Australia's National Report

Eighth Conference of Contracting Parties to the Convention on Wetlands (Ramsar, Iran, 1971)

18-26 November 2002
Valencia Spain

- A cooperative project between the Commonwealth, State and Territory governments of Australia, community and non-government organisations to report on Australia's progress in the last triennium.

April 2002

The information in this publication was provided by various Commonwealth, State and Territory government agencies and several community and non-government organisations.

The views and opinions expressed in this publication are those of the authors and do not necessarily reflect those of the Commonwealth Government or the Minister for Environment and Heritage.

The *National Report* is online at:
http://www.ea.gov.au/water/wetlands/index.html

Also available from:
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Front Cover Photograph
Moulting Lagoon Game Reserve Ramsar site, Tasmania.
Photo by Sarah Young, Wetlands section, Environment Australia.

Companion Document

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A cooperative project between the Commonwealth, State and Territory governments, community and non-government organisations, coordinated by Environment Australia and involving:

- Aboriginal and Torres Strait Islander Commission
- Australian Agency for International Development
- Australian Wetlands Alliance, The (representing a broad range of more than 30 non-government wetland interest groups)
- Commonwealth Scientific and Industrial Research Organisation
- Commonwealth Department of Agriculture, Fisheries and Forestry – Australia
- Commonwealth Department of Communications, Information Technology and the Arts
- Commonwealth Department of Defence
- Commonwealth Department of Foreign Affairs and Trade
- Commonwealth Department of Transport and Regional Services
- Environment ACT
- Environment Australia (Commonwealth Department of Environment and Heritage)
- Environmental Research Institute of the Supervising Scientist
- Great Barrier Reef Marine Park Authority
- Murray-Darling Basin Commission
- New South Wales Department of Land and Water Conservation
- New South Wales National Parks and Wildlife Service
- Queensland Environmental Protection Agency
- Queensland Parks and Wildlife Service
- South Australian Department for Environment and Heritage
- Tasmanian Department of Primary Industry, Water and Environment
- Victorian Department of Natural Resources and Environment
- Western Australian Department of Conservation and Land Management

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Front Cover Photograph
Lake Clifton stromatolites, Peel-Yalgorup System Ramsar site, Western Australia.
Photo by Mark Butz, Environment Australia.

Introduction

Over the past Ramsar triennium (1999 – 2002), there have been many successful and interesting projects taking place across Australia that have contributed to the fulfilment of Australia's obligations under the Convention on Wetlands (Ramsar, Iran, 1971). In this Companion Document to Australia's National Report to the eighth Conference of Contracting Parties to the Convention of Wetlands, Valencia, Spain (November 2002), we present case studies to highlight some of Australia's achievements and to allow Australians and the international community alike to learn about specific projects, which may have relevance their own situations. These case studies are designed to complement the information provided in the National Report.

The case studies focus on a range of sites, including sites of international importance listed under the Ramsar convention, local streams, creeks and wetlands. The studies were undertaken by a variety of groups, including government, industry and community organisations. The case studies also cover a range of issues, including wise use, awareness raising, and conservation and have been organised and presented according to the General Objectives of the Ramsar Convention's Strategic Plan 1997-2002.

In addition to on-ground works, there is also a considerable body of policy and legislation relating to wetlands in Australia. Appendix One presents an extensive, though not exhaustive, list of current Commonwealth and State/Territory legislation, which affords protection to wetlands. Similarly Appendix Two provides an extensive, though not exhaustive, list of current Commonwealth and State/Territory policies relating to wetlands. Australia also has substantial resource information covering wetland management, and this is presented in Appendix Three.

I hope you find the case studies presented in this document an informative and useful catalogue of Australia's continuing wetland conservation and management efforts.

Stephen Hunter
Deputy Secretary
Environment Australia
April 2002

Australia's Ramsar Sites and Jurisdictions

It is useful to keep in mind when reading the Companion Document that the Commonwealth of Australia is a federation of six self-governing States - New South Wales, Victoria, Queensland, South Australia, Western Australia and Tasmania, and two self-governing Territories - the Northern Territory and the Australian Capital Territory. In addition, Australia has two external territories with Ramsar sites – Cocos (Keeling) Islands and Christmas Island, both in the Indian Ocean. As at April 2002 Australia has 57 Ramsar sites, which are shown below and listed overleaf.

Australia's Ramsar Sites

1. Cobourg Peninsula Aboriginal Land and Wildlife Sanctuary
2. Kakadu National Park (Stage 1) including wetland components of Stage III
3. Moulting Lagoon Game Reserve
4. Logan Lagoon Conservation Area
5. Lavinia Nature Reserve
6. Pitt Water-Orielton Lagoon
7. Apsley Marshes
8. East Coast Cape Barren Island Lagoons
9. Flood Plain Lower Ringarooma River
10. Jocks Lagoon
11. Interlaken Lakeside Reserve (Lake Crescent)
12. Little Waterhouse Lake
13. Corner Inlet
14. Barmah Forest
15. Gunbower Forest
16. Hattah-Kulkyne Lakes
17. Kerang Wetlands
18. Port Phillip Bay (Western Shoreline) and Bellarine Peninsula
19. Western Port
20. Western District Lakes
21. Gippsland Lakes
22. Lake Albacutya
23. Towra Point Nature Reserve
24. Kooragang Nature Reserve
25. Coorong and Lakes Alexandrina and Albert
26. Bool and Hacks Lagoons
27. Coongie Lakes
28. The Macquarie Marshes
29. "Riverland"
30. Kakadu National Park (Stage II)
31. Ord River Floodplain
32. Lakes Argyle and Kununurra
33. Roebuck Bay
34. Eighty-mile Beach
35. Forrestdale and Thomsons Lakes
36. Peel-Yalgorup System
37. Lake Toolibin
38. Vasse-Wonnerup System
39. Lake Warden System
40. Hosnie's Springs (Christmas Island)
41. Moreton Bay
42. Bowling Green Bay
43. Currawinya Lakes (Currawinya National Park)
44. Shoalwater and Corio Bays
45. Ginini Flats Wetland Complex
46. Pulu Keeling National Park (North Keeling Island)
47. Little Llangothlin Nature Reserve
48. Blue Lake
49. Lake Pinaroo (Fort Grey Basin)
50. Gwydir Wetlands
51. Great Sandy Strait
52. Myall Lakes
53. Narran Lake Nature Reserve
54. Becher Point Wetlands
55. Lake Gore
56. Muir-Byenup System
57. Edithvale-Seaford Wetlands

Contents

Objective One: Universal Membership of the Convention

Case Study – Promoting the Ramsar Convention

1. Pacific Islands Ramsar Liaison Officer Project

Australia has been successful in its promotion of the principles of the Ramsar Convention in the Pacific Islands. Australia has engaged 14 countries in wetland conservation efforts and other Ramsar related activities, and has assisted the preparation of nomination documents for seven countries. These achievements are largely due to the work conducted by the Pacific Islands Ramsar Liaison Officer.

The Commonwealth government has funded Wetlands International - Oceania since 1995 to provide a Pacific Islands Liaison Officer to promote and support the Ramsar Convention in the Oceania region. The liaison officer is tasked to encourage greater interest in Ramsar among Pacific Island countries (Papua New Guinea and New Zealand are the only other Contracting Parties from the region).

The Officer has assisted in identifying areas within the Pacific Island countries which are experiencing severe wetland impacts and, where possible, includes those countries in the Ramsar promotion efforts. Technical support was also provided to countries in the development of wetland projects as well as emphasising implementation in these countries of other aspects of the Ramsar Convention Strategic Plan 1997-2002, particularly capacity building.

The Liaison Officer has also explored linkages with other organisations and initiatives, such as the South Pacific Regional Environment Program (SPREP), International Coral Reef Initiative (ICRI) and the Australian Agency for International Development (AusAID), where those linkages may assist Ramsar promotion efforts in the Pacific Islands.

Of the 14 countries that have been engaged in Ramsar and/or wetland activities Palau and Fiji are in the advanced stages of accession to the Convention and serious interest in accession has been generated in Vanuatu and the Solomon Islands. Ten candidate Ramsar Sites have been documented across seven countries and documentation of additional candidate sites is imminent in four Melanesian countries.

Several threats have been identified as severely affecting reef, mangrove and floodplain wetland sites. The impact of logging in Melanesian countries and the destructive affect of dynamite fishing on coral reef areas have been identified as major concerns.

A wetlands-dedicated conservation program has been established by Wetlands International in the Pacific Islands region and conservation projects have been completed at reef, mangrove, floodplain and forested wetlands. In Papua New Guinea the program has supported the development of a marine conservation program that will enhance community-based conservation of coral reefs.

Technical support was provided to Pacific national delegations at 1996 and 1999 Ramsar CoPs and direct assistance has been provided to six countries in writing project funding applications.

Regional collaboration and harmonisation has been developed with WWF South Pacific. Site-based projects have been undertaken in collaboration with local non-government organisations (NGOs) in Palau, PNG and Fiji. Input has also been provided to the technical and strategic planning workshops of SPREP and to the production of SPREP's Regional Wetlands Action Plan.

The Pacific Islands Ramsar Liaison Officer discussing Ramsar issues and their relevance to Madang Lagoon with resource owners and PNG Office of Environment staff. Photo by Miriam Phillip , PNG Ramsar Support Officer.

Objective Two: Wise Use of all Wetlands

Case Studies – Reviews and Changes to Legislation and Institutions to Better Protect Wetlands

See also Appendix One: Commonwealth and State/Territory Legislation Affording Protection to Wetlands.

1. The Environment Protection and Biodiversity Conservation Act, 1999

In 1997, the Council of Australian Governments (COAG) agreed in principle to the Heads of Government Agreement on Commonwealth/State Roles and Responsibilities for the Environment. In this agreement, the States and Territories and the Commonwealth agreed that reform in the following five areas was needed to develop a more effective framework for intergovernmental relations on the environment:

- Matters of national environmental significance;
- Environmental assessment and approval processes;
- Listing, protection and management of heritage places;
- Compliance with State environmental and planning legislation; and
- Better delivery of national environmental programs.

In order to implement some of the key aspects of the agreement, the Commonwealth developed the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which came into force in July 2000.

The EPBC Act represents a fundamental reform of Commonwealth environmental laws since the first environmental statutes were enacted in the early 1970s. It is the first comprehensive attempt to define the environmental responsibilities of the Commonwealth, and provides for Commonwealth leadership on the environment, while also recognising and respecting the responsibility of the States/Territories for delivering on-ground natural resource management.

The objects of the EPBC Act are to:

- provide protection for those parts of the environment that are considered to be of national importance;
- promote ecological sustainable development; and
- promote biodiversity conservation.

The Act has established a legislative framework that enables the Commonwealth to manage environment protection through an assessment and approvals process; and biodiversity conservation through species, ecological community and site listing, recovery and management planning.

The EPBC Act strengthens Australia's capacity to protect its biodiversity through a range of measures, including:

- providing legislative protection for Ramsar wetlands and migratory species for the first time;
- enhancing protection for threatened species and ecological communities;
- improving protection for World Heritage properties;
- providing for improved management of Commonwealth reserves;
- providing for voluntary conservation agreements with land holders for the conservation of biodiversity;
- recognising and improving management for biosphere reserves;
- promoting bioregional planning;
- increased recognition of the importance of identifying and monitoring components of biodiversity;
- providing for regulations to be made for the control of access to biological resources in Commonwealth areas; and
- providing a framework for protecting our environment from invasive species.

Community participation is encouraged through a wide range of opportunities for public comment and consultation. This includes opportunities to comment on development proposals, recovery plans, management plans, and applications for permits. The Act supports the involvement of Indigenous people in the management of biodiversity and promotes the use of Indigenous knowledge and practices in managing Commonwealth reserves and conserving biodiversity, in cooperation with Indigenous people.

The EPBC Act contains environment protection provisions, which provide that actions likely to have a significant impact on a matter of national environmental significance are subject to a rigorous assessment and approval process. Approval is required for actions that have, will have, or are likely to have a significant impact on a matter of national environmental significance. The unlawful taking of an action that has a significant impact on one of these matters may attract a civil penalty of up to AUS$5.5 million or a criminal penalty of up to 7 years imprisonment.

Matters of national environmental significance include:
- World Heritage properties
- Ramsar wetlands
- Nationally threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- Nuclear actions

In addition to these matters, the Act also protects the environment on Commonwealth land and regulates the actions of Commonwealth departments and agencies which may have a significant impact on the environment.

Guidelines have been developed by Environment Australia to assist in determining whether an action is likely to have a significant impact on a matter of national environmental significance. In determining the nature and magnitude of an action's impact, the proponent needs to consider:

- all onsite and offsite impacts;
- all direct and indirect impacts;
- the sensitivity of the receiving environment; and
- the degree of confidence with which the impacts of the action are known and understood.

In addition to these general considerations, specific criteria have been developed to aid in determining whether an action will have a significant impact on each of the matters of national environmental significance. For Ramsar wetlands, an action has, will have, or is likely to have a significant impact on the ecological character of the Ramsar site if it does, will or is likely to result in:

- areas of the wetland being destroyed or substantially modified;
- a substantial and measurable change in the hydrological regime of the wetland – for example, a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland;
- the habitat or lifecycle of native species dependant upon the wetland being seriously affected;
- a substantial and measurable change in the physico-chemical status of the wetland – for example, a substantial change in the level of salinity, pollutants or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health; or
- an invasive species that is harmful to the ecological character of the wetland being established in the wetland.

If the Minister decides that a proposed action is likely to have a significant impact on the ecological character of a Ramsar wetland, then an environmental assessment of the action will be carried out through one of a range of methods, including:

- assessment by preliminary documentation;
- public environment report (PER);
- environmental impact statement (EIS);
- public inquiry; or
- an accredited process (ie accreditation on a project by project basis).

After assessment, the Minister decides whether to approve an action, and if so, what conditions to impose to ensure the protection of the Ramsar wetland.

For further information – http://www.ea.gov.au/epbc

2. New Marine Protected Areas in Victoria

In 2001, the Victorian Government announced its intention to create a comprehensive system of marine national parks and sanctuaries. This announcement followed an investigation and recommendations by Victoria's Environment Conservation Council. This review commenced in 1991 and involved extensive community and industry consultation over ten years with six formal public comment phases.

Marine national parks will be large, highly protected areas in which fishing, extractive and damaging activities are not allowed. However, public access will not be restricted and recreation, tourism, education and research can occur within the parks. Marine sanctuaries will be similar to marine national parks, except they will be smaller in size.

Many of Victoria's new marine national parks and sanctuaries include significant marine and coastal wetland habitats. The system of marine national parks and sanctuaries will provide an increased level of protection for these wetlands. Mud Islands and Swan Bay in the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site, which are currently Fisheries Reserves, will be included in Port Phillip Heads Marine National Park. Part of the marine wetlands at Point Cook within the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site will be covered by the Point Cook Marine Sancturay which will replace and extend the area that is currently declared as a Fisheries Reserve. Jawbone Marine Sanctuary in Port Phillip Bay will protect important roosting sites for migratory waterbirds, mangroves, rocky basalt reefs, intertidal flats and saltmarsh.

Parts of the Western Port Ramsar site will be afforded a much higher level of protection as new marine national parks. These areas include Yaringa, French Island and Churchill Island and support saltmarsh and mangrove communities, sheltered intertidal mudflats and seagrass beds and include significant habitat for migratory waterbirds. The new Corner Inlet Marine National Park provides a highly protected area in the Corner Inlet Ramsar site including seagrass and mangrove communities and intertidal sandy beaches.

The network of new marine national parks to be established will include Discovery Bay, Twelve Apostles, Point Addis, Bunurong, Wilsons Promontory, Ninety Mile Beach and Point Hicks. These parks, together with a further eight marine sanctuaries, cover various marine and coastal wetland habitats.

The Government of Victoria intends to legislate to establish marine national parks and sanctuaries via an amendment to the *National Parks Act 1975*.

Case Studies – Reviews and Changes to Wetlands Policies

See also Appendix Two: Commonwealth and State/Territory Wetland Related Policies and Initiatives.

1. South Australian Wetlands Strategy

South Australia, despite its reputation as a dry State, has many types of wetlands. These range from the mound springs and ephemeral lakes and rivers of the arid zone, through to the floodplain wetlands of the River Murray, and estuary and tidal environments.

The South Australian Government recognises the many benefits that wetlands provide and has embarked on a course of action to ensure that these benefits are maintained.

A draft wetlands strategy, titled Our Seas and Coasts: A marine and estuarine strategy for South Australia,[1] was released for public consultation on World Wetlands Day, 2 February 2002. This Strategy builds on the State Water Plan 2000, which established principles for the management of wetlands as an integral part of water resource management.

The goal of the Strategy is to see wetlands recognised and managed as ecological and community assets for the benefit of present and future generations. It will do this by coordinating the key elements of wetland conservation and management through an integrated approach. This will involve government, business, industry, private landholders and the community.

The implementation of the Strategy will be coordinated primarily through National Parks and Wildlife South Australia, working in close cooperation with the Department for Water Resources, catchment water management boards and other key stakeholders. However, the effective implementation of the Wetlands Strategy requires key partnerships and investment from all sectors of the community. Catchment water management boards, local governments and regional integrated natural resource management groups have important roles to play and each of these organisations has an opportunity to incorporate the relevant actions from the strategy into their regional plans.

2. Exotic Invasive Marine Species in Victoria

Exotic invasive marine species threaten Victoria's marine and coastal wetlands including the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula, Western Port, Corner Inlet and Gippsland Lakes Ramsar sites.

[1] Our Seas and Coasts: A marine and estuarine strategy for South Australia can be found at http://www.environment.sa.gov.au/coasts/pdfs/strategy.pdf

Action to address the environmental, social and economic issues from this threat has included policy and administrative reform and the development and promotion of better practices that reduce the possibility of exotic species being introduced and spreading to new areas. Partnerships with marine industries, coastal communities and other Australian Governments have helped guide the reform process.

Policy and administrative reform includes reviewing legislation to ensure it is adequate to control undesirable activities and developing and promoting improvements. The scope of the reform is outlined in 'Introduction of Exotic Organisms into Victorian Marine Waters', an Action Statement under the *Flora and Fauna Guarantee Act, 1988*. The reform recognises that actions will also be required by all Australian Governments and the international community.

Expenditure has been in the order of AUS$2.6 million, over the last four years, and includes contributions from the Victorian Government, the Commonwealth Government's Natural Heritage Trust, the Australian Quarantine Inspection Service, the Centre for Research on Introduced Marine Pests at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the private and community sectors.

The priority has been to stop the introduction of exotic species and programs have focussed on those vectors that lead to introductions. The approach is to assess and act on the risk from the discharge of ballast water, the fouling and cleaning of the hulls and gear of small and large vessels, and the movement of aquaculture equipment. The capacity to identify and respond to outbreaks of new exotic species has also been improved.

The exotic seastar species, *Asterias amurensis,* has been especially targeted for action. When it invades this species is able to rapidly multiply (to tens of millions within three years). It is also highly predatory and, as result, affects wetland values and ecological processes where it is present. As thousands of kilometres of southern Australia's coastal marine wetlands are vulnerable to this species, it is the subject of the first Australian National Control Plan for an exotic marine species.

Western Port Ramsar site has been chosen as the site for a National Demonstration Project to manage the risks of marine pest introductions from both international and domestically sourced ballast water. The project represents a major step towards the implementation of a comprehensive ballast water management system for Victoria. The project will provide a port model for ballast water management that can be implemented in other Australian ports. It is an important step towards the development of a single national ballast water management regime.

Case Studies – New Policies to Ensure the Wise-Use of Wetlands

1. River Murray Environmental Water Allocations

Since development of the River Murray for water supply in the early 1900's, the amount of water diverted for consumptive use has steadily increased. The hydrological regimes of wetlands along the Murray in particular have been adversely affected by river regulation and water extractions for agricultural and domestic purposes.

Four of Victoria's Ramsar sites are closely linked to the Murray River: the Kerang Wetlands, Barmah Forest, Gunbower Forest and Hattah-Kulkyne Lakes. Together the Barmah Forest and the Millewa Forest on the north bank of the Murray in New South Wales form a single extensive floodplain wetland system. In addition, numerous wetlands of significance listed in *A Directory of Important Wetlands in Australia* and other wetlands of regional or local significance are part of the River Murray system. Today it is widely accepted that the health of the River Murray and its environs has degraded to a precarious state. Of particular concern is the destructive impact that modified flow patterns are having on the riverine environment including floodplains and wetlands.

