Local gov, Federal gov, NT gov, Industry, Volunteer Groups, Community	B	June 2006	Achievements showcased

### Outcome 5.2

#### Strategy 2. Provide opportunity for public participation in the Plan of Management for the Darwin Harbour

Code	Action	Key Responsibility	Partners	Commitment	Time	KPI
5.2 2.1	Develop a participation strategy that enables the community to be involved in the implementation of the Plan and its revision	DHAC	Local gov, NT gov, Industry, Community Groups, IWG	B	June 2005	Participation strategy developed and implemented
5.2 2.2	Periodically review membership of DHAC to ensure representation adequately reflects the community, stakeholders and expertise required	NT gov	All stakeholders	B	June 2005	Periodic review of membership
5.2 2.3	Initiate the representation of a Commonwealth delegate on the DHAC	NT gov	Defence/ Commonwealth	B	June 2004	Appointment of delegate

**Outcome 5.2**

**Strategy 3. Improve public participation in legislation, policy, strategies and plans relevant to the Darwin Harbour region**

<b>Code</b>	<b>Action</b>	<b>Key Responsibility</b>	<b>Partners</b>	<b>Commitment</b>	<b>Time</b>	<b>KPI</b>
5.2 3.1	Inform the community of opportunities for their participation under current legislative frameworks	DHAC	NT gov (OEH, DIPE, DBIRD)	B	Ongoing	Information provided regarding participatory processes in current legislation
5.2 3.2	Promote public participation in the development and review of legislation, policy, strategies and plans relevant to the region	DHAC	NT gov (OEH, DIPE, DBIRD), Local gov	B	Ongoing	Promotions undertaken as required
5.2 3.3	Provide submissions whenever legislation, policies, strategies and plans are under development or review, where appropriate	DHAC	NT gov (OEH, DIPE, DBIRD), Local gov	B	Ongoing	Submissions tendered as required

**Outcome 5.2**

**Strategy 4. Develop a management framework for indigenous involvement and participation in the monitoring, planning and management of the Darwin Harbour region**

<b>Code</b>	<b>Action</b>	<b>Key Responsibility</b>	<b>Partners</b>	<b>Commitment</b>	<b>Time</b>	<b>KPI</b>
5.2 4.1	Establish an Indigenous Working Group (IWG)	DHAC	NLC, Larrakia Nation, DIPE, OEH, AAPA, HAC	B	July 2004	Advisory Group established
5.2 4.2	Indigenous Working Group to provide advice to Government on planning and management issues in the region through the Darwin Harbour Advisory Committee	IWG	NLC, Larrakia Nation, OEH, DIPE, HAC, AAPA	B	Ongoing	Ongoing provision of advice to DHAC
5.2 4.3	Develop a strategy to explore effective involvement of indigenous people in monitoring, planning and management in the Darwin Harbour region and for the protection of indigenous values and uses. This may also include exploring options for joint management approaches	IWG	NLC, Larrakia Nation, AAPA, DBIRD, OEH, DIPE, Local gov,	B	June 2006	Strategy developed and options explored
5.2 4.4	Promote indigenous involvement and participation in the monitoring, planning and management of the Darwin Harbour region	DHAC	NLC, Larrakia Nation, NT gov, IWG	B	Ongoing	Improved participation in planning and management

## SECTION 4

### Implementation and integrated management

This section examines the institutional arrangements necessary to allow implementation of the Darwin Harbour Regional Plan of Management, as well as providing recommendations for the ongoing role of the Darwin Harbour Advisory Committee. It sets the framework for an integrated management approach to the Darwin Harbour region.





## INTEGRATED MANAGEMENT

Integrated management provides a continuous and dynamic process for decision making regarding the use, development and protection of areas and resources. It seeks to consider, share and coordinate the values, interests and objectives of a broad range of people, organisations and disciplines when conceiving, designing and implementing policies, programs or projects to create a more complete, harmonious or unified entity. The adoption of integrated and coordinated planning and management systems has been described as the key to achieving ecologically sustainable development.

One approach to achieving integrated management and a balance between different community values and resource needs is to involve representatives from a cross section of society in management. This is frequently achieved through the actions of a community based committee or group which acts to incorporate community values, interests and objectives into the decision making process and make current systems more transparent and open. This "participatory" approach to management has proven to be effective in improving the level of integration and achieving the right balance.

The current system of governance and legislation in the Darwin Harbour region generally provides for sound management. There is, however, a perceived lack of integration, community engagement and community participation in the process. Through the establishment of the Marine and Coastal Management Policy, the Darwin Harbour Advisory Committee and the Darwin Harbour Regional Plan of Management, the Northern Territory Government has demonstrated its commitment to implementing an integrated approach to the management of the Darwin Harbour region. This in itself is highly significant, given the small population of the region, low resource base and the low level of environmental impacts.

The following section provides recommendations to enhance integrated management of the Darwin Harbour region through the Darwin Harbour Advisory Committee, and to support the implementation of the Darwin Harbour Regional Plan of Management.

## **RECOMMENDATIONS FOR INTEGRATED MANAGEMENT AND IMPLEMENTATION**

The following recommendations are provided to support the further development of integrated management of the Darwin Harbour region and the implementation of the Darwin Harbour Regional Plan of Management.

### **1. The actions of the Darwin Harbour Regional Plan of Management should be progressively implemented**

The actions described within the Darwin Harbour Regional Plan of Management should be progressively implemented by the nominated parties of key responsibility, with funding provided by the Northern Territory Government and other parties as appropriate, depending on the allocated time frames and financial constraints. Each of the responsible parties should be provided with a listing of the strategies and actions designated to them (with associated timeframes and performance indicators) by the Darwin Harbour Advisory Committee. It will then be the responsibility of each party to resource and implement these actions appropriately. The Northern Territory Government should make some commitment to providing funding for these actions where required within a reasonable timeframe, with priority actions (identified later in this section) funded as soon as practicable.

### **2. The Darwin Harbour Regional Plan of Management should be recognised under current legislation**

The Darwin Harbour Regional Plan of Management should be recognised and considered in the decision making process, under current legislation, such as the Planning Act; the Water Act; and the Waste Management and Pollution Control Act. By way of example, this may require consideration of the Darwin Harbour Regional Plan of Management, when assessing development applications or when granting or amending licences to take or use surface or ground water; or to dispose of wastes in the Darwin Harbour region.

### **3. The Darwin Harbour Advisory Committee should become an independent statutory Advisory Committee**

As a statutory Advisory Committee under current legislation, the Darwin Harbour Advisory Committee could provide advice directly to inform planning and management of the Darwin Harbour region. This would enhance consideration of community values and objectives in decision making and would facilitate the fulfilment of the goals of the Darwin Harbour Regional Plan of Management.

The advantages of strengthening the role of the Darwin Harbour Advisory Committee to become a statutory Advisory Committee include:

- Providing a long term integrated and coordinated framework for management, through engagement of a community based stakeholder group. An independent advisory

committee would provide pro-active advice regarding stakeholder and community values and aspirations into current government processes, and oversee the implementation and update of the Darwin Harbour Regional Plan of Management;

- Providing a point of contact for decision-makers, scientists and the community to obtain advice and information regarding the Darwin Harbour region and its management;
- Providing a voice for stakeholders and community of the region and a formal mechanism for stakeholders and the community to participate in the management of the Darwin Harbour region;
- Satisfying community requests for an independent statutory body, which reflects the values and objectives of stakeholders and the community.

It is recommended that the Darwin Harbour Advisory Committee becomes a statutory Advisory Committee/Consultative Committee under one or more of the following pieces of legislation:

- The Water Act;
- The Planning Act;
- The Waste Management and Pollution Control Act.

In this way, the Darwin Harbour Advisory Committee would have the ability to directly provide advice as part of the decision making process, rather than reactively responding to external initiatives.

The Darwin Harbour Advisory Committee would be available to provide independent, community based, input into matters referred to it by the Minister, including but not limited to:

- Policy formulation relevant to the Darwin Harbour region, including planning policy;
- Licence approvals and permits for developments that are likely to have significant environmental impacts on the Darwin Harbour region;
- Changes to land use zoning within the Darwin Harbour region, where the nature and use of the land is fundamentally altered;
- Actions or developments that require the formulation of a Public Environment Report or Environmental Impact Statement;
- Major development proposals requiring Ministerial consent, such as those that require Exceptional Development Permits within the Darwin Harbour region;
- Any other matter referred to it by the Minister.

The Darwin Harbour Advisory Committee may also provide submissions as part of public consultation processes related to any legislation, strategies and plans relevant to the Darwin Harbour region.

It is expected that there would be significant interaction between the Darwin Harbour Advisory Committee and the relevant Minister on a regular basis. This would involve discussions regarding the implementation and update of the Darwin Harbour Regional Plan of Management and would also allow the committee to provide advice to the Minister on issues determined by the committee and relevant to the Plan of Management. The Minister should

also facilitate interactions between the committee and other Ministers, to discuss issues relevant to the Darwin Harbour region.

**4. The Northern Territory Government should inform the Darwin Harbour Advisory Committee of relevant activities in the Darwin Harbour region**

In order to facilitate integrated management of the Darwin Harbour region, the Northern Territory Government should inform the Darwin Harbour Advisory Committee of the development of, or amendments to, policy, legislation, strategies, plans and reports relevant to the Darwin Harbour Regional Plan of Management.

The Northern Territory Government should specifically ensure that the Darwin Harbour Advisory Committee is provided with adequate information to allow informed consideration of the activities and developments referred to them by the Minister, for the provision of relevant advice (see Recommendation 3).

**5. The Northern Territory Government should duly consider the advice provided by the Darwin Harbour Advisory Committee**

When advice is requested and provided by the Darwin Harbour Advisory Committee regarding various developments, legislation, strategies and plans (see Recommendation 3) the Northern Territory Government, through the relevant Consent Authorities, should give this advice due consideration. The advice provided by the Darwin Harbour Advisory Committee should be considered to be as important as advice requested and provided by other agencies and organisations.

**6. The name of the Darwin Harbour Advisory Committee should be changed**

The name of the Darwin Harbour Advisory Committee should be changed to the Darwin Harbour Regional Management Board to reflect the enhanced role as an independent statutory body. The name of the committee/board should also reflect its interest in the region and catchment. The name chosen, however, would need to be consistent with the relevant legislation. The committee will continue to be referred to as the Darwin Harbour Advisory Committee until this recommendation has been implemented.

**7. The membership of the Darwin Harbour Advisory Committee should be reviewed**

A review of the membership of the Darwin Harbour Advisory Committee should be undertaken prior to implementation of the plan, to ensure it is representative of the community and stakeholders. Membership of Darwin Harbour Advisory Committee should have expertise and authority in, but not be limited to, the following areas:

- Industry and commerce;
- Primary industry;
- Extractive industries;
- Shipping and port activities;
- Urban development;

- Land use planning;
- Local Government;
- Northern Territory Government;
- Commonwealth Government;
- Recreational use;
- Community groups;
- Indigenous groups;
- Research and monitoring groups;
- Conservation groups.

The committee should also seek to engage Commonwealth, Local or Northern Territory Government agencies, or any other stakeholders as necessary, to facilitate the implementation, review or update of the Darwin Harbour Regional Plan of Management.

**8. The Northern Territory Government should provide executive support to the Darwin Harbour Advisory Committee**

It is recommended that the Northern Territory Government provides support to the Darwin Harbour Advisory Committee in the form of an Executive Officer to facilitate the functions of the advisory committee and funding to cover meeting costs and sitting fees, where required.

**9. The effectiveness of the Darwin Harbour Advisory Committee should be reviewed periodically**

The effectiveness of the Darwin Harbour Advisory Committee should be reviewed periodically (perhaps every 3 years). This review should include an assessment of:

- The ability of the Darwin Harbour Advisory Committee to achieve its terms of reference;
- The degree to which the goals and outcomes of the Darwin Harbour Regional Plan of Management are being achieved;
- The degree of implementation of the Darwin Harbour Regional Plan of Management and whether this is sufficient;
- The mechanisms for the consideration of the Darwin Harbour Regional Plan of Management under current legislation;
- The ability for the Darwin Harbour Advisory Committee to provide advice under current legislation;
- The degree of consideration by the relevant authorities of the advice provided by Darwin Harbour Advisory Committee;
- The need, if any, to strengthen the role of the Darwin Harbour Advisory Committee;
- The degree of community engagement being achieved by the Darwin Harbour Advisory Committee.

#### **10. The Darwin Harbour Regional Plan of Management should be updated annually**

It is recommended that the Darwin Harbour Regional Plan of Management is updated annually and becomes a rolling 5 year plan. In this way, the plan would identify activities for up to 5 years, and be revised annually to add an additional year of actions and to delete those actions implemented within the past year. This would enable the plan to become a living document, with regular revision ensuring that it reflects the current management situation and is adaptive to changes occurring within the Darwin Harbour region.

Annual update of the plan should involve review and amendment of the actions of the previous plan, incorporation of new actions, review of activities, strategies, legislation, policies and guidelines in the region and review of scientific understanding. This process should involve extensive public consultation, similar to that undertaken for the development of the Darwin Harbour Regional Plan of Management in 2003.

Each of the following components of the plan should be updated annually:

- Vision for the Darwin Harbour region;
- Values for the Darwin Harbour region;
- Issues and concerns for the Darwin Harbour region;
- Goals for management;
- Outcomes required to achieve these goals;
- Strategies to achieve the outcomes and specific actions (with responsible parties, partners, timeframes, key performance indicators).

#### **11. The Darwin Harbour Advisory Committee should provide annual reports to the relevant ministers reviewing the implementation of the Darwin Harbour Regional Plan of Management**

The Darwin Harbour Advisory Committee should complete annual reports outlining the progress of implementation of the Darwin Harbour Regional Plan of Management. These reports should be provided to cabinet through the Minister for Planning.

#### **12. A framework for integrating and coordinating research and monitoring in the Darwin Harbour region should be established**

A framework for integrated and coordinated monitoring and research in the Darwin Harbour region should be established. This should include the establishment of an Ecosystem Monitoring Group and Ecosystem Research Group to coordinate and strategically direct monitoring and research in the Darwin Harbour region.

The role of the Ecosystem Research Group (ERG) should be to direct strategic research in the region to address knowledge gaps and information needs. This group should determine and undertake research programs including habitat mapping and species inventories; should undertake risk analyses to identify and characterise threats to species and ecosystems in the Darwin Harbour region; and should develop conceptual, hydrodynamic and predictive models to assess the threats to these ecosystems from current and proposed developments.

The Ecosystem Monitoring Group (EMG) should primarily coordinate monitoring activities undertaken in the region to ensure that data protocols are developed, monitoring data is comparable and accessible to all parties and monitoring programs are complementary. The monitoring group should also design and implement the Integrated Monitoring Program, which should combine current monitoring undertaken, as well as new monitoring programs to address monitoring needs.

The EMG and ERG should function separately, but may be comprised of similar members. Members should include representatives from all parties who undertake scientific monitoring and research in the Darwin Harbour region. This may include, but is not limited to: Department of Infrastructure, Planning and Environment; Department of Business, Industry and Resource Development; Charles Darwin University (Northern Territory University); Centre for Tropical Wetland Management; Commonwealth Scientific and Industrial Research Organisation; Australian Institute of Marine Science; Museum and Art Gallery of the Northern Territory; Environmental Research Institute of the Supervising Scientist; Key Centre for Tropical Wildlife Management; Centre for Indigenous Natural and Cultural Resource Management and the CRC Tropical Savannas.

### **13. A Darwin Harbour Integrated Monitoring Program should be established**

Numerous studies, monitoring and research programs are currently being undertaken in the Darwin Harbour region. While much data exists for water quality, biota and ecosystems of the Darwin Harbour region, this data has generally been reported upon differently depending upon the type of data and the organisations involved, and has not been interpreted broadly to provide knowledge and understanding of the entire system or to guide management. In order to adequately assess the impacts of development in the region and to obtain knowledge of the system to guide effective management, there needs to be an integrated and coordinated approach to monitoring - a Darwin Harbour Integrated Monitoring Program.

This program should coordinate current monitoring programs (sites and methodologies) undertaken in Darwin Harbour and its catchment and provide recommendations to direct future monitoring efforts. It should monitor water physico-chemical parameters, biological indicators and undertake ecosystem assessments.

In designing such a monitoring program, several factors need to be considered, including:

- Values and uses in the region;
- Issues to be addressed;
- Objectives and goals;
- Review of current monitoring;
- Knowledge synthesis and research;
- Indicators;
- Guideline and targets;
- Coordination of monitoring;

- Management frameworks; and
- Reporting and information dissemination.

The development of this Integrated Monitoring Program should be undertaken by the Ecosystem Monitoring Group (see Recommendation 12).

**14. Community engagement in planning and management of the Darwin Harbour region should be enhanced through the actions of the Darwin Harbour Advisory Committee**

Several actions of the Darwin Harbour Regional Plan of Management, if implemented, will facilitate community engagement in planning and management of the Darwin Harbour region.

These actions include:

- Developing a Darwin Harbour region communication and education strategy to improve public awareness of the Darwin Harbour region, values, issues and management;
- Establishing a point of contact for the community to obtain information regarding the Darwin Harbour region and the Plan of Management;
- Developing a database and network of stakeholders in the Darwin Harbour region;
- Developing and regularly updating a Darwin Harbour region website for dissemination of information to the community;
- Investigating the development of a Darwin Harbour Library Collection and reference database;
- Regularly undertaking community surveys to gauge community values, issues and objectives;
- Informing the community of opportunities for their participation under current legislative frameworks;
- Promoting public participation in the development and review of legislation, policy, strategies and plans relevant to the region;
- Improving public participation in monitoring and research in the Darwin Harbour region;
- Promoting the Darwin Harbour region ecosystem values, cultural diversity; recreational opportunities and lifestyle.

**15. The Darwin Harbour Advisory Committee should seek to enhance indigenous engagement in planning and management of the Darwin Harbour region**

It is recommended that an Indigenous Working Group is established to provide advice to the Darwin Harbour Advisory Committee regarding the effective involvement of indigenous people in monitoring, planning and management in the Darwin Harbour region. This working group should also develop a strategy for the effective engagement of indigenous people, in monitoring, planning and management of the region and for the protection of indigenous values and uses of the Darwin Harbour region.

## IMPLEMENTATION

Implementation of the Darwin Harbour Regional Plan of Management and an integrated management framework will require funding from the Northern Territory Government and a commitment from the various stakeholders of the region. Funding of all of the actions listed in Section 3 would require several millions of dollars. The following unfunded actions are considered as priority actions to initiate integrated management and the implementation of the Darwin Harbour Regional Plan of Management. An indication of the resources required for achievement of each of these actions has been provided, as has an indication of the ongoing funding commitment required for continuation of the activities of the Darwin Harbour Advisory Committee.