The bulk entitlement process established clearly defined rights for two previous environmental water allocations:

1. a Flora and Fauna entitlement of 27.6 Gigalitre (GL) per annum to be used for wetlands along the Murray, converting an allocation originally made in 1987; and
2. an environmental water allocation for the Barmah-Millewa Forest consisting of 50 GL of high security water per annum with a further 25 GL of low security water per annum. The 50 GL high security water represents Victoria's half of a 100 GL allocation from Victoria and New South Wales, originally agreed to in 1993. The 100 GL is managed as a single allocation for both Barmah and Millewa Forests and can be carried over from year to year (up to a total amount of 400 GL).

During the bulk entitlement process, new allocations from surplus flows in the Murray were also agreed for Gunbower Forest Ramsar site and Lindsay-Walpolla Islands (extensive wetland systems in the far west of Victoria formed between the Lindsay and Walpolla Creeks, which are anabranches of the Murray River, and the river itself).

Arrangements have been progressively put in place to ensure effective use of the River Murray environmental water entitlements. For the Flora and Fauna Bulk Entitlement, these include prioritisation of wetlands to receive a share of the allocation, preparing water management plans and constructing water control structures to allow the water to be used and monitoring water use and ecological parameters. A community and stakeholder advisory group has been set up to advise on the use of the allocation each year. Wetlands in the Kerang Wetlands, Barmah Forest, Gunbower Forest and Hattah-Kulkyne Lakes Wetlands Ramsar sites are priority wetlands for the use of this allocation. Operating arrangements for use of the Gunbower Forest and Lindsay-Wallpolla allocations are currently being developed.

The Murray-Darling Basin Commission (MDBC) coordinates management of the Barmah-Millewa environmental water allocation in its role as manager for the Murray River under the 1993 Murray-Darling Basin Agreement. This agreement between the Commonwealth and Murray-Darling Basin States promotes and co-ordinates effective planning and management for the equitable efficient and sustainable use of the water, land and other environmental resources of the Murray-Darling Basin.

The Barmah-Millewa Forum, a community advisory group convened by the MDBC, produced the 'Barmah-Millewa Forest Water Management Strategy in June 2000. Victoria produced an interim watering strategy for the Barmah Forest in 1992 and is currently finalising this strategy. Environmental triggers for release of the Barmah-Millewa environmental allocation were produced jointly by Victoria and New South Wales in 2000 and operating rules for managing the allocation were agreed to by the Murray-Darling Basin Commission in March 2001.

The first use of the Barmah-Millewa environmental water allocation was made in 1998 when 100 GL was provided to supplement a minor flood in the forest caused by high flows in the Ovens River. The second and largest use of the Barmah-Millewa environmental water allocation commenced in October 2000 to prolong biological processes stimulated by the best natural flooding for several years, including major bird breeding events, fish breeding and growth of aquatic flora which benefit from prolonged flooding and higher water temperatures later in the season. A total volume of about 340 GL was released to prolong forest watering during this watering event, including 300 GL from the accumulated forest allocation and a supplementary amount of 40 GL from other New South Wales and Victorian wetland environmental allocations. This allowed watering to continue to late January 2001.

Moira Lake, Millewa Forest after release of environment water allocation.
Photo by Wetlands Section, Environment Australia.

Little Edwards Regulator, Millewa Forest.
Photo by Wetlands Section, Environment Australia.

2. Victoria's Biodiversity Strategy

Victoria's Biodiversity Strategy, which includes a statement on wetland policy, was released in 1997. An implementation plan for the Biodiversity Strategy was then produced in 2000. Victoria has made significant progress in implementing the priority management responses for wetlands, as set out in the Biodiversity Strategy. Significant achievements are indicated below.

Priority management responses for wetlands outlined in 'Victoria's Biodiversity Directions in Management' 1997.	**Implementation highlights to August 2001**
Work in conjunction with the Commonwealth and other States and Territories to implement the Ramsar Convention and to secure the best possible outcomes for wetland biodiversity through the Natural Heritage Trust and forums such as ANZECC and the Murray-Darling Basin Ministerial Council.	The Government of Victoria, the Commonwealth and the Victorian community invested more than AUS$2.0 million in wetland projects in Victoria from 1998/99 to 2000/01 under the Natural Heritage Trust.
Complete integrated management planning for the ten Ramsar sites in Victoria and investigate	Plans are currently being developed for all Ramsar sites. A draft high level strategy for

potential new sites.	all Ramsar sites in Victoria was released for public comment in February 2001. Draft plans for three sites have also been released for public comment, two in February 2001 and one in 2002.
Protect important habitat of migratory waders and species listed on JAMBA and CAMBA with a focus on investigating the addition of significant sites to the East Asian-Australasian Shorebird Site Network.	Two new shorebird sites were added to the network in 2000.
Ensure wetland water regimes are considered in the bulk water entitlement conversion and new allocation processes and, as part of the Government's water reform package, investigate new strategies for the effective use of environmental water on floodplains, savings in irrigation systems to be used for environmental purposes and improve and maintain habitat where environmental water is provided.	• Environmental water allocations were secured for Murray River wetlands and Goulburn River floodplain wetlands. • An environmental water allocation of 24,700 ML from water savings (as of July 2001) has been secured for the Wimmera River system. (Lake Albacutya Ramsar site is a terminal lake of the Wimmera). • A new bulk water entitlement for the Thomson and Macalister Rivers will deliver greater environmental flows in summer which are expected to provide some benefit to the Gippsland Lakes Ramsar site.
Develop management agreements to encourage water authorities to take account of the environmental values of those wetlands which are part of the water distribution system.	Commenced.
Implement the State Environmental Protection Policy 'Waters of Victoria' as it relates to water quality in wetlands, including the preparation of an Environmental Management Plan for Port Phillip Bay.	• A draft Environmental Management Plan was completed for Port Phillip Bay in 2001. It is currently being finalised. • Several Environment Protection Authority wastewater discharge licences were revised to reduce nutrient input into wetlands. • Victoria continues to implement the 1995 Nutrient Management Strategy for Victorian Inland Waters to reduce the incidence of algal blooms and other impacts, particularly on rivers and streams. Draft or final nutrient management plans have been prepared for all Victorian catchments and are being implemented. • The Environment Protection Authority is coordinating the Victorian Stormwater

	Action Program, a AUS$22.5 million program over three years (2000/01 - 2002/03) to implement urban stormwater best practice environmental management across Victoria. The program will assist local government in moving towards best practice by supporting the development and implementation of management plans. These plans aim to minimise threats to identified environmental values. This government program will improve the quality of urban runoff and therefore improve the water quality in rivers, streams, estuaries and other wetlands.
Phase out the use of lead shot for duck hunting, in consultation with hunting organisations.	Lead shot for duck hunting has been phased-out according to the following timetable: 2000 - prohibited on all State Game Reserves 2001 - prohibited on all public lands 2002 - prohibited for duck hunting throughout Victoria.
Complete the process of identifying important and representative wetlands in Victoria and contribute to a third edition of *'A Directory of Important Wetlands in Australia'* and a national wetlands inventory. Promote recognition of important wetlands and encourage actions leading to their improved management.	• Thirty-eight additional wetlands were listed in the third edition of the Directory in 2000. • Directory wetlands have been mapped at 1:100,000 on a Geospatial data layer. The layer will be incorporated into the 'BioMap' mapping product and the Directory website in 2002 to promote awareness among land managers and planners.
Promote World Wetlands Day and World Wetlands Week in Victoria as a focus for increasing community awareness of the importance of wetlands.	Displays, events and announcements are made each World Wetlands Day. For example, an announcement by the Minister for Environment and Conservation of Ramsar site management plans and new shorebird sites was made in 2001. In 2002 a launch of the draft Gippsland Lakes Ramsar plan was held and a set of marine wetlands postcards were distributed.
In conjunction with the Commonwealth the Asia Pacific Wetlands Management Training Program, develop and implement a training program for wetland managers.	
Make information about wetlands more accessible to the community, wetland managers, students and planners by establishing a Victorian	• A wetlands webpage has been established at http://www.nre.vic.gov.au/. (Follow the "Parks and Reserve" prompt, then the

Wetlands Home Page on the Internet, promoting useful publications and interpretive material and through Land for Wildlife and other extension programs.	"Wetlands" prompt). • An education resource, 'Wetlands: Resource Material for Teachers', has been published on the Department of Natural Resources and Environment website. • A third edition of *'A Directory of Important Wetlands in Australia'* publication has been distributed to catchment management authorities, local governments and coastal boards across Victoria. • Additional interpretive wetlands signs have been placed at Western Port and near Geelong.
Improve environmental monitoring programs in wetlands with particular emphasis on Ramsar sites and encourage the community to adopt new wetland sites for monitoring through the Waterwatch Program.	Commenced

Case Studies – Participation by the Local Community

1. Apex Park Waterwatch Program, South Australia

Waterwatch is a Commonwealth Government initiative under the Natural Heritage Trust (NHT) that provides funding to establish a national network of Waterwatch project officers and groups. These project officers organise local community support and activities to monitor river and wetland sites for ecosystem health, organise data collection and sharing, identify areas in need of priority restoration and encourage rehabilitation of sites.

Across Australia, a number of Waterwatch groups are monitoring either a Ramsar site or a catchment that feeds into a Ramsar site. Of the 57 Ramsar sites in Australia, approximately a third of the sites or catchments that feed into Ramsar wetlands are now monitored by Waterwatch groups.

Apex Park, in the suburb of West Beach in Adelaide is one site being monitored by a Waterwatch group. The project was coordinated by the staff of Torrens and Patawalonga Waterwatch who initially organised a letterbox drop in the area and advertisements in the local paper detailing a Community Information Day to assess the local interest in the park.

The Community Information Day was a success with a large number of people attending and numerous partnerships were formed to assist in saving the wetland. Some of the organisations and groups involved were: Banrock Station / Landcare Australia, City of West Torrens, Torrens Catchment Water Management Board, Our Patch, SA Urban Forest Biodiversity, City of West Torrens Biodiversity Project, City of Charles Sturt, Native Fish Australia-SA, The Native Fish Association of South Australia, Paringa Park Primary School, Grange Primary School, Emmanuel College and Friends of Apex Park Wetland.

Volunteers planted 3,000 native plants, propagated from locally collected seeds, and the wetland was pumped to remove water to recreate the natural drying/wetting cycles the wetlands would have naturally experienced. Over 1,000 Carp, a species of introduced fish, were also removed and destroyed. At a much later stage, when wetland water levels increased, local native fish species were released into the wetland. West Beach Primary School regularly undertake water quality and biological monitoring of the site.

The biodiversity is gradually improving at Apex Park and a high number of local groups and individuals are involved with ongoing wetland management.

2. Corner Inlet Ramsar Site, Victoria

Corner Inlet Ramsar Site, in Victoria's Gippsland region, is the southernmost marine embayment in mainland Australia and receives inflow from a series of small rivers. It includes vast intertidal flats and a complex network of islands and channels. Most of the Ramsar site is reserved in Corner Inlet and Nooramunga Marine and Coastal Parks and managed by Parks Victoria. A small proportion is private land.

Wetlands International – Oceania received funds from the Natural Heritage Trust for a community based monitoring project at Corner Inlet. A small team was set up to manage the project in 1999 and 2000. It was led by a local resident (who was also involved in LandCare) and included experts in community participation, marine science and wetland management.

The aim of the project was to develop a community based monitoring program for Corner Inlet that could serve as a pilot for the implementation of monitoring programs at all of Australia's Ramsar listed wetlands. Project activities were as follows:

- review and identify monitoring needs at the Corner Inlet Ramsar Site;
- conduct a workshop with stakeholders and community groups;
- build on existing activities and trial new monitoring activities eg. waterbird counts, vegetation assessment, water quality, land use changes in the catchment, specific threats to the site; and
- review and report on monitoring activities to Parks Victoria, participants, community groups and Environment Australia.

The project reviewed 24 current monitoring programs at Corner Inlet or within the catchment. These included monitoring of waterbirds and other fauna, predators, pest plant and animals, water quality, vegetation monitoring, LandCare projects underway in the catchment and seawall condition. Some of these programs have a strong level of community involvement while others are conducted by land managers and government agencies. Data on existing monitoring were collated into a database managed by Wetlands International, which is available to State and Commonwealth agencies and interested parties.

The various stakeholders at Corner Inlet were widely represented in the workshops and meetings and together set up a steering committee to plan and coordinate future monitoring. The steering committee decided that the first priority was for channelling information on existing monitoring to Parks Victoria and the wider community. The committee decided that no new monitoring would be attempted under the project and agreed to seek funding to build on the foundations laid.

The project succeeded in raising local community awareness about the Corner Inlet Ramsar site and in forging links between local, State and national bodies to monitor the wetland condition. The project also highlighted the need to understand the unique dynamics of the local community, the need to use innovative approaches to engage the full range of stakeholders and the importance of acknowledging existing monitoring

efforts. Lessons learnt were communicated in a paper on models for developing community-based monitoring of Australia's Ramsar wetlands, at a National Wetland Conference, Canberra, November 1999.

The challenge at Corner Inlet, and many other Ramsar sites in Australia, is the absence of locally based organisations involved in wetland conservation that could take the lead in coordinating community involvement in monitoring activities. Community groups can make an important contribution to monitoring and Ramsar site managers need to find means to support this involvement.

3. Lower Hunter River and Estuary, encompassing Kooragang Nature Reserve Ramsar Site, New South Wales

The wetlands of the Lower Hunter form an interconnected ecosystem ranging from tidal mudflats to Melaleuca Forests. A number of projects have provided opportunities for the community to participate in wetlands conservation.

In 1999, The Wetlands Centre Australia secured Natural Heritage Trust funding to investigate models for community monitoring at Kooragang Wetlands in the Hunter Estuary, as part of a project at Ramsar sites across Australia. The project framework was developed by Wetlands International - Oceania, with other sites located at Roebuck Bay in Western Australia and Corner Inlet in Victoria (see above). The project identified a range of existing monitoring activities in the Hunter Estuary, as well as data gaps, to make the best possible use of community participation in monitoring.

Utilising a Steamwatch Kit (a water quality monitoring kit designed for students and non-professional groups), community members developed skills in water quality testing at a number of locations within the Kooragang Nature Reserve and surrounding areas, taking on greater responsibility as consistency in techniques improved.

In evaluating the project, volunteers and the project coordinator identified the need to have an ongoing coordination role. Suggestions included the promotion of participation to a wider range of community participants through field days and local media. This would enable people to join the program as it suited, gaining skills in environmental monitoring, and an understanding of an estuarine system while working with their peers. A major benefit of the project was the identification of existing information, as well as raising the awareness of stakeholders and wetlands managers of the scientific resources available within the community.

Community volunteer and university students have also been monitoring changes to vegetation (in particular mangrove invasion of saltmarsh) in response to re-establishment of tidal flushing by the Kooragang Wetlands Rehabilitation Project (responsible for managing part of the Ramsar site and the restoration of degraded agricultural land on the western portion of Kooragang Island).

In another study, The Wetlands Centre has developed a comprehensive understanding of local flight paths and roosting patterns of Ibis flocks, building on knowledge that has been developed over 15 years on Egret migrations as part of Project Egret Watch. This information has enabled the Centre to provide expert comment regarding the impacts to wildlife likely to be caused by development proposals to build an international airport on Kooragang Island. In addition, the two local government authorities with management responsibilities for the estuarine system have developed 'Naturewatch Diaries' which encourages individuals to develop observational skills and document changes in the natural environment.

Fullarton Cove within the Kooragang Nature Reserve Ramsar site. Photo by Wetlands Section, Environment Australia.

4. Towra Lagoon Restoration Project, New South Wales

Towra Lagoon is a freshwater lagoon within the Towra Point Nature Reserve Ramsar site. The lagoon is an example of a Sydney Freshwater Wetland, a listed endangered ecological community under the NSW *Threatened Species Conservation Act, 1995*. The lagoon is situated metres from the shores of Botany Bay and has been threatened by severe erosion along Towra Beach. In 1999 a storm destroyed what was left of a sandbag protective dune, allowing salt water and sand to enter the lagoon.

Volunteers from the Friends of Towra Point Nature Reserve have been working with the NSW National Parks and Wildlife Service to restore protection to the lagoon and to regenerate the freshwater habitat. A new protective dune, constructed from large geotextile sandbags, was completed in December 2000. In January 2001, volunteers planted over 2,500 native plants on the newly created dune. Since this time the volunteers have been visiting the site every three months to monitor the habitat restoration works, conduct weed control and continue replanting with native plants grown from locally collected seed.

Towra Beach erosion. Photo by Wetlands Section, Environment Australia.

The habitat restoration works have been extremely successful. Volunteers have noted that the dune has effectively protected the lagoon from the wave action of the Bay, there has been a significant reduction in the salinity of the lagoon and planted native species have established well on the new dune. Volunteers have also noted that some local native plants, eg. *Kennedia rubicunda*, have "self-sown" on the site.

Historical wildlife records show that the Lagoon once supported a variety of ducks, the endangered Green and Golden Bell Frog and the freshwater dependent Eastern Long-necked Tortoise. Volunteers will be continuing to monitor the success of the restoration project with a particular focus on the fauna as it begins to utilise the lagoon again.

Towra Lagoon
Photo by Wetlands Section, Environment Australia.

4. Phillips Brook Catchment, Western Australia

Phillips Brook begins in the Julimar State Forest, WA, a pending Conservation Park, however much of the catchment has been heavily cleared for farming. The increase in surface water run-off, which has resulted from this clearing, has transformed the minor streams and shallow depressions that drain into the Brook into deeply incised gullies. The increase in stream flow has also undermined banks and bends of the Brook. In 1999, concerned landowners in the catchment formed the Phillips Brook Catchment Group Inc., with the aim of protecting the health of the Brook by carrying out measures to alleviate land degradation, stream erosion and enhancing stream biodiversity.

Early in 2000, the group sought support from regional Ribbons of Blue/Waterwatch, Western Australia (WA) for the design and implementation of a catchment monitoring program. Turbidity, temperature, electrical conductivity and pH levels continue to be monitored on a monthly basis at six selected sites as baseline record of the health of the Brook. The group envisage long term monitoring to identify water quality trends following their revegetation and river restoration works.

From May to June 2000, group members prepared a riparian revegetation trial site, implementing weed control measures and planting trees native to the region (predominantly Swamp Sheoak, Swamp Paperbark and Flooded Gums). Later in the season, students from the Toodyay District High School planted local sedge and rush species. Once established, the shallow spreading surface roots of the sedges should bind the soil and help stabilise the bank, minimising further erosion. Trial log walling measures to dissipate stream energy and protect the newly revegetated embankments were constructed by securing tree branches and logs on the inside meander immediately upstream of the site. Individual property boundaries continue to be fenced along the Brook to encourage the natural regeneration of species, and options for weed control are addressed annually.

Rock riffle structures were also constructed in the Brook, to minimise erosion and the transportation of sediment caused by the rapid stream flow. The group are hopeful that the riffles, once stabilised, will help to create in-stream habitat areas for aquatic invertebrates. The group also plans to monitor for macroinvertebrates at the riffles and selected sites along the Brook.

Case Studies – Participation by the Indigenous Community

1. Kakadu National Park Board of Management, Northern Territory

The Kakadu Board of Management was established in 1989 to enable the full participation of Aboriginal people in the planning and management of Kakadu National Park, which incorporates the Kakadu National Park Ramsar sites, Stages I & III and II. The Kakadu Board of Management currently has fifteen members, ten of whom are Aboriginal people nominated by the Park's Traditional Owners. At its first meeting the Board decided that its Chairperson should be appointed from the Aboriginal members of the Board.

The Board is established under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act). Its functions, as set out in the EPBC Act, are:

- to prepare, along with the Director, Plans of Management for the park;
- to make decisions, consistent with the Plan of Management, about the management of the park;
- to monitor, with the Director, the management of the park; and
- to give advice, along with the Director, to the Minister on all aspects of how the park develops in the future.

In making decisions about the management of the park, the Board is also responsible for determining the overall allocation of resources in the park and setting priorities to implement the principles of the Plan of Management.

Some examples of wetland management issues considered by the Board include:

- Developing a river management strategy - the Board has commenced work on the development of a long-term visitor management strategy for the major river systems in the park. This will include carrying out surveys and other forms of monitoring to develop a more detailed understanding of the level and types of boating and fishing in the park, and their associated impacts.