Code	Action	Key Responsibility	Partners	Time	KPI	Indicative Cost (\$)
1.1 1.1	Establish a Darwin Harbour Region Ecosystem Research Group (ERG) to direct and oversee strategic research	DIPE	Industry, Local gov, NT gov, Research organisations	June 2004	ERG established	DHAC core business
1.1 1.2	Identify and evaluate the significance of knowledge gaps, at an ecosystem level	ERG	Industry, Research organisations	Dec 2004	Knowledge gaps identified	\$15,000
1.1 2.1	Establish a Darwin Harbour Region Ecosystem Monitoring Group (EMG) to oversee the development and implementation of an integrated environmental monitoring program	DIPE	Industry, Local gov, NT gov, Monitoring organisations	June 2004	EMG established	DHAC core business
1.1 2.2	Initiate the development of a Darwin Harbour Regional Integrated Monitoring Program for the environment	EMG	Industry, Local gov, NT gov, Community	June 2005	Integrated environmental monitoring program initiated	\$30,000
1.1 3.1	Conduct an inventory of data management systems and data sources for water quality,	EMG	Industry, Local gov, NT gov, Community	June 2005	Inventory complete	\$30,000

	flora, fauna and other relevant data, and evaluate data quality					
1.2 1.1	Develop a Stormwater Management Strategy and implementation plan	OEH	DIPE, Local gov	June 2005	Strategy completed	\$100,000
3.2 3.1	Evaluate current potential threats (eg risk analysis) to the environment associated with development of the Darwin Harbour region	ERG	DBIRD, DIPE Industry	Dec 2005	Potential threats evaluated	\$30,000
4.1 1.1	Undertake a systematic survey to identify sites of cultural, spiritual and heritage value in the Darwin Harbour region	OEH,AAPA	IWG, Larrakia Nation, NLC, National Trust	June 2005	Preliminary survey initiated	\$55,000
5.1 1.1	Develop a Darwin Harbour region communication and education strategy to improve public awareness of the Darwin Harbour region, values, issues and management	DHAC	All stakeholders	June 2005	Strategy developed	\$15,000
5.1 2.1	Establish a point of contact for the community to obtain information regarding the Darwin Harbour region and the Plan of Management	DHAC	DIPE	June 2005	Point of contact established	DHAC core business
5.1 2.2	Develop a database of stakeholders in the Darwin Harbour region	DHAC	All stakeholders	June 2005	Stakeholder database developed	DHAC core business
5.1 2.5	Develop and regularly update a stand alone Darwin Harbour region website which includes a GIS interface	DHAC	DIPE	June 2006	Website developed	\$20,000
5.1 2.6	Investigate the development of a Darwin Harbour Library Collection and reference database	DHAC	Public libraries	June 2006	Library system and database developed	DHAC core business
5.1 2.7	Develop a regular regime of surveying members of the public to gauge community sentiment, needs, values and issues	DHAC	DIPE, Community	June 2006	Survey results reported	\$10,000

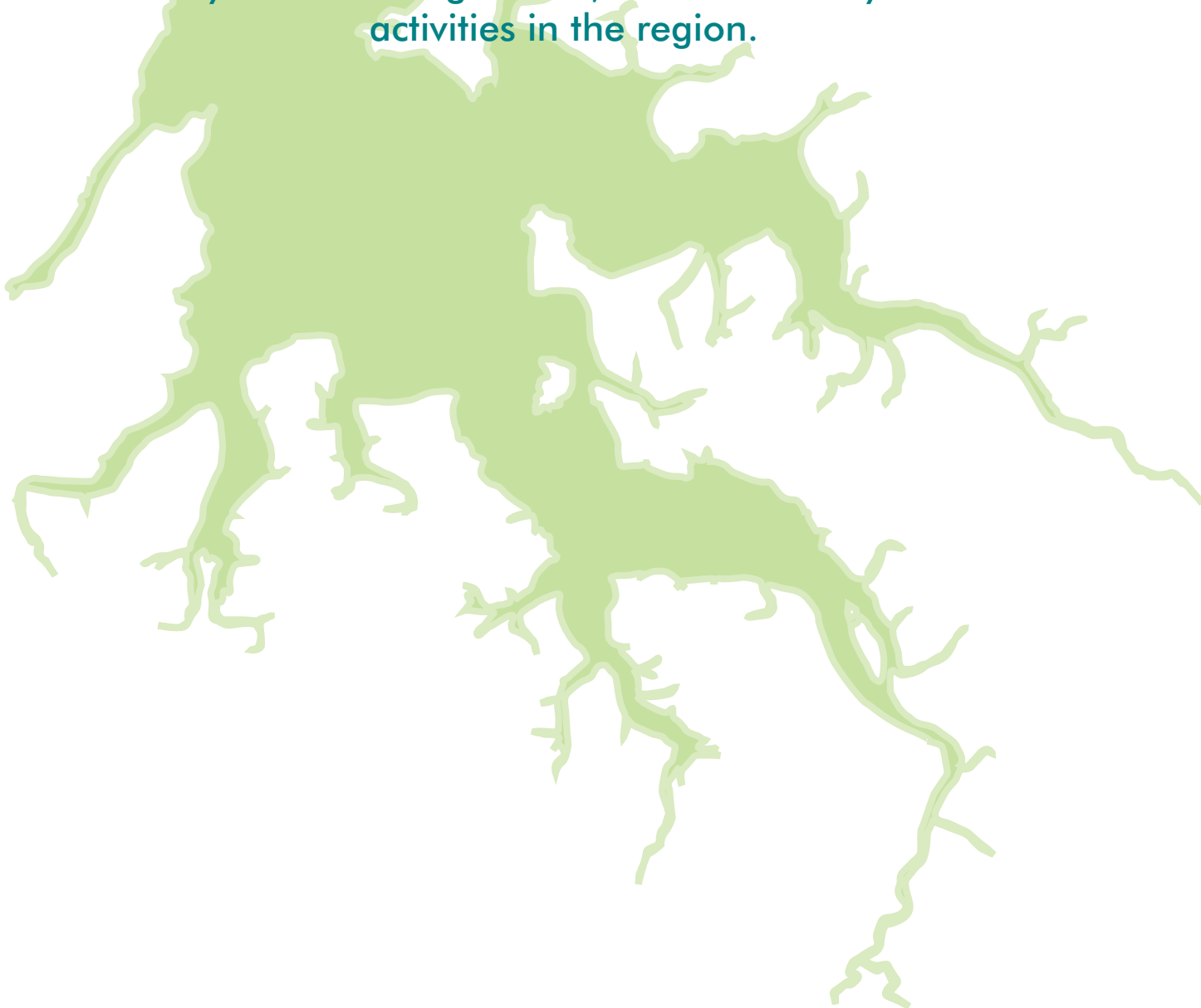
5.2 3.1	Inform the community of opportunities for their participation under current legislative frameworks	DHAC	NT Gov (OEH, DIPE, DBIRD)	On-going	Information provided regarding participatory processes in current legislation	DHAC core business
5.2 4.1	Establish an Indigenous Working Group (IWG)	DHAC	NLC, Larrakia Nation, OEH, DIPE, AAPA, HAC	July 2004	Advisory Group established	DHAC core business
5.2 4.3	Develop a strategy to explore effective involvement of indigenous people in monitoring, planning and management in the Darwin Harbour region and for the protection of indigenous values and uses. This may also include exploring options for joint management approaches	IWG	NLC, Larrakia Nation, AAPA, DBIRD, OEH, DIPE, Local gov	June 2006	Strategy developed and options explored	\$35,000
Support of the ongoing role of the Darwin Harbour Advisory Committee, the Ecosystem Monitoring Group and the Ecosystem Research Group, including sitting fees where required, meeting costs and an Executive Officer. This would also allow for an annual implementation report to be produced and for the Darwin Harbour Regional Plan of Management to be updated annually, with the necessary public consultation.						\$120,000 to \$300,000 (depending on scope of work) per annum



# SECTION 5

## Appendices

This section comprises additional information relevant to the Darwin Harbour Regional Plan of Management, including: members who contributed to the Plan of Management; acknowledgments; references; terms and abbreviations; a summary of current legislation; and a summary of current activities in the region.





## CONTRIBUTING MEMBERS

### **Darwin Harbour Advisory Committee**

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All efforts are greatly appreciated.

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#### **Darwin Harbour regional land use**

1. Owen, G and Meakin, M. (2003). Land use mapping of the Northern Territory. Technical Report 02/2003D Department of Infrastructure Planning and Environment, Darwin.

## **PUBLIC CONSULTATION REPORTS AND SUPPORTING DOCUMENTS**

The following documents were prepared to summarise the outcomes of the first round of Public Consultation, as well as the current knowledge regarding the environments of the Darwin Harbour region and the issues faced in managing the region. These documents have been used extensively in the development of the Darwin Harbour Regional Plan of Management.

Darwin Harbour Advisory Committee (2003). Darwin Harbour Regional Plan of Management: Public Consultation Phase 1. Public Hearings - Transcript of Proceedings. Department of Infrastructure, Planning and Environment, Darwin.

Darwin Harbour Advisory Committee (2003). Darwin Harbour Regional Plan of Management: Public Consultation Phase 1. Summary of outcomes from public forum consultation. Department of Infrastructure, Planning and Environment, Darwin.

Darwin Harbour Advisory Committee (2003). Darwin Harbour Regional Plan of Management: Public Consultation Phase 1. Written Submissions for the Darwin Harbour Regional Plan of Management. Department of Infrastructure, Planning and Environment, Darwin

Working Group to the Darwin Harbour Advisory Committee (2003). Proceedings: Darwin Harbour Region: Current knowledge and future needs. Department of Infrastructure, Planning and Environment, Darwin.

Working Group to the Darwin Harbour Advisory Committee (2003). Proceedings: Technical Workshops for the Darwin Harbour Regional Plan of Management: Current knowledge and future needs. Department of Infrastructure, Planning and Environment, Darwin.

Working Group to the Darwin Harbour Advisory Committee (2003). Management Issues for the Darwin Harbour Region. Department of Infrastructure, Planning and Environment, Darwin.

## TERMS AND ABBREVIATIONS

### Acronyms

<b>AAPA</b>	Aboriginal Areas Protection Authority
<b>AFANT</b>	Amateur Fishermen's Association of the Northern Territory
<b>AHC</b>	Australian Heritage Commission
<b>AIMS</b>	Australian Institute of Marine Science
<b>CDU</b>	Charles Darwin University
<b>CSIRO</b>	Commonwealth Scientific and Industrial Research Organisation
<b>DBIRD</b>	Department of Business, Industry and Resource Development
<b>DCA</b>	Development Consent Authority
<b>DCC</b>	Darwin City Council
<b>DCDSCA</b>	Department of Community Development, Sport and Cultural Affairs
<b>DEET</b>	Department of Employment, Education and Training
<b>DHAC</b>	Darwin Harbour Advisory Committee
<b>DHCS</b>	Department of Health and Community Services
<b>DHRPOM</b>	Darwin Harbour Regional Plan of Management
<b>DIPE</b>	Department of Infrastructure, Planning and Environment
<b>DPC</b>	Darwin Port Corporation
<b>ECNT</b>	Environment Centre of the Northern Territory
<b>EMG</b>	Ecosystem Monitoring Group
<b>ERG</b>	Ecosystem Research Group
<b>ERISS</b>	Environmental Research Institute of the Supervising Scientist
<b>HAC</b>	Heritage Advisory Council
<b>IWG</b>	Indigenous Working Group
<b>KABC</b>	Keep Australia Beautiful Campaign
<b>KPI</b>	Key Performance Indicator
<b>MAGNT</b>	Museum and Art Gallery of the Northern Territory
<b>MCCN</b>	Marine and Coastal Community Network
<b>NLC</b>	Northern Land Council
<b>NTCCI</b>	Northern Territory Chamber of Commerce and Industry
<b>NTHA</b>	Northern Territory Horticulture Association
<b>NTSC</b>	Northern Territory Seafood Council
<b>NTTC</b>	Northern Territory Tourist Commission
<b>NTU</b>	Northern Territory University (now known as Charles Darwin University)
<b>OEH</b>	Office of Environment and Heritage
<b>OTD</b>	Office of Territory Development
<b>PCC</b>	Palmerston City Council
<b>PFES</b>	Police, Fire and Emergency Services
<b>PWC</b>	Power Water Corporation
<b>PWCNT</b>	Parks and Wildlife Commission of the Northern Territory
<b>TTE</b>	Tourism Top End

### Terms

**Monitoring organisations**

AIMS, CSIRO, ERISS, CDU, MAGNT

**Research organisations**

AIMS, CSIRO, ERISS, CDU, MAGNT

## SUMMARY OF LEGISLATION, POLICIES AND STRATEGIES

The following legislation, policies and strategies are considered relevant to the design and implementation of the Darwin Harbour Regional Plan of Management.

NT Legislation	Primary roles relating to harbour management
Aboriginal Land Act 1978	Provides for access to Aboriginal land, certain roads bordered by Aboriginal land and the seas adjacent to Aboriginal land.
Agricultural and Veterinary Chemicals (Northern Territory) Act 1995	Requires that the National Registration Authority (NRA) is satisfied that the use of a chemical does not put the health of the user, community or the environment at risk.
Biological Control Act 199	Provides for the biological control of pests in the Northern Territory.
Building Act 1996	Provides for the establishing of technical standards for buildings, the registration of building practitioners and certifiers, the regulation of building matters, the granting of building and occupancy permits and the establishing of a building appeal process. On 1 January 2003 Energy Efficient Measures were adopted in the Northern Territory as part of an amendment of the Building Code of Australia.
Bushfires Act 2001	Provides for the prevention and suppression of bushfires.
Crown Lands Act 1992	Relates to Crown Lands.
Cullen Bay Marina Act 2002	Relates to the subdivision and management of certain land at Cullen Bay and the obligations and liabilities of certain persons in relation to the development of that land.
Dangerous Goods Act 1981	Regulates the manufacture, handling, storage and disposal of dangerous goods and wastes, including petroleum and hazardous gases.
Darwin City Council By Laws 2003	Regulations under the Local Government Act.
Darwin Port Corporation Act (and By-laws) 2003	Provides for the establishment of the Darwin Port Corporation for the control and management of the Port of Darwin. The functions of the Port Corporation include controlling and dealing with the land vested in it and control and regulation of the use of all waters. Includes control over port facilities; berthing, unloading, loading and handling services; dredging and maintaining channels; reclaiming land and managing pollution by oil or other hazardous substances.
Energy Pipelines Act 2003	Makes provision for the construction, operation, maintenance and cessation of use or abandonment of pipelines for the conveyance of energy-producing hydro-carbons. Act covers the current high-pressure gas pipeline to Channel Island Power Station and will also cover the section of the offshore pipeline from Bayu-Undan that is laid under Darwin Harbour. Outside the harbour, the pipeline will be licensed under the Petroleum (Submerged Lands) Act.
Environmental Assessment Act 1982	Allows the assessment of environmental effects of proposed developments and options for mitigation. Ensures that environmental implications are taken into account in the decision-making for development in the NT. Provides for Public Environment Reports or Environmental Impact Statements to be prepared for developments that may pose a Significant Environmental Impact.
Environmental Offences and Penalties Act 1996	Creates four levels of environmental offences with associated penalties of up to \$1.25M. The penalty levels created under this Act are then referenced in a range of other Acts that identify those activities that constitute environmental offences.
Gas Pipelines Access (Northern Territory) Act 1998	Provides for regulation of third party access to natural gas pipeline systems.
Fisheries Act 1988	Regulates the recreational and commercial fishing industries, the release of exotic fish and aquatic plants, taking, sale and conservation of fish. Allows the establishment of aquatic parks. Management Plans are required to be prepared for all managed fisheries. Provides for control of pollution of waters by any substance likely to affect aquatic life.
Heritage Conservation Act 1991	Provides for the protection of places and objects of prehistoric, historic, social, scientific or aesthetic value, including geological structures, fossils, archaeological sites, buildings, gardens, landscapes, coastlines or plant and animal communities in the NT. Penalties can be imposed for people damaging a protected place or object.
Lands Acquisition Act 2001	Relating to the acquisition of land by the Territory.
Land Title Act 2002	An Act to consolidate and reform the law about the registration of land and interests in land and for related purposes.
Litter Act 1999	Makes it an offence to leave, throw, deposit or abandon litter into a public place (public place includes the water in and off the coast of the NT that is open to and used by the public).
Local Government Act 2002	An Act to continue to provide for the constitution of municipalities and community government areas and for the election of self-governing authorities to control municipalities and community government areas, to provide for a similarity of power and function between self-governing authorities.

Marine Act 1981	Regulates shipping and provides for the implementation of the Uniform Shipping Laws Code. Deals with, among other things, the crewing of ships, examination and pilotage, passengers, safety, collisions, and the handling of dangerous goods. Provides for the establishment of pilotage authorities to control the entry of ships to designated pilotage areas and set the rules for the operation of such authorities. Darwin Harbour is a designated pilotage area and the Darwin Port Corporation is the pilotage authority for the Harbour. Controls the building of structures in coastal waters below the high water mark and navigation aids.
Marine Pollution Act 2003	Allows for penalties relating to marine pollution by oil, noxious liquid substances, packaged substances, sewage and garbage. Gives effect to the International Convention for Prevention of pollution from Ships 1973.
Mining Act 2002	Provides for the issue of mining titles and the regulation of mining activity.
Mining Management Act 2001	Provides for the authorisation of mining activities, the management of mining sites and the protection of the safety and health of persons and of the environment on mining sites. Requires operators to develop Mine Management Plans to address occupational health, safety and environmental management.
National Environment Protection Council (Northern Territory) Act 1999	An Act to provide for the establishment of a National Environment Protection Council.
Northern Territory Aboriginal Sacred Sites Act 1989	Allows for the protection of sacred sites.
Northern Territory Tourist Commission Act 1979	Used to establish a Tourist Commission to assist in the development of tourism in the Territory, and for related purposes, 1954.
Pastoral Land Act 1992	Deals with the administration, management and conservation of pastoral land.
Petroleum Act 1984	Regulates the exploration for, and the production of, petroleum in onshore and internal waters.
Planning Act 1999	Allows for the planning and control of the use and development of land.
Poisons and Dangerous Drugs Act 2001	Regulates the registration and use of all veterinary and agricultural chemicals.
Public Health Act 1952	Allows for the filling or draining of any swamp or accumulation of water in which mosquitoes are liable to breed.
Soil Conservation and Land Utilisation Act 1980	Provides for the prevention of soil erosion as well as the conservation and reclamation of soil. Ensures that planning for and management of future development recognises and minimises potential for erosion through identification of potential risk and implementation of erosion controls.
Special Purposes Leases Act 2002	Relates to leases of Crown land pursuant to the Special Purposes Lease Act.
Territory Parks and Wildlife Conservation Act 1988	Provides for the declaration of land, including the sea above any part of the seabed of the NT, to be a sanctuary, park reserve or protected area. Provides for the protection and limited exploitation of animals and plants, and the preparation of lands for management for parks and reserves.
Trespass Act 2000	Provides a means to evict campers where camping is not permitted on Crown land.
Waste Management and Pollution Control Act 1998	Allows for the establishment of Environmental Protection Objectives. Encourages improved environmental management of activities that have a capacity to pollute. Includes provisions for licensing, environmental auditing, issuing of Directions and pollution Abatement Notices, setting environmental protection objectives, accreditation and training and negotiation of scheduled step-wise improvements to waste management and pollution control practices.
Water Act 1992	Provides for the investigation, use, control, protection, development, management and administration of water resources and the rights relating to natural water. Prohibits (unless it is authorised by the Act or under any other law in force in the NT) waste coming into contact with water or for water to be polluted. Water is defined for the purposes of the sections concerning pollution, to mean water flowing or contained in a waterway, ground water or tidal water. Allows for the declaration of Beneficial Uses.
Water Supply and Sewerage Services Act 2002	Regulates the water supply and sewerage services industries. Provides for areas to be declared water supply or sewerage services licence areas and prohibits discharge of certain classes of waste to sewer without an approval, and provides for trade waste agreements.
Weeds Management Act 2001	Landowners and occupiers have a general duty to prevent their land being infested with weeds and to prevent weeds spreading to other land.
Work Health Act 2002	Promotes occupational health and safety in the Territory to prevent workplace injuries and diseases, to protect the health and safety of the public in relation to work activities, to promote the rehabilitation and maximum recovery from incapacity of injured workers, to provide financial compensation to workers incapacitated from workplace injuries or diseases and to the dependants of workers who die as the results of such injuries or diseases, to establish certain bodies and a fund for the proper administration of the Act.
<b>Commonwealth Legislation</b>	<b>Primary roles relating to harbour management</b>
Aboriginal Land Rights (Northern Territory) Act 1976	Providing for the granting of Traditional Aboriginal Land in the Northern Territory for the benefit of Aboriginals.
Aboriginal and Torres Strait Islander Heritage Protection act 1984	Deals with the preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginals in accordance with Aboriginal tradition.
Customs Act 1901	Relates to customs.
Environmental Protection and	Commonwealth legislation that replaces previous legislation for environmental

Biodiversity Conservation Act 1999	assessment. Triggers for Commonwealth assessment of environmental impact relate to matters of National Environmental Significance, including Endangered Species, Migratory Species protected under International Treaties, and Commonwealth Marine Areas.
Environment Protection (Sea Dumping ) Act 1981	Regulates the dumping of wastes and other matters at sea.
Export Control Act 1982	Provides for the control of the export of certain goods.
Fisheries Management Act 1991	Relates to fisheries.
Hazardous Wastes (Regulation of Exports and Imports) Act 1989	Provides for the regulation of the export, import and transit of hazardous waste.
Historic Shipwreck Act 1976	Provides protection to maritime archaeological sites.
Imported Food Control Act 1992	Provides for the inspection and control of food imported into Australia.
Native Title Act 1993	Relates to native title in relation to land or waters.
Navigation's Act 1912	Relates to navigation and shipping.
Protection of Moveable Cultural Heritage Act 1986	Used to protect Australia's heritage of movable cultural objects.
Protection of the Sea (Prevention of Pollution from Ships) Act 1983	Relating to the protection of the sea from pollution by oil and other harmful substances discharged from ships.
Quarantine Act 1908	Relates to quarantine.
Wildlife Protection (Regulation of Exports and Imports) Act 1982	Relates to the protection and conservation of wildlife by regulating the export and import of certain animals, plants and goods.

## National Strategies

### Aquaculture Industry Action Agenda (announced December 2002)

- Initiatives include a national policy statement, developing a more efficient regulatory environment, improving animal health standards and a greater focus on R&D and training.

### Australia's Oceans Policy

- Recognises that ecosystem health and integrity are fundamental to ecologically sustainable development.
- Principles in the Policy are being integrated into legislative and other commonwealth management initiatives, including development of a National Representative System of marine protected areas; development of regional marine plans (a scoping exercise for the eastern coast of the Territory is underway); consistent management of ships' ballast water and marine pest incursions; phase-out of toxic anti-fouling (TBT) paints; etc.

### Australia's Marine Science and Technology Plan

- Identifies needs and priorities for marine science and technology, reflecting the importance of improving understanding of marine zones and their resources, using them sustainably and conserving them;
- Describes major programs being undertaken or required to meet those needs and priorities;
- Identifies key resources (skills, facilities and infrastructure) for effective conduct and application of Australian marine science; and
- Proposes a means to coordinate effort in implementing the programs identified in the Plan.

### The Natural Heritage Trust Extension

The NHT Extension is delivered through three founding components:

- (a) The National/Territory component addresses activities that have a national or Territory focus, in addition to activities that cross over Territory and State boundaries;

(b) Regional funding is based on priorities identified in a Northern Territory Integrated Natural Resource Management Plan and Investment Strategy; and

(c) Australian Government Envirofund targets small projects aimed at conserving biodiversity and sustainable resource use. Up to \$30,000 is available for community groups and organisations.

Coasts and Clean Seas (Initiative of the Natural Heritage Trust)

- An initiative aimed at tackling Australia's coastal and marine environmental problems. Environment Australia funds initiatives under seven sub-programs, offering funding to government and non-government organisations, and the Territory has been the recipient of funding from this source. Programs include:
  - Coastal and Marine Planning Program (providing opportunities for Local and State governments to improve the quality of their plans);
  - Coastal Monitoring Program (priorities include seagrass loss, water quality in bays and estuaries, loss of mangrove and saltmarsh, eutrophication and coastal reefs);
  - Marine Protected Areas Program (promoting conservation of marine biodiversity and the ecologically sustainable use of marine resources through the establishment of the National Representative System of Marine Protected Areas);
  - Marine Species Protection Program (to protect species of conservation concern from human-related threats and impacts such as overfishing and marine pollution, eg dugong, whales, seabirds and turtles);
  - Coastcare (supporting a range of community projects such as dune revegetation, beach access and boardwalk construction, weed control, reef and marine species monitoring, coastal habitat protection, community education and new initiatives to protect migratory shorebirds and threatened marine species);
  - Introduced Marine Pests Program (to support actions to control and eradicate introduced marine pest species); and
  - Marine Waste Reception Facilities Program (Promoting establishment of best practice facilities for the management and treatment of marine waste at ports, marinas and boat harbours).
- Territory projects that have been funded in the past and relate to the Darwin Harbour catchment include:
  - Effluent re-use to reduce discharge of wastewater from the Darwin Correctional Facility into Hudson Creek/Darwin Harbour;
  - Development of a Community Identification and Monitoring Kit for Fishing Debris;
  - Installation of gross pollutant traps from outfalls into Darwin Harbour;
  - Monitoring the Buffalo Creek Estuary for impacts of urbanisation;
  - Development of a Strategic Plan for the Beneficial Uses of Darwin Harbour;
  - Conserving dugongs in the Darwin Region;
  - Mosquito and Biting Midge monitoring and investigations

- AQIS quarantine container wash bay/water wash recycler, Frances Bay; and
- Dinah beach waste retention and recovery project.
- Other management-related activities under the Coasts and Oceans program include:
  - State of the Environment Reporting (with Coasts and Oceans as one of seven themes);
  - National Strategy for the Management of Coastal Acid Sulfate Soils (to ensure coastal acid sulfate soils are assessed and managed responsibly);
  - Coastal Catchment Initiative (seeks to reduce discharge of pollutants to identified "hotspots", through agreements between the Commonwealth and State/Territory governments);
  - Introduced Marine Pests Program (to support actions to control and eradicate introduced marine pest species); and
  - Fisheries Action Program (to restore and protect fish habitat; encourage community participation to improve fisheries ecosystems, ensure that fishing is sustainable and responsible, and promote targeted research; supported NT Seafood Council production of *"Working Today for a Sustainable Tomorrow"*).

#### Environmental Resources Information Network (ERIN)

- Provides environmental information for policy developers and decision-makers;
- Under "Coasts and Oceans," contains the State of the Environment report for the Coasts and Oceans theme, the Australian Coastal Atlas (including data on Darwin Harbour, provided by the NT Government) and the Australian National Shipwreck Database.

#### Inter-governmental Agreement on the Environment (IGAE)

- Mechanism by which to facilitate a cooperative national approach to the environment; a better definition of the roles of the respective governments; a reduction in the number of disputes between the Commonwealth and the States and Territories on environment issues; greater certainty of Government and business decision making; and better environment protection.

#### Living on the Coast: Commonwealth's Coastal Policy

- States a number of objectives and principles for coastal planning and management in the Commonwealth's waters and coastal zones and for activities regulated by the Commonwealth (eg defence, export/import, etc.)

#### Marine and Coastal Community Network

- Assists community involvement in caring for oceans and coasts and is a non-government organisation (NGO); provides a range of services including Newsletters, internet postings, conducting workshops on marine and coastal issues, etc.

#### National Action Plan for Salinity and Water Quality

- Targets 21 regions in Australia most affected by salinity and water quality problems, including the Darwin/Katherine region for development of action plans to tackle salinity and water quality problems.

#### National Landcare, Bushcare and Rivercare Programs (Supported by the Natural Heritage Trust)

- Encourages landholders to undertake Landcare and related conservation works, by supporting collective action by communities to sustainably manage the environment and natural resources.
- Territory projects funded by this program include:
  - Clearing the Myilly Point Escarpment of Weeds;
  - Bushland Management Manual;
  - Casuarina Rainforest and Coastal Dune Rehabilitation (Casuarina Coastal Reserve);
  - Update/reprinting of *Weeds of Natural Ecosystems*;
  - Mitchell Creek Catchment Vegetation;
  - Duke Street Rainforest Revegetation Project;
  - Aboriginal Landcare Education Program; and
  - Ludmilla Creek Catchment Management (improving integrity of upper catchment).

#### National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances (NATPLAN)

- Maintains a national integrated Government and industry organisational framework capable of effective response to pollution incidents in the marine environment and manages associated funding, equipment and training programs.

#### National Pollutant Inventory

- An Internet database providing the community, industry and government with information on the types and amounts of certain substances being emitted to the environment.
- One of several National Environment Protection Measures.

#### National Strategy for Ecologically Sustainable Development

- Provides broad strategic directions and framework for governments to direct policy and decision-making;
- Facilitates a coordinated and co-operative approach to ecologically sustainable development (ESD) and encourages long-term benefits for Australia over short-term gains.

#### National Strategy for the Conservation of Australia's Biological Diversity

- A comprehensive approach to bridge the gap between current efforts and the effective identification, conservation and management of Australia's biological diversity and to ensure an integrated approach across State/Territory and local government boundaries.

#### National Policy on Recreational Fishing

- Commits to community participation in management and equitable resource sharing amongst recreational fishers and others.

#### National Water Quality Management Strategy (and Guidelines)

- Established to protect and enhance the quality of water resources while maintaining economic and social development.
- Consists of twenty-one guideline documents providing the principles for managing key elements of the water cycle.

#### Ocean Rescue 2000

- A ten-year conservation and management program, aiming to bring together marine information and develop long-term plans for the ecologically sustainable management of Australia's marine environments.
- Major components include State of the Marine Environment Report, National Representative System of Marine Protected Areas; development of an Australian Marine Conservation Strategy; National Marine Education Program; National Marine Information System; and the Marine and Coastal Community Network.

#### Waterwatch

- A community water quality monitoring and education program, working with government, landholders and industry to assess and improve water quality.

#### Wetlands Policy of the Commonwealth Government

- Provides strategies to ensure that the activities of the Commonwealth Government promote the conservation, ecologically sustainable use and enhancement of wetlands functions.
- Forms a platform for the development of a national framework of wetland policies and strategies.

#### Other relevant strategies and initiatives include:

- Good Practice Guidelines for Integrated Coastal Planning, 1998;
- Marine Industry Development Strategy;
- National Maritime Accidents and Pollution Strategy;
- Strategy to Manage Discharges of Ballast Water;
- The National Greenhouse Strategy, 1998.

#### **International Treaties and Conventions**

##### Agenda 21 (Chapter 17 covers the protection and use of oceans, sea and coastal areas), 1992

- An international framework agreement for pursuing global sustainable development, endorsed by Australia at the 1992 Rio Earth Summit.

##### Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention)

- Links together in a single document the concepts of nature conservation and the preservation of cultural sites.
- Defines the kind of natural or cultural sites, which can be considered for inscription on the World Heritage List, and sets out the duties of States Parties in identifying potential sites and their role in protecting and preserving them.

#### Convention on Biological Diversity

- Establishes three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources.

#### Convention on Conservation of Migratory Species of Wild Animals (Bonn Convention)

- Established to protect those species of wild animals that migrate across or outside national boundaries.
- Aims to restrict harvesting, conserve habitats, and control other adverse factors (including marine mammals, sea turtles and sea birds).

#### Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

- Prevents the international trade of threatened species.
- Establishes controls on the import and export of agreed species that are endangered, or at risk of becoming endangered, due to inadequate controls over trade in them or their products.

#### Convention on Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the London Convention)

- Aims to promote the effective control of pollution of the marine environment through the regulation of discarding wastes and other matter that has the capacity to detrimentally impact:
  - human health;
  - living resources;
  - amenities; and
  - other legitimate uses of the sea.
- The convention sets a framework for regulating dumping at sea from vessels, aircraft and platforms. Regulations are based on a list of substances for which dumping is either prohibited, special care required or incineration at sea entailed.

#### Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar) [at present no Ramsar wetlands have been declared in the Darwin Harbour catchment]

- The broad intention of this convention is to cease the worldwide loss of wetlands and to conserve those that remain through wise use and management.
- Its objective is to establish activities that develop international cooperation, policy making, capacity building and technology transfer.

#### International Convention for the Prevention of Pollution from Ships (MARPOL)

- Constitutes the principal convention that deals with the operational disposal of wastes from ships, excluding land generated wastes (eg dredge spoil), by dumping.
- The convention comprises five technical Annexes:
  - Annex I. Regulations for the Prevention of Pollution by Oil

- Annex II. Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk
- Annex III. Regulations for the Prevention of Pollution by Harmful Substances carried by sea in Package Forms
- Annex IV. Regulations for the Prevention of Pollution by Sewage from Ships
- Annex V. Regulations for the Prevention of Pollution by Garbage from Ships

#### Jakarta Mandate on Marine and Coastal Biological Diversity

- Institutes a program of action that recognises the importance of marine biodiversity and addresses the conservation and sustainable use of marine and coastal biological diversity.
- Focuses on integrated marine coastal area management to achieve its goal, in addition to the sustainable use of living resources, protected areas, mariculture and exotic species.

#### Migratory Bird Agreements with Japan (JAMBA) and China (CAMBA)

- JAMBA is an agreement between the Government of Australia and the Government of Japan for the protection of migratory birds and birds in danger of extinction and their environment.
- Establishes list of migratory birds that are protected under the agreement, in addition to lists of endangered bird species in both Australia and Japan.
- CAMBA is an agreement between the Government of Australia and the Government of the Peoples Republic of China for the protection of migratory birds and their environment.
- Establishes a list of migratory birds to be protected under the agreement.

#### The United Nations Convention on the Law of the Sea (UNCLOS)

- Perhaps the most important international agreement, because it allows coastal states to claim territorial seas (which extend 12 nautical miles from the coastal baseline); an Exclusive Economic Zone (EEZ) extending to 200 nautical miles, and a legally defined continental shelf. It requires signatories to
  - ensure that the living resources in the EEZs are not endangered by over-exploitation;
  - promote optimum utilisation of the living resources in their EEZs; and
  - protect the marine environment from pollution.
- in addition to many others relating to fishing; maritime transport, safety and salvage (including oil spills and other incidents); military operations; marine scientific research; and other matters.

#### Other agreements include:

- Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property 1970;
- Food and Agriculture Organisation of the United Nations (FAO) International Code of Conduct for Sustainable Fishing, 1995;
- International Convention for the Safety of Life at Sea (SOLAS), 1974;
- Kyoto Declaration and Plan of Action on the Sustainable Contribution of Fisheries to Food Security, 1997;

- UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks, 1995;
- UNESCO Convention Concerning the Protection of World Cultural and Natural Heritage 1972;
- United Nations Commission on Environment and Development 1992;
- United Nations Framework Convention on Climatic Change 1992.

## SUMMARY OF CURRENT ACTIVITIES

### GOAL 1

#### Management

##### Aquatic Pest Management Program

The Aquatic Pest Management Program was established within the Department of Business, Industry and Resource Development following the black-striped mussel outbreak in 1999. The role of the Aquatic Pest Management Program is to:

- establish and maintain a comprehensive biological monitoring program to detect any further incidence of aquatic pests in the Northern Territory;
- coordinate inspections of high risk vessels for aquatic pests, including international vessels entering marinas;
- protect Northern Territory inland waters by minimising the establishment of exotic aquatic pest species through legislation, public awareness and eradication operations; and
- participate in the development of national protocols for the prevention, emergency response and management of introduced marine pests.

##### AQIS Australian Ballast Water Decision Support System

The Australian Ballast Water Decision Support System (DSS) is a computer software application developed by Australian Quarantine Inspection Service (AQIS) in consultation with industry. The DSS undertakes a biological risk assessment that predicts the likelihood of entry of harmful aquatic organisms and pathogens on a tank by tank basis based on ballast uptake and discharge information entered by the vessels Master or agent. The DSS supports the AQIS's new ballast water management requirements.

##### Australian Ballast Water Management Requirements (Ballast Water Guidelines)

The Australian Quarantine and Inspection Service (AQIS) is the lead agency for the management of international vessels ballast water. Australia was the first country in the world to introduce voluntary ballast water management guidelines for international shipping, which have been in use by since 1991. In September 1999, the Australian Government announced that mandatory ballast water management arrangements would be introduced for all international vessels arriving in Australian ports or waters from 1 July 2001. Since that announcement, AQIS, in consultation with State / Territory Governments and the shipping industry, has developed new ballast water management arrangements which help minimise the introduction of harmful aquatic organisms into Australia's marine environment.

The mandatory Australian ballast water management requirements were developed to be consistent with the International Maritime Organisation (IMO) Guidelines for minimising the uptake of harmful aquatic species when vessels are performing ballasting operations. Australia's new ballast water management requirements are enforced under the *Quarantine Act 1908*. All international vessels are required to manage their ballast

water in accordance with AQIS requirements and not discharge high-risk ballast water in Australian ports or waters.

#### Australian Maritime Safety Authority

The Australian Maritime Safety Authority (AMSA) is a largely self-funded government agency with the charter of enhancing efficiency in the delivery of safety and other services to the Australian maritime industry. AMSA undertakes and assists in audits of vessels to ensure their compliance with legislation as well as managing the National Oil Spill Contingency Plan. AMSA is also the Regulatory Authority for ensuring compliance of the International Maritime Dangerous Goods Code.

#### Australian National Water Quality Guidelines

The main objective of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (the Water Quality Guidelines) is: "to provide an authoritative guide for setting water quality objectives required to sustain current, or likely future, environmental values [uses] for natural and semi-natural water resources in Australia and New Zealand."

The Water Quality Guidelines have been prepared as part of Australia's National Water Quality Management Strategy (NWQMS). They provide government and the general community (particularly catchment/water managers, regulators, industry, consultants and community groups) with a sound set of tools for assessing and managing ambient water quality in natural and semi-natural water resources.

The NWQMS provides a framework for water quality management that is based on policies and principles that apply nationwide.

#### Beneficial Uses (declared under the Water Act)

Beneficial Uses are environmental values or uses that are important for a healthy ecosystem or for public benefit, welfare, safety or health, which require protection and management.

Beneficial use categories are as follows:

- Agricultural - to provide irrigation water for primary production including related research;
- Cultural - to provide water to meet aesthetic, recreational and cultural needs;
- Aquaculture - to provide water for commercial production of aquatic animals including related research;
- Public Water Supply - to provide source water for drinking purposes delivered through community water supply systems;
- Environment - to provide water to maintain the health of aquatic ecosystems;
- Riparian - public rights and ownership rights to take water for domestic and/or stock purposes;
- Manufacturing Industry - to provide water for secondary industry including related research.

A number of beneficial uses have been declared for the waters of the Darwin Harbour region under the Water Act (1992). These are as follows:

- Darwin Harbour (Charles Point to Lee Point): Protection of Aquatic Ecosystems, Recreational Water Quality and Aesthetics;

- Blackmore, Elizabeth and Darwin Rivers: Protection of Aquatic Ecosystems, Recreational Water Quality and Aesthetics, Agricultural Water Use;
- Darwin River Dam: Raw Water for Drinking Water Supply;
- Ground Water: Raw Water for Drinking Water Supply, Agricultural Water Use;
- Rapid Creek: Protection of Aquatic Ecosystems, Recreational Water Quality and Aesthetics.

#### Conservation Plan for the Darwin Region

This Plan involves extensive vegetation and fire mapping, in addition to fauna and weed surveys in the Coomalie Shire, Darwin River and Litchfield Shire areas of the catchment. Recommendations will be made in relation to weed and fire management; extractive mineral operations; native vegetation clearing; and feral animal control.