- Banning the use of lead shot - Aboriginal people (Bininj/Mungguy) maintain the right to hunt and gather resources from within the park, and lead shot has traditionally been used for hunting. The major impact of lead shot is lead poisoning of magpie geese. The Board decided that three actions need to be taken to minimise/ban the use of lead shot: informing people and providing an alternative, enforcement and monitoring.

2. Paruku Indigenous Protected Area, Western Australia

The Indigenous Protected Area (IPA) program is part of a broader national objective to establish a comprehensive, adequate and representative National Reserve System in Australia. The Paruku IPA covers 434,600 hectares, including a proposed Ramsar site, south of Halls Creek in the Kimberley region of Western Australia. It was the first IPA declared in WA and the 15th declared in Australia.

The Paruku IPA provides an opportunity for the Aboriginal Traditional Owners to protect their places of cultural significance, to develop an ecologically sustainable pastoral enterprise, and to conserve the Paruku wetlands. The Kimberley Land Council worked with the Traditional Owners over several years to organise the declaration of the IPA, and continues to support the management of Paruku.

The Traditional Owners of Paruku comprise several language groups such as Walmajarri, Jaru, and Kukatja. They reside in several towns and communities, in particular, Halls Creek, Ringer Soak, Billiluna, Mulan, and Balgo. They are among the Tjurabalan native titleholders who have maintained a connection with the land for thousands of years.

The land covered by the Paruku IPA is under two pastoral leases held by the Aboriginal Lands Trust and managed by the Tjurabalan Pastoral Company.

Cultural values
Paruku, also known as Lake Gregory, is of enormous spiritual significance to the Traditional Owners of the country. Paruku is the Walmajarri name for Lake Gregory. Paruku is also the name used by Traditional Owners to describe the system of lakes at the end of Sturt Creek.

Paruku is at the terminal end of a long Dreaming track that binds together a large number of people living across a wide area. Mulan Lake itself is of intense spiritual significance as several other Dreaming tracks also terminate within the lake.

Tjurabalan Tingarri Law governs the Traditional Owners' management of the lands and waters, including the placement of fences, bores, living camps or any other activity. It also binds the Traditional Owners together and expresses their communal ownership of native title.

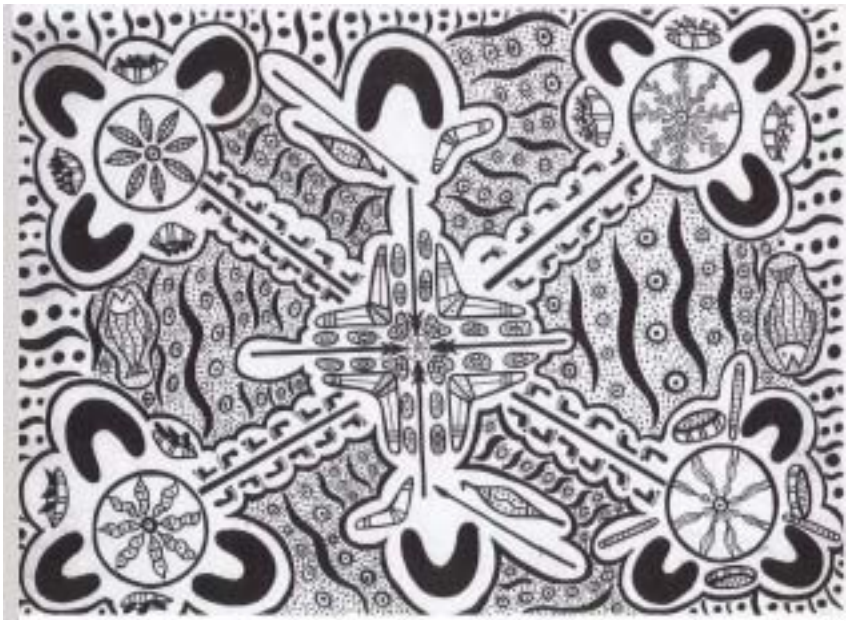
Bush food is gathered regularly and is an important component of the diet of Aboriginal people living on the IPA. Foods include bush onions, potatoes, tomatoes, Bush Turkey (Australian Bustard) and Goannas. Residents of Mulan, Billiluna and Halls Creek are exploring the development of a tourism venture that would permit tourists to visit some Dreaming sites.

Ecological values
Paruku is about 200m above sea level and contains a diversity of land systems. The Mulan district comprises undulating red sand plains, salt pans and occasional dunes with

stunted eucalyptus and acacias and soft Spinifex pastures. The Lake Gregory system is surrounded by country subject to natural flooding and contains short grasses and low shrubs. The Sturt Creek drainage system includes drainage lines and depressions, alluvial plains and sand rises. Vegetation is mainly Eucalyptus, Melaleuca, Eremophila and Acacia shrublands with Eragrostis and Ribbon Grass pastures.

Sturt Creek, which forms a delta-like system as it enters Paruku, is believed to form the headwaters of a large ancient river that once flowed westwards across the Canning Basin, entering the Indian Ocean 150km south of Broome. The most frequent area of the lakes, 387 km^2, is about one-twelfth of the extent of an ancient lake that existed more than 30,000 years ago.

The lakes and waterholes support at least 73 species of waterbird, 21 of which are listed under JAMBA and CAMBA, and 175 species of aquatic invertebrates.



This is the story about Paruku. Long time ago, the people saw a star coming from the east and it fell into Paruku. Star became a man, Giki. Giki had song and dance about the pelican Walang. In the picture, the four waterholes around the lake are where people used to gather meat and food. They got black mussels and seeds, Mungul, that were ground into flour. They gathered bush onions Junta and bush potatoes Karnti. The four waterholes in the picture are Kirliwa, Kiji, Lirra and Kunturkuta. The middle part of the picture represents the men's Dreaming. The outside part of the picture with the waterholes represents the women's Dreamings and shows the gathering of food.

Artist: ∀ Nooni

The area is a stopover for 16 migratory shorebirds, including the Oriental Plover, the Sharp-tailed Sandpiper and the Long-toed Stint. More than 100,000 birds occur regularly at Mulan Lake and as many as 650,000 have been observed at the lake at one time.

Paruku is also one of Australia's most important inland wetlands and a major drought refuge for waterfowl. It supports the largest breeding colony of Little Black Cormorant in Australia and is an isolated breeding locality for the Great Crested Grebe, the Australian Pelican, the Magpie Goose, Rufous Night Heron and Whiskered Tern. Fifty-three reptile species and 13 native mammal species are found in the area.

Aboriginal land management
Billiluna and Lake Gregory stations have been grazed since 1920 although grazing levels have fluctuated radically in the past 40 years. The cattle on the station represent an important part of the diet of the people of Mulan and Billiluna while the pastoral business provides part-time employment.

Large numbers of wild Horses are found on the pastoral leases, along with wild Dogs and a few Camels, Donkeys, Mules and Cats. Feral animals cause problems by taking or injuring stock, grazing extensively in competition with cattle, and may be responsible for declines in bird and flora species, although widespread vegetation death due to flooding occurs naturally.

Paruku IPA has been divided into two management zones:

Zone 1 comprises the prime waterbird habitat on the southern, eastern and northern sides of Paruku Lake and around Lera Lake. It will be managed primarily for cultural heritage, ecosystem protection and recreation, similar to a national park. Where monitoring indicates that grazing is causing a decline in wildlife values then wildlife values will take precedence.

Zone 2 incorporates the rest of the Billiluna and Lake Gregory pastoral leases. It will be managed to maintain biodiversity while enabling the sustainable grazing of cattle and other enterprises to meet community needs.

3. Ngan-Girra (Mungabareena), New South Wales

Ngan-Girra (Mungabareena) is an important place for Aboriginal people and the Europeans who settled in the Albury-Wodonga area in southern New South Wales.

For thousands of years, Aboriginal people from several tribal groups used Ngan-Girra as a meeting place, for ceremonies and for elders to discuss important matters. Men would move from the site into the Bogong ranges in search of Bogong Moths. The area was also an important gathering place for European pioneers as they travelled across the country.

The land was taken from Aboriginal people in the early 1800s as European settlement expanded in the district. Generations later, Aboriginal and non-Aboriginal people are working together to restore the natural and cultural values of the Ngan-Girra Reserve.

With support from the Commonwealth Government's Natural Heritage Trust, community members and government agencies are working in the spirit of reconciliation to improve the environmental and heritage values of the reserve.

Funding provided through the Trust's Bushcare Program is being used to fence out cattle from the banks of the Murray River and to undertake revegetation around a lagoon and along the river banks.

The revegetation work will combine Aboriginal traditional knowledge of native plants and modern planting techniques to enhance the biological diversity of the reserve. It will also bring about a new cultural learning from old cultural teachings.

Yal-mambirra, direct descendent of Wiradjuri,
and Janette Crew, Aboriginal Natural Resource Office
NSW Department of Land and Water Conservation. Photo by Robert Clegg, Indigenous Land Management Facilitator, Environment Australia.

Fencing out cattle from the Murray River will improve the environmental health of the area, which is to be opened up to the public. The lagoon will be cleaned and made available for recreation activities such as swimming, canoeing and bushwalking.

Local native plants, species endemic to the area before European settlement, will be used in the revegetation work. An interpretative trail will be designed to show how different Aboriginal clans of the Wiradjuri group used plants for foods and medicines.

Cattle and vehicles will be fenced out of the reserve to enable natural regeneration of the native vegetation and better protection of the environment**. Photo by Robert Clegg, Indigenous Land Management Facilitator, Environment Australia.**

The long-term aim is for the reserve to become a place to teach people about Indigenous cultural heritage and to raise awareness of these matters among Aboriginal and non-Aboriginal people.

This project is the first of its kind in the Albury-Wodonga District. It has broad support from the community and government agencies. Among those groups involved in the project are Albury City Council, the NSW National Parks and Wildlife Service, Charles Sturt University, the Murray-Darling Basin Commission, the NSW Department of Land and Water Conservation, and the Murray River Catchment committees.

Work is to be done by school children, university students, city council members, members of the broader community, and the Aboriginal communities that reside in Albury.

4. Great Barrier Reef Marine Park, Queensland

The Great Barrier Reef Marine Park Authority (GBRMPA) has made a number of efforts to recognise and apply traditional knowledge and management practices.

The Authority has several legislative and administrative arrangements in place to ensure Indigenous people are consulted on Park management decisions. The Authority gives precedence to the views and interests of traditionally affiliated Indigenous groups, whilst acknowledging the views and interests of historically associated Indigenous groups. An

Indigenous Policy and Liaison Unit, consisting of four staff, assists in communicating management issues and issues of concern between Indigenous people and the Authority, to ensure the appropriate people are involved in consultations and negotiations. The *Great Barrier Reef Marine Park Act, 1975* (amended in 1995) provides for an Indigenous member to sit on the Marine Park Authority Board. The Act also requires the appointment of a Great Barrier Reef Consultative Committee, on which two Indigenous members are appointed each three year term. The Authority also maintains four Reef Advisory Committees that consider critical issues for reef management. An Indigenous member sits on each of these Committees, which are expert-based rather than representative.

The Authority recognises that traditional estates of coastal Indigenous groups include large areas of the marine environment, extending sometimes to the outer barrier reefs. As such, the Authority heavily involves Indigenous people in its planning exercises, and has to date focussed specifically on Indigenous involvement in the review of the Far Northern Section of the Marine Park, including Indigenous input into re-zoning and proposals for local cooperative management agreements. Incorporated into the new zoning is additional protection for culturally sensitive sites and hunting and fishing grounds, additional protection for seagrass beds and Dugongs which are culturally important, and additional access to Preservation Zones (where use and entry is generally prohibited) for the purposes of tradition and custom. Native title has also been contemplated in the provisions of the new Commonwealth Islands zone, which allow land-based issues to be dealt with separately to marine-based issues.

All permit applications are assessed in accordance with criteria established in the Great Barrier Reef Marine Park Regulations. These assessment criteria were amended in 1995 to include 'the need to protect the cultural and heritage values of traditional inhabitants and others'. All permit applications are referred to native title claimants and native title representative bodies for comment, in accordance with the *Native Title Act, 1993*. Comments received by the Authority are accommodated as far as possible in the decision-making process and in ongoing monitoring. This has sometimes involved site inspections by Indigenous groups for particular activities.

GBRMPA has recommended the use of Indigenous names for unnamed reefs throughout the Great Barrier Reef Marine Park, on request from appropriate Aboriginal groups. A number of Aboriginal names for reefs have now been added to the Queensland place names register. The Authority has named one of the Sections of the Marine Park 'Gumoo Woojabuddee' to reflect the interests of the Darumbal Aboriginal people of that area.

The Authority supports self-management of Turtle and Dugong hunting by Indigenous groups along the coast. The Authority has supported the work of the Hope Vale Aboriginal community in developing a Turtle and Dugong Hunting Management Plan that aims to ensure that hunting takes place in accordance with tradition and custom and is ecologically sustainable. GBRMPA encourages the issue of hunting permits that devolve decision-making to a 'Councils of Elders' and other Aboriginal community-based groups for authorisation of hunting events.

It is important to note that the Authority focuses on agreement-making with Indigenous groups for marine management rather than information management, which is often associated with acquisition of traditional knowledge.

Traditional fishing on the reef. Photo by GBRMPA

5. Kakadu National Park, Northern Territory

In Kakadu National Park the Cultural Heritage Management Section of Parks Australia North (PAN), Environment Australia, is responsible for collecting and storing traditional knowledge. A database is currently being set up which will house the cultural knowledge that is collected in the Park. Included in the collection are several reports on Aboriginal wetland management practices. Two such reports are 'Aboriginal Fire Management of the Woolwonga Wetlands' and 'Traditional Resources of the South Alligator Floodplain: Utilisation and Management'.

The Woolwonga project documents Aboriginal people's understanding of ecological processes occurring on wetlands in Kakadu and the effect of different fire management regimes on these processes. It also documents approaches to fire management by Aboriginal people in the wetlands and wetland margins in the Woolwonga area and wherever possible, it identifies differences in contemporary and traditional approaches to fire management by Aboriginal people in these environments. It also documents Aboriginal people's understanding and perceptions of "good" and "bad" approaches to the use of fire in the management of wetlands in Kakadu. The report is based, in the main, on video interviews conducted with three generations of Aboriginal people resident in the northern lowlands of the Park.

'Traditional Resources of the South Alligator Floodplain: Utilisation and Management' provides an account of what resources exist in the floodplain and how Aboriginal people use those resources. It concerns traditional Bininj (Aboriginal) utilisation and management of fresh-water floodplains and Bininj people's perceptions of major environmental changes that have occurred on the floodplains. The report presents and summarises the information as provided by a large number of mostly older Aboriginal people for use as a resource document.

One example of the use of traditional knowledge in wetlands management is the interpretation signage at the wetlands in the park. These signs provide a welcome from the traditional owners of those sites. Before such signs are made, the Cultural Heritage Management Section consults with the relevant Traditional Owners to ask them what information they would like conveyed. Traditional Owners are also asked what stories can be told about their sites, and interpretation rangers then present this information in line with the Traditional Owners' requests.

6. Joint Fire Management – South Alligator Wetlands, Kakadu National Park, Northern Territory

(This case study was provided by the project coordinators and remains in their words)

This project ran from May until November in 2001 and uses traditional knowledge to conduct fires on the South Alligator wetlands. The aim of this project is to improve fire management to a level that Bininj and Parks Australia North are satisfied with and to have fire regimes more closely resemble traditional burning practices. The program also

provides an important avenue for participation and use of Aboriginal skills. It provides for the active passing on of cultural knowledge to younger members, repatriation to country and active participation in a key role in managing country. Flood plain management is one of the most important issues for Aboriginal people and it is vital that floodplain management occurs through continuing family visits to and use of this country.

Fire on the South Alligator plains. Photo by Greg Miles, Kakadu National Park .

An important part of the project includes a focus on intensive wetlands management in an effort to improve habitat for animals such as the Long Necked Turtle and Magpie Geese. This project importantly focused on native species. It involved progressive burning and various fire intensities to achieve a mosaic burn. This pattern of wetland burning is essential as only a mosaic burn can provide good habitat for a diversity of plants and animals in the wetlands. If the wetlands are left unattended then a mono-culture, such as native *Hymenachne*, can appear. An inundation of this grass offers no food diversity or areas free from grass for Turtles and Lilies. Wetlands need to be managed intensely to create a diverse range of foods for animals.

Feedback from other people who hunted in these areas was a good monitoring tool. People commented on how the burning allowed easier hunting. The area has always been productive, but now much more of the area could be hunted in and many turtles were harvested.

The project will begin again in March, 2002 (in Banggereng season), and finish in June. Projects like these are essential for maintaining Aboriginal culture as an ongoing way of life, and they need to be supported.

Case Studies – Participation by the Private Sector

1. Banrock Station - Australian Conservation Projects

Banrock Station Winery is located on a 1,700 hectare property in South Australia, on the floodplain of the River Murray. Two hundred and fifty hectares of the property are devoted to vineyards while the remainder is being rehabilitated, including 12 kilometres of river frontage and more than 400 hectares of wetland and floodplain area. Banrock Station employ 'state of the art' sustainable land management practices on their vineyards. The Station uses advanced trellising and soil conservation techniques, minimal chemical spraying programs and environmentally-friendly irrigation systems.

Banrock Station has also formed an alliance with the non-government organisation *Wetland Care Australia* to rehabilitate the wetlands on the property. An extensive revegetation program, restoration of the natural hydrological cycle to the wetlands on the property, and measures to reduce the number of invasive fish species present in the wetlands have been undertaken. In 1999 Banrock Station opened the *Wine and Wetland Centre*, overlooking one of the wetlands on the property. The Centre provides educational information on wetlands, viewing platforms and wine tastings for visitors to the property. A boardwalk has also been constructed to allow visitors to the centre to observe the wetlands with minimal disruption to the ecosystem, and documentation has now been prepared with a view to Ramsar nomination for the restored wetlands in 2002.

Following the successful restoration of the Banrock Station wetlands, the corporate owners of the wetlands, Hardy BRL Pty Ltd, decided to take the concept to the community. Banrock joined forces with Landcare Australia Limited in an initiative to direct part proceeds from the sale of wines to Landcare.

Landcare Australia is a very high profile conservation group with membership across all facets of society – farmers, landholders, city dwellers and conservationists who work closely together for the improvement of the environment.

These funds are used on a number of wetland conservation projects around Australia, including:

1. Conservation of the Coomanditchy Lagoon, in the Illawarra region of New South Wales coast, to save the remaining habitat of the Green and Golden Bell Frog;

2. Preservation of wetlands used by endangered migratory birds at Seaford, in Victoria;

3. Revegetation of the banks of the Eprapah Creek and surrounding bushland near Brisbane, QLD;

4. Regeneration of the Yellagonga Regional Park, in the suburbs north of Perth, WA, to counter the effects of population, feral animals and stormwater pollution;

5. Salvation and extension of the 6% of native vegetation remaining in the Marcollat Watercourse in the upper South East of South Australia;

6. Restoration of the banks of the River Murray at the Toolunka Flat and Reedy Creek sites; and

7. Restoration of the Mason Park Wetlands at Homebush Park in Sydney, NSW.

2. Revive Our Wetlands

The non-government organisation *Conservation Volunteers Australia* (CVA) together with the private mining and petroleum company *BHP-Billiton*, joined forces and established the Revive our Wetlands Project in 2001. Revive is the largest business-community partnership in Australia addressing the issue of wetland rehabilitation. The project aims to restore 100 wetlands throughout Australia over the next three years. The Revive project forms part of BHP-Billiton's strategy to ensure that communities in which the company operates directly benefit from its success.

BHP Billiton staff and local community at Tom Thumb Lagoon Port Kembla, NSW
Photo by Robynne Murphy, BHP Steel.

BHP-Billiton aim to contribute the equivalent of one per cent of the company's pre-tax profit to community development programs and partnerships, and through the Revive project, more than AUS$2.5 million will be provided to improve Australia's wetlands.

In the first year of the Revive partnership, 83 wetlands have been selected for rehabilitation in consultation with CVA, wetland consultants and local land management organisations. A wide-range of wetland types are being selected for rehabilitation, including inter-tidal wetlands, salt marshes, mangroves, desert lakes, floodplain and riverine wetlands, upland lakes, alpine bogs, and even significant constructed wetlands. Approximately 65% of the 83 wetlands selected to date are of international or national significance.

Long Neck Lagoon, Western Sydney – volunteers removing *Salvinia* infestation.
Photo by Nick Layne, Revive.

During the three year program, CVA will also train seven wetland environment officers and engage communities in locally based wetlands activities. Project teams will undertake a wide range of practical activities addressing wetland rehabilitation and protection, such as weed removal, access control, revegetation, seed collection, plant propagation, simple flora and fauna surveys and installation of interpretive signage. As of October 2001, volunteers involved in the Revive project have planted over 40,000 stems, collected 49 kilograms of seed, removed 120 hectares of weeds, conducted 30 flora and fauna surveys and built and maintained 22 kilometres of walking tracks.

Lake Dartmouth, QLD – Revive volunteers fencing to stop stock destruction of wetlands.
Photo by Chris Evenson, QPWS.

Case Studies – Integrated River Basin and Coastal Zone Management

1. The Gippsland Lakes Ramsar site, Victoria

The Gippsland Lakes are a group of coastal lagoons in eastern Victoria separated from the sea by sand dunes. They form the largest navigable inland waterway in Australia. These features create a distinctive regional landscape of wetlands and flat coastal plains which is of considerable environmental significance in terms of its landforms, vegetation and fauna. The lakes are fed by a number of river systems. The largest of the rivers are the Avon, Macalister, Thomson and LaTrobe Rivers (in the Lake Wellington catchment), and the Mitchell, Nicholson and Tambo Rivers (in the Lake King catchment). The system is linked to the sea by an artificial entrance opened in 1889.

In 1998, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) conducted an environmental audit of the Gippsland Lakes and concluded that the system was approaching a level of severe environmental damage that may be difficult to reverse. Long term changes in ecological character in the Gippsland Lakes are primarily attributed to changed water and salinity regimes associated with the permanent artificial entrance to the lakes from the sea and reduced water quality and quantity associated with changed land and water use in the catchment. In 1999, the Victorian Government made an election commitment to prepare a Gippsland Lakes Action Plan to tackle the increasing nutrient levels within the Lakes.

The Gippsland Coastal Board commissioned the CSIRO to undertake the Gippsland Lakes Environmental Study. CSIRO developed a water quality modelling tool that could be used to test potential engineering, technological and hydraulic solutions to the problem without expensive on-ground works.

The Gippsland Coastal Board prepared the Gippsland Lakes Coastal Action Plan in 1999 and it has since been endorsed by the Victorian Government. The plan establishes a strategic direction for the management of public and private coastal land around the Gippsland Lakes. It encompasses seven themes including (amongst others) water quality and quantity, environmental protection and natural resource management and planning scheme controls. Phosphorus loads in the Lakes resulting from sewage are being addressed under the plan. Gippsland Water is aiming to achieve a ten-fold decrease in phosphorous outputs from the sewerage treatment plants under its control. Sewage pumpout and slop hopper receptacles have been installed for boats to use and pit toilets around the Lakes are being replaced with composting toilets.

The Government has committed AUS$1.9m in 2000/2001 and a further AUS$1m in 2001/2002 under the Gippsland Lakes Rescue Package, which is a component of the Gippsland Lakes Action Plan. Funding from this is being dedicated to implement the Macalister River Irrigation District Nutrient Reduction Plan. This plan will reduce levels of nutrients entering the Lakes by increasing the efficiency of water and fertiliser use on farms.

A new Bulk Water Entitlement for the Thomson and Macalister Rivers will deliver greater environmental flows in summer which are expected to provide some benefit to the western part of the Gippsland Lakes. The entitlement will be reviewed in three years time to assess the effectiveness of environmental flows, taking advantage of the findings of the Gippsland Lakes Environmental Study.

The West and East Gippsland Catchment Management Authorities have obtained funding to undertake waterway management works including activities such as riparian vegetation protection and revegetation, willow removal and erosion control. Catchment Management Authorities (CMAs) were established in Victoria on 1 July 1997 with the aim of creating a whole of catchment approach to natural resource management. The primary goal of each CMA is to ensure the protection and restoration of land and water resources, the sustainable development of natural resources-based industries and the conservation of our natural and cultural heritage.

A new, high level Gippsland Lakes and Catchment Taskforce chaired by the Secretary of the Victorian Department of Natural Resources and Environment has been established to provide leadership on managing the Gippsland Lakes and their catchments and to take the findings of the Gippsland Lakes Environmental Study forward.

The Gippsland Lakes Environmental Study was completed in 2001. The key findings of the study show that:

- the improved health of the Gippsland Lakes will be best achieved through continued improvement in catchment management and nutrient reduction activities across public and private land. It is clear that algal blooms are related to nutrient inputs;
- increased freshwater would generally result in less improvement in water quality than similar effort in nutrient reduction. It's important to note, however, that freshwater flows are still critical for river health and in-stream values; and
- the findings on constructing a second ocean entrance to the Gippsland Lakes are not conclusive. While it is confirmed that salinity levels in Lake Victoria will increase as a result of a second entrance, it is unclear whether this would reduce blooms of blue-green algae in the Gippsland Lakes to acceptable levels. The study clearly indicates that the results from the modelling of the second entrance need further investigation and research.

More information on the Gippsland Lakes Environmental Study can be found at the Gippsland Coastal Board website at http://www.vcc.vic.gov.au/gcboard. The Gippsland Lakes Taskforce was established in 2001 to develop an overarching plan to provide a high level and integrated approach to the management of the Gippsland Lakes and their catchments in response to the findings of the study.

2. Intertidal wetlands in South Australia

The South Australian State Water Plan 2000 promotes the need to maintain connectivity between marine and freshwater systems essential for the healthy functioning of estuaries. Key actions under the Plan include:

- Developing an Estuaries Management Implementation Plan that establishes an agreed approach to the management of estuaries and articulates the roles and responsibilities of the community and local, State and the Commonwealth governments in planning and management; and
- Reviewing and, as appropriate, recommending revised legislation or other actions to support the agreed approach.

Under the Plan, the Coast and Marine Section of the Department of Environment and Heritage, mapped the intertidal wetlands of South Australia and is currently investigating whether these areas are adequately protected in the reserve system. The SA Coast Protection Board has also begun a review of all policies and legislation relevant to intertidal wetlands. From this review, the Board is proposing to write new strategies to ensure ecological information and integration is included in the revised strategies.

Case Study – Wetland Rehabilitation

1. Bicentennial Park Wetlands Rehabilitation, New South Wales

Bicentennial Park is situated at Homebush Bay, adjacent to the Sydney Olympics site and only 12 km from Sydney's central business district. Of its 100 hectares, almost 40 hectares are estuarine vegetation communities dominated by Grey Mangrove (*Avicennia marina*). This forms the largest contiguous wetland ecosystem in Sydney Harbour. Incorporating a mix of landfill, reclaimed land, industrial relics and contamination, as well as a large population of the endangered Green and Golden Bell Frog (*Litoria aurea*), the conservation of the Homebush Bay wetlands poses significant challenges.

A Scientific Advisory Committee was formed in 1998 to ensure that sound scientific advice, targeted research and monitoring informed management and restoration. Some research areas include catchment management, algal blooms, soil erosion, sedimentation, biodiversity, exotic species, fish migration, storm water, and landfill management.

A number of successful restoration and repair works have been undertaken, both in collaboration with specialised research institutions, and by staff and volunteers at the Park. These include management of pests and weeds, tidal restoration, and the monitoring of birds and water quality.

A pilot project in a four hectare area was undertaken which involved a process of restoring tidal exchange by simply clearing artificial barriers to tides. Pre- and post-modification monitoring show a seven-fold increase in tidal exchange, reduced mosquito numbers, and an increase in fish, crabs, and other fauna within the area. New growth on mangroves, prolific growth of saltmarsh vegetation in some elevated areas and altered vegetation cover has been accompanied by a noticeable change in community attitude towards these degraded wetlands.

After restoration, the abundance of mosquito larvae has been reduced to almost nil. No aerial spraying of mosquito control agents was required in the 12 months after introduction of tidal exchange, saving the New South Wales Government an estimated AUS$104,000 per annum.

Objective Three: Awareness Raising

Case Studies – Communication, Education and Public Awareness

1. The Wetlands Environmental Education Centre, New South Wales

The Wetlands Environmental Education Centre (EEC) is located within the grounds of the Wetlands Centre, on the edge of Hexham Swamp, one of the largest coastal wetlands in NSW. The Wetlands Centre is a 45-hectare park established as a community company in 1986, and is dedicated to the promotion of wetland values, conservation and sustainable ecosystem management through communication, education and public awareness.

The Wetlands Environmental Education Centre is one of 22 NSW Department of Education and Training (DET) Environmental Education Centres. This partnership has supported the EEC's development of a highly regarded and well-used wetlands education program for school students. In addition to the wetlands education program the EEC has also been involved in the development and delivery of environmental education generally in NSW. Currently four High School courses feature wetlands and require fieldwork in a local environment setting.

EEC Wetlands Education Program
Wetland education is delivered informally and formally through targeted programs. Informal education is achieved through marketing The Wetlands Centre as a community venue and meeting place. Community education programs include static displays, guided walks, monthly programs such canoe tours, twilight walks and breakfast with the birds, wetland-related education classes and annual events such as Catchment Day and World Wetlands Day. Wetland education is also achieved through hands-on involvement of community volunteers in all aspects of The Wetlands Centre's operations, especially site management.

The formal school program caters for students from Kindergarten through to Year 12 and offers a series of topics to cater for a range of ages and ability levels. The ability to deliver the program in a managed wetland ecosystem adds the critical dimension to the program. The programs focuses on wetland animals, wetland habitats, ecosystem values, functions and management.

The topics of the program and their focus and desired outcomes are listed below. All topics include presentations, displays, hands-on activities and direct experience of the natural environment. The program is supported with face-to-face staffing and up-to-date equipment.

Wetland Biodiversity:
Focus: Students are introduced to some of the many different plants and animals that are found in wetlands around the world, ranging from microscopic plants and animals to larger mammals.
Outcome: Students will have a greater awareness of the range of plants and animals that depend on wetlands and therefore a greater appreciation for the importance of wetlands.

Living in wetlands:
Focus: Students are taught that wetlands are made up of water, special soils, plants and animals. Each of these is always changing and they interact in different ways. Plants and animals that inhabit wetlands must adapt with this change.
Outcome: Students will have a better understanding of wetlands as a habitat type and how plants and animals adapt to its changing nature.

Wetlands as an ecosystem:
Focus: Students are taught that wetlands are found in many different places. There are many types of wetlands and they are all heavily influenced by their surrounding landscapes. They are one of the most dynamic ecosystems.
Outcome: Students will understand that wetlands are dynamic systems and that this is part of their unique value.

Wetland functions and values:
Focus: Students are shown that wetlands are important for many reasons. Their values include biodiversity, their storage of water and maintenance of water quality.
Outcome: Students will have a greater appreciation for the importance of wetlands through a better understanding of wetland values.

Managing for wetland values:
Focus: Students are shown how wetlands have been managed in the past and how they are being managed today at the local, state and national levels of government. They are introduced to national and international policies and agreements that relate to wetlands. The concept of managing for particular values is introduced and students investigate a local wetland case study.
Outcome: Students will have a greater understanding of the current status of wetland management locally, nationally and internationally.

2. Australian Wetlands Forum

A new focus for wetland interaction and discussion is emerging in the Australian Wetlands Forums (AWF), organised jointly by the Australian Society for Limnology, the Society for Wetland Scientists (Australia), Wetland Care Australia and the World Wide Fund for Nature (Australia).

The Australian Wetlands Forum No 2 was held at Moama, New South Wales in September 2001. This Forum built on the inaugural Australian Wetlands Forum, held in

Darwin in July 2000, which developed a Strategy to Stop and Reverse the Loss and Degradation of Australian Wetlands (see http://www.asl.org.au).

Discussion in 2001 sought to expand on the following components of the Strategy:

- seek adoption of adaptive management practices;
- motivate greater interaction and cooperation between key players to address information gaps; and
- develop longer term and holistic visions for wetland mitigation.

The AWF2 program comprised four keynote speeches which were followed by smaller group workshops on the issues raised in the speeches. The keynote presentations were:

- *The Critical Issues and a Framework for Long-Term and Credible Monitoring* by Anne Jensen, Wetland Care Australia;
- *Updating our Scientific Knowledge: Wetland Processes and Functions and Recommendations for Specific Research Priorities* by Terry Hillman, retired Director, Murray-Darling Freshwater Research Centre;
- *Mitigation and Adaptive Management: Approaches for Different Wetland Types and Solutions to Halt the Decline and Increase Information Exchange* by Neil Saintilan, Australian Catholic University, representing the Society of Wetland Scientists (Australia); and
- *Causes of Wetland Loss – A Story about Incentives* by Stuart Whitten, University of New South Wales.

Three critical issues were identified: preventing degradation; undertaking rehabilitation; and improving communication, particularly to private wetland owners.

Topics identified as needing further research were: ground and surface water interactions; nutrient cycling processes; and the need for diverse and flexible management approaches to allow for complexity and diversity.

Delegates agreed that a well-defined framework with clear objectives should be defined for a national wetland database and a standard format for wetland inventories. A valuable tool would be a standardised national on-line network of wetland monitoring (linked to objectives) which recognised the diversity of habitats and landscapes.

It was agreed in discussions that whilst it is simple to value an ecosystem service such as the provision of fresh water or to value large wetlands like Kakadu, it is very difficult to quantify more abstract values like beauty, wildlife and amenity. It was felt that ecologists can better identify and define values (inputs) and recognise that a change in inputs has effects on ecological character and values.

Key messages arising from AWF2 were the need to:

- protect remaining 'healthy' wetlands;
- target key groups such as landholders;
- define clear management objectives and monitor progress in achieving them;
- develop community based and scientifically valid monitoring protocols;
- develop partnerships among community, managers and scientists;
- lobby for funding to research key wetland information gaps; and
- find one or more icon species to use to promote wetland conservation.

An official report on the findings of the second Australian Wetlands Forum will be posted on the websites of the host organisations. The Third Australian Wetlands Forum will be held in the Margaret River region of Western Australia in late September 2002.

3. Great Barrier Reef Education Centre, Queensland

Reef Headquarters (Reef HQ) is the Education Centre for the Great Barrier Reef Marine Park Authority, Queensland and is the largest living coral reef aquarium in the world. Since 1997 Reef HQ has developed and implemented a range of educational programs, with input from representatives of scientific and educational organisations.

School students inside Reef HQ. Photo by GBRMPA

In 1998, Reef HQ commenced an innovative multimedia education program for teachers and students in Townsville, Queensland. A comprehensive program of materials was developed for teachers in marine education for the early, middle and senior years of schooling. The programs encourage students to:

- investigate the relationship between aquatic ecosystems in natural and built environments;
- develop an understanding of the interrelationships within environments and societies;
- develop an appreciation of marine diversity and the fragility of the natural environment;
- adopt ecologically sustainable lifestyles, and most importantly, encourage students to take action for the environment, particularly its marine resources; and
- take action for marine pressures on local, regional and global scales resulting in a greater understanding and empowering them to make responsible decisions.

Developing educational programs and resources involves working within structures and frameworks familiar to the school setting. Reef HQ education resources are explicitly designed for integration into the required areas of study in the curriculum, particularly the Queensland syllabus documentation and National Curriculum Guidelines.

Reef HQ also holds the Living Classroom, Reef Play, Reef-VIDEOLINQ, and Science by the Sea programs which target students in early childhood through to high school.

The Living Classroom programs include a visit to Reef HQ for a reef experience and embrace a number of individualised learning opportunities including:

- exploratory learning, based on students' observations and research in collecting and sorting information;
- understanding the functioning and behaviour of living things in response to variations in their environments; and
- drawing conclusions and communicating ideas.

The Reef-VIDEOLINQ program builds on the Living Classroom program and provides learning opportunities for those who cannot visit Reef HQ in Townsville. Reef-VIDEOLINQ is comprised of two modules. They are:

Module 1 – The Living Reef (Upper Primary)
The Living Reef module runs for five weeks with activities in the classroom before and after an initial videoconference. The purpose of this module is for students to develop, through experimentation, a suitable filtration system for the Coral Reef Exhibit. This module enables students to:

- investigate the ecosystem of a coral reef;
- develop an understanding of adaptations made for a reef on land in the Coral Reef Exhibit at Reef HQ;
- work collaboratively to problem solve and define issues, gather and present information; and
- explore the delicate ecology of the food web and devise innovative ideas to maintain a healthy reef equilibrium.

Module 2 – Managing the Great Barrier Reef (Secondary)
This module runs for three weeks. The program stimulates students to explore the needs and wants of the main reef user groups and initiates discussion on how the user groups' requirements can best be achieved. Students are required to create solutions to external pressures, such as not being able to control what enters the marine environment from the terrestrial environment and debate why an area should be zoned in a particular way. This encourages discussion of values and perspectives, leading to the development of a range of concepts, understandings and skills for a sustainable world environment and society.
This module enables students to:

- use role play to explore the complexities of zoning a fictitious section of the Great Barrier Reef Marine Park;
- work collaboratively and use issue-based learning to identify and define issues, gather and present information;
- investigate ideas related to ecological sustainability;
- explore innovative ways the reef can be managed and conserved by communities, industries, organisations and schools; and
- decide on actions that can be taken to manage the reef sustainability.

Science by the Sea is an after-school program, which explores the relationship between science and the reef. It embraces elements of ecology, biotechnology, animal husbandry and marine science in a practical and interactive setting. This program challenge students to:

- understand and appreciate the delicate nature of the marine ecosystem;
- develop an understanding of some of the complex interactions that exist both in the ocean and at Reef HQ; and
- interact with a range of people in the marine industry and access the latest information about marine issues.

The Great Barrier Reef Marine Park Authority's education programs will continue to encourage the exploration of choices – they will analyse with students why certain choices are made, what assumptions are taken for granted in making them and what values lie behind the choices. The direction in Reef HQ Education for the future includes continued program and resource development that supports the Great Barrier Reef Marine Park Authority's focus on marine management and conservation.

Inside the living coral reef aquarium, Reef HQ. Photo by GBRMPA

Objective Four: Reinforcing Capacity

Case Studies – Research, Education and Training

1. National Centre for Tropical Wetland Research

The National Centre for Tropical Wetland Research (NCTWR), based in Darwin in the Northern Territory, is an initiative of the Commonwealth Government of Australia. It is a collaborative venture between the Environmental Research Institute of the Supervising Scientist (eriss), James Cook University, Northern Territory University and the University of Western Australia. A Board of Management with an independent Chair, and an Advisory Committee drawn from relevant community, government and industry groups guide the direction of the Centre.

The NCTWR aims to promote the wise use of wetlands. This aim is supported by comprehensive training and research programs and an emphasis on effective consultation with stakeholders. Training directions encompass formal and academic programs (with formal accreditation) as well as informal and field-based training, with specific short courses for researchers, managers, owners and users of tropical wetlands.

To encourage the wise use of tropical wetlands the NCTWR is committed to:

- developing procedures and standards to survey and monitor tropical wetlands;
- assessing risks to tropical wetlands by potentially adverse activities such as pollution and introduced species;
- promoting sustainable development of wetland resources within catchments and through adaptive management practices;
- developing an understanding of the primary determinants regulating the physical, chemical, and biological variables of wetlands;
- working with national agencies and international conventions that contribute to the global conservation of tropical wetlands;
- fostering greater responsibility for wetlands through environmental education and awareness;
- adopting a pragmatic and people orientated approach to wetland conservation; and
- developing training courses for wetland users, managers and scientists.

The NCTWR has established itself as an important focal point for wetland management and training in northern Australia. The NCTWR university partners deliver formal wetland-related courses at undergraduate and postgraduate levels. The Northern Territory University also administers the Asia Pacific Wetland Managers Training Program (refer to Objective Seven).

The NCTWR encourages and supports visits to northern Australia by wetland students, managers and scientists; and hosts and supports conferences, workshops and seminars which attract national and overseas leaders in the field of wetland management and research.

2. Shorebird Managers Training Workshop

The East Asian-Australasian Shorebird Site Network has 29 sites, across 9 countries, 11 of which are in Australia. The Australian and New Zealand site managers identified the need for further training and an inaugural shorebird managers training workshop was held during World Wetlands Week, 2001. The workshop was conducted by Environment Australia and held in Victoria.