#### Conservation reserves in the Darwin Harbour region

There are several conservation reserves in the Darwin Harbour region, including:

- Berry Springs Nature Reserve;
- Blackmore River Conservation Reserve;
- Casuarina Coastal Reserve;
- Channel Island Conservation Reserve;
- Charles Darwin National Park;
- Doctors Gully Aquatic Life Reserve;
- East Point Aquatic Life Reserve;
- Holmes Jungle Nature Park;
- Howard Springs Nature Park;
- Knuckeyes Lagoon Conservation Reserve;
- Shoal Bay Coastal Reserve.

Each of these reserves has associated Plans of Management, administered through Parks and Wildlife Service, DIPE or the Fisheries Group, DBIRD (Aquatic Life Reserves). See "Parks and Wildlife Service Plans of Management" and "DBIRD Fisheries Group" for further details.

#### Darwin Port Corporation

The Darwin Port Corporation is the Authority for compulsory pilotage within the Harbour, primarily for the safety of the public, vessels, infrastructure and the environment. The Darwin Port Corporation presently operates the East Arm and City Wharves in the Port of Darwin and offers facilities and services to commercial shipping. The Corporation controls shipping within the Harbour and is responsible for channels and all navigational aids. The Corporation's marine staff conduct safety audits on petroleum tankers, gas carriers and bulk vessels. The Corporation's Harbourmaster also controls dangerous goods within the port limits and at its facilities.

#### Darwin Sewerage Strategy

Power Water Corporation has adopted a comprehensive strategy, known as the Darwin Sewerage Strategy, to meet future population growth; reduce sewage overflows during intense rainfall events; improve the quality of effluent discharged to Darwin Harbour; and increase effluent reuse. This strategy outlines future plans to divert sewage flows from the Larrakeyah outfall to the Ludmilla Waste Water Treatment Plant; upgrade the treatment level capacity at Ludmilla Waste Water Treatment Plant to enable secondary

treatment; provide tertiary treated sewage effluent for reuse through irrigation of recreation areas, parks and gardens; and increase the hydraulic capacity and efficiency of the collection and trunk sewer networks to cater for new residential and commercial developments.

A key part of the Darwin Sewerage Strategy is the upgrading of the Ludmilla Waste Water Treatment Plant, to be completed in two stages. Stage One of the Ludmilla Waste Water Treatment Plant upgrade has been completed. It provides for significant removal of floatables and grit from the influent stream, and increased hydraulic capacity to reduce backup of sewage in the Fannie Bay and Parap sewers. Direct benefits realised include: improved quality of waste water; improved operation and maintenance of the plant and reduced operating cost; and elimination of potential sewer overflows in adjacent suburbs. Stage Two includes transfer of the Larrakeyah sewerage catchment to Ludmilla, with works planned for completion in 2003. The macerator unit at Larrakeyah will then be decommissioned resulting in macerated raw sewage no longer being discharged into Darwin Harbour.

#### Developing a Strategy for Northern Territory Greenhouse Action

In response to the 1998 National Greenhouse Strategy, the Northern Territory National Greenhouse Strategy Implementation Plan was completed in August 2000. The Plan outlines Northern Territory responsibilities under the National Greenhouse Strategy for greenhouse action. In April 2002, the Northern Territory Government endorsed a Northern Territory Greenhouse Policy Framework. The framework outlines goals and principles to guide the development of comprehensive, practical and achievable greenhouse initiatives for the Northern Territory.

To assist in the development of a NT Strategy for Greenhouse Action in February 2003 the government released a discussion paper, 'Developing a Strategy for Northern Territory Greenhouse Action', which outlines greenhouse issues relevant to the Northern Territory and provides a basis to determine priorities for effective greenhouse action. The Northern Territory National Greenhouse Strategy is expected to be completed by the end of 2003.

#### DIPE Marine Safety branch

The Marine Safety Branch of the Department of Infrastructure, Planning and Environment is responsible for a range of marine matters in the Northern Territory. These include: Marine Safety through the *Marine Act* (including Commercial and Recreational Boating Safety); Marine Pollution through the *Marine Pollution Act* and other services including plan and design approval for new vessels, and planning and sponsorship of marine facilities.

Commercial vessels are required to meet prescribed safety standards in accordance with the Uniform Shipping Laws Code (USL Code).

The purpose of the *Marine Pollution Act*, which commenced in June 2003 and gives effect to MARPOL (International Convention for the Prevention of Pollution from Ships 1973/78), is to protect the marine and coastal environment by minimising intentional and negligent discharges of ship sourced pollutants into coastal waters. The Act applies to commercial and recreational vessels.

### Environmental Guidelines for Reclamation in Coastal Areas

The purpose of these guidelines is to provide practical environmental advice to developers who are planning to undertake reclamation work in coastal regions of the Northern Territory. The guidelines apply to activities such as foreshore filling in coastal areas and along rivers, canal estate, marina and port developments, coastal aquaculture development and development occurring on coastal floodplains. The main environmental issues associated with land reclamation in coastal areas include the loss of natural habitat and the subsequent potential reduction in biodiversity, erosion of the coastline and pollution of the marine environment especially from acid sulfate soils.

### Fire management strategy

The Bushfires Council of the Northern Territory is a statutory body established by the Bushfires Act, and is subject to the direction of the Minister for Parks and Wildlife. The Council has a legislated responsibility to advise the Minister on bushfire prevention and control in the Territory, including policy and issues affecting the operational efficiency and strategic direction of bushfire management. The Bushfires Council operates under a series of policy guidelines designed to achieve its fire management objectives. They include:

- protection of life, assets and the environment from the effects of uncontrolled fire;
- maintenance of natural resources, including native ecosystems and productive lands, by the use of appropriate fire regimes.

The policy stresses the need for individual landholders, be they public or private, to have fire management plans in place which are in the main devoted to the prevention of large and intense fires. Such plans should be set in the context of a broader regional strategy.

The Northern Territory is divided into nine Fire Control Regions that reflect varying land use, population density, climate, soil and vegetation type. A Bushfires Committee represents each Region. The area designated as the Darwin Harbour region falls with the Vernon Fire Control Region and the Northern Territory Fire and Rescue's Emergency Response area. The Vernon Regional Bushfire Committee is responsible for all that area east of the Howard River and south of the Elizabeth River and including all of Cox Peninsula.

A broad fire management strategy has been developed to outline the current state of fire control measures, with the following purposes:

- to prevent and control wildfires;
- to manage fire in non-urban areas in order to maintain diversity of species and ecosystems;
- to manage fire so as to improve future rural productivity.

### Fish Passage Requirements for Waterway Crossings

This document aims to minimise impacts on fish passage and general aquatic wildlife by providing practical guidelines to those involved in the planning, design, construction and maintenance of waterway crossings. Fish passage barriers include the physical blockage of waterways by dams, weirs and floodgates or other barriers to migration caused by the construction of a waterway crossing (bridges, culverts and causeways). These barriers can affect fish migration and breeding.

### Guidelines for Dredging

At present, the Office of Environment and Heritage (OEH) is developing two documents aimed at increasing the efficiency and effectiveness of Environmental Impact Assessment for dredging proposals:

- NT Dredging and Disposal Guidelines; and
- A Dredging Strategy for Darwin Harbour.

The Guidelines will provide background information on the NT coastal environment, potential impacts and the assessment and approvals processes in the NT as they relate to dredging.

The Dredging Strategy, to be developed in consultation with the Darwin Port Corporation and other stakeholders on a Dredging Advisory Group, will identify a decision-making process to determine the best options for disposal/management of dredge spoil from projects in Darwin Harbour. The Strategy will also outline monitoring and reporting requirements to ensure that unacceptable impacts are not occurring or likely to occur.

### Guidelines for Siting, Design and Management of Solid Waste Disposal Sites

These guidelines advocate that the disposal of waste to landfill should only be undertaken as a last resort. However, despite the many successful waste minimisation efforts and the growing viability of recycling, landfilling is still the only practicable method for dealing with many wastes. Given this, these guidelines have been written to:

- Help landfill operators be aware of NT Government requirements regarding development and operation of landfills; and
- Provide landfill designers and operators with the advice to help in minimising the impact of landfills on human health and the environment.

### Howard Region Water Resource Strategy (in preparation)

The Northern Territory Government has agreed to National Principles for the Provision of Water for Aquatic Ecosystems, and also to the implementation of comprehensive water allocation and entitlement systems. Water Resource Strategies incorporate Water Allocation Plans to guide the allocation of water for drinking, irrigation, aquaculture, industry, recreation and to ensure the sustainability of ecosystems. These plans also take into account future social, economic and environmental needs for the water.

A management strategy is currently being developed for the Howard Region and will form the basis for the allocation planning of regional water resources. The strategy will incorporate current understanding of the regional aquifer systems and the current level of use. The result will be an allocation framework to guide future planning and the sustainable development of the region.

Additional Water Resource Strategies will need to be developed in the future to cover the Cox Peninsula, the Blackmore River and Elizabeth River regions. These will be developed in consultation with the community and progressively implemented.

#### Land Clearing Guidelines for Broadacre Development, Linear Development and Subdivisions

These guidelines provide technical advice for planning and undertaking land clearing in the Northern Territory. Advice is provided for use by land owners, managers and developers on how to clear in a manner that will avoid/minimise adverse environmental impact. The guidelines state that land should only be cleared if the risk of degradation is low and the resultant area is capable of being used for the purpose for which it was intended. Limitations or constraints to clearing include slope; erodible soils; waterlogging or seasonal inundation; rock outcrop; and off-site impacts, such as alteration to drainage in neighbouring properties. "To reduce the impacts of clearing, it is important to protect the plants, animals and/or ecosystems which may be a particularly important component of biodiversity".

#### Land Clearing Guidelines Litchfield Area Plan

Under the Litchfield Area Plan 1992 (as amended) and Section 75 of the Planning Act 1999, landowners in the Litchfield Shire are permitted to clear up to 50% of their land without a permit. For any additional clearing in excess of the first 50%, approval must be obtained from the Development Consent Authority. Applications to clear are assessed by a Vegetation Clearing Committee of the Development Consent Authority. In most cases, relevant Government departments also assess development applications and a site inspection may be required. A report is made to the Development Consent Authority including a recommendation on whether the application should be approved and any special conditions that may need to be imposed. Clearing must not result in soil erosion or water quality problems on adjoining or down stream allotments.

#### Land for Wildlife

Land for Wildlife is a voluntary scheme to encourage and assist private landholders to provide habitats for wildlife on their property, even though the property may be managed for other purposes.

#### Listing of "Weeds of National Significance (WONS)"

The inaugural list of Weeds of National Significance was announced jointly by Commonwealth Ministers on Tuesday the 1st of June, 1999. Since then, twenty weeds have been identified from a list of 3000 non-native naturalised plants in the Australian environment. Weeds include *Mimosa pigra*, *Lantana* and *Cabomba*. The agreed methodology for determining Weeds of National Significance comprised of the following four major criteria:

- Invasiveness;
- Impacts;
- Potential for Spread;
- Socioeconomic and Environmental Values.

### Mangrove Management in the Northern Territory

This report, produced by the DIPE outlines a framework for the effective management of mangroves, including research focused on gaining knowledge required for management, monitoring and community education.

### Medical Entomology Branch, DHCS

The Medical Entomology Branch is a sub program of the Communicable Diseases program within the Department of Health and Community Services. The Branch provides advice and carries out surveillance and control of mosquitoes that affect human health. The Branch primarily performs a public health function with the aim of reducing the impact of insects and other arthropods of medical importance on the health and well being of the people of the Northern Territory. Mosquitoes and biting midges are the primary focus.

Primary functions of the branch include: carrying out mosquito monitoring and control operations in Darwin in liaison with local government and other agencies under the NT Mosquito Borne Disease Control Program; promoting public awareness; and providing an advisory service on insects of medical importance to Government, private enterprise and the public. This includes administrating the Mosquito Control Advisory Committee and providing a consultancy service for large development projects and providing planning and development advice and guidelines to the DIPE and others to prevent new biting insect problems.

### National Pollutant Inventory

The National Pollutant Inventory (NPI) is an Internet database ([www.npi.gov.au](http://www.npi.gov.au)) designed to provide the community, industry and government with information on the types and amounts of certain substances being emitted to the air, land and water.

Since 1998, larger Australian facilities have been required to estimate and report annually their emissions to the NPI. Estimation of emissions from smaller industry, households and transport related activities have been made by State and Territory environment authorities and are also listed on the data base.

The main objectives of the NPI are to:

- provide information to industry and government to assist in environmental planning and management;
- satisfy community demand for accessible information on emissions to the environment; and
- promote waste minimisation, cleaner production, and energy and resource savings.

### National System for the prevention, emergency management and control of introduced marine pests

In August 1999, the Joint Standing Committee on Conservation / Standing Committee on Fisheries and Aquaculture, National Taskforce on the Prevention and Management of Marine Pest Incursions was convened, following decisions of the Ministerial Council on Forestry, Fisheries and Aquaculture and the Australian and New Zealand Environment and Conservation Council. The Taskforce's report, submitted in December 1999,

proposed a National System for the Prevention and Management of Introduced Marine Pests. The National System is being coordinated by a single body, the National Introduced Marine Pests Coordination Group that reports to all relevant Commonwealth and State Ministers. The group is chaired by Agriculture Forestry and Fisheries. The Northern Territory Government participates in the National System through the Aquatic Pest Management Program, DBIRD.

#### National Weed Strategy

The National Weeds Strategy (NWS) was launched in June 1997. It takes a strategic approach to weed management problems of national significance, addressing environmental and agricultural weeds equally. The NWS describes the nature of the weed problem, discusses why existing weed management measures are not adequate, lists the roles and responsibilities of government, community, landowners and land users. It lists three goals with underpinning objectives and strategies, which are to be addressed by the Executive Committee and government at all levels in tackling this form of land degradation.

#### Native Vegetation Clearing Controls

As a temporary measure, Interim Development Control Order No. 12 has been declared under the Planning Act to prohibit clearing more than one hectare of land without a development permit. Following a period of review over the next two years, the Interim Development Control Order will be replaced by an amendment to the NT Planning Scheme.

Under the new controls, landholders are required to get a permit to clear any more than one hectare of native vegetation. The new controls will apply to all freehold and Crown land of 2 hectares or more outside of existing Towns and current control plan areas such as Darwin, Katherine and Alice Springs. The new controls do not apply to: Pastoral Leases which will continue to operate in accordance with the existing clearing controls under the Pastoral Land Act; the Territory's National Parks and Reserves which will continue to be managed in accordance with existing legislation; towns and current control plan areas such as Darwin, Katherine and Alice Springs; land where clearing is controlled by the Mining Act.

Under the new controls, landholders must lodge a development application with the DIPE in their regional centre to get a permit before clearing, where the clearing would result in more than one hectare of native vegetation being cleared on the property. The application is then assessed to determine whether clearing can occur, and if so the areas of land that can be cleared in accordance with land clearing guidelines.

#### Natural Resource Information Management Environment

The NT Government, and in particular the DIPE holds a substantial amount of data and information about the natural resources of the Territory. This information is held in various forms, from point source recordings of water quality information to maps of land capability for various land uses. The data could be held in digital form or on paper.

The Natural Resource Information Management Environment project is being designed to identify and document data and information on the Territory's natural resources. It will develop procedures to allow the information to be accessed and integrated across data sets to meet identified users requirements. The Database will be accessible via the

Intranet (and ultimately Internet) and will allow more efficient flow of information to those who need to use it.

The Natural Resource Information Management Environment project has progressed from a concept, through a "Proof of concept" to a written strategic proposal that was endorsed by the NT Government who committed funding for three years to develop the framework for ongoing implementation and management.

#### Northern Territory Pastoral Land Clearing Guidelines

These guidelines have been prepared by the Pastoral Land Board to assist land holders in the application process, the planning and implementation of clearing on Pastoral Land in the Northern Territory. The guidelines aim to minimise the potential for property damage, reduce costs associated with ongoing maintenance, prevent land degradation and prevent the loss of biodiversity.

#### Northern Territory Weeds Management Strategy 1996-2005

The goal of this strategy is to protect the Northern Territory economy, community, industries and environment from the adverse impacts of weeds.

The goal will be achieved by:

- Preventing introduction and spread of weeds;
- Ensuring weeds management is an integral part of land management;
- Learning more about weeds in the Territory as an essential basis for land management;
- Increasing public awareness and education;
- Providing appropriate legislation for weed management;
- Reviewing progress in weed management"

The work of the DBIRD Weeds Branch is directed towards the achievement of the strategy goals and its six contributing objectives.

#### Oil Spill Contingency Plan

Australia has a "National Plan" to respond to significant spillage of oil and chemicals in its territorial waters. In a national context, the Australian Maritime Safety Authority (AMSA) manages the Plan, working cooperatively with State/Northern Territory governments; the shipping, oil, chemical and exploration industries; and emergency services and fire brigades to plan for and respond to incidents threatening Australia's natural and human resources.

The Darwin Harbour Oil Spill Contingency Plan identifies priority resources and sites for protection and clean up, should a significant spill occur in Darwin Harbour. The Darwin Harbour Oil Spill Contingency Plan is implemented by the NT Marine Pollution Management Committee, which has representatives from a number of government and private sector representatives. The Marine Safety Branch of the DIPE is involved in management of the Plan and the plan is implemented directly by the Darwin Port Corporation (DPC) under the control of the Corporation's Harbourmaster.

In the event of an Oil Spill, advice would be provided to DPC by OEH through the Environment and Scientific Coordinator (ESC). Advice may include environmentally sound response and clean-up options (eg use of chemical dispersants to break-up the slick),

depending on the volume and type of oil and the habitats oiled or under threat of being oiled.

The primary resource document for the identification of significant sites and resources in the NT is the NT Oil Spill Response Atlas, which includes a substantial amount of data on Darwin Harbour. OEH maintains this Atlas, which complies with National Plan standards and can be integrated with the Oil Spill Trajectory Model (maintained by AMSA) to access predicted movements of an oil slick.

#### Park's and Wildlife Service Plans of Management

The Parks and Wildlife Service is responsible for planning and developing the Territory's system of land and marine protected areas. The Service manages over 90 parks and reserves for conservation and nature-based recreation and tourism in the Northern Territory. As a requirement of the Territory Parks and Wildlife Conservation Act, the Service prepares Plans of Management for its protected areas. These plans provide direction for the development and day to day management of parks and reserves for up to ten years. They define the purpose and objectives for the park, identify values and current issues and present management strategies.

In the Darwin Harbour region, there are several parks managed through Parks and Wildlife, including Casuarina Coastal Reserve, Holmes Jungle Nature Park, Howard Springs Nature Park, George Brown Darwin Botanic Gardens, and Charles Darwin National Park.

#### Planning Act and Scheme

The revised Planning Scheme has several aspects that are relevant to water quality and habitat conservation. These are listed below:

- Planning Principles for the NT recognise the need to "contribute to the sustainable use and development of land and water resources so that the use and development of land is consistent with the principles of sustainable development and avoids or minimises the degradation of the environment or the pollution or over commitment of water resources; assist in the conservation of areas and sites of environmental, cultural or heritage value as identified by government; facilitate the sustainable use of land for primary production so that land particularly suited to agriculture, horticulture and other primary production activities, by reason of the nature of the soils, proximity of adequate water supplies or for other reasons, will be preserved for those activities within the context of competing land uses; and value unimproved land for its inherent ecosystem functions in protecting native flora, fauna, soil and water resources."
- Conservation zones (to protect and preserve the flora, fauna and character of natural areas); Heritage zones (to conserve or enhance those elements that contribute to the significance of a heritage place) and Water Management zones (to restrict development within a water catchment area or other area providing surface or ground water for public water supplies) are found across the Darwin Harbour region.

In addition to these broad principles and zones, performance criteria for development are provided in the Scheme as follows:

- Land Reclamation - "The purpose of this clause is to ensure that landfill of coastal areas does not degrade the environment of adjacent areas or the quality of adjacent waters and is suited to its intended purpose. The placement of fill material on foreshore areas requires consent."
- Dredging - "The purpose of this clause is to ensure dredging within Darwin Harbour does not degrade the environmental values of the harbour waters. Dredging of the seabed within Darwin Harbour, (being those waters south of a line between Charles Point and Gunn Point), for purposes other than associated with navigation requires consent."
- Clearing of Native Vegetation - "The purpose of this clause is to ensure that clearing of native vegetation: a) does not unreasonably contribute to environmental degradation of the locality; and b) is based on land capability and suitability for the intended use, allows for the retention of native wildlife corridors, allows for protection of waterways and avoids impacts on environmentally significant or sensitive vegetation and fragile soils."
- Subdivisions - "The purpose of this clause is to ensure (residential/industrial/rural) subdivisions: (a) respond to the physical characteristics of the land; (b) are integrated with infrastructure, community services and facilities; (c) the lots are of a size, configuration and orientation suited for the purpose. Subdivision design should: (d) avoid the development of land of excessive slope, unstable or otherwise unsuitable soils (eg seasonally waterlogged) and natural drainage lines; (e) retain and protect significant natural and cultural features including views; (f) avoid development of land affected by a 1% AEP flood or storm surge event."
- Effluent Disposal - "The purpose of this clause is to ensure that an industrial use does not cause detriment to the environment through the inappropriate discharge of effluent. Industrial developments should be connected to a reticulated sewerage system. Where this is not the case the consent authority must be satisfied that the proposed means of effluent disposal is appropriate to the nature of the use and the site and will not cause detriment to the environment and in particular, to ground or surface waters."

#### Public education brochures and information

The Office of Environment and Heritage has developed a number of environmental guidelines, codes of practice and technical support and education programs in consultation with industry, other government agencies, local government bodies and NGOs.

OEH has also developed a number of helpful fact sheets aimed at achieving better community awareness of pollution and environmental best practice management. Some of these include:

- Marine debris;
- Managing our household waste;
- Composting;
- Environmentally safe storage of hazardous materials;
- Safe disposal of paint.

### Reuse and Recycling Directory

The DIPE website and OEH provide a concise Waste Reuse and Recycling Directory ([www.lpe.nt.gov.au/enviro/Fact/Faqindex.htm](http://www.lpe.nt.gov.au/enviro/Fact/Faqindex.htm)). The information has been formulated to assist reuse and recycling efforts in the Northern Territory. The directory consists of a list of waste products and companies that will recycle and/or collect these products, thus reducing the pressure on landfill in the region and supporting viable waste product markets in the NT.

### Sewerage Overflow Management Plan for the Darwin Region

Sewer overflows generally occur due to excess storm water in the sewer system, as a consequence of illegal connections of stormwater drains and infiltrations of stormwater to the system due to leaks, cracks or incorrectly placed overflow relief gullies. The Sewerage Overflow Management Plan was developed by Power Water Corporation in 1999 to address sewer overflows, particularly in the wet season by constructing additional overflow valves. There is also a program of repairing leaks and cracks and locating illegal connections.

### Soil conservation program

One of the goals of the Natural Resource Management Division of the DIPE is to develop, promote and ensure land management practices that conserve, enhance and where appropriate, rehabilitate land resources of the Northern Territory. The Soil Conservation and Land Utilisation Act is currently being updated and a Land Resource Conservation Bill has been drafted for consideration by Parliament. The Bill recommends that the current legislation be repealed and replaced with the more up to date version. Soil Conservation and Erosion Control Guidelines have been produced, but are still in a draft format.

### Strategic Plan for Beneficial Uses (Draft)

The Strategic Plan for Beneficial Uses (Draft) was developed in 2000 with the aim of maintaining and enhancing the Beneficial Uses through the establishment and fulfilment of key environmental objectives through an effective management framework.

The objectives of the Plan were to:

- Ensure that all development within the catchment is ecologically sustainable, consistent with the existing planning and environmental management framework and has support of the community;
- Obtain a thorough understanding of the baseline water quality in the catchment and implement waste management and pollution control measures to maintain this water quality;
- Protect and maintain the aquatic ecosystems within the catchment;
- Maintain suitable areas for recreation and tourism in and around water;
- Maintain the scenic value and landscape character of Darwin Harbour;
- Educate and involve the community in the management of Darwin Harbour and its catchment.

The plan was established jointly by the Northern Territory Government and the Commonwealth Dept of Environment and Heritage and prepared by a consultant. The draft plan was never endorsed and has not been implemented.

### Strategic Plan for *Mimosa pigra*

Prepared in conjunction with DBIRD and the Commonwealth, the strategy outlines four management programs to prevent further spread and to minimise the impacts of *Mimosa pigra* across the NT. The desired outcomes of the strategy are that:

- Stakeholders are informed and educated about *Mimosa pigra* and appropriate land management strategies for its control and prevention of spread;
- The spread of *Mimosa pigra* is prevented;
- The knowledge base and integrated methods for effective and efficient management of *Mimosa pigra* are further developed;
- The adverse impacts of *Mimosa pigra* are reduced;

The progress towards achieving these outcomes will be evaluated as part of a five- year review cycle.

### Strategy for Cleaner Production

In 1996, ANZECC decided to develop a National Strategy for Cleaner Production. In 1998, the ANZECC Cleaner Production taskforce that was established to develop the strategy produced the report "Towards sustainability – achieving cleaner production in Australia". The key objective of this strategy document was to establish a framework that provides industry with the incentive, the information and the capacity to improve its environmental performance in the design, production and delivery of goods and services to the community. The Office of Environment and Heritage is the lead agency for the strategy in the Territory and encourages cleaner production initiatives in the business and industry community.

### Strategy for the Conservation of Marine Biodiversity in the Northern Territory of Australia

This strategy canvasses the broad range of issues concerning the management and conservation of biodiversity in the Northern Territory's marine environment. It identifies the marine biodiversity values of the Northern Territory and objectives and actions to conserve and protect those values. The strategy covers Northern Territory waters (three nautical miles from the baseline) and areas outside of Territory waters where NT jurisdiction applies, such as offshore petroleum and mineral activity and management of specific fisheries. The strategy draws upon and complements several nationally agreed strategies pertaining to conservation of biological diversity, including, The National Strategy for the Conservation of Australia's Biological Diversity and The National Strategy for Ecologically Sustainable Development.

### Strategy for Conservation of the Biological Diversity of Wetlands in the Northern Territory of Australia

Although directed primarily at wildlife conservation, this strategy recognises the wide range of benefits that wetlands provide to Northern Territory residents and the nation. The goal sought through the implementation of this strategy is to conserve the biological diversity of the wetlands of the Northern Territory. The strategy outlines a number of key guiding principles and objectives to be achieved through a range of actions. It draws upon a number of vital incentives to protect wetland values, using an operational framework that will allow us to recognise and avoid problems before they cause irreversible damage.

### Strategy for Waste Management and Pollution Control

This strategy is intended to provide a broad framework for improving waste management and pollution control in the Northern Territory. The strategy highlights initiatives that are intended to:

- Better co-ordinate legislative aspects of waste management and pollution control by the establishment of a co-ordinating "Waste Management and Pollution Control Act";
- Improve legislative mechanisms for addressing waste management and pollution control by preparing new or amended legislation addressing the establishment of the National Environment Protection Council (NEPC), implementation of National Environment Protection Measures (NEPMs), management of scheduled wastes, performance of hazardous waste management contractors, tracking of hazardous waste movements, and performance of municipal waste management facilities;
- Ensure that waste management and pollution control issues are addressed comprehensively and consistently by establishing a coordinating body for waste management and pollution control;
- Ensure continued participation by the Territory in national and international waste management and pollution control initiatives through support of programs such as ozone protection and climate change and participation in forums such as ANZECC and NEPC;
- Reduce the amount of wastes generated and disposed of in the NT through the introduction of waste minimisation planning and promotion of reuse and recycling;
- Improve the management of particular types of wastes by: promoting waste management planning by waste generators and preparing Territory management plans and sub-strategies on:
  - unwanted chemicals;
  - medical wastes;
  - municipal wastes;
  - quarantine wastes;
  - scheduled (or intractable) wastes;
  - sewage and trade wastes going to sewers;
  - used tyres;
  - waste oil and oil contaminated wastes;
  - stormwater.
- Improve the management of air quality;
- Improve the control of noise pollution;
- Improve the quality and consistency of performance requirements by the establishment of environment protection measures for the NT (eg guidelines, standards, codes of practice) to deal with issues not covered under national measures;
- Ensure that the likelihood of accidental pollution from hazardous industries and activities is kept within acceptable limits and that appropriate responses are in place for minimising environmental impacts;
- Ensure that sites which may, or have been, polluted in the past are assessed and managed appropriately and in a consistent manner;
- Ensure that legislative provisions and penalties are sufficient to deter deliberate acts of pollution;

- Facilitate community reporting of pollution incidents by establishing and publicising the availability of a single contact point for pollution reporting;
- Foster better communication between industry, government and the community on waste management and pollution control issues;
- Foster better community awareness of, and involvement in, waste management and pollution control issues by reviewing mechanisms for public access to information, developing and implementing community awareness programs, and establishing forums for consultation; and
- Establish a strategy that is responsive to current community needs and sufficiently flexible to adjust to new demands through the development of performance indicators, monitoring and reporting arrangements, and review mechanisms.

#### Trade Waste Management System and Trade Waste Code

On the 1st January 2002, Power Water Corporation implemented its Trade Waste Management Program. The Trade Waste Management System will provide Power Water Corporation with the framework for accepting, regulating and administering the disposal of trade waste to the sewerage system. The Trade Waste Management System potentially affects any business that discharges waste to the sewer system, including the automotive, hotel and hospitality industries.

The Trade Waste Code is a key document of the Trade Waste Management System and establishes the criteria under which an Approval will be granted to allow the discharge of Trade Waste to Power Water's Sewerage System.

#### Wagait Beach Coastal Management Plan - Coastcare

Wagait Beach is located on the Cox Peninsula. A draft Coastal Management Plan has recently been developed for Wagait Beach, with the plan covering a strip of Crown Land from the Mandorah Jetty at Picnic Point, west to Imaluk Creek. The objective of this Plan of Management is to establish a basis upon which management agencies can work with the local community to facilitate sustainable use and management of Wagait Beach and Mandorah. The main goals of the Plan are:

- To provide conservation issues to all stakeholders;
- To provide guidance to management authorities in the prioritisation of management issues;
- To provide community guidance on the sustainable use of the foreshore areas; and
- To provide options for future management of the area.

### **Monitoring**

#### DBIRD Aquatic Pest Management Program monitoring programs

Since April 1999 the Aquatic Pest Management Program has regularly monitored water quality and biological diversity in Darwin Harbour and its marinas, coincident with a vessel inspection program targeting internationally travelled vessels visiting Darwin marinas.

The current monitoring program is primarily focused in Darwin Harbour with water quality parameters (temperature, salinity, dissolved oxygen, pH and turbidity) recorded

from each of the four marinas, and four high traffic areas in the Harbour (Fisherman's Wharf, Stokes Hill Wharf, Darwin Navy Base and outside Cullen Bay marina) on a fortnightly basis between May 1999 and January 2003, and on a monthly basis since January 2003.

Coincident with the water quality monitoring are surveys of biological diversity which are conducted monthly. Settlement traps deployed in similar locations to water quality sites are checked monthly with quantitative assessment of species diversity and biomass. In addition, a more extensive in water scuba facilitated survey of areas such as Quarantine, Channel Island, Mandorah, Stokes Hill Wharf, Sadgrove's Creek is conducted monthly during neap tides.

#### DIPE monitoring programs

- Darwin Harbour Catchment Load Monitoring (ongoing, annual reporting) - catchments representative of different land uses are monitored to determine the concentration and amount of contaminants (nutrients, metals and sediment) that flow to the harbour during the wet season;
- Darwin Harbour Catchment Stream Monitoring (ongoing, annual reporting) - streams in the Darwin Harbour catchment are sampled at the end of the wet season for chemical and biological measures to assess levels of impact;
- Darwin Harbour Water Quality Monitoring (ongoing, annual reporting) - ten sites are monitored quarterly in East and Middle Arms and the main body of the Harbour. This activity is being undertaken in collaboration with the Australian Institute of Marine Science;
- Land Clearing Monitoring (ongoing, annual reporting) - this is an NT wide project that is part of land condition reporting. This project covers all the Darwin Harbour catchment. The aim is to report on land clearing on an annual basis;
- Beach Monitoring (ongoing) - this measures the erosion and accretion of sand at major Darwin beaches to determine changes that are seasonal, long-term and event driven (eg cyclones). It also includes cliff monitoring with erosion of cliffs monitored using photopoints;
- Specific investigations have also been undertaken, including (1) metal contamination of mangrove sediments receiving stormwater from an industrial catchment, (2) review of pesticide monitoring in the Darwin region, and (3) sediment and nutrient tidal fluxes in the Blackmore River estuary.

#### Land Use Mapping of the Northern Territory (DIPE)

Land Use Mapping was undertaken in 2002 by the DIPE across the Northern Territory. This utilised digital data sets as well as local knowledge to determine the current and proposed land uses, through identification of the primary land-management objectives of the land manager. Seventy-four primary land-uses were identified within the Darwin Harbour region. The most extensive primary land-uses in terms of area were remnant native vegetation cover, surface water supply, other conserved area and rural residential.

### Licence /permit monitoring programs

Water quality monitoring is required under the following licences and permits:

- Waste Discharge Licences under the *Water Act*, for the Power Water Corporation sewage treatment facilities at Larrakeyah, Palmerston, Ludmilla and Leanyer plants (quality of plant effluent and receiving waters);
- Licence to operate Shoal Bay waste disposal facility under the *Waste Management and Pollution Control Act* (Quality of leachate and receiving waters);
- Trade Waste Discharge Permits issued to industries/businesses for discharge of liquid wastes to sewer (quality of effluent to sewer).

The first two are administered by DIPE (OEH and Natural Resource Management) and the latter by Power Water Corporation.

### Mangrove mapping and monitoring

The mangrove communities of Darwin Harbour were formally mapped and characterised by DIPE in 1995. Regular monitoring of 27 sites around the harbour has been undertaken to determine primary productivity, stand structure and species composition since 1999. Recently DIPE increased the number of mangrove monitoring sites in the harbour to 47, with 12 sites established at Wickham Point for assessing impacts of construction and operations associated with the LNG plant, and 8 sites established as part of a community awareness program spanning two years from 2000-02.

### National Pollutant Inventory

In 2001-2002, 86 facilities reported to the National Pollutant Inventory (NPI) database across the Northern Territory. In Darwin Harbour and surrounding catchments, 69 substances from 46 sources were reported to the NPI. This included reported data from 19 facilities and additional aggregated emission data for 35 sources.

Aggregated data include smaller facilities that are not required to report, and mobile and non-industrial sources. Aggregated data sets were created for 35 sources in the Darwin region including:

- Bushfires;
- Transport -Aeroplanes; Motor vehicles; Recreational boating; Commercial shipping and boating;
- Commerce - Accommodation; Automotive fuel retailing (service stations); Bakeries; Cafes and restaurants; Laundries and dry-cleaners; Lawn mowing (public open spaces); Motor vehicle refinishing (spray painters); Print shops/Graphic Arts; Pubs, taverns and bars; Rifle ranges;
- Industry - Abrasive blasting; Airports; Fuel combustion; Funeral directors and crematoria; Milk and cream processing; Petroleum and coal product manufacturing results; Port operations;
- Households - Lawn mowing; Barbeques; Backyard incinerators; Gaseous fuel burning; Liquid fuel burning; Solid fuel burning;
- Aquaculture;
- Other - Domestic and commercial solvents; Architectural surface coating; Cutback bitumen.

Facilities reporting to the NPI included:

- BP Australia;
- CSR;

- Darwin City Council (Leanyer Waste Disposal Site, Shoal Bay Waste Disposal Site);
- Darwin Galvanising;
- Department of Defence (Robertson Barracks);
- Mobil Oil;
- NT Livestock Exporters;
- Ord River Unit Trust ( Darwin Piggery);
- Power Water Corporation ( Berrimah Power Station, Leanyer/Sanderson waste water stabilisation ponds, Ludmilla Waste Water Treatment Plant, Palmerston Waste Water Stabilisation Ponds);
- Royal Darwin Hospital;
- Shell (Kitchener Terminal, McMinn Terminal, Darwin Refuelling Services).

#### Waterwatch community based water quality monitoring

Waterwatch promotes water quality monitoring as a tool to involve the Australian community in land and water management at a local and catchment scale. Through monitoring their local waterways, communities are geared into action to address water quality issues and work together to protect and rehabilitate waterways. At the time of publication of this plan, Commonwealth and the NT Government funding for Waterwatch was under review.

### **Research**

#### Darwin Air Emission Inventory

The Darwin Air Emission Inventory was a one off evaluation undertaken in of the major sources of emissions in the Darwin region and an estimation of the annual emission loads from these. Annual emissions from 32 sources were estimated, with 64 pollutants studied to determine air emission loads. The inventory showed that bushfires are the main source of carbon monoxide, cadmium and its compounds, fine particles of size 10  $\mu\text{m}$  or smaller, benzene and volatile organic compounds. The transport sector is a major source of oxides of nitrogen, chromium (VI) compounds, sulphur dioxide, arsenic and its compounds and lead.

#### Darwin River Dam monitoring (Power Water Corporation)

Mapping Darwin River Dam catchment is undertaken to determine the following:

- biodiversity/conservation values ;
- feral animal refuge habitats;
- occurrence of weeds;
- fire history and occurrence;
- vegetation;
- sediment and erosion risk.

#### Emissions to Darwin Harbour study (DIPE)

Funding obtained through the National Pollutant Inventory was used by DIPE in a one off study to model emissions into Darwin Harbour from differing land uses. Surface water runoff is a source of pollution in Darwin Harbour. Different sub-catchments in the Darwin Harbour catchment generate different amounts of pollutants depending on their size and the land-use activities within them.

Emissions to water were estimated from 21 sub-catchments in the Darwin Harbour region using existing data from studies undertaken by DIPE and Power Water Corporation, together with two new studies. Four main land uses: undisturbed, rural, urban and industrial, were designated for each sub-catchment. The substances estimated were nutrients (total nitrogen and total phosphorus) and metals (arsenic, cadmium, chromium (III), copper, lead, nickel and zinc).

#### Groundwater modelling of the Howard River catchment

Groundwater modelling is currently being undertaken by the Water Resources and Hydrographic Branches of the Natural Systems Division of the DIPE. The results will give better understanding of the regional aquifer system dynamics. The model will also be an important tool for future strategic management and water allocation planning.

#### Habitat fragmentation research (CDU, DIPE)

This program assesses the response of mammals to habitat fragmentation and involves trapping and radio-tracking Black-footed Tree-rats, possums and Quolls.

#### Hydrodynamic model (DIPE)

A numerical model of Darwin Harbour was constructed by DIPE to aid management decisions. Originally built to evaluate tidal currents at East Arm wharf the computer model has now been applied to many other areas. The model simulates tidal current speed and direction along with changes in depth, and can be used to track sediment plumes. The model can also be used to evaluate the fate of nutrients and other water quality constituents. Use of the model, along with field studies, has shown that Darwin Harbour does not readily flush particles via physical transport. Particles tend to move to and from and often migrate from one arm of the harbour to another. More field studies are needed to quantify this movement and to analyse the importance of dilution (advection / diffusion) processes. The present seaward limit of the model is a line joining Charles Point to Lee Point.