The workshop objectives were to:

- provide training for site management staff on the conservation and management of shorebirds and their habitat;
- enable staff to gain a better understanding of the Shorebird Site Network and international conservation activities for migratory shorebirds; and
- develop cooperative links between staff at Network sites.

The workshop was attended by representatives of the 11 Australian and two New Zealand Network sites. Site managers shared information on network sites and participated in sessions on shorebird biology, site management, the Shorebird Action Plan and new Australian legislation for migratory shorebirds. Topics covered included life histories of migratory shorebirds, flyway routes, protection of the birds and their habitat and threats to their survival. Resourcing and raising of public awareness were issues common to many sites.

A network certificate presentation ceremony was held during the course to acknowledge the inclusion of the sites in the network and to commend site manager's contributions to the protection of migratory shorebirds. Participants reported that the workshop was very motivating and that it met the stated objectives.

Australian and New Zealand shorebird site managers at certificate presentation ceremony. Photo by Doug Watkins, Wetlands International - Oceania.

Objective Five: Conservation and Management of Ramsar Wetlands

Case Studies – Ramsar Management Plans and Actions

1. Victoria's Ramsar wetlands

The management objectives for Victoria's Ramsar wetlands, as set out in the 'Management of Victoria's Ramsar Wetlands Draft Strategic Directions Statement', are as follows:

1. Maintain or seek to restore appropriate water regimes,
2. Address adverse processes and activities,
3. Manage within an integrated catchment management framework,
4. Manage resource utilisation on a sustainable basis,
5. Protect, and where appropriate enhance, ecosystem processes, habitats and species,
6. Encourage strong partnerships between relevant agencies,
7. Promote community awareness and understanding, and provide opportunities for involvement in management,
8. Ensure recreational use is consistent with the protection of natural and cultural values,
9. Increase the scientific understanding of wetland ecosystems and their management requirements,
10. Develop ongoing consistent programs to monitor ecological character.

Strategic Management Plans for each individual Ramsar site will translate these objectives to the site level. Reference committees have been convened at each Ramsar site to assist with the development of the management plans. Key stakeholders from government and the community are represented on these committees.

In addition, Ramsar sites and their values are recognised in a range of strategies and plans currently being implemented. These include catchment strategies, coastal action plans, water bulk entitlement processes, the Victorian Planning Provisions and local government planning schemes and management plans for National Parks, conservation reserves and State forests within Ramsar sites. The new Ramsar management plans will support positive actions already taking place under other planning frameworks.

Significant measures that are currently being implemented to maintain the ecological character of individual Ramsar sites are outlined overleaf.

Ramsar site	Significant actions to maintain ecological character
Corner Inlet	• The 'Corner Inlet Ramsar Site Draft Strategic Management Plan' was released for public comment in February 2001. • Government support has been announced in 2001 for a new marine national park of 4150 hectares. • Seagrass mapping was completed in 1998. • Ecological vegetation class mapping at 1:25,000 was completed for all terrestrial areas in Corner Inlet Ramsar site and catchment in 1999. • Parks Victoria continued to implement an ongoing Spartina control program. • A report on Corner Inlet fish Habitats was completed in 1998. It provides an assessment of the condition of Corner Inlet fish habitats to assist in defining research directions and management actions needed to ensure suitable utilisation of Corner Inlet's fish resources. • Community water quality monitoring program for Corner Inlet catchment, in its fifth year, recently extended to waters in Corner Inlet. The project is developing baseline information on water quality for streams feeding into Corner Inlet and the inlet itself and promoting public awareness of water quality issues locally.
Port Phillip Bay (Western Shoreline) and Bellarine Peninsula	• Government support was announced in 2001 for the incorporation of the Swan Bay and Mud Islands Fisheries Reserves into a new Port Phillip Heads Marine National Park and for an additional area of the Ramsar site at Point Cook to be protected in the Point Cook Marine Sanctuary. • The 'Western Treatment Plant and The Spit Nature Conservation Reserve Conservation Management Action Plan' was completed in 2000. Implementation is underway. • Melbourne Water completed the 'Little River-Beacon Point Shorebird Study - Pilot Study' in 2000. The purpose of the study was to conduct a pilot investigation into the relationship between intertidal shorebird abundance, intertidal invertebrate abundance and nutrients. The study was commissioned in response to a requirement by the Environment Protection Authority for Melbourne Water to decrease nutrient discharge levels to Port Phillip Bay by 2005. The study recommended implementation of shorebird monitoring at the Western Treatment Plant and adjacent areas in the Bay. A waterfowl and migratory wader monitoring program was designed and implementation commenced in late 2000.
Barmah Forest	• A previous environmental water allocation of 50GL a year high security water and new environmental water allocation of 25GL a year low security water were established in a water bulk entitlement. These amounts are matched by entitlements from New South Wales to water the Barmah-Millewa Forest (see case study 'River Murray Environmental Water Allocations', page 12). • The Barmah-Millewa Forest Water Management Strategy was completed in June 2000. Operating rules and triggers were also agreed to guide the use of the environmental water allocation. • The second and largest use of the Barmah-Millewa environmental water allocation commenced in October 2000 to prolong biological processes

	stimulated by natural flooding. • Water control, road and bridge work has been undertaken to facilitate management of water flows. • A review of the 1992 interim watering strategy for Barmah Forest has commenced to finalise a detailed plan for water management in the forest. • The Proposed Forest Management Plan for the Mid-Murray Forest Management Area, released by the Department of Natural Resources and Environment in 2001 for public comment, covers Barmah Forest The plan provides for the balanced use and care of State forest in the Ramsar site in accordance with the Victorian government's approach to sustainable forest management.
Gippsland Lakes	• The 'Gippsland Lakes Ramsar Site Draft Strategic Management Plan' was released for public comment in February 2002. • An environmental audit of the Gippsland Lakes was completed in 1998. This audit indicated that the wetland system, particularly Lake Wellington, was approaching a level of severe environmental damage that may be difficult to reverse. The decline in ecological health was attributed to excessive levels of nutrients, the increasing volume of salt water coming into the lake since the artificial entrance to the sea was constructed in 1889 and reduced volumes of water coming into Lake Wellington from the Thomson, Macalister and Latrobe Rivers, limiting the flushing of the system. • The Gippsland Lakes Coastal Action Plan was approved in 1999 and implementation funding was allocated over three years. The Gippsland Lakes Environmental Study was a key project funded. Other projects include boat sewage pumpout systems and provision of composting toilets in remote locations to address water quality issues and preparation of several foreshore management plans. The gazettal of the Gippsland Lakes Reserve has also been funded to implement recommendations by the former Land Conservation Council of Victoria in 1983. • The Gippsland Lakes Environmental Study : Water Quality Modelling Project was completed in 2001. The study found that catchment nutrients were the most important factor contributing to toxic blue-green algal blooms. • A Nutrient Reduction Plan for the Macalister Irrigation District was completed in 1998 to achieve a 40% nutrient reduction from irrigation drains in the Gippsland Lakes catchment by 2005 in accordance with Schedule F5 to the State Environment Protection Policy: Waters of Victoria. An implementation plan was completed in 2000 and is being funded under the Gippsland Lakes Rescue Package. Implementation measures include reducing runoff and recharge from irrigated agriculture through improved water use efficiency, keeping nutrients and water on farms through irrigation and fertiliser best management practices, increased spray irrigation, tailwater reuse and intercepting water in irrigation drains before it enters waterways. • Government announced the Gippsland Lakes Rescue funding package of AUS$1.9 million in 2000/2001 and a further AUS$1million in 2001/2002. Key elements of the package include: resolution of the Thomson water sharing arrangements; increases in environmental flows to the Thomson and Macalister rivers; funding to implement the Macalister Irrigation District Nutrient

	Reduction Plan and establishment of a Gippsland Lakes Co-ordinating Group. • The Gippsland Lakes Co-ordinating Group was established in 2000. The Gippsland Lakes Taskforce, a high-level task force with representation from executives of key agencies, was also been established in 2001 to advise the Government on the response to the Gippsland Lakes Environmental Study. • The Gippsland Coastal Board has released the "Draft Integrated Planning for Gippsland - Coastal Action Plan" for public comment. This Coastal Action Plan deals specifically with coastal policy and proposes amendments to local Government planning schemes to improve consistent planning and to achieve integrated decision making. • Stage 1 of a two-stage project was completed in 1998 to improve the water quality of Macleod Morass, provide more flexibility for managing hydrology in the morass and enable compliance with water quality standards required by the Environment Protection Authority. Stage 2 is currently underway. The project involves developing a constructed wetland in Macleod Morass to further treat wastewater discharged into the lower parts of the Morass from the Bairnsdale Wastewater Treatment Plant. The level of treatment at the plant has also been upgraded. • Review and updating of the 1997 Lake Wellington Wetlands Draft Management Plan has commenced. A management plan for Macleod Morass has been initiated. • Seagrass mapping was completed in 1997.
Gunbower Forest	• A scoping study was completed in 2001 to identify ecological values and examine environmental water management requirements and options. A water management plan has commenced. • Use was made of a small environmental water allocation of 1,500 ML in 2000 to water Reedy Lagoon and Black Swamp in Gunbower Forest. • The Proposed Forest Management Plan for the Mid-Murray Forest Management Area, released by the Department of Natural Resources and Environment in 2001 for public comment, covers Gunbower Forest The plan provides for the balanced use and care of State forest within the Ramsar site in accordance with the Victorian Government's approach to sustainable forest management. • A new, low security environmental water entitlement was established of 25 GL to be used, on average, one year in three and of 40GL to be used one year in twelve.
Kerang Wetlands	• A previous 27.6 GL environmental water allocation was established as a Bulk Entitlement in 1999. • The program to allocate the environmental water to wetlands each year continued. The program allocates water in accordance with water management plans, giving priority to Ramsar wetlands, including the Kerang Wetlands. Environmental water allocations were used in Johnsons Swamp in 1999, Cullens Lake and Johnsons Swamp in 2000. • Water management plans were completed in 2000 and 2001 for Cullens Lake, Cemetery Swamp, the Reedy Lakes and Hirds Swamp. • A consultative high level steering committee was established in 2000 to develop a coordinated wetland planning framework for the Ramsar and other wetlands in

	the Kerang area. The purpose of the framework is to address competing requirements in relation to major initiatives and management requirements in the Kerang area, including environmental protection, water for agricultural development, irrigation system management, water savings and floodplain management. A project was commenced in 2001 to coordinate wetland priorities in relation to these demands. • A major wetland habitat restoration program was commenced at Hirds Swamp in 2000 following wildfire in December 1999, with AUS$200,000 being spent over two years. Water control structures have also been completed at Hirds Swamp to improve flushing capacity. • Environmental impact assessment of future management options for Lake Tutchewop, Lake Kelly, Little Lake Kelly and Lake William was completed in 2000. New management arrangements were agreed for Lake Tutchewop, Lake Kelly, Little Lake Kelly and Lake William to control rising salinity levels and optimise habitat values in these lakes which are used as saline evaporation basins. Negotiations are underway to attract private investment in salt harvesting as a means of removing excess salt from these lakes.
Western District Lakes	• The Western District Lakes Ramsar Site Draft Strategic Management Plan was released for public comment in February 2001. • Major habitat restoration works were undertaken in 1999 - 2001. These included the protection and rehabilitation of 60 kilometres of Ramsar wetland frontages through fencing, revegetation with approximately 60,000 Indigenous species propagated from locally collected seed and the implementation of appropriate livestock grazing regimes. • A research project on the ecology and conservation of the endangered Corangamite Water Skink has been accepted as the basis for conservation actions now being implemented by the National Recovery Team for the species. Half the known occurrence of the species is on the shores of Western District Lakes Ramsar wetlands. Priority actions for each of the known populations have been identified and agencies are working with landholders to implement these. • An ongoing program to control pest plants and animals such as Boxthorn and Rabbits has continued, with areas around Lakes Cundare, Corangamite and Gnarpurt being targeted. • A program has been undertaken to conserve and enhance populations of Spiny Peppercress and to reintroduce it to sites where it formerly occurred. The plant is endangered in Victoria and threatened nationally and occurs in the Western District Lakes Ramsar site. • A program has been completed to control erosion and to reduce harbour for Rabbits at Lake Colongulac. • A web site is currently being developed to provide information on wetlands in the Corangamite region, including the Western District Lakes. • The Corangamite Catchment Management Authority launched a ten-year, AUS$3.8 million plan to implement the Draft Corangamite Waterway Health Strategy. The strategy aims to improve the condition of waterways in the region. Key recommendations will benefit the Western District Lakes Ramsar

	wetlands. These include re-establishing appropriate flow regimes to significant wetlands and a major study of wetlands to provide a region-wide inventory on the condition, values and threats of wetlands. • All the Western District Lakes Ramsar sites are now included in environmental significance overlays that have been developed by Local Shire councils in liaison with the Department of Natural Resources and Environment.
Hattah-Kulkyne Lakes	• A Greencorps volunteer project was undertaken in 2000 to revegetate lake margins and set up monitoring plots in the lakes where European Carp are excluded. The aim of the monitoring is to examine the effect of Carp exclusion on macrophyte establishment. • A steering committee has been convened to oversee a water modelling plan for the lakes to examine options for use of environmental water. The committee prepared a project plan in 2001 as the basis for engaging a contractor to develop the modelling plan. • An environmental action plan is under development for Hattah-Kulkyne National Park to outline works to be undertaken over the next three years, including at the Hattah-Kulkyne Lakes.
Lake Albacutya	• A report on eco-hydrological change at Lake Albacutya and other terminal wetlands of the Wimmera River in Wyperfeld National Park has been completed by Parks Victoria to provide a basis for negotiating favourable outcomes for Lake Albacutya and Wyperfeld National Park in water allocation forums. • In May 2001, NRE commenced the bulk entitlement process for the Wimmera and Glenelg Rivers. This will include hydrological modelling for the Wimmera system, including Lake Albacutya. An environmental water allocation of 35,000 ML will be established for the Wimmera and Glenelg River systems but may not benefit Lake Albacutya as the system is significantly overcommitted. Further options have been proposed for making water savings in the Wimmera system by piping the remainder of an open channel system that supplies stock and domestic water. This proposal is being considered by government.
Western Port	• Government support was announced in 2001 for three new marine national parks of 930, 2,700 and 675 hectares. • State Environment Protection Policy (The Waters of Westem Port Bay and Catchment) (1979) is currently under review, a draft was released in May 2000 for public comment. The policy is expected to be finalised late in 2001. Restoration of Western Port's seagrass and mangroves are a key objective of the draft policy. • The Action Westernport Conference was held in May 1999. It set the scene for a broad based and cooperative push for regional catchment improvements. • The Western Port Action+ Program has been initiated to protect Western Port and its catchment by fostering stakeholder understanding, involvement and ownership of strategic and practical environment protection and improvement measures. • A Western Port Seagrass Planning Group was formed in late 1999. • In 1999 a report on Western Port Seagrass Restoration was completed. The report was commissioned by the Victorian Environmental Protection Agency to investigate the possibility of promoting seagrass recolonisation within Western

	Port through a program of restoration. Extensive decline of seagrass and macroalgae occurred between 1974 and 1984. • Melbourne Water is leading a three year project: 'Determining the Sources of sediment and Associated Nutrients Delivered To Western Port Bay'. The project started in 2000 and aims to determine major sources of sediment, and sediment-bound nutrients delivered to Western Port. • The Department of Natural Resources and Environment is implementing a long-term saltmarsh and mangrove monitoring program for Western Port to ensure that the marine and coastal environment in Western Port is managed in an ecologically sustainable manner. The project has the objectives to assist in developing measures for monitoring the ecological status of saltmarsh and mangroves and to determine rates of change in saltmarsh and mangrove communities potentially related to threatening processes. • A three year baseline study is in progress to provide quantitative data on the structure of vegetation units and changes in rates of sedimentation and surface elevation within mangrove and saltmarsh habitats. The 'Mangrove and Saltmarsh Monitoring in Westernport Bay: A Progress Report' was completed in 2001. • A literature review of saltmarsh and mangrove vegetation in Western Port was published in May 2000. • A project is currently underway to investigate the use of satellite imagery as a cost effective tool to map the saltmarsh and mangrove habitats. • Seagrass mapping in Western Port was completed in 2001. • A report was completed in 1998 on Western Port fish habitat. The report provides an assessment of the condition of Western Port fish habitats to assist in defining research directions and management actions needed to ensure suitable utilisation of fish resources.

2. The Macquarie Marshes, New South Wales

The Macquarie Marshes are located in NSW on the lower reaches of the Macquarie River. The Macquarie River rises on the western slopes of the Great Dividing Range and breaks into the many streams that form the Macquarie Marshes on the plains north of Warren. The Macquarie River was one of the most variable rivers in the Murray-Darling Basin before the construction of Burrendong and Windermere dams. Dams and the extraction of water to support irrigated agriculture have altered flows to the Marshes. It has been estimated that the total area of the Marshes has been reduced by 40 – 50%. The Marshes have been important for grazing of stock for over a hundred years.

The Marshes are a complex system of braided swamps, lagoons, channels and floodplain inundated by flooding from the Lower Macquarie River and its distributary streams. Inflows can occur at any time of year and are highly variable in size and duration. The Marshes incorporate extensive areas of reed swamp, River Red Gum woodland and

Water Couch grasslands. These provide important habitat for many species of flora and fauna, particularly large numbers of colonial waterbirds, and migratory species.

The Macquarie Marshes Ramsar Site is within the wider Marshes, on both private and public land. It comprises about 10% of the total area of the Marshes. The components are the Wilgara Wetland and the Macquarie Marshes Nature Reserve. The Nature Reserve was listed under the Convention on Wetlands (Ramsar, Iran, 1971), in 1986 and the Wilgara Wetland was added in 1999. The criteria for which the Marshes were listed include importance for:

- representativeness;
- threatened species and ecological community habitat;
- maintaining biological diversity;
- species at a critical stage in their life cycle; and
- waterbird numbers.

Wilgara Wetland, part of the Macquarie Marshes Ramsar Site. Photo by Wetlands Ssection, Environment Australia.

Management of the Macquarie Marshes Ramsar Site

The Macquarie Marshes Nature Reserve is managed by the National Parks and Wildlife Service on behalf of the Government of NSW.

The landholders with management responsibility for the Wilgara Wetland are the Fisher family. They have owned the property, Wilgara, since 1909, and agreed to list 583 hectares of wetland under the Convention on Wetlands in September 1999.

They have worked closely with the National Parks and Wildlife Service (NPWS), other agencies and other landholders to protect the Marshes. A Memorandum of Understanding was entered into between the Wilgara property owners, the NSW NPWS (as landholder for the Macquarie Marshes Nature Reserve), the Commonwealth Government, the NSW Government, the World Wide Fund for Nature and the National Parks Association to state the commitment of all signatories to the better conservation and wise use of the Macquarie Marshes Ramsar site.

Management Framework
Consultation between the Commonwealth and NSW Governments, agencies, landholders, and conservation groups lead to the adoption of an integrated planning approach to prepare the Ramsar management framework for the Macquarie Marshes Ramsar Site.

This allowed a diverse range of plans such as catchment plans, river management plans, vegetation plans, local environment plans and other relevant documents and processes to be taken into account as part of an integrated catchment-based approach to managing the Ramsar site. It also takes into account the diverse management arrangements across tenures, and acknowledges the planning context within which the Wilgara Individual Property Management Plan and the Nature Reserve Plan of Management operate.

The management framework represents a living document because the process of natural resource management in NSW; the implementation of the EPBC Act and the development of bilateral agreements between the states, is constantly evolving. These evolving requirements can be addressed when required, or when the Individual Property Management Plan and the framework are reviewed in five years.

Individual Property Management Plan.
The Wilgara Wetland meets the criteria for Ramsar listing with current agricultural management practices in place. The Individual Property Management Plan was designed to document the existing situation on the Ramsar site, and set in place actions to ensure that the health of the wetland is maintained.

Documentation of the existing situation and actions were based on the Principles for Management and Co-operation in the Memorandum of Understanding (MoU, 1999). The agreed principles are shown below. Options for actions may include no action, limited action or active management.

The Individual Property Management Plan and the Macquarie Marshes Management Framework together address the Australia Ramsar Management Principles as required under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999*.

Agreed management principles for Wilgara Wetland:

1. Water sharing and management: To strive to return to a more natural flooding regime for the wetlands, while acknowledging the essential need for water for stock and domestic use.

2. Water quality: to preserve water quality, by minimising contamination from pesticides and other chemicals.

3. Grazing management: to maintain stocking rates which achieve a balance between available feed and the productivity of animals, with a view to preserving native pastures.

4. Wildlife conservation: to manage livestock with regard for birds and other wetland-dependent biodiversity.

5. Vegetation management: to maintain and restore wetland vegetation, by excluding cultivation from Ramsar listed areas.

6. Feral and exotic species: to control exotic species and eradicate them where possible.

7. Monitoring and research: to undertake appropriate and relevant monitoring programs (eg. water volumes and quality, bird numbers and species, vegetation responses). These programs must be understood and agreed by all signatories, and the information shared.

8. Education and awareness: to share all information with signatories and other stakeholders.

9. Ramsar cooperation: to ensure that all decisions regarding the management of the wetlands are made with the full understanding and support of the landholders.

3. New East Asian-Australasian Shorebird Site Network Listings, Victoria

The East Asian-Australasian Shorebird Site Network is a network of internationally important sites for migratory shorebirds in the East Asian-Australasian Flyway (see case study 'Asia Pacific Migratory Waterbird Conservation Initiative', page 85). It was initiated under the 'Asia Pacific Migratory Waterbird Conservation Strategy' and was launched at the 1996 Ramsar Conference in Brisbane (CoP6).

The establishment of a shorebird network is now a key action of the 'Action Plan for the Conservation of Migratory Shorebirds in the East Asian-Australasian Flyway: 2001-2005', which comes under the revised 'Asia Pacific migratory Waterbird Strategy: 2001-2005'. The goal of the network is to ensure the long-term conservation of migratory

shorebirds in the East Asian-Australasian Flyway through recognition and appropriate management of network sites.

Victoria now has three of Australia's eleven shorebird sites - Western Port and Port Phillip Bay (Western Shoreline) and Bellarine Peninsula, added in October 2000, and the Corner Inlet Ramsar, one of the original 19 sites put forward at the Network launch in 1996. The addition of sites to the shorebird site network is one of the priorities relating to wetlands in Victoria's Biodiversity Strategy (see case study 'Victoria's Biodiversity Strategy', page 14).

Victoria's three sites are among the most significant for shorebirds in Victoria. Corner Inlet is the most southerly marine embayment and tidal mudflat system of mainland Australia. The inlet regularly supports over 20% of the total known Victorian wader population and an estimated 50% of the overwintering Victorian population of migratory wader species. Western Port is a large bay incorporating 270 square kilometres of tidal mudflats. There are a wide variety of habitat types, ranging through deep channels, seagrass flats, extensive mangrove thickets and saltmarsh vegetation. It is of national zoological significance for its foraging areas and high tide roosts for migratory shorebirds. Port Phillip Bay (Western Shoreline) and Bellarine Peninsula includes a variety of wetland types including intertidal mudflat, seagrass bed, saltmarsh, shallow marine waters, seasonal freshwater swamp, saltworks and extensive sewage ponds. The site provides habitat for high densities of migratory shorebirds, and the largest numbers known for Victoria.

Victoria is committed to protecting the values of these internationally important shorebird sites. Victoria's three shorebird sites are also listed as Ramsar sites and management strategies to protect shorebird values are being incorporated into Ramsar site strategic management plans.

Case Studies – Monitoring Ecological Character

1. Waterbird Breeding in the Macquarie Marshes Ramsar Site, New South Wales

The investigation into the response of colonial waterbirds to water flows within the Macquarie Marshes is a joint project between the Macquarie Marshes Catchment Committee (MMCC) and the NSW National Parks and Wildlife Service, with funds provided by the Natural Heritage Trust. The objective of this project is to measure the impacts of changing water regimes on the breeding of colonial waterbirds in the Macquarie Marshes. This project uses data collected over the past fourteen years to link water flows to breeding events. The project also aims to measure the reproductive success of waterbirds in the Macquarie Marshes and to provide an adaptive management framework for decision-making on environmental flows for the entire river system. This aim includes the following objectives, which are elaborated below:

- Identify key waterbird breeding sites (past and present)
- Determine a sound method for monitoring waterbird breeding
- Determine breeding waterbird movements
- Further examine and model relationships between breeding waterbirds and varying water regimes

Nesting sites, Macquarie Marshes Ramsar site. Photo by Wetlands Section, Environment Australia.

The project aims to ensure that current and future water management regimes provide for the ecological sustainability of the Macquarie Marshes. The project also aims to provide

information to assist in the adaptive management of the Wildlife Allocation (WLA) for the Macquarie Marshes, and on a broader scale to provide information and methodologies applicable and relevant to other river and wetland areas throughout NSW and Australia. The project aims are strongly based on the goals and actions of the Macquarie Marshes Land and Water Management Plan and the Macquarie Marshes Water Management Plan 1996. The project is currently in its second year and completion is expected in 2002.

- **Objective: Identification of waterbird breeding sites (past and present)**

Previous studies have shown how changing water regimes, through regulation of the Macquarie River, have a detrimental affect on breeding waterbird populations.

Nesting site, Macquarie Marshes Ramsar site. Photo by Wetlands Section, Environment Australia.

Identification of breeding sites has assisted in understanding the habitat requirements of breeding colonial waterbirds and further contributes to the understanding of the effects of changing water regimes.

Oral histories of past and present landholders and community members of the Macquarie Marshes were taken with the aim of establishing past and present waterbird breeding sites. Information about past waterbird breeding sites was also found on county maps that dated back to the early half of the twentieth century. Present waterbird breeding sites were identified through information provided by current landholders, existing data and helicopter surveys during the breeding season. These breeding sites have been recorded using Global Positioning System (GPS) co-ordinates and placed on maps.

- **Objective: Develop a method for monitoring waterbird breeding**

Successful management of river systems is dependent on good information of the ecological responses. In the past, methodologies for collection of waterbird breeding data have seldom been standardised or described. An important aim for this project was to

develop a repeatable and rigorous method for collecting data on the breeding of waterbirds. Rapid techniques that can cater for large breeding events are essential. Data has been collected over 14 years (1986-2000) for 10 colonial nesting waterbird species: Intermediate Egret, Great Egret, Cattle Egret, Little Egret, Straw-necked Ibis, White Ibis, Glossy Ibis, Rufous Night Heron, Little Pied Cormorant and Little Black Cormorant. The following methodology was developed for data collection in the 1999/00 and 2000/01 breeding season.

Helicopter surveys were undertaken at the beginning of each breeding season to assess the spatial distribution of colonies and spread of water. Initial helicopter surveys also assist in providing an initial estimate of breeding numbers. The positions of active colonies were recorded using latitude and longitude coordinates. As were satellite colonies (colonies < 2,000 breeding pairs) and their approximate sizes. The stage of the breeding (eg. nests without eggs or nests with eggs) was also recorded to ensure that the birds would not be disturbed too early by entering the colonies on foot , and to establish the breeding start date. Approximately three helicopter surveys are conducted throughout a breeding season to continually monitor the growth or reduction in breeding colonies and bird numbers. Helicopter surveys also assist in monitoring flood extent.

Once colonies were established the accessible colonies were then set up for data collection. The following steps were undertaken:

- A general survey of the colony to get an idea of the general distribution and composition of the colony;
- Random numbers were allocated and a percentage of the colony was selected for data collection;
- An initial count of every visible nest to ascertain colony size;
- Each colony was visited weekly to collect data on egg and hatchling development. Photography was used to minimise the time spent in the colony, minimising the time the eggs were exposed to heat and predators;

Each nest was visited and photographed once per week until the chicks were mobile and no longer remained in their nests;

After the breeding season was completed the photographs were then used to monitor changes in nest composition. Each nest was numbered and the number of eggs and chicks were recorded for each visit.

Data collected (nest numbers, breeding success) from the last two years has further supported previous work. Using the data collected in the last two breeding seasons and prior to this project, predictive models are being developed to assist in the prediction of possible breeding waterbird numbers. It is anticipated that these models will assist in the delivery of the Macquarie Marshes Wildlife Allocation. The last two years of data collection have shown that numbers of breeding birds and their reproductive success are inextricably linked to river flows. This relationship gives insight into the connectivity

between size and length of flood and the possible impact of reduced flood to colonial waterbird populations.

- **Objective: Determine breeding waterbird movements**

The relationship between river flows and colonial waterbird breeding has been well established. However, little is known about the importance of feeding areas during breeding periods. It is contended that for colonial waterbirds, area of flooding is as important as variation of flows reaching breeding colonies. This has implications for the management of breeding colonial waterbird colonies. It is predicted that they need to use large foraging areas around their colonies. To determine the relationship between breeding success and feeding areas, it is necessary to investigate the distance that adults with young will fly to forage.

Waterbirds are capable of moving great distances (> 1,000 km) and during non-breeding periods colonial waterbirds use other wetlands within NSW and Australia. Due to the decline in habitat for these waterbirds the relationship between the remaining wetlands and waterbirds breeding in the Macquarie Marshes, and their movement between these wetlands is important to establish.

After animal ethic trials at Western Plains Zoo Dubbo, two breeding Straw-necked Ibis were captured and each were fitted with a 30 gram satellite tracker using a harness made from Teflon ribbon. The birds were then released. The satellite trackers were programmed to switch on every second day for three months to cover movements during the breeding season and then once per week for nine months during the migration period. Data is received via satellite and downloaded. This data has shown that the birds will fly for an average of five kilometres to forage for food. Both birds left the Macquarie Marshes and flew north-east once breeding was completed, with one bird recorded as far north as Cairns only two and half months after completing a breeding season.

- **Objective: Further examination and modelling of relationships between breeding waterbirds and varying water regimes**

A model is currently being developed using waterbird breeding data, river flows, rainfall and flood distribution data to predict the response of waterbird breeding to varying regimes. It is envisaged that results from this model will contribute greatly to successful future management of water within the Macquarie River.

2. Monitoring and Research at Kakadu National Park Ramsar sites, Northern Territory

Kakadu National Park's Ramsar wetlands are closely monitored by Park management and several research bodies in the Northern Territory. The following is a list of monitoring activities undertaken at Kakadu's Ramsar sites in the last three years.

- Twenty three research permits were granted for research projects that directly related to wetlands and watercourses in the park. These included projects to monitor the riverbanks and wetland areas, surveys of aquatic species, water quality sampling, monitoring changes in wetland inundation, and geological studies of ocean and river flooding.

- Estuarine fish surveys were conducted in 1999 and 2001. This data was used to compile an inventory of estuarine fish species and community structures in Kakadu.

- Barramundi, a highly sought after fish by Bininj (Aboriginal people) and recreational fishers, are monitored through a tagging program undertaken in Yellow Water every two years. This provides information on population estimates and size distributions.

- Kakadu is anticipating a large influx of the invasive Cane Toads with the wet season in 2001/2002. Toad monitoring devices (Toad poles) have been set up to measure native Frog densities before and after the Toad invasion.

- Crocodile surveys are undertaken annually at each major watercourse.

Saltwater crocodile, Kakadu National Park. Photo by Greg Miles, Kakadu National Park.

- The three weeds, Mimosa, Para Grass and Olive Hymenachne, which pose the greatest weed threat to Kakadu's wetlands are closely monitored. Every five years a weed survey of the whole park is carried out. Within this, Para Grass is monitored by conducting remote sensing distribution of areas of concern. A Mimosa team of four people, three of whom are Aboriginal, are employed full time to continuously check known Mimosa sites. They destroy any new seedlings and look for new plants in new areas. This team also informally monitors the spread of Para Grass and notes new

outbreaks. Olive Hymenachne arrived in the park six months ago and is currently in three wetland areas. Aerial surveys of each site have been undertaken and the approximate area covered is known. The paths of Magpie Geese, which are known to visit sites with Olive Hymenachne outside the park, are monitored, as the Geese cause the spread of this weed by dropping seed.

- Feral animals also pose a threat to Kakadu's wetlands. Aerial surveys of hard hoofed animals – Horses, Buffalo, Donkeys and Cattle – are undertaken. Buffalo, while their numbers are low, still have the greatest impact on the wetlands. The information captured from these surveys will feed into the feral animal strategy. The Mimosa team also monitors Pigs. They look for areas where Pigs are active and if they report serious damage or numbers then a cull will take place. There is also a project being developed to monitor the fringes of the floodplains to measure Pig rooting. This will provide a quantitative assessment of Pig numbers and the extent of Pig rooting. It will also provide a measure by which to determine the success of Pig culling.

3. Para grass and the Magela Creek floodplains, Kakadu National Park, Northern Territory

An experimental study was carried out on the Magela Creek Floodplain in Kakadu National Park between 1997 and 2000. This study represents one of the most comprehensive investigations of the ecological impacts of an aquatic weed. The aims of the study were to: (1) assess the impact of Para Grass (*Urochloa mutica*) on faunal biodiversity and ecosystem processes (community metabolism and trophic pathways) of tropical wetlands; (2) assess the effectiveness of herbicide treatments in the control of Para Grass, and; (3) determine the impact of chemical control of Para Grass on wetland biodiversity and ecosystem processes, and to monitor recovery in treated areas.

Biodiversity was examined by sampling floodplain vegetation, aquatic and terrestrial invertebrates, and fish. Ecosystem processes were examined by using stable isotope analysis to determine aquatic food web structure and by measuring community metabolism during the wet seasons. Comparisons were made between samples collected in replicate areas of Para Grass, *Hymenachne acutigluma* (Hymenachne), *Oryza meridionalis* (Rice), and Para Grass that had been treated with herbicide. An experimental trial was done to assess the effectiveness and impacts of herbicide control of Para Grass.

Para Grass invasion had significant effects on native vegetation. Compared with native Rice and Hymenachne grass communities, Para Grass habitats had markedly different plant composition and significantly lower plant biodiversity, particularly during the dry season. Para Grass was found across a wide range of water depths and therefore has the potential to spread widely, greatly reducing habitat diversity.

Para Grass invasion had significant negative effects on wet season terrestrial invertebrate biodiversity, but few negative impacts on aquatic invertebrate or fish communities. In

some cases, Para Grass invasion resulted in the reduction of aquatic invertebrate biodiversity, and fish community composition differed between Para Grass and the two native grasses. However, fish and aquatic invertebrate communities appear to be largely insensitive to changes in grass composition.

Para Grass invasion had little effect on the aquatic food web of the floodplain. This is in marked contrast with the terrestrial food web of the floodplain, as important bird and mammal species rely heavily on native grass seeds and will be negatively impacted by Para Grass invasion.

Native water plants, Magela Creek, Kakadu National Park.
Photo by Greg Miles, Kakadu National Park .

Para Grass habitats had higher rates of autotrophy than other habitats. Whilst this shows that Para Grass was a more productive habitat, the greater oxygen demand overnight created anoxic conditions. Floodplain fish must either be tolerant of these anoxic conditions or must rely on moving to areas of open water in less dense native vegetation types. Para Grass invasion reduces these refugia.

Para Grass has the potential to alter floodplain fire regimes, with negative consequences for native flora and fauna. Despite having higher rates of decomposition, Para Grass produced approximately twice the dry season fuel load of Rice. This is likely to result in hotter fires, which would be detrimental for floodplain fauna and native vegetation, and would facilitate the spread of Para Grass.

Roundup Biactive (a commercial herbicide) reduced the cover of para grass by over 90% and there was no evidence of adverse effects of herbicide on invertebrates or fish

communities. Native vegetation quickly recovered following the removal of Para Grass, however, follow-up control would be required as Para Grass readily reinvades treated areas.

Despite the limited effects on aquatic food webs, Para Grass should be viewed as a significant threat to tropical wetlands as it has the potential to spread widely and to adversely impact biodiversity (primarily native vegetation and terrestrial fauna reliant on it) and ecosystem processes such as fire regimes.

Magela Creek floodplains, Kakadu National Park. Photo by Greg Miles, Kakadu National Park.

4. Proposal to Manage Salt Water Intrusion in Kakadu National Park, Northern Territory

Saltwater intrusion is identified as a significant threat to the low-lying floodplains of northern Australia including the Ramsar listed wetlands of Kakadu National Park. Whilst there is ongoing debate about the causes of saltwater intrusion, and especially the relative importance of natural versus anthropogenic influences, there is no question of the dramatic and deleterious impacts that saltwater intrusion has on freshwater habitats. One anthropogenic factor clearly identified over a decade ago in Kakadu National Park was the breaking down of levee banks by the foraging and wallowing activities of feral Buffalo. The channels and breaches in levee banks created by Buffalo are widely held to have allowed the draining of freshwater and the ingress of saltwater.

Historically there have been many attempts to restrict saltwater intrusion in Kakadu. The success of these efforts has not been formally assessed and saltwater intrusion remains a matter of grave concern to Bininj (Aboriginal people) with cultural responsibilities for the floodplains. Saltwater intrusion in many areas has led to the loss of important freshwater habitats and hunting areas for Geese, Turtles, *Eleocharis* (Spike Rush) and other wetland food resources. In other areas the loss of such habitats and resources is widely believed to have only been prevented by the construction of artificial levee banks and similar structures.

In order to address the threats of saltwater intrusion, Park management will undertake a project to:

1. map the locations and document the conditions of all structures in Kakadu built to restrict saltwater intrusion;
2. document the history of each structure, including the social and cultural aspects of their construction and intended purpose of each structure;
3. using information from 1. and 2. above, assess, where possible, the success of each structure in meeting its intended purpose with regard to preventing saltwater intrusion;
4. document the locations where saltwater intrusion is currently occurring in Kakadu National Park with special focus on areas where saltwater intrusion threatens areas with special cultural or ecological significance;
5. use remote sensing data including aerial photos to examine historical changes in areas affected and develop a GIS model to predict future consequences of further saltwater intrusion intrusion in to currently affected locations as well as likely locations where saltwater intrusion may occur in the future; and
6. using historical data on the success of existing structures, results of the GIS analysis (above) and new information from saltwater intrusion control work elsewhere in the Top End, identify locations and methods where saltwater intrusion control works could be undertaken in Kakadu.

5. Monitoring the Ecological Character of Victoria's Ramsar Wetlands

Lake Albacutya Ramsar site

Lake Albacutya is one of a series of terminal lakes on the Wimmera River. Over several decades, over-commitment of flows for agricultural and domestic purposes has reduced the frequency and extent of natural flooding. Severe dieback of the River Red Gum and Black Box communities is continuing at Lake Albacutya. This is attributed to gradually rising groundwater levels, increasingly saline groundwater and reduced occurrence of floodwaters and contributes to a loss of breeding habitat for threatened parrot species. Lakebed herbfields are being replaced by annual weeds as a result of infrequent flooding.

In May 2001, the Victorian Department of Natural Resources and the Environment (NRE) commenced the bulk entitlement process for the Wimmera and Glenelg Rivers. This will establish an environmental water allocation for these river systems. The environmental allocation comes from water savings made from implementation of the Northern Mallee Pipeline project whereby open channel systems to supply stock and domestic water are being piped. The project has one more stage to be completed. It has so far provided savings for the environment of 24,700 ML of a projected 35,000 ML on completion. The water allocations may provide some environmental benefits for Lake Albacutya but it is expected that hydrological modelling will demonstrate that a larger allocation is needed for any significant improvement to the ecological character of Lake Albacutya.

A study has just been completed to examine the feasibility of piping the remaining southern area of the Wimmera Mallee Stock and Domestic Supply System. It predicts water savings for the environment of up to 83,000 ML if the project were to be undertaken. The study has been presented to Government for consideration.

Lakes Tutchewop, William, Kelly and Little Kelly in the Kerang Wetlands Ramsar site

Since 1968, Lakes Tutchewop, William, Kelly and Little Kelly have been managed as a part of the Barr Creek Drainage Diversion Scheme. This scheme involves pumping 10 to 15 percent of the flows down Barr Creek into the lakes for evaporation, thereby intercepting saline flows into the Murray River and reducing the salinity impact on the river. In 1968, the largest of the lakes, Lake Tutchewop, was a freshwater lake, supporting a diverse ecosystem. Since the advent of the drainage diversion scheme, the salinity of the Tutchewop lakes has steadily risen and a 1999 study estimated that over 1,300,000 tonnes of salt was stored in them. This has significantly altered ecological conditions in Lake Tutchewop, Lake Little and Lake Kelly. Lake William has always been a salt lake, although with lower salinities before the advent of the diversion scheme.