#### Mangrove research (CDU)

A project to assess use of mangrove habitats in Darwin Harbour by fish and to model the ecological interactions is nearing completion. The project is being conducted by a CDU PhD student, as a Fisheries Group Research Associate.

#### Marine mapping and marine fauna inventory (DIPE, MAGNT)

This program involves the collection of baseline data and mapping areas where insufficient data exists to enable well-defined and informed monitoring programs into the future. This information will also be used to conduct threat/risk assessment on marine biodiversity in relationship to current developments in Darwin Harbour.

MAGNT maintains a collection database that contains detailed records of the marine fauna of Darwin Harbour collected by the museum and other surveys. Using this database, MAGNT is working towards developing an inventory of the marine fauna of Darwin Harbour.

MAGNT is developing a range of publications related to marine fauna in Darwin Harbour including - Field guide to the soft corals of Darwin Harbour and NT coastline (Complete);

The Mollusc fauna of Darwin Harbour (In progress); The polychaete worms of Darwin Harbour (In progress); A Checklist and identification guide to the Sponges of Darwin Harbour (In progress);

MAGNT is also undertaking Bioprospecting for marine invertebrates.

## GOAL 2

### Management

#### Aboriginal Subsistence Fishing

Subsistence fishing has been undertaken along the Northern Territory coast since the first occupation of the region by Aboriginal tribes over 40,000 years ago. During their occupation of the land and seas, Aboriginal and Torres Strait Islander people had carried out their custodial rights, hunting and collecting marine resources in a sustainable manner and wish to continue to do so.

Many of the marine and freshwater species are totemic for the Top End Aboriginal people featuring in many of their art, craft and stories. Aboriginal subsistence fishing continues to form an important part of their culture as well as a source of protein. A major concern of coastal Northern Territory Aboriginal people is a perceived depletion of subsistence fishing stock through commercial fishing.

Provision has been made, under section 53 of the Fisheries Act that:

"Unless and to the extent to which it is expressed to do so, but without derogating from any other law in force in the Territory, nothing in a provision of this Act or an instrument of a judicial or administrative character made under it shall limit the right of Aboriginals who have traditionally used the resources of an area of land or water in a traditional manner from continuing to use those resources in that area in that manner."

#### Aboriginal Fisheries Consultative Committees

In the 1995/96, the Northern Territory Government endorsed funding towards the establishment of several regional consultative committees with coastal Aboriginal people (and their respective Land Councils as advisers), Northern Territory Seafood Council and the Northern Territory Government. Since then the Amateur Fishermen's Association of the Northern Territory (AFANT) have been permanently invited to attend meetings, with a representative on the majority of these regional committees. These committees were established because the Northern Territory Government acknowledges Aboriginal people as a major user group who have a keen interest in the well being of the fisheries resource. One of the successful functions of the committees has been to provide an understanding to members on scientific fisheries management methods based on sustainable development. Fisheries have also gained some valuable historical and cultural knowledge from the Aboriginal members.

There are currently seven Aboriginal Fisheries Consultative Committees, which are scheduled to meet at least twice per year. The Beagle Gulf Fisheries Committee (BGFC) was formally established in April 1999 and covers the Darwin Harbour region. Some of the key issues discussed at these meetings include the involvement of Aboriginal people in Fisheries Enforcement and the wasted by-catch from commercial barramundi fishers. Fisheries Division recently worked with Territory Health Services on a shellfish study of the Darwin Harbour region. This came about when concerns were raised by BGFC members regarding sewerage effluent release and reports from Aboriginal people in the

area about illness after eating shellfish and other marine species. Results of the study are not yet complete.

#### Amateur Fishermen's Association of the Northern Territory (AFANT)

AFANT was formed in 1980 by a group of keen anglers who wanted a body to represent their interests to the government of the day. Incorporated in 1980 the organisation is now fully recognised by the government as the peak body representing all angling interests in the Northern Territory. AFANT's mission is to represent the interests of recreational fishing in the Northern Territory and ensure the quality of their sport. DBIRD Fisheries Group works very closely with AFANT to achieve those goals.

#### Australian National Water Quality Guidelines

Guidelines for Recreational Water Quality and Aesthetics are currently being prepared for Australian waters. Until these Guidelines are revised and endorsed, managers should apply the guidelines from the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC 2000). Water quality guidelines are used in the monitoring and management of a range of microbiological, physical and chemical characteristics that determine the suitability of a water resource for recreational purposes.

Recreational guidelines accommodate two categories of recreation:

- primary contact recreation - sports in which the user comes into frequent direct contact with water, either as part of the activity or accidentally; for example, swimming or surfing;
- secondary contact recreation - sports that generally have less-frequent body contact with the water; for example, boating or fishing.

#### Darwin City Council Recreation Strategy 2001-2004

The 3 year recreation strategy provides the Darwin City Council with a strategic plan for the provision, maintenance and development of recreation services and facilities within the Darwin community through identified procedures and resource allocation.

It includes action such as:

- Maintain an inventory, condition rating and forward plans of all infrastructure within the parks, gardens and foreshores;
- Identify infrastructure needed at these venues to facilitate non-structured activities;
- Annual budget consideration for the provision and maintenance of infrastructure as identified;
- Implementation of the Council's Cycleway Strategy from 2001 to 2005;
- Day to day management of grounds and infrastructure;
- Work with other organisations to promote the benefits of physical activity using passive recreation facilities;
- Implementation of the East Point Reserve Plan of Management and Bicentennial Park master plan recommendations regarding recreation;
- Develop a masterplan for the future recreational use of Parap and Casuarina Pools;
- Adopt and implement the 5 year Sporting Areas Management Program;
- Maintain current Fun in the Parks School Holiday Program;
- Continue to allocate appropriate funding for the FREEPS program in future years;
- Council to allocate appropriate funding to support approved recreational events as necessary;

- Council to liaise with Northern Territory Government over development of facilities in the Darwin area.

#### DBIRD Fisheries Group

The aquatic resources of the Northern Territory and their fisheries are managed by the Aquatic Resource Management Branch of the DBIRD Fisheries Group. In general fisheries are managed on a species or species group basis across the whole of the Northern Territory and the aquatic resources of Darwin Harbour are not subject to separate management in most instances. However, in recognition of the requirements for recreational fishing most commercial fishing has been excluded from the harbour for the past 10 years.

Aquatic resources in the Northern Territory are managed in accordance with the *Fisheries Act 1988* and the *Fisheries Regulations*.

The management objectives for Northern Territory Fisheries as outlined in the *NT Fisheries Act 1988* are to "conserve, enhance, protect, utilise, and manage the fish and aquatic life resources of the Territory to:

- (a) Promote, develop and maintain commercial and amateur fishing;
- (b) Provide for optimum yields from a fishery and maintain the quality of the yield;
- (c) Ensure that the fisheries of the Territory are not endangered or overexploited;
- (d) Encourage tourist and scientific interest in fish and aquatic life; and/or
- (e) Ensure that the habitats of fish or aquatic life and the general environment is not detrimentally affected".

These objectives for the management of all Northern Territory Fisheries are strategically assessed through the annual Northern Australian Fisheries Management Workshop (NAFMW). Membership to the workshop includes State, Territory and Commonwealth Fisheries managers, researchers and compliance staff. The workshop is undertaken annually to assess the status of northern Australian fisheries and to measure the effectiveness of the management arrangements.

The Northern Territory is a signatory to the National Strategy on Ecologically Sustainable Development (ESD).

Within Darwin Harbour DBIRD Fisheries Group is also responsible for two specific Aquatic Life Reserves:

- East Point Aquatic Life Reserve - Recreational fishing is permitted but only with rod and handline and attachments or handline and attachments. Only fish are allowed to be taken and must be greater than 30 cm in length. This reserve was created primarily to protect sponge habitats in the area.
- Doctor's Gully Aquatic Life Reserve - This is a gazetted area and people are not to take fish or aquatic life; injure or destroy fish or aquatic life; or have possession or control of fish or aquatic life. This reserve was created to protect the fish that feed at the Aquascene fish feeding tourist attraction.

Information for the management of aquatic resources is provided by the Aquatic Resource Research Branch of the DBIRD Fisheries Group. Historically, research effort

has focussed largely on the species of major commercial and recreational importance such as barramundi, mud crabs, Spanish mackerel, snappers (inshore and offshore) and sharks. Again most of the research has not been directed at the aquatic resources of Darwin Harbour. A notable exception has been work on nursery habitat requirements for barramundi that was conducted in the wetlands adjacent to Shoal Bay in the late 1970s and 1980s. Fisheries Group has also supported a project examining the significance of mangroves to fish populations at several locations in Darwin Harbour.

Strategic direction for future aquatic resource research in the NT is provided in the "Northern Territory Strategic Plan for Fisheries Research and Development 2002-2006". This plan was created in consultation with recreational and commercial industry stakeholders, through the Northern Territory Fisheries Research Advisory Board (NT FRAB), and was funded by Fisheries Research and Development Corporation. The function of this revised Plan is to ensure that, within the resources available in the NT for fisheries research and development, the biological and technical advice needed for managing and conserving its fisheries is optimised.

#### DIPE Marine Safety branch

The Marine Safety Branch of the Department of Infrastructure, Planning and Environment is responsible for a range of marine matters in the Northern Territory. These include: Marine Safety through the Marine Act (including Commercial and Recreational Boating Safety); Marine Pollution through the Marine Pollution Act and other services including plan and design approval for new vessels, and planning and sponsorship of marine facilities.

Commercial vessels are required to meet prescribed safety standards in accordance with the Uniform Shipping Laws Code (USL Code).

Pleasure craft do not require registration and operators are not required to hold a licence to drive a pleasure craft. However, minimum requirements for safety equipment have been determined for most pleasure craft.

The purpose of the Marine Pollution Act, which commenced in June 2003 and gives effect to MARPOL (International Convention for the Prevention of Pollution from Ships 1973/78), is to protect the marine and coastal environment by minimising intentional and negligent discharges of ship sourced pollutants into coastal waters. The Act applies to commercial and recreational vessels.

#### Education Strategy for DBIRD Fisheries Group

This strategy provides a framework for producing educational packages to suit Fisheries Division stakeholders and target audiences. It aims to promote greater awareness of Northern Territory's aquatic resources, the role fisheries research and management plays in resource protection and optimal sustainable utilisation of fisheries resources, management arrangements governing the use of these resources and stakeholder responsibility when utilising shared aquatic resources.

For the purpose of a Fisheries Education Strategy, eight target groups and methods of addressing these groups have been identified: Primary and Secondary School Students; Recreational Fishers; Indigenous Anglers; Fishing Tour Operators; Professional Fishers; Recreational Divers; Aquarium Owners; and Visiting Vessel Owners.

### Northern Territory Police Marine and Fisheries Enforcement Unit

Since 1980 the Northern Territory Police Marine and Fisheries Enforcement Unit has enforced the Fisheries Act, Regulations and management plans. Police enforce amateur and commercial fishing laws; marine safety regulations; and Territory and Commonwealth legislation covering the fishing industry. This is done with sea, inland waterways, land patrols and air patrols.

### NT Fisheries Management Strategies

A series of management strategies have been developed for target fisheries species. These include Barramundi, Mud Crab and Spanish Mackerel amongst many others.

### NT Planning Scheme

A review of the NT Planning Scheme is currently underway. The revised NT Planning Scheme highlights the importance of recreational use of the region through the following mechanisms:

- Planning Principles for the NT recognise the need to support "the diverse lifestyle and the social, cultural and economic development of the Territory" and promote "recreational and cultural opportunities";
- Planning Principles of the Darwin Region "provide as far as possible for continuous public access along and to the foreshore from public open space and road reserves"
- Organised Recreation zones (to provide areas for organised recreational activities) and Public Open Space zones (to provide areas for recreational activity) are found across the Darwin Harbour region;
- Conservation zones (to protect and preserve the flora, fauna and character of natural areas) and Heritage zones (to conserve or enhance those elements that contribute to the significance of a heritage place) are found across the Darwin Harbour region. These zones may also provide opportunity for environmentally sensitive recreation.
- Performance criteria state that Residential subdivisions should "retain and protect natural drainage lines and any distinctive landform features or stands of natural vegetation and incorporate them in public open space; provide a minimum of 10% of the subdivision area as public open space which ensures the majority of dwellings are within 400m walking distance of a neighbourhood park with a minimum area of 3200m<sup>2</sup>; incorporates recreational open space in larger units available for active leisure pursuits; is unencumbered by drains and has sufficient flat area for informal recreation; and is designed and located to allow passive surveillance and provide a safe environment for users."

The revised NT Planning Scheme highlights the importance of aesthetic values of the region through the following mechanisms:

1. Planning Principles for the NT recognise the need to promote "urban/ building design which is climatically appropriate, energy efficient and contributes to the existing and future character and appearance of an area;"
2. Performance criteria are also in place to ensure that:

For General development:

- "the height of buildings does not impinge on the amenity of adjoining properties";
- "buildings achieve a city form with the highest buildings and structures concentrated at the centre of the peninsula, stepping down towards the perimeter optimising opportunities for harbour views" in Central Darwin;

- "landscaping undertaken on a site complements and enhances the streetscape and contributes to the creation of a pleasant and attractive environment. For the purpose of this clause, landscaping may include paved areas for pedestrian traffic, entertainment and recreation facilities."

For Industrial development:

- "that an adequate level of visual amenity is provided and maintained within industrial zones".
- "that minimum frontage setback should be landscaped with lawn, gardens, shrubs or trees, be continuously maintained and not used for any other purpose except for appropriate access driveways or footpaths."

For Subdivisions:

- Subdivision design should: "retain and protect significant natural and cultural features including views" and "retain and protect natural drainage lines and any distinctive landform features or stands of natural vegetation and incorporate them in public open space (residential)".

#### Palmerston City Council Management Plan 2002/2003

The Palmerston City Council Management Plan sets strategic direction and provides a focus for the long-term direction of Council. One of the principal functions of the council is recreational and related cultural services. The following actions are identified under this function:

- To coordinate and support sport and recreation providers in Palmerston and its region.
- To promote sport and recreation in Palmerston.
- To provide and facilitate new recreation service and development options within Palmerston based on assessment of community needs and aspirations.
- To work with key NT Government and community representatives to ensure establishment of a new and versatile multi-purpose recreation and community centre.
- To maintain, develop and facilitate sporting and recreation facilities or options.
- Ensure developed parks and landscaped open areas are accessible to residents and provide an affordable, healthy and safe environment for the amenity and leisure needs of the community.
- To approve residential subdivision development applications for landscaped areas to standards and guidelines adopted by Council.
- Ensure parks and open space and associated facilities are presented and maintained in accordance with best practice.
- Initiate action plans to upgrade sub standard landscaped areas and associated facilities including playground equipment, barbeques, public toilets, boat ramps etc.
- Upgrade existing parks.
- Audit of parks and equipment annually.
- To provide and maintain a bicycle and footpath network within parks and reserves.

The following actions are identified under this plan for improving aesthetic values:

- To undertake landscaping in verges, median and roundabouts.
- To enhance the visual amenity and enjoyment of public places in the City Centre.

### Parks and Wildlife Service Plans of Management

The Parks and Wildlife Service is responsible for planning and developing the Territory's system of land and marine protected areas. The Service manages over 90 parks and reserves for conservation and nature-based recreation and tourism in the Northern Territory. As a requirement of the Territory Parks and Wildlife Conservation Act, the Service prepares Plans of Management for its protected areas. These plans provide direction for the development and day to day management of parks and reserves for up to ten years. They define the purpose and objectives for the park, identify values and current issues and present management strategies. The Parks and Wildlife Service is responsible for maintaining and upgrading the facilities at these parks and recreational areas in order to enhance recreational opportunity.

In the Darwin Harbour region, there are several parks managed through Parks and Wildlife, including Casuarina Coastal Reserve, Holmes Jungle Nature Park, Howard Springs Nature Park, George Brown Darwin Botanic Gardens, and Charles Darwin National Park.

### Strategic Plan for Fisheries Research and Development

The intent of this plan is to ensure that the biological and technical advice needed for managing and conserving the Territory's fisheries is optimised. Principal outcomes for management include sustainable harvesting, conservation of aquatic biodiversity, optimum utilisation of fish and aquatic resources, growth of the aquaculture industry, control of aquatic pests and development of appropriate approaches for development of regional and remote communities.

### Top End Regional Organisation of Councils Policy on the Protection of Darwin Harbour and its Coastline

The Top End Regional Organisation of Councils (TOPROC) includes the Councils of Cox Peninsula, Coomalie, Litchfield Darwin and Palmerston. TOPROC has developed a "Policy on the Protection of Darwin Harbour and its Coastline". This policy states that:

- TOPROC requests the Northern Territory Government gives consideration to the establishment of a linear coastal reserve system around the harbour to protect the natural values of the harbour and provide for public access to the coastline. (Charles Darwin National Park, Darwin's Bicentennial Park and East Point Reserve could be a start to establishing this coastal reserve system.)
- TOPROC seeks to maintain and enhance public access to and recreational use of the coastline, Darwin Harbour and its inland waterways.
- TOPROC supports the protection of the natural character of the coastal environment and the recognition of the intrinsic values of the coastal and harbour ecosystems.
- TOPROC supports the maintenance and enhancement of the amenity values of the Darwin Harbour and coastline.
- TOPROC supports the following principles:
  - Maintenance and enhancement of public access to views and vistas of the harbour.
  - Development of urban areas to work with the natural topography (eg. Darwin Peninsula, mangroves) and to have a gradual transition of building heights from urban core areas to the coastal edge.
  - Development to take advantage of the tropical climate with the use of shade and shelter and appropriate landscaping.

## **Monitoring**

### DBIRD Fisheries Group monitoring programs

Fisheries Group undertakes various monitoring programs including:

- Collection and analysis of broad-scale data for recreational and subsistence fishing as part of 5-yearly, territory-wide telephone/diary surveys.
- Collection and analysis of commercial fishing data through compulsory daily or monthly logbooks.
- Collection and analysis of Fishing Tour Operator data through compulsory daily logbooks.
- Research monitoring of commercial fishing operations in the field; recording details of fishing operations and sizes etc of fish caught.
- Monitoring the status of key exploited species through analysis of available information on biology, catch, fishing effort, fishery dynamics, and population dynamics etc.
- Investigation of fish kill events as they occur in collaboration with other government agencies.

## GOAL 3

### Management

#### Agricultural and Veterinary Chemicals (Control of Use) Bill

The Northern Territory Government is introducing an Agricultural and Veterinary Chemicals (Control of Use) Bill to provide a contemporary framework that will help to reduce the need for pesticides. A discussion draft of the Agricultural and Veterinary Chemicals (Control of Use) Bill is available. The purposes of this proposed Act are:

- 1) (a) to impose controls in relation to the possession, sale, use and application of chemical products, and the manufacture, sale and use of fertilisers and stock foods, that ensure sustainable agriculture by protecting -
  - (i) the health of the general public and the users of those substances;
  - (ii) the environment;
  - (iii) the health and welfare of animals; and
  - (iv) domestic and export trade in agricultural produce and(b) to promote the harmonisation of legislation in Australia controlling the use of chemical products by regulating the possession and use of those products in accordance with labels and permits under the Agvet Code.
- 2) the controls referred to in subsection (1)(a) include but are not limited to the following:
  - (a) the prohibition and regulation of the possession and use of chemical products, including the prescription and supply of chemical products by veterinarians and pharmacists;
  - (b) the regulation of ground and aerial spraying and the use of Schedule 7 chemical products;
  - (c) the declaration of chemical control areas and agricultural emergencies;
  - (d) the management of land and agricultural produce contaminated by chemicals.