If current trends continue, the ecological character of the lakes will decline further and, in addition, the effectiveness of the lakes as saline evaporation basins will be reduced significantly, with resulting negative implications for salinity in the Murray River. In 1999, six management options were identified for the lakes. These were examined for

their potential to maximise evaporative efficiency and to optimise Ramsar values. An environmental impact assessment was completed in 2000.

The assessment identified the preferred future management option as one that involved salt harvesting, using part of Lake William to concentrate water for off-site processing. Lake William would continue at a high salinity level but the salinity level of Lake Tutchewop will be halved and that of Lakes Kelly and Little Kelly reduced considerably with regular flushing. This option depends on commercial salt harvesting and the Murray-Darling Basin Commission, which has assumed management responsibility for the lakes, is currently negotiating to secure a commercial venture. In addition, a fallback option was identified whereby salt will be concentrated in Lake William while the other lakes are managed to reduce their salinities. The lakes are being managed in line with this option until a commercial salt harvesting operation can be developed.

Lake Corangamite, Western District Lakes Ramsar site

Long term rising salinity levels and high levels of nutrients from catchment runoff pose significant threats to the ecological character of Lake Corangamite. The Woady Yallock Diversion Scheme normally diverts natural water inflow away from Lake Corangamite to maintain the lake at a level where surrounding freehold grazing land is not inundated. Salinity had reached very high levels (111,600 Electrical Conductivity (EC)) in 1991 but these fell to pre-disturbance levels (39,800 EC) in 1993 when the scheme had to be shutdown temporarily for repairs. Salinity levels subsequently began to rise again. Algal blooms occurred after the 1993 shutdown of the Woady Yallock Diversion Scheme as a consequence of the inflow of a large volume of high nutrient runoff from agricultural land in the catchment. High nutrient runoff also comes from other small tributaries.

The water levels at Lake Corangamite were very low in 2001. This was caused by several consecutive years of below-average rainfall and salinity levels continued to rise as water concentrated. Such an occurrence is a normal response to long-term climatic cycles. However the issue of maintaining the lake at a lower maximum level than it would naturally reach in times of high rainfall, thereby exacerbating high salinity levels, still needs to be addressed. Algal blooms have not occurred recently, probably because of the very high salinity levels and low volume of water inflow.

The Western District Lakes Draft Strategic Management Plan, released for public comment in 2001, proposes a number of strategies to address water level and nutrient problems. These include increasing the maximum water level of Lake Corangamite, purchasing land flooded at high lake levels (subject to funding availability) and implementing the Corangamite Region Nutrient Management Plan and Corangamite Waterway Health Strategy. Actions are currently underway in the catchment to control nutrient runoff.

Case Studies – Zoning and Strict Protection Measures for Wetlands

1. Moreton Bay Ramsar Site, Queensland

The Moreton Bay Ramsar site is within the larger Moreton Bay Marine Park and is managed as part of the Marine Park. Moreton Bay stretches 125kms from the Gold Coast to Caloundra with a population of 1.5 million people in the adjacent catchment area. The Bay is popular for recreational fishing and tourism as well as important for commercial fishing and port activities.

The Marine Park was declared in 1993 and extended in 1997. The Ramsar site was nominated in 1996. The Marine Park includes most of Moreton Bay's tidal lands and waters seaward to the limit of Queensland waters. The mainland and island boundary is the highest astronomical tide. Freehold land is generally not included.

The Marine Park is managed to allow people to use and enjoy the Bay while still protecting the environment. This is done through a zoning plan introduced in 1997. Each zone has activities that are allowed, those that require permits and those that are prohibited. The zones are:

- **General Use zone –** provides for reasonable use and enjoyment while allowing activities such as shipping operations;
- **Habitat zone –** provides for reasonable use and enjoyment while maintaining productivity of the natural communities by excluding activities such as shipping operations and mining;
- **Conservation zone –** conserves the natural condition to the greatest extent possible and provides for recreational activities free from commercial trawling;
- **Buffer zone –** similar to protection zones but allows trolling for pelagic fish;
- **Protection zone –** 'look but don't take' areas of high conservation value with all forms of fishing and extracting prohibited; and
- **Designated area –** protects ocean beaches, allows shipping operations or conserves Turtle and Dugong populations. Designated areas include Turtle and Dugong areas and commercial Bloodworm gathering areas.

The Activities table is shown overleaf.

Activities Table

Activity	General use zone	Habitat zone	Conservation zone	Buffer zone	Protection zone
Recreational boating, diving	yes	yes	yes	yes	yes
Line fishing (except trolling)	yes	yes	yes	no	no
Trolling for pelagic fish	yes	yes	yes	yes	no
Spearfishing	yes	yes	yes	no	no
Recreational bait gathering	yes	yes	yes	no	no
Recreational collecting (limited to five declared fish, or declared invertebrates other than coral)	yes	yes	yes	no	no
Jetskis and similar motorised watercraft	yes	yes	yes only within navigation channels	no	no
Trawling	yes	yes	no	no	no

While most of the Marine Park is general use zone, the Ramsar site is mainly habitat zone or conservation zone. In addition, in all areas of Moreton Bay Marine Park :

- A person must not cause undue disturbance to shorebirds or their habitats;
- Dogs must be kept on a leash or secured when near a flock of shorebirds;
- Boats, motorised watercraft and vehicles must be driven away/around a flock of feeding or roosting shorebirds; and
- Aircraft must not land or take off near a flock of feeding or roosting shorebirds.

Since the zoning plan was introduced in 1997, the emphasis has been on public awareness and education to change behaviour rather than legal enforcement. However legal measures such as issuing of permits and infringement notices are applied where necessary and have been successfully tested in court. Infringement notices are issued during patrols by Marine Park Rangers.

As management issues become critical they are given priority in enforcement. For example, boat speed in Turtle and Dugong habitat has been identified as crucial to reducing injuries to these animals and rangers have concentrated on enforcing ‘go slow’ areas. Decreases in boat speed in these areas have been observed. However the zoning plan has not been in place long enough for changes in visitor behaviour and ecological responses to be assessed and the zoning reviewed.

Objective Six: Designating Wetlands to the Ramsar list

Case Study – Use of Wetland Inventory to Identify Important Wetlands

1. A Directory of Important Wetlands in Australia

A Directory of Important Wetlands in Australia (the Directory) identifies nationally important wetlands across Australia and provides information on the wetlands, their variety and the dependent flora and fauna. The Directory is a cooperative project between the Commonwealth, State and Territory Governments of Australia. The Commonwealth Government is building and maintaining this inventory of important wetland habitat so as to gain a better understanding of their values and location in order to prevent further loss of wetlands in Australia.

The Directory provides information useful for making decisions on the protection of wetlands and how wetland resources will be utilised. It will enable those who wish to restore or rehabilitate wetlands to access a valuable source of information on wetland characteristics. It provides a substantial knowledge base of what defines wetlands, their variety and the dependence on them of many flora and faunal species. It can also provide a substantial basis for the future development of a national wetlands inventory to document all of Australia's wetlands, not just those that are considered to be nationally or internationally important.

Three editions of the Directory have now been released. The first edition included a total of 517 wetlands qualified as nationally important. The second edition built on this information, with a review of existing entries and the addition of 181 new site entries, bringing the total to 698 nationally important wetlands.

Since publication of the second edition of the Directory in 1996, extensive survey work has been undertaken, particularly in the north-west and south coast regions of New South Wales and in Victoria, to assess important streams and rivers. An inventory of important wetlands on Commonwealth owned and managed areas has also been undertaken.

The total number of sites in the third edition of the Directory is 851. The net increase is 153, mostly from New South Wales and Victoria, including a significant number of important rivers and streams. The inventory of wetlands on Commonwealth owned and managed areas resulted in the addition of 20 wetlands to the Directory, three in the External Territories and 17 in the Defence Estate on mainland Australia.

The Directory describes 851 wetlands that have qualified as nationally important against the criteria for inclusion. Of these wetlands, 57 are designated to the List of Wetlands of International Importance of the Ramsar Convention.

Relation to the Ramsar Convention

The Directory database is being used to identify new Ramsar sites in Australia. In this way Australia is implementing Resolution 15.11 adopted at the 7th Conference of Parties in Costa Rica, 1999 which urges Contracting Parties to develop a systematic approach to identifying future Ramsar sites for designation to the List of Wetlands of International Importance. Three new Ramsar sites in Western Australia (Becher Point Wetlands, Lake Gore and Muir-Byenup) were identified using a strategic and systematic approach, generally consistent with this resolution (see below). The Western Australian chapter of the second edition of *A Directory of Important Wetlands in Australia* was used as the primary data source for identifying these potential candidate Ramsar wetlands.

The Directory will also be used to identify sites of importance for particular species, including threatened or migratory species, and assisting with the implementation of conservation initiatives to protect migratory waterbirds through identification of important habitat and the addition of new Australian sites to the East Asian-Australasian Shorebird Site Network.

Future of project

Existing data is regularly reviewed to investigate regions of Australia that were previously under-represented or not represented in the Directory. Work is ongoing in most jurisdictions to assess under-represented regions, and future additions to the Directory are expected from survey projects underway in Western Australia, Queensland, South Australia and the arid zone of the Northern Territory. Environment Australia will continue to examine wetlands occurring on Commonwealth land to identify any further sites that meet the criteria for inclusion in the Directory. Regular updates of existing listings will also be sought to revise information on wetland sites.

There is a need however for ongoing survey work, particularly in regions where significant gaps in information exist so that comprehensive State/Territory wetland inventories can be developed and aggregated towards a national wetlands inventory. Some States have already embarked on a comprehensive assessment of wetland types and coverage and will be producing digital data sets that could form the basis of a national wetland inventory.

Case Studies – New Ramsar Nominations

1. Western Australia's Strategic Approach to Ramsar nominations

The nomination of three additional Western Australian Ramsar sites in 2001 saw, for the first time in Australia, a strategic approach to identifying Ramsar wetlands as promoted by Ramsar's *Strategic Framework for the Future Development of the List of Wetlands of International Importance*.

In December 1996, the Western Australian Government made an election commitment to consider nominating additional wetlands such as the Lake Muir complex. The Department of Conservation and Land Management (CALM), engaged Wetlands International-Oceania, to undertake a systematic review to identify candidate wetlands, consult with key stakeholders, and prepare documentation and maps. This work was funded by the Commonwealth through the National Wetlands Program of the Natural Heritage Trust (AUS$48 645 was provided in 1997-98).

The Western Australian chapter of *A Directory of Important Wetlands in Australia* (see previous case study) was used as the primary data source for identifying potential candidate wetlands. Information was tested against the Ramsar criteria and 38 candidate wetlands/systems were identified as meeting the criteria. Many of the candidate sites include CALM-managed land. Consultation with staff of each CALM Region in the State was undertaken leading to the identification of candidate wetlands suitable to be nominated in the short term and extensions to existing Ramsar Sites.

The report made a number of recommendations including extensions to four existing Ramsar Sites and nomination of eight wetlands/systems as new Ramsar sites. Of the recommended new sites, six are located in south-western Western Australia and two are in the arid zone, including the first Ramsar Sites proposed for the Pilbara, Midwest and Southern Forest CALM Regions.

The Western Australian Government has proceeded to nominate three of the recommended new Ramsar Sites and extended the four existing Ramsar sites announced on WWD 2001. The new sites are in south- western Western Australia:

- the Becher Point Wetlands south of Rockingham,
- Lake Gore west of Esperance; and
- Muir-Byenup System east of Manjimup.

And, encompass the following wetland values:

The inter-dunal wetland system at Becher Point is a rare wetland type in south western Australia. Examples of this geomorphological sequence in good condition and with protected status are also rare worldwide, and the sedgelands that occur within the wetland depressions are on the national list of threatened ecological communities.

Becher Point Wetlands Ramsar site. Photo by Jim Lane, CALM.

Lake Gore supports the largest known populations of Hooded Plover worldwide (being the single most important wetland for this species) as well as thousands of Banded Stilts. It is also important for moulting by thousands of Australian Shelduck and as drought refuge for thousands of ducks and shorebirds.

The Muir-Byenup System supports three wetland-dependent orchids that are nationally vulnerable; is important for moulting by Australian Shelducks; is a drought refuge for tens of thousands of waterbirds (up to 51,000 waterbirds have been counted at Lake Muir, when full); is one of five remaining refuges for the south-western Australian population of the globally threatened Australasian Bittern; and includes non-forested peatlands, an under-represented wetland type on the Ramsar list.

The extensions occurred at the these four existing Ramsar sites: Ord River Floodplain, Peel-Yalgorup System, Lake Toolibin and Vasse Wonnerup System, and provide for protection of additional areas of wetlands, provide buffers and improve the function and viability of these Ramsar sites.

Muir-Byenup System Ramsar site. Photo by Greg Keighery, CALM.

2. Designation of the Gwydir Wetlands, New South Wales – Wetlands Previously with no Special Conservation Status

A group of four landholders in the 'Watercourse Country' of the Gwydir River catchment nominated sections of their properties to the Ramsar List in 1999. The listing was the result of many years of discussion and planning with representatives from a number of State agencies and non-Government organisations.

The driving force behind the Listing of these privately owned properties was the desire to restore some of the environmental water flows to the lower catchment in a highly regulated river system. The landholders in the flood plains of the Gwydir Valley (downstream of Moree) are traditionally pastoralists, managing grazing systems on highly productive soils that receive floodwaters from upstream on a 1-2 year basis.

In the 1970's, the construction of a dam in the upper catchment triggered a rapid expansion of irrigation; the amount of water received downstream was severely restricted, with the flows being received only during major flood incidents. The contraction of frequency and extent of flooding resulted in a loss of wetland vegetation. This was replaced by dryland pasture species that, unable to cope with the intermittent severe floods, became subject to invasion by Lippia (an introduced prostrate plant species that is unpalatable to stock). The loss of wetland productivity affected both pastoralists and wildlife. A severe contraction in bird breeding activity was matched by the inability of graziers to turn prime stock off the property. In one case, a 600 hectare paddock that had previously produced 1,000 prime steers for market was reduced to producing less than 150 animals.

Many pastoralists were forced to seek other income sources, turning to dryland and irrigated cropping systems, as a previously drought-proof area failed to provide adequate income. This exacerbated the difficulties facing the remaining graziers. Irrigation channels and earth banks built to protect crops concentrated the few large floods into a much constrained watercourse, increasing the wetted period, and causing losses of dryland pasture on higher ground and roost trees on the floodplains from waterlogging.

In the early 1980's, the Gwydir Watercourse landholders became aware of the potential for Ramsar listing to redress some of the inequity created by over-allocation of irrigation licences. However, a lack of continuity in water agency staff made it difficult to investigate the opportunities to list the wetlands.

In 1995 the NSW NPWS initiated informal discussions with landholders and prepared a draft RIS for comments. Environment flow rules were also established. This work was followed up by the National Parks Association, NSW (NPA) and WWF and a partnership established between WWF, NPA and NPWS through funding from the NHT to promote Ramsar nominations on private land.

A *Memorandum of Understanding* was developed with four of the Gwydir landholders and the Commonwealth, State and non-government organisations to nominate sites on

each property and signed on World Wetlands Day, 1999. Since then, work has been undertaken with the water user associations on the Gingham and Lower Gwydir watercourses, the Gwydir Watercourse Landholders Committee, to develop a Plan of Management which encompassed water sharing agreements. Agreement was also reached with water interest groups (even those irrigation sectors reluctant to lose any water access) across the Gwydir catchment to provide an environmental flow allocation from the reservoir, as well as a percentage of all off-allocation flows, to the 'Watercourse Country'.

The first environmental allocation was planned for February 2001. However, a concern was raised by the local government authority that this flow might cause flood damage to roads, resulting in the planned release being aborted and disappointment among the landholders.

The next important step will be the implementation of effective water sharing agreements across the catchment. As the first privately owned Ramsar sites in Australia, there will continue to be many lessons to be learned in the process of implementation. Yet there is potential to develop a sustainable system of water sharing across the various sectors in the Gwydir, showcasing the ability to sustainably manage wetlands whilst meeting other needs.

Objective Seven: International Cooperation

Case Studies – Twinning Agreements

1. Twinning Arrangement between Boondall Wetlands (Moreton Bay Ramsar site), Queensland and Yatsu Tideland, Japan

A site twinning arrangement was entered into between the Brisbane City Council and Narashino City for the Boondall Wetlands in Moreton Bay and the Yatsu Tideland in Japan in 1998. Both wetlands are Ramsar listed and part of the East Asian-Australasian Shorebird Site Network. The mayors of both cities agreed to: support joint research and the exchange of research and study information; support the exchange and reciprocal training of persons involved in wetland protection; support the exchange of students; support the development of domestic and international educational projects and support exchange visits by members of their respective communities.

Boondall Visitors Centre. Photo by Wetlands Section, Environment Australia.

Both cities promote each other's wetlands through advertising materials such as displays and brochures and through events such as international wetland symposia and conferences and celebratory days such as the "Yatsu Higata Day" held annually in Narashino.

Opportunities for the exchange and reciprocal training of persons involved in wetland protection have been made available. Since 1998, volunteers and council officers from Narashino have visited Brisbane annually. Three delegations from Brisbane, including councillors, community representatives and a council officer have attended the Yatsu

Higata Festival. While language differences and differences in wetland size and environs remain a difficulty, these visits have encouraged an understanding between wetland administrators and volunteers.

Both cities support joint research and the exchange of research and study information in relation to wetland preservation and the protection of migratory shorebirds. A website to promote this exchange has been proposed. While the expected degree of exchange of research and training may not have occurred, there remains potential for using the arrangement to increase the understanding of the importance of preserving these wetlands and protecting migratory shorebirds.

Domestic and international educational projects are supported by the agreement. Council officers and educational authorities from both cities are jointly developing the "Children's Shorebirds Information Network" that links school students from both cities through video-conferencing via the Internet. Video-conferencing will allow the involvement of students from many schools and promote education in the areas of language, culture, environment and information technology. The information network could be integrated into the Language Other Than English (LOTE) program in Queensland and environment programs such those associated with World Wide Fund for Nature and the Shorebird Site Network. Until the infrastructure for the video-conferencing is complete, students from the Yasu and Yatsu-Minami Elementary Schools in Japan and the Nudgee-Banyo P-12 school will exchange information twice-yearly on shorebird movements in Boondall and the Yatsu-Higata by regular e-mail.

Both cities recognise the importance of working together with the local community to protect wetlands and have a deep understanding of the significance of projects for the preservation of those wetlands being undertaken in the sister city. They therefore have a unique opportunity to learn from and assist each other through their common interests.

Case Studies – International Cooperation and Training

1. Asia Pacific Migratory Waterbird Conservation Initiative

The Governments of Australia and Japan have been core supporters of regional initiatives for migratory waterbird conservation in the Asia Pacific region. The work has been coordinated under the Asia Pacific Migratory Waterbird Conservation Strategy and its associated Action Plans for shorebirds, Cranes and Anatidae. This initiative requires the involvement of governments, non-government organisations, experts and communities to work cooperatively to implement conservation actions. Australia has focused on supporting coordination of the Strategy and implementation of the Shorebird Action Plan. The Commonwealth, through the Natural Heritage Trust (NHT), is funding Wetlands International - Oceania to coordinate the implementation of the Action Plan.

The Shorebird Action Plan has three key components: building a network of internationally important sites for shorebirds; improving management of network sites; and increasing the information needed for shorebird conservation.

The East Asian-Australasian Shorebird Site Network (see overleaf)[2], launched at CoP6 in Brisbane, has now grown to include 29 sites in 9 countries, many of which are Ramsar listed. The Site Network provides a framework for international cooperation on migratory shorebird conservation. It gives international recognition to important sites, promotes awareness of these sites, enables links to be developed between staff at key sites, focuses training and management efforts and provides a model to leverage funding. The long-term objective is to have all sites of international importance to migratory shorebirds included in the Network.

Over the past three years, training and survey activities have been conducted in the People's Republic of China, Mongolia, Republic of Korea, Vietnam, Cambodia, Thailand, the Philippines, Papua New Guinea and Australia. This program has been most intensive in the critical staging area of the Yellow Sea in China where a total of 18 training activities have been conducted involving over 180 participants.

An updated Action Plan has recently been endorsed at a regional workshop in Japan for implementation over the 2001 - 2005 period.

The World Wide Fund for Nature – Australia (WWF) is also being funded under the NHT to assist in the implementation of the Shorebird Action Plan in Australia through the Shorebirds Conservation Project. This project was initiated in mid-2001 and is being undertaken by a consortium of non-government conservation groups under the coordination of WWF.