Essentially, the Bill provides directions on how chemicals can be used and requires competencies for users of high risk chemicals.

#### Chemical usage and pest management in the horticulture industry

Market forces are driving significant advances in the adoption of quality assurance schemes amongst commercial horticulturists.

- Yearly random audits apply to chemical residue tests for fruit and chemical and biological tests for groundwater. Detailed record keeping is required throughout the supply chain to allow traceback from market to grower. One such quality scheme is Freshcare and 300 growers are now independently accredited or provisionally accredited.
- The Northern Territory University provides Chemcert training that includes risk analysis, correct use of chemicals, storage, and disposal of old containers.
- The Interstate Certification Assurance (ICA) scheme allows accredited businesses access to Tasmanian, Victorian, South Australian and Western Australian markets that impose quarantine conditions for fruit that are susceptible to fruit fly. The scheme has led to the improved application of chemicals and the use of softer, target specific chemicals (eg baits rather than preharvest cover sprays on mangoes). About 600 ICA arrangements are in place and the majority are in Darwin Harbour

catchment. Some 500 audits occur per year - twice per year for those businesses that operate for more than 6 months (eg bananas) and once per year in season for businesses that operate for less than 6 months (eg mangoes).

- Industry is increasingly adopting Integrated Pest Management (IPM) and codes of practice to help to reduce chemical use, both in volume and spectrum and to manage that use more efficiently and responsibly.

#### Department of Defence Environmental Policy

As one of Australia's largest land and property owners, the Department of Defence is responsible for sustaining natural, indigenous and historic heritage sites within their land. To facilitate this role, Defence has established an Environment and Heritage section. The vision of this section is as follows: 'Defence will be a leader in sustainable environmental management to support the ADF's capability to defend Australia and its national interests'.

The Department of Defence Environmental Policy has six key strategic objectives:

- Establishing an innovative Environmental Management System (EMS) which supports ADF capability, promotes environmental sustainability and achieves the Government's broader environmental objectives;
- Creating a culture in which sustainable environmental management is considered an integral element of capability development, equipment acquisition and through life support, including operational application;
- Establishing clear lines of accountability for environmental outcomes;
- Developing effective processes for education and training in support of the creation of an environmentally aware culture;
- Measuring and reporting environmental performance as a part of a process of continuous improvement; and
- Creating a climate of transparency and strategic partnerships with key environmental stakeholders.

#### Economic Development Strategy - "Building a Better Territory"

The Northern Territory's Economic Development Strategy, 'Building a Better Territory', is based on building successful core business, while encouraging emergent industries and positioning the NT to take advantage of new economies and job opportunities for the future. Five theme outcome areas provide strategic direction that includes sustainable regional development. These outcome areas focus on:

- Core industries;
- Economic drivers;
- Emerging industries;
- Regional initiatives;
- Economic support.

The priority theme area of Economic Support includes a number of strategic approaches for our 'Natural Resources and Environment'. These strategic approaches have been developed to achieve the vision of managing natural resources and protecting the environment for future generations. Strategic approaches for Natural Resources and Environment include:

- Ensure that developments are undertaken with minimal environmental impact;
- Maximise the sustainable use of our land and water resources;

- Retain and protect biodiversity;
- Provide a transparent legislative framework for environmental protection and heritage conservation;
- Provide an integrated information management environment to support effective management and use of natural resources and the environment by industry, government and community.

One of the actions of the strategy is the development of a Plan of Management for Darwin Harbour.

#### Environmental Management Plans

Under various legislation (Environmental Assessment Act; Waste Management and Pollution Control Act; Planning Act); Environmental Management Plans may be prepared to ensure the constructional and operational phases of projects are managed in an environmentally sound manner. These plans may be developed to gain approval for development and practices and may address the conditions placed upon approvals for certain developments or practices. Under the Plans, potential impacts to the environment are addressed and/or mitigated through management measures. Monitoring programs to assess impacts also form a component of an Environmental Management Plan.

#### Howard Region Water Resource Strategy (in preparation)

The Northern Territory Government has agreed to National Principles for the Provision of Water for Aquatic Ecosystems, and also to the implementation of comprehensive water allocation and entitlement systems. Water Resource Strategies incorporate Water Allocation Plans to guide the allocation of water for drinking, irrigation, aquaculture, industry, recreation and to ensure the sustainability of ecosystems. These plans also take into account future social, economic and environmental needs for the water.

A management strategy is currently being developed for the Howard Region and will form the basis for the allocation planning of regional water resources. The strategy will incorporate current understanding of the regional aquifer systems and the current level of use. The result will be an allocation framework that will be a tool for future planning and the sustainable development of the region.

Additional Water Resource Strategies will need to be developed in the future to cover the Cox Peninsula, the Blackmore River and Elizabeth River regions. These will be developed in consultation with the community and progressively implemented.

#### Identification of horticultural areas

Land use should be in accordance with assessed capability of resources. Effectively, three criteria apply in sequence to define areas suitable for horticulture:

- First, areas of remnant vegetation and of significance for the conservation of biodiversity should be defined clearly and retained by exclusion from development subdivisions.
- Secondly, horticulture in the catchment requires irrigation. Hence the distribution and availability of groundwater is the next determinant/limitation for horticulture. Based on available information, DBIRD supports the retention of 80% water

resources for the environment and the allocation of 20% for other uses. Thus, horticulture needs to occur where it can access groundwater or surface water economically.

- Thirdly, land with a suitable assessed capability determines the extent and distribution of areas suitable for horticulture and agriculture. The limited, discrete areas so defined on the basis of natural characteristics should be designated (as in the Litchfield and Coomalie Land Use Concept Plans) and retained.

Other land users in the catchment should recognise horticultural areas and understand the implications of this land use for adjoining areas. Similarly, horticultural producers must recognise that they do not operate in total isolation from others. This is occurring in the commercial horticultural sector. Adequate buffers between different types of land use help to avoid or overcome near neighbour issues.

#### Indigenous Economic Forum - "Seizing our Economic Future"

The Seizing our Economic Future forums are designed to focus on achieving realistic outcomes in economic development for Indigenous Territorians. The first consideration of the forums is to promote the vision of creating "equitable opportunity for Indigenous Territorians to participate in economic growth". The first Seizing our Economic Future Forum was held in Alice Springs on 6-7 March 2003. The principal objectives that have since been identified as key strategies for indigenous economic development are:

- the promotion of Indigenous capacity to participate in, and initiate, economic development;
- enabling Indigenous rights to, and management of, land and resources to advance their economic well being;
- the maximisation of opportunities for sustainable employment;
- the identification and exploitation of opportunities for Indigenous economic development through existing and emerging industries where there is clear comparative advantage; and
- support to the development of indigenous business enterprises.

#### Mining Management Plans (MMP's)

MMP's are required under the Mining Management Act to accompany all applications for authorisation to conduct mining activities. The Mining Management Act requires that MMP's address occupational health, safety and environmental management. Particular issues pertaining to site environmental management, which are required to be addressed, include; water, weed and top layer management, site stability and rehabilitation.

All MMPs undergo a preliminary environmental assessment to determine if the proposal warrants referral to the DIPE for assessment under the Environmental Assessment Act. If DIPE determines that the project has the potential for significant environmental impact, a formal public assessment process is initiated. If the project does not require formal assessment under the Act, the MMP is assessed internally by DBIRD.

Assessment of the MMP takes into consideration stakeholders concerns and may require the requesting additional information. If the MMP is considered acceptable, an Authorisation may be granted and mining activities can then commence.

### NTCCI Best Practice Management Guidelines and Codes of Practice

The NTCCI currently provide a range of practical guidance material for business and industry of the Northern Territory. Information has been developed to assist industry in meeting their legislative and environmental obligations, with particular focus on environmental best practice. Some of the materials include:

- Environmental Codes of Practice
- Trade Waste fact sheets and guidance material
- Waste management guidelines and Waste Exchange
- Energy Efficiency guidelines and information

Voluntary Codes of Practice have been developed by the NTCCI with the intention of providing practical guidance to businesses that wish to reduce their impact on the environment. The Codes of Practice aim to educate and motivate business and industry to become leaders in sustainability by reducing their greenhouse emissions, reducing the amount of waste going to landfill, choosing environmentally preferred goods and services and educating their staff and customers on environmental best practice.

Codes of Practice have been drafted for the following industries:

- Automotive Repairs Industry
- Spray Painting and Surface Coating Industries
- Service Station Operations
- NT Hotels Industry
- NT Mango Industry

Additional support is provided by a range of informative local case studies with the application of eco-efficiency or 'doing more with less' featured. The NTCCI continue to actively promote guidelines and relevant NT-based and national environmental management initiatives to the business community to encourage sound environmental management practices.

### NT Planning Scheme

A review of the NT Planning Scheme is currently underway. The revised NT Planning Scheme incorporates Planning Principles, Zoning Maps and Performance Criteria. Zoning maps identify the existence of concepts and the zoning tables identify particular development provisions relevant to a particular use.

Planning Principles for the NT are as follows:

- Contribute to a built, rural and natural environment supporting the diverse lifestyle and the social, cultural and economic development of the Territory promoting: housing choice; public infrastructure including a coordinated, integrated and efficient transport network; recreational and cultural opportunities; and commercial, primary production and industrial diversity servicing community needs and export potential;
- Contribute to the sustainable use and development of land and water resources so that the use and development of land is consistent with the principles of sustainable development and avoids or minimises the degradation of the environment or the pollution or over commitment of water resources;

- Facilitate the supply of sufficient land for residential, commercial, industrial, recreational, primary production, institutional and other public uses so that the subdivision of land is cost effective, equitable and timely and maximises the value of public and private investment in infrastructure;
- Ensure development does not unreasonably intrude on or compromise the privacy of adjoining residential uses and ensures its own amenity is not prejudiced in the future;
- Assist in the conservation of areas and sites of environmental, cultural or heritage value as identified by government;
- Facilitate the sustainable use of land for primary production so that land particularly suited to agriculture, horticulture and other primary production activities, by reason of the nature of the soils, proximity of adequate water supplies or for other reasons, will be preserved for those activities within the context of competing land uses;
- Facilitate the further development of the tourist industry capitalising on the territory's aesthetic, natural and cultural heritage;
- Consider flood and storm surge levels to minimise risk to life and property associated with floods and cyclones; and
- Value unimproved land for its inherent ecosystem functions in protecting native flora, fauna, soil and water resources.

#### Planning Principles for the Darwin Region:

- Provide for orderly and appropriate expansion of urban development around Darwin Harbour catering for a growing population consistent with the Darwin Regional Land Use Framework and any planning concepts in part 8 applicable in the circumstances;
- Provide, as far as possible, for continuous public access along and to the foreshore from public open space and road reserves;
- On Darwin Peninsula, facilitate development of a central, integrated land/ water transport interchange which is capable of expansion to cater for possible future mass transit;
- Affirm the primacy of existing and planned future commercial centres and discourage commercial ribbon development.

Planning of the future uses of the Darwin Harbour region is undertaken through the allocation of zones across areas. These zones are as follows: SD - Single Dwelling Residential; MD - Multiple Dwelling Residential; MR - Medium Density Residential; HR - High Density Residential; CV - Caravan Parks; CL- Community Living; CB - Central Business; C - Commercial; SC - Service Commercial; TC - Tourist Commercial; LI - Light Industry; GI - General Industry; DV - Development; PS - Public Open Space; OR - Organised Recreation; H - Horticulture; A - Agriculture; RR - Rural Residential; RL - Rural Living; R - Rural; CP - Community Purposes; CN - Conservation; HT - Heritage; RD - Restricted Development; WM - Water Management; FD - Future Development; T - Township;

The draft Scheme also incorporates comprehensive Performance Criteria relating to all facets of development and planning concepts relevant to particular localities. While development provisions and concepts are in the main not binding the Development Consent Authority in making determinations of development applications will have regard to them and should not make determinations which are demonstrably inconsistent with them or would frustrate their achievement.

Performance Criteria address the following facets of development:

- **General Performance Criteria:**  
General Height Control; Building Heights in Central Darwin; Plot Ratios; Vehicle Parking and Loading Bays; Loading Bays; Advertising Signs; Demountable Structures; Land in Proximity to Airports; Heritage Places and Development; Sheds; Landscaping; Development of Land Zoned FD; Land Subject to Inundation; Land Reclamation; Dredging within Darwin Harbour.
- **Residential Development Performance Criteria:**  
Residential Density and Height Limitations; Second Dwellings within Zones RL, R, H and A; Building Envelopes; Private Open Space; Communal Open Space; Landscaping for Residential Development; Residential Building Design; Residential Development in Zones C And TC; Associated Residential Uses.
- **Commercial Use and Development Performance Criteria:**  
Commercial Uses; Commercial and Other Development in Zones HR, CV, CB, C, SC, TC,
- **Industrial Use and Development Performance Criteria:**  
Industrial Use; Building Setbacks; Effluent Disposal; Industrial Development on Middle Arm Peninsula.
- **Non Urban Use And Development Performance Criteria:**  
Animal Related Use And Development; Aquaculture in Zone CN; Clearing Of Native Vegetation In Zones H, A, RR, RL, R, CP, CN; Clearing Of Native Vegetation - Performance Criteria; Development of Land in Zone WM; Mining.

#### OEH Environmental Guidelines

The Office of Environment and Heritage is committed to the development of a range of guidelines to guide certain practices to minimise environmental impacts. Guidelines already developed include the Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory and the Guidelines for Reclamation of Coastal Areas.

At present, the Office of Environment and Heritage is involved in the development of two documents related to dredging proposals: NT Dredging and Disposal Guidelines and a Dredging Strategy for Darwin Harbour.

#### Oil Spill Contingency Plan

Australia has a "National Plan" to respond to significant spillage of oil and chemicals in its territorial waters. In a national context, the Australian Maritime Safety Authority (AMSA) manages the Plan, working cooperatively with State/Northern Territory governments; the shipping, oil, chemical and exploration industries; and emergency services and fire brigades to plan for and respond to incidents threatening Australia's natural and human resources.

The Darwin Harbour Oil Spill Contingency Plan identifies priority resources and sites for protection and clean up, should a significant spill occur in Darwin Harbour. The Darwin

Harbour Oil Spill Contingency Plan is implemented by the NT Marine Pollution Management Committee, which has representatives from a number of government and private sector representatives. The Marine Safety Branch of the DIPE is involved in management of the Plan and the plan is implemented directly by the Darwin Port Corporation (DPC) under the control of the Corporation's Harbourmaster.

In the event of an Oil Spill, advice would be provided to DPC by OEH through the Environment and Scientific Coordinator (ESC). Advice may include environmentally sound response and clean-up options (eg use of chemical dispersants to break-up the slick), depending on the volume and type of oil and the habitats oiled or under threat of being oiled.

The primary resource document for the identification of significant sites and resources in the NT is the NT Oil Spill Response Atlas, which includes a substantial amount of data on Darwin Harbour. OEH maintains this Atlas, which complies with National Plan standards and can be integrated with the Oil Spill Trajectory Model (maintained by AMSA) to access predicted movements of an oil slick.

#### Review of Public Consultation in the Planning Process

In March 2003 the review of the Planning Act was announced. A discussion paper was released for public comment as a basis for further consultation, including public forums and discussions with specific interest groups. The discussion paper identifies and discusses a range of issues in relation to the Act. Government will consider all comments received before determining what action if any should be taken.

Among other matters identified in the Discussion Paper, consultation in the planning process has been acknowledged as an area where amendments may be considered. The review will examine possible ways to improve the process so that all stakeholders have further opportunity for input.

The *Planning Act* provides for a mandatory process of public exhibition and consultation for proposals to amend the NT Planning Scheme, for development application and applications for the grant of an exceptional development permit and for draft developer contribution plans prepared by local councils or other service authorities.

In the case both of proposed Planning Scheme amendments and of development applications, this involves notification in a newspaper and where practicable a sign on the land affected and public exhibition of the actual documentation forming the proposal. Proposed Planning Scheme amendments must also be notified in the *Gazette*.

These are mandatory processes and do not preclude the Minister determining a more comprehensive process should it be considered necessary or desirable.

In addition to requirements to notify and exhibit, the Act also provides for hearings of proposed amendments and issues raised in submissions. In the case of an amendment within a council area for which there is a Division of the Consent Authority, hearings by the Development Consent Authority are mandatory.

### Sustainable agriculture development

Sustainable agriculture is the use of farming practices and systems which maintain or enhance:

- the economic viability of agricultural production;
- the natural resource base; and
- other ecosystems which are influenced by agricultural activities.

The Economic Development Strategy requires the Department of Business Industry and Resource Development to:

1. Encourage all stakeholders in primary industries to work in partnership to create a framework of investment certainty for developing the Territory's primary industry potential;
2. Maintain and expand consultative arrangements between government, industry groups and Indigenous bodies to address land and other development issues; and
3. Collaborate with industry to prepare sectoral plans for each primary industry and fisheries sector.

Plans have been produced in consultation with industry for pastoral, buffalo, camel, citrus, nursery, cut flower, banana, mango, Asian vegetables, table grapes, bushfood industries and are guiding the development of industry in each sector.

### Trade Waste Management System and Trade Waste Code

On the 1st January 2002, Power Water Corporation implemented its Trade Waste Management Program. The Trade Waste Management System will provide Power Water Corporation with the framework for accepting, regulating and administering the disposal of trade waste to the sewerage system. The Trade Waste Management System potentially affects any business that discharges waste to the sewer system, including the automotive, hotel and hospitality industries.

The Trade Waste Code is a key document of the Trade Waste Management System and establishes the criteria under which an Approval will be granted to allow the discharge of Trade Waste to Power Water's Sewerage System.

### **Monitoring**

#### Ground water level monitoring

A total of 82 ground water level monitoring sites within the boundary of the Darwin Harbour catchment are monitored regularly by the Department of Infrastructure, Planning and Environment

#### Licence /permit monitoring programs

Water quality monitoring is required under the following licences and permits:

- Waste Discharge Licences under the *Water Act*, for the Power Water Corporation sewage treatment facilities at Larrakeyah, Palmerston, Ludmilla and Leanyer plants (quality of plant effluent and receiving waters);
- Licence to operate Shoal Bay waste disposal facility under the *Waste Management and Pollution Control Act* (Quality of leachate and receiving waters);

- Trade Waste Discharge Permits issued to industries/businesses for discharge of liquid wastes to sewer (quality of effluent to sewer).

The first two are administered by DIPE (OEH and Natural Resource Management) and the latter by Power Water Corporation.

Landfill Operation Licences and Licences for handling listed wastes on a commercial basis are distributed by Office of Environment and Heritage.

#### National Pollutant Inventory

In 2001-2002, 86 facilities reported to the National Pollutant Inventory (NPI) database across the Northern Territory. In Darwin Harbour and surrounding catchments, 69 substances from 46 sources were reported to the NPI. This included reported data from 19 facilities and additional aggregated emission data for 35 sources.

Aggregated data include smaller facilities that are not required to report, and mobile and non-industrial sources. Aggregated data sets were created for 35 sources in the Darwin region including:

- Bushfires;
- Transport -Aeroplanes; Motor vehicles; Recreational boating; Commercial shipping and boating;
- Commerce - Accommodation; Automotive fuel retailing (service stations); Bakeries; Cafes and restaurants; Laundries and dry-cleaners; Lawn mowing (public open spaces); Motor vehicle refinishing (spray painters); Print shops/Graphic Arts; Pubs, taverns and bars; Rifle ranges;
- Industry - Abrasive blasting; Airports; Fuel combustion; Funeral directors and crematoria; Milk and cream processing; Petroleum and coal product manufacturing results; Port operations;
- Households - Lawn mowing; Barbeques; Backyard incinerators; Gaseous fuel burning; Liquid fuel burning; Solid fuel burning;
- Aquaculture;
- Other - Domestic and commercial solvents; Architectural surface coating; Cutback bitumen.

Facilities reporting to the NPI included:

- BP Australia;
- CSR;
- Darwin City Council (Leanyer Waste Disposal Site, Shoal Bay Waste Disposal Site);
- Darwin Galvanising;
- Department of Defence (Robertson Barracks);
- Mobil Oil;
- NT Livestock Exporters;
- Ord River Unit Trust ( Darwin Piggery);
- Power Water Corporation ( Berrimah Power Station, Leanyer/Sanderson waste water stabilisation ponds, Ludmilla Waste Water Treatment Plant, Palmerston Waste Water Stabilisation Ponds);
- Royal Darwin Hospital;
- Shell (Kitchener Terminal, McMinn Terminal, Darwin Refuelling Services).

### Stream flow measurements

In the Darwin Harbour region, stream flow measurements have been recorded at a total of 43 hydrographic sites. Seven of these sites are currently equipped with time series data loggers which provide a continuous record of water level (and indirectly, flow) measurements over a period of time.

## **Research**

### Groundwater modelling of the Howard River Catchment

Groundwater modelling is currently being undertaken by the Water Resources and Hydrographic Branches of the Natural Systems Division of the DIPE. The results will give better understanding of the regional aquifer system dynamics. The model will also be an important tool for future strategic management and water allocation planning.

## **Other activities**

### Activities to enhance economic competitiveness

Other activities that will enhance the economic competitiveness of Darwin Harbour region include:

- Specific regional infrastructure developments (such as the new railway and port) servicing the demands of a wide range of businesses both inside and outside the region;
- Major regional development projects effectively linking with both upstream and downstream local industries;
- Regional land use planning that allocates land resources efficiently and provides security of property rights;
- Resource definition and clear access arrangements for the resource based industries (such as aquaculture, agriculture and mineral extraction);
- Population growth (through lifestyle and job attractions) that will lead to increased demand for dwelling and a wide range of consumer goods and services.

## GOAL 4

### Management

#### Draft Management Plan for Shell Middens

In 1996, Gregory prepared a draft management plan for shell middens in Darwin Harbour. Research to date (Burns and Gregory) has shown that in excess of 80% of archaeological sites in the Harbour environs are shell middens. These sites are significant at a general level because of their capacity to inform about the changing habitats of Darwin Harbour during the Holocene as well as test propositions about the nature of human behaviours in the region.

Gregory (1996) made a number of recommendations:

- Future land use concept and structure plans should identify and address cultural heritage issues;
- The incorporation of sites suitable for community awareness and education purposes into the regional parks and conservation area plans, with appropriate protection measures and documentation;
- The identification and documentation of those sites in need of protection;
- Conservation of sites with a high level of significance;
- Where practicable, support research concerning the archaeology of the Darwin region;
- Develop a management strategy that deals with the all heritage sites in the Darwin region.

#### Heritage Advisory Council Statements of Significance and Conservation Statements

The Heritage Advisory Council (HAC) has prepared a statement of significance for all declared heritage places and objects including those within Darwin Harbour. In addition, the HAC has established conservation statements for each of these sites. These statements establish the requirements for conserving the key elements of the significance of each place. There is no overarching plan for conservation of declared heritage places generally.

#### Heritage Conservation Act 1991

Prescribed archaeological places and objects are subject to 'blanket protection' under the *Heritage Conservation Act 1991* - that is they are protected whether they have been recorded or not. Ministerial consent is required prior to undertaking any works on such places/objects, including collection, excavation, damage, disturbance, destruction etc. Such places and objects may include Aboriginal or Macassan sites such as stone artefact scatters, shell middens and mounds, stone and ochre quarries, and rock art (paintings and engravings).

Declared heritage places and objects are those that are listed on the NT Heritage Register. Such places/objects have been declared by the Minister to be heritage places/objects after a formal assessment process undertaken by the Heritage Advisory Council. This process is specified within the Act and includes provision for public comment, and consultation and conflict resolution with owners/lessees of places/objects proposed for declaration. Declared heritage places/objects are protected under the Act and Ministerial consent is required prior to undertaking any works to such places/objects. These places/objects may include shipwrecks, historic buildings, World War II sites or reefs.

The Act does not however provide any power to require an action to be taken to prevent damage or destruction of a site identified as protected. Rather, it merely offers penalty provisions for contravention. As a result most management regimes are implemented in response to formal applications to undertake development on or near the harbour. These applications are assessed for their environmental impact at the Notice of Intent, Public Environmental Report or Environmental Impact Statement which separately require an assessment of the likely impact of any given development on (*inter alia*) cultural resources. This reactive strategy has nonetheless been reasonably effective in ensuring the conservation of sites, or at the least the mitigation of damage to those identified as having a high level of significance.

#### NT Aboriginal Sacred Sites Act

This Act is Northern Territory legislation pursuant to special powers given to the Territory under Commonwealth legislation to protect sacred sites in the Northern Territory.

The broad purpose of the Sacred Sites Act is to:

*...effect a practical balance between the recognised need to preserve and enhance Aboriginal cultural tradition in relation to certain land in the Territory and the aspirations of the Aboriginal and all other peoples of the Territory for their economic, cultural and social advancement,...*

The Act establishes the Aboriginal Areas Protection Authority as a prescribed statutory corporation which is charged with legislative responsibility for creating a register of aboriginal sacred sites, conducting consultations with aboriginal custodians, issuing permission for works, making registers available for the public and prosecution.

Under the Act, the accommodation between sacred site protection and land use is achieved mainly by sacred site avoidance under Authority Certificate process.

People proposing to use or work on land may apply to the Authority for an Authority Certificate to cover their proposed activities. The Authority will respond to an application by consulting the relevant Aboriginal custodians within 60 days to ascertain whether a Certificate can be issued and any conditions needed to protect any sacred sites that might be affected by the proposed works.

Legally, an Authority Certificate provides a defence against possible prosecution in relation to the works or uses covered by the Certificate as long any conditions imposed to protect sacred sites are followed. Also, the process can offer the opportunity for

applicants to meet with custodians to reach a mutually acceptable resolution of any sacred site issues, so that the end result reflects the agreement of the people directly involved.

### Register of Sacred Sites

The Register of Sacred Sites and the Register of Authority Certificates are two Registers held by the Authority under the Act. All sacred sites in the Territory are protected by the Act, regardless of whether they are registered. The legal effect of a site being placed on the Register of Sacred Sites is that Magistrates and Judges accept this as *prima facie* evidence that the site is a sacred site.

During Registration, the significance of the site is thoroughly documented including the location and extent of the site, its traditional significance, the identity of the custodians and any restrictions applying to the traditional information.

Also, the landowners are invited to comment on any problems they may have arising from the site being on their land.

When the Authority is satisfied, having reviewed and considered this information, that the site is a sacred site the public information is placed on the Register of Sacred Sites.

### **Monitoring**

#### Surveys for archaeological sites

In 1995 Burns undertook a systematic survey for archaeological sites in the Darwin Catchment Region on behalf of the (then) Department of Lands, Planning and Environment. This survey was structured to examine the distribution of archaeological sites with reference to land units. During 1995, through both this survey and others 113 previously unrecorded archaeological sites were located. While many of these were located in the Hope Inlet area in combination with those located in and around the harbour, a predictive model was developed for sites in the region.

Burns predictive model stated that 1) a large number of unrecorded sites remain within the region, 2) middens will constitute the most common site type, 3) middens will be less than 300 metres from mangroves and 4) sites location generally will be concentrated on land unit boundaries.

Since Burns research, the major surveys for archaeological sites have been conducted as part of impact assessments for development projects. Notable amongst these has been the Wickham Point LNG project which has located a suite of previously unrecorded middens. The nature and distribution of these sites is highly consistent with the Burns predictive model.

## GOAL 5

### **Management and monitoring**

#### Charles Darwin University Symposia

A series of symposia has recently been held in the Northern Territory at the Charles Darwin University. These forums have provided the community with a valuable opportunity to discuss issues, reflect on successes and failures and identify future opportunities and threats for Australia's Northern Territory. The aim of the series is to:

- Build on the NT Economic summit of 2001 to bring the best available information to bear on policy issues;
- Establish mutually influencing dialogue between the research, business and policy communities;
- Encourage vigorous, provocative and contemporary intellectual debate; and
- Provide analysis for advancing and improving the social and economic benefits, services and programs for the community.

Each symposia presents the work and ideas of a diverse range of international, national and Northern Territory-based researchers, public figures, government leaders and service providers. The forums enable all those interested or involved in research, policy or providing services to northern Australians, to be actively involved in the Northern Territory's future.

#### Conservation Volunteers Australia

Conservation Volunteers Australia (CVA) is a national, not for profit, community organisation and is Australia's largest practical conservation volunteer organisation. CVA works with many like-minded organisations, offering support with a dedicated labour force to assist with practical conservation work. Included in these working partnerships are Landcare groups, local councils, the pastoral and mining industries and governments. Many of the NT Landcare groups have benefited from CVA teams that have assisted in erosion, salinity control, weed control and habitat restoration programs.

#### Darwin City Council public education program

The document entitled the 'Action Plan of the 18<sup>th</sup> Council 2000-2004' outlines six focus areas to work towards achieving the Darwin City Council's (DCC) key goals. The DCC has established goals in the areas of governance, economy, corporate, infrastructure, environment and community.

Community participation and education is an integral part of an open and accountable city council under the governance goal of the council. The DCC acknowledges the need to provide community with the opportunity to contribute to the councils decision making process. To achieve this, the council is currently formulating a community consultation plan.

The DCC also supports community groups through the provision of grants and a range of community events, programs and information aimed at public awareness.

#### Darwin Harbour Advisory Committee public consultation program

The Darwin Harbour Advisory Committee is committed to enhancing public awareness of the Darwin Harbour region and community engagement in management. In 2003, the advisory committee sought to enhance public awareness and obtain community input into the Plan of Management in the following ways:

- A website was developed and regularly updated, which contained information on the Darwin Harbour region as well as information pertaining to the Plan of Management;
- Regular newsletters and other informative material was disseminated to interested stakeholders and general public;
- Several consultation events were undertaken to provide opportunity for public involvement and participation in the development of the Darwin Harbour Regional Plan of Management. Outcomes of these events were summarised in reports which were disseminated and made available on the committee's website;
- Three public presentations and three workshops entitled 'Current Knowledge and Future Needs' were undertaken in February 2003 as part of the wider consultation and awareness campaign for the Plan's development. These presentations examined what we know about Darwin Harbour and its catchment, its natural resources, values and uses, in addition to identifying gaps in our knowledge. Proceedings of public presentations and workshops were published and made publicly available via the committee's website.

#### Environment Centre of the Northern Territory public education program

The Environment Centre of the Northern Territory was established in 1983 and since then has played an important role in achieving environmental protection and management throughout the Territory. In recent times, the centre has worked on a number of land management issues, most notably tracking urban and rural developments; participating in planning processes; and attempting to raise community awareness of environmental issues related to land clearing; coastal and marine issues; rangelands management; mining impacts; development proposals; and the problems posed by weeds and feral animals. The Centre acts as a clearinghouse for information from government and non-government sources, and a resource centre on environmental issues. ECNT also produces education materials, and has for a number of years distributed its highly regarded *Weeds of Natural Ecosystems: A Field Guide to Environmental Weeds of the Northern Territory*.

#### Greening Australia community education and community vegetation management program

Greening Australia is a solutions-driven organisation that is doing something practical about Australia's environmental problems. Greening Australia tackles critical issues like salinity, declining water quality, soil degradation, climate change and biodiversity loss through an innovative blend of practical experience, science, community engagement and commitment.

Greening Australia NT has four organisational aims:

- Community Education - to provide expert, effective and highly respected community education programs in order to empower the community to make informed natural resource management decisions.
- Project Development and Management - to develop projects that contribute to sustainable land and water management and to manage those projects effectively and efficiently.

- Business Management - to manage the organisation effectively and efficiently, in order to ensure its long-term viability and provide the best possible return on the time, effort and resources invested by its supporters.
- Business Development - to increase the level of broad community awareness of, and support for, the organisation and its aims and maintain a diversity of income sources which reflects the broader community of environmental stakeholders.

Greening Australia NT undertakes vegetation management projects in partnership with the community to strategically re-establish, protect and enhance tree and understorey vegetation. This work includes community education and training programs as well as on-ground operations involving direct seeding, native grass seed harvesting, weed control, fire management and tree planting.

#### Keep Australia Beautiful public education program

The Keep Australia Beautiful Council (NT) Tidy Towns Program has an increasing focus on the environment with awards which recognise efforts to improve communities' waste management strategies and environmental health programs such as dust suppression. The Territory Tidy Towns Awards are aimed at encouraging communities to unite to protect and enhance their local environment.

The Keep Australia Beautiful Council (NT) also manages the Territory Anti-litter Committee Program (TALC). TALC was originally formed in 1981 and is made up of a number of people from the beverage manufacturing and packaging industries: (Beverage Industry Environment Council - BIEC), the Northern Territory Government, Local Government Association of the NT and the Keep Australia Beautiful Council (NT). TALC volunteers work on ways to reduce the amount of litter within the Territory and generally improve the environment.

#### Landcare, Waterwatch, Coastcare community management and monitoring programs

Landcare, Waterwatch and Coastcare are community-based programs designed to engender a sense of stewardship within the community for the management of Natural Resources.

Landcare is a national movement consisting of local communities working to develop practical solutions to manage our natural resources. There are currently 20 community based Landcare groups involved in both Landcare and Waterwatch activities in the Darwin and Litchfield area. The types of activities they participate in include bushland management, revegetation, fire management, erosion control, weed management, rubbish removal, and water quality monitoring.

Waterwatch Australia is a national network of more than 50,000 people who share a vision of healthy waterways. Waterwatch promotes water quality monitoring as a tool to involve the Australian community in land and water management at a local and catchment scale. Through monitoring their local waterways, communities are geared into action to address water quality issues and work together to protect and rehabilitate waterways. The Darwin Litchfield area has 72 monitored sites which are regularly tested for water quality parameters such as turbidity, conductivity, pH, nitrates, phosphates, dissolved oxygen, temperature and macro invertebrates. Waterwatch aims to collect useful

scientific baseline data, identify any areas affected by pollution and encourage community involvement in monitoring.

Coastcare is a national environment program that provides opportunities for the community, indigenous groups, the business sector and governments to become actively involved in the protection and management of Australia's coastal and marine environments. The Coastcare program in the Northern Territory covers the entire 11,000km of Coastline, including all of the islands.

These programs are all jointly funded by the Commonwealth Government, through its Natural Heritage Trust program, the Northern Territory Government and other non-government organisations such as Greening Australia.

#### Land for Wildlife

Land for Wildlife is a voluntary scheme to encourage and assist private landholders to provide habitats for wildlife on their property, even though the property may be managed for other purposes.

#### Marine and Coastal Community Network public education program

The Marine and Coastal Community Network (MCCN) is a national non-government organisation which aims to assist industry, government and all sectors of the community to better understand and protect Australia's marine and coastal environment. A particular focus of MCCN's work is to promote marine protected areas. The network publishes a free quarterly newsletter, information sheets and from time to time organises workshops and seminars on marine and coastal issues.

#### NTCCI Best Practice Management guidelines

The Northern Territory Chamber of Commerce and Industry (NTCCI) currently provide a range of practical guidance material for business and industry of the Northern Territory. Information has been developed to assist industry in meeting their legislative and environmental obligations, with particular focus on environmental best practice. Some of the materials include:

- Environmental Codes of Practice for the motor trades and hotel industries;
- Trade Waste fact sheets and guidance material;
- Waste management guidelines and Waste Exchange;
- Energy Efficiency guidelines and information.

Additional support is provided by a range of informative local case studies with the application of eco-efficiency or 'doing more with less' featured. The NTCCI continue to actively promote guidelines and relevant NT based and national environmental management initiatives to the business community to encourage sound environmental management practices.

#### NT Government factsheets

The DIPE have produced a range of fact sheets to enhance public awareness of a number of environmental, social and economic issues in the region and across the NT. Some of these include environmental management practices, community monitoring programs, planning, economic performance and sectoral performance, guidelines and codes of practice.

#### Palmerston City Council public education program

Palmerston City Council Management Plan 2002/03 sets the strategic direction for the council's services and role in the community. This document highlights the council's commitment to enhancing community consultation mechanisms and education, with a community consultation policy to be developed in the near future.

The council has also established a range of community based information aimed at informing the public of several environmental, economic and social aspects of the local government jurisdiction.

#### Power Water Corporation public relations and education program

As the Northern Territory's premier provider of electricity, water and sewerage services, the Power Water Corporation is also an active and committed supporter of the Territory community, business, education and sport.

Power Water Corporation conducts a number of major educational, awareness and promotional campaigns throughout the Territory. These campaigns are aimed at highlighting the unique conditions of the Northern Territory environment, promoting Power Water Corporation as a responsible corporate and community citizen, and generating community support.

Major campaigns include:

- Wet Season Campaign - an annual campaign, conducted from October to February, focuses on tree trimming near power lines and reducing storm water flows into the sewerage system;
- Tree Replacement Program - in conjunction with the Darwin City Council, Power Water Corporation removes many unsuitable street trees interfering with power lines in five Darwin suburbs. The trees were replaced with more suitable species;
- Show Santa Where You Live - encourages Territorians to decorate their households and businesses with Christmas lights to 'Show Santa Where You Live';
- Site Visits and Study Tours - each year a large number of schools, interstate and overseas visitors access Power Water Corporation's facilities throughout the Territory.

Power Water Corporation also has a comprehensive sponsorship program and recognises that supporting the community is an essential part of community relations. Power Water Corporation's sponsorship program focuses upon projects related to the following, with particular emphasis on youth:

- Education (science and technology);
- Caring for the Environment;
- Aboriginal partnerships;
- Sporting partnerships;
- Business development.

#### Review of Public Consultation in the Planning Process

In March 2003 the review of the Planning Act was announced. A discussion paper was released for public comment as a basis for further consultation, including public forums and discussions with specific interest groups. The discussion paper identifies and discusses a range of issues in relation to the Act. Government will consider all comments received before determining what action if any should be taken.

Among other matters identified in the Discussion Paper, consultation in the planning process has been acknowledged as an area where amendments may be considered. The review will examine possible ways to improve the process so that all stakeholders have further opportunity for input.

The *Planning Act* provides for a mandatory process of public exhibition and consultation for proposals to amend the NT Planning Scheme, for development application and applications for the grant of an exceptional development permit and for draft developer contribution plans prepared by local councils or other service authorities.

In the case both of proposed Planning Scheme amendments and of development applications, this involves notification in a newspaper and where practicable a sign on the land affected and public exhibition of the actual documentation forming the proposal. Proposed Planning Scheme amendments must also be notified in the *Gazette*.

These are mandatory processes and do not preclude the Minister determining a more comprehensive process should it be considered necessary or desirable.

In addition to requirements to notify and exhibit, the Act also provides for hearings of proposed amendments and issues raised in submissions. In the case of an amendment within a council area for which there is a Division of the Consent Authority, hearings by the Development Consent Authority are mandatory.

#### Waterwatch education kits

Education is the primary focus for the NT Waterwatch Program. The NT Waterwatch Education Kit has been specifically designed and developed in the Northern Territory, by Territorian scientists and teachers. The information and activities included in the Kit aim to increase awareness and understanding of water resources in the Northern Territory and the interdependence of our natural and human systems.