The new WWF project is a community-based, on-the ground approach to the conservation of shorebirds. It promotes awareness and actions to protect the habitats of these birds, with a focus on Australian shorebird sites. Working in collaboration with a number of conservation organisations, this project will:

- Conduct a range of awareness raising and capacity building activities targeted at community groups, local governments, State agency branches and local and regional media.
- Increase recognition of important sites and improve site management through advocacy for changes in site tenure, development of management guidelines, increased profile for sites in natural resource management plans, on-ground management and rehabilitation works, and bird counting programs to enhance existing inventory data collected.

[2] See related case studies: New East Asian-Australasian Shorebird Site Network Listings, Victoria, page 62 and Shorebird Managers Training Workshop, page 52.

2. Asia Pacific Wetland Managers Training Program

The Asia Pacific Wetland Managers Training Program (APWMTP) promotes the wise use of wetlands by equipping wetland managers within the Asia Pacific region with the skills necessary to manage their wetlands in an ecologically sustainable way. The program is focused on tropical areas of the Asia Pacific region, but also includes Indigenous Australian wetland managers and managers of sites within the East Asian-Australasian Flyway. The program is an initiative of the Commonwealth Government and is offered through the Centre for Tropical Wetlands Management at the Northern Territory University (NTU) in Darwin, Australia.

Weed Control Techniques and Occupational Health and Safety Issues, Tram Chim National Park, Vietnam, 14-18 May 2001. Photo by Northern Territory University.

The program began delivery of courses in December 1999. Courses combine a mixture of classroom and field based training in both Australia and selected locations of the Asia Pacific region. An ecological framework has been used to incorporate inventory, monitoring, planning and management issues. These issues are explored from both technological and hands on perspectives. Additional course components include education and public awareness as important management tools. Specialised courses targeted at particular issues or countries are also planned.

The training program provides important opportunities for wetland managers within the Asia Pacific region, particularly those involved in managing Shorebird Site Network sites, to learn about practical and cost effective on-ground wetland management techniques. The Program also addresses more general and ongoing efforts by the Ramsar Convention to increase its membership in the Pacific Islands region.

Site visit to mudflats/mangroves near the University of the South Pacific, Introduction to Wetland Ecology and Management of Mangroves and Freshwater Wetlands, Fiji, 6-10 December 1999. Photo by Aaron Jenkins, Wetlands International Oceania.

- ***Training in Wetland Survey Techniques in Fiji***

One course held under the APWMTP was the "Inventory of freshwater and mangrove biota of Fiji: a field and lab-based course on systematic survey techniques and identification of fishes, invertebrates and aquatic plants". This was the second training course in Fiji under the program, and was hosted by the University of South Pacific (USP), Institute of Applied Sciences, and jointly managed by Wetlands International – Oceania, USP and the Fiji Department of Environment.

Fish sampling and water quality sampling in Nakavu stream. Photo by Aaron Jenkins, Wetlands International Oceania.

The course was designed to build on the "Introduction to Wetland Ecology and Management of Mangroves and Freshwater Wetlands" course held in Fiji in December 1999. Following this introductory course, participants identified the need to develop field techniques and skills to build on their theoretical understanding. The 2001 course had a strong field and lab emphasis to address these needs. This course comprised one classroom day reviewing/learning Fijian freshwater and mangrove biodiversity and studying fieldwork techniques; one field day in a freshwater system conducting systematic survey work; one field day in a mangrove system conducting systematic survey work; one laboratory day working on the taxonomy/identification of taxa collected; and a classroom day dedicated to the Ramsar Convention and progressing Ramsar site documentation for Fiji. The course was attended by sixteen participants from five government agencies and five non-government organisations (NGOs).

Following the first (December 1999) course, most of the participants and other interested parties formed a Ramsar Site Selection Committee which has been actively meeting throughout the past year. The Wetland Managers Training Program has clearly facilitated greater cooperation within and among government agencies and NGOs in Fiji. This was explicitly stated by many of the participants and was underpinned by the creation of an excellent draft wetland database for Fiji by the participants, supported by WWF South Pacific.

Manasa Sovaki of Fiji Department of Environment checks his net for mangrove fauna. Photo by Aaron Jenkins, Wetlands International Oceania.

Overall the course contributed significantly to building the capacity of wetland managers to survey and monitor Fijian wetlands. Additionally, all principal members of the Ramsar Site Selection Committee attended the course and on the last day made their selection of two wetland sites to be nominated to the Ramsar Convention (as part of Fiji completing its accession) based on information gained

from the course. Since then, the Committee has selected a third option, which will soon be put up as the first candidate Ramsar site.

3. Development Assistance for Wetland Conservation - Australian Agency for International Development (AusAID) Wetland Related Projects

A) Sri Lanka Hikkaduwa Coastal Zone Waste Management Project

The goal of this AUS$3.4 million project is to improve the environment of Hikkaduwa, and the welfare of its people, through the introduction of sustainable solid and liquid waste management systems. The project commenced in December 1999 and is due to be completed in December 2002.

The objectives of the project are to:

- develop sustainable solid waste management practices in the project area;
- develop and implement a sewerage and wastewater treatment plan; and
- assist NGOs to provide opportunities for income generation and health improvement to the poor of the Hikkaduwa community.

The benefits of the project will be a reduction in the volume and environmental impact of wastewater and solid waste on the coastal environment in the Hikkaduwa area, which is a major tourist destination; and increased incomes and better health for the people of the area. The project will be used as a pilot for replication in other areas of Sri Lanka.

B) Indonesia Coral Reef Management and Rehabilitation Project

The goal of the Indonesia Coral Reef Management and Rehabilitation Project project is to improve the management of coral reef ecosystems and rehabilitate degraded coral reefs for the protection of biodiversity and the sustainable use of marine resources. AusAID is co-financing a component of the project with the World Bank, The Asian Development Bank, the Japanese aid agency, JICA, and the Global Environment Facility (GEF). Australia's contribution is approximately AUS$9 million over four years from April 2000.

The project is part of Indonesia's national coral reef strategy and is being implemented in a number of provinces. AusAID's two main areas of responsibility are a community based pilot project in Nusa Tenggara Timur (NTT) province, plus training and capacity building at the national level and in four targeted provinces (Riau, South Sulawesi, Papua and NTT). The overall project includes elements of integrated coastal resource management, improving institutional management capability, research, monitoring, surveillance and enforcement.

C) China Wetlands Resource Management Project

Australia is providing approximately AUS$3.9 million to fund the development of sustainable alternative livelihoods for impoverished communities in four wetland sites in Heilongjiang, Sichuan/Gansu, Jiangsu and Hunan Provinces. The project, commenced in May 1999 and ending in June 2004, is being co-financed with the United Nations Development Program (UNDP) and is complementary to a larger UNDP/GEF project being undertaken in the same sites. The larger project will contribute to the protection of globally important wetland biodiversity, its main objective being to develop China's national capacity to integrate wetland conservation into the development process.

Australia's component will include development of sustainable harvesting practices, secondary sector processing of products, improved land-use planning and involvement of local people in resource management and eco-tourism. Micro-credit facilities will be designed in tandem with alternative livelihood packages.

Appendices

Appendix One: Commonwealth and State/Territory Legislation Affording Protection to Wetlands

(No information provided by the Northern Territory)

Jurisdiction	Details of Legislation	How legislation protects wetlands
Commonwealth of Australia	*Environment Protection and Biodiversity Conservation Act, 1999*	An Act that gives Ramsar sites and listed migratory waterbird species the status of matters of "national environmental significance" and provides an environmental impact assessment process for likely impacts upon these matters, and a management planning framework.
	Murray Darling Basin Act, 1993	An Act to approve and provide for carrying out an agreement entered into between the Commonwealth, New South Wales, Victorian and South Australian governments with regard to water, land and other environmental resources of the Murray-Darling Basin, including wetlands.
	Aboriginal and Torres Strait Islander Heritage Protection Act, 1984	An Act to preserve and protect places, areas and objects of particular significance to Aboriginal people, including wetlands.
	Australian Heritage Commission Act, 1975	Allows for the protection of Australia's heritage through the Heritage Commission and the Heritage Register.
	The Great Barrier Reef Marine Park Act, 1975	This Act offers protection to the marine environments in the Great Barrier Reef Marine Park which include seagrasses and coral reefs.
	Airports (Environment Protection) Regulations, 1996	Ensures sensitive wetlands on leased Federal airport land are protected from action causing environmental pollution or harm. The Regulations also specify the accepted water pollution limits applicable to stormwater and provide a general duty to avoid polluting.
South Australia	*Aboriginal Heritage Act, 1988*	Provides protection and preservation of Aboriginal heritage, including wetland areas.
	Animal and Plant Protection (Agricultural and other Purposes) Act, 1986	An Act to provide for the control of animals and plants for the protection of agriculture and the environment and for the safety of the public.
	Coast Protection Act, 1972	This Act established the Coast Protection Board that develops Coastal management Plans with local councils for any land subject to tidal movement. The responsibilities of estuaries largely lie under this Act.
	Cooper Basin (Ratification) Act, 1975	An Act to Ratify and Approve a certain Indenture between the State of South Australia and others.
	Development Act, 1993	The overall objective of this Act is the proper, orderly and efficient planning and development of the State. Included within the planning strategy are sections which have concern for water management generally and for specific water sensitive regions such as Mt Lofty Ranges and River Murray.

Jurisdiction	Details of Legislation	How legislation protects wetlands
South Australia	*Environmental Protection Act, 1993*	Primarily pollution control and prevention legislation in South Australia. Provides for standards of care that apply to industry and the community by means of general environmental duty of care, offences under the Act and Environmental Protection Policies and Regulations.
	Fisheries Act, 1982	An Act to provide for the conservation, enhancement and management of fisheries, the regulation of fishing and the protection of certain fish; to provide for the protection of marine mammals and the aquatic habitat; to provide for the control of exotic fish and disease in fish.
	Heritage Act, 1993	An Act to conserve places of heritage value.
	Local Government Act, 1999	This Act gives local councils powers in relation to flood management, including power to acquire land in order to carry out flood mitigation or prevention works and power to act in an emergency. Local government can play a significant role in wetland management through the preparation of local water management plans under the Water Resources Act 1997.
	Mining Act, 1971	An Act to regulate and control mining operations.
	National Parks and Wildlife Act, 1972	Provides for the protection of many wetlands included in the States reserve system. Provides for the conservation of areas of wetlands that are representative of the full range of wetland types.
	Native Title (SA) Act, 1994	To protect the rights and interests of Aboriginal people within areas where they have a connection with the land.
	Native Vegetation Act, 1991	Controls the clearance of native vegetation in South Australia. The Act states that native vegetation should not be cleared if it is growing in, or associated with, a wetland environment.
	Pastoral Land Management and Conservation Act, 1989	An Act to make provision for the management and conservation of pastoral land.
	Petroleum Act, 1940	An Act relating to the search for and mining of petroleum.
	Soil Conservation and Land Care Act, 1989	To improve land management through the management of soil and vegetation, water quality of surface water runoff and groundwater recharge.
	South Eastern Water Conservation and Drainage Act, 1992	An objective of this Act is the enhancement or development of natural wetland ecosystems.
	Water Resources Act, 1997	Overarching framework for better wetland management.
	Wilderness Protection Act, 1992	Provides for the protection of wilderness and the restoration of land to its condition before European colonisation. This legislation protects some wetlands on Kangaroo Island that are located within the Wilderness Areas.
Queensland	*Agricultural Chemical Distribution Act, 1966*	An Act to control the distribution of agricultural chemicals from aircraft and other equipment.

Jurisdiction	Details of Legislation	How legislation protects wetlands
Queensland	*Chemical Usage(Agricultural and Veterinary) Control Act, 1988*	An Act to apply Commonwealth laws about agricultural and veterinary chemical products as Queensland laws.
	Aboriginal Land Act, 1991	Provides for the grant, and the claim and grant of land as aboriginal land.
	Canals Act, 1958	Provides for regulation and control of the construction, maintenance and use of canals.
	Coastal Protection and Management Act, 1995	Provides for the protection and management of the coast through a coordinated and integrated planning framework including a State coastal management plan, regional plans and control districts.
	Cultural Record (Landscapes Queensland and Queensland Estate) Act, 1987	Provides for the preservation and management of Landscapes Queensland and the Queensland Estate.
	Environment Protection Act, 1994	Provides for the protection of Queensland's environment while allowing ecologically sustainable development; it includes provision for environmental protection policies.
	Fisheries Act, 1994	An Act for the management, use, development and protection of fisheries resources and fish habitats and the management of aquaculture activities.
	Integrated Planning Act, 1997	Provides a framework for integrated planning and development assessment to ensure development is ecologically sustainable.
	Land Act, 1994	Provides for management of Crown Land for the benefit of the people of Queensland.
	Local Government Planning Act, 1993	Provides for local government including land use strategic planning, development and impact assessment.
	Marine Parks Act, 1982	Provides for conservation of marine areas and declaration of zoned marine parks for their sustained use and protection.
	Mineral Resources Act, 1989	Provides for assessment, development and utilisation of mineral resources.
	Nature Conservation Act, 1992	Provides for the conservation of nature through a comprehensive conservation strategy including declaration and management of protected areas, protection of native wildlife and its habitat, recognition of Indigenous peoples interests and co-operative involvement of landholders.
	Native Title (Queensland) Act, 1993	An Act to ensure that Queensland law is consistent with the Commonwealth Native Title Act for future dealings affecting native title and to validate past acts and intermediate period acts, invalidated because of the existence of native title and to confirm certain rights.
	River Improvement Trust Act, 1940	Provides for protection and improvement of the beds and banks of rivers; repair and prevention of damage; and prevention and mitigation of flooding.
	Rural Lands Protection Act, 1985	Provides for protection of land from certain animal or vegetable pests.
	Torres Strait Islander Land Act, 1991	Provides for the grant, and the claim and grant, of land as Torres Strait Islander land.

Jurisdiction	Details of Legislation	How legislation protects wetlands
Queensland	*Transport Infrastructure Act, 1994*	Provides a regime that allows for and encourages effective integrated planning and efficient management of a system of transport infrastructure. For ports it establishes a regime under which a ports system is provided and can be managed within an overall strategic framework.
	Transport Planning and Coordination Act, 1994	Aims to achieve overall transport effectiveness and efficiency through strategic planning and management of transport resources. It requires that the government's environmental policies be taken into account in the development of a transport coordination plan.
	Transport Operations (Marine Pollution) Act, 1995	An Act to protect Queensland's marine and coastal environment by minimising deliberate and negligent discharges of ship-sourced pollutants into coastal waters.
	Water Resources Act, 1989	An Act to consolidate and amend the law relating to rights in water, the measurement and management of water, the construction, control and management of works with respect to water conservation and protection, irrigation, water supply, drainage, flood control and prevention, improvement of the flow in or changes to the courses of watercourses, lakes and springs; protecting and improving the physical integrity of watercourses, lakes and springs; the safety and surveillance of referable dams.
	Water Management Act, 2000	An Act that aims to advance sustainable management and efficient use of water and other resources.
	Vegetation Management Act, 1999	Regulates clearing on freehold land through codes for assessment of development applications and enforcement of vegetation clearing provisions.
Tasmania	*National Parks and Wildlife Act, 1970*	Provides for the protection and management of natural areas including wetlands and their catchments.
	Aboriginal Relicts Act, 1975	Controls activities that may affect Aboriginal relics including excavation works around wetlands.
	Crown Lands Act, 1976	Provides for the protection and management of natural areas including wetlands and their catchments.
	Forest Practices Act, 1985	Controls the clearing of vegetation including riparian strips and the movement of machinery through streams.
	Land Use Planning and Approvals Act, 1993	Controls land use and provides for the planning of developments including those affecting wetlands.
	Inland Fisheries Act, 1995	Provides protection for freshwater species and controls the obstruction of fish passage.
	Threatened Species Protection Act, 1995	Protects threatened species including aquatic species.
	Living Marine Resources Management Act, 1995	Deals with the taking and protection of marine species and provides for the creation of marine reserves.
	Marine Farm Planning Act, 1995	Controls the location of marine farm development and manages environmental impacts.
	Mineral Resources Development Act 1995	Controls the exploration for and extraction of mineral resources.
	Water Management Act, 1999	Governs the allocation of water including the provision of environmental flows.

Jurisdiction	Details of Legislation	How legislation protects wetlands
Victoria	*Catchment and Land Protection Act, 1994*	Provides for a comprehensive catchment management framework for Victoria. It establishes Catchment Management Authorities (CMAs) with responsibility to ensure the protection and restoration of land and water resources, the sustainable development of natural resources-based industries and the conservation of the natural and cultural heritage. It requires CMAs to prepare regional catchment strategies to achieve these goals.
	Coastal Management Act, 1995	Establishes the administrative framework for strategic planning and management of the Victorian coast. Requires preparation of a Victorian Coastal Strategy to provide for the long term planning of the Victorian coast to ensure the protection of significant environmental features of the coast and to ensure the sustainable use of natural coastal resources.
	Crown Lands (Reserves) Act, 1978	Provides the framework for the reservation, administration and management of Crown land reserves including conservation reserves. Many conservation reserves include wetlands.
	National Parks Act, 1975	Provides for the reservation, protection and management of national parks, wilderness parks, State parks and other parks and reserves. The level of ecological protection afforded parks and reserves is generally high. For instance, grazing and mining are not permitted in most parks and reserves. Many wetlands are on land managed under the *National Parks Act.*
	Forests Act, 1958	Provides for the management of State forests, the protection of these and other public and private lands from fire, development of working plans (Forest Management Area Plans), and the licensed removal and sale of forest produce. It also provides for the control of recreational activities and other uses including grazing. Many wetlands are located in State Forest.
	Planning and Environment Act, 1987	Provides for the use, development and protection of public and private land in Victoria. Under the Act, the objectives of planning in Victoria include providing for the fair, orderly, economic and sustainable use, and development of land, and providing for the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity. The Act establishes the State Planning Policy Framework, which establishes an obligation to ensure that any change in land use or development would not adversely affect the habitat values of Ramsar sites.
	Environmental Effects Act, 1978	Allows for the Minister to require an Environment Effects Statement for those public works or proposals which require a Government or municipal decision that may have a significant effect on the environment.

Jurisdiction	Details of Legislation	How legislation protects wetlands
Victoria	*Environment Protection Act, 1970*	Establishes the Environment Protection Authority and defines its powers, functions and duties. It contains a number of instruments to minimise pollution, wastes and environmental risks including State Environment Protection Policies (SEPPs), industrial waste management policies, works approvals, licences, pollution abatement notices, environmental audits, environmental management plans and industry waste agreements.
	Fisheries Act, 1995	Provides a framework for the regulation, management and conservation of Victorian fisheries. It deals with commercial and amateur licences, fish culture, noxious aquatic species, research and development, the declaration and management of fisheries reserves; and the preparation of management plans for individual fisheries, declared noxious aquatic species and fisheries reserves. The Fisheries Regulations 1998 provide for the control and management of Victorian fisheries on a sustainable basis.
	Flora and Fauna Guarantee Act, 1988	Establishes a legal and administrative framework for the conservation of Victoria's native flora and fauna on all land across the State. The Act provides procedures for the conservation, management or control of flora and fauna and the management of potentially threatening processes. Action Statements must be prepared for threatened flora and fauna and threatening processes listed under the Act.
	Water Act, 1989	Provides for the integrated management of water, enhancement of environmental qualities of waterways and the protection of catchment conditions. It establishes a framework for allocating environmental flows that has the potential to address appropriate water allocation to wetlands.
	Wildlife Act, 1975	Regulates the protection, management and use of wildlife including waterbirds and management of game hunting, including duck hunting. The Act also provides for the establishment of State Wildlife Reserves, areas which primarily conserve wetlands. There are more than 230 in Victoria.
	Wildlife (State Game Reserve) Regulations, 1994	Provide for the management of State Wildlife Reserves where hunting is permitted.
	Wildlife (Game) Regulations, 2001	Regulate hunting.
Australian Capital Territory	*Nature Conservation Act, 1980*	Provides for the protection and conservation of native animals and native plants and the reservation of areas for those purposes.
	Environment Protection Act, 1997	Provides for the protection of the environment and for other purposes by regulating activities that cause or may cause environmental harm and by creating offences for polluting the environment. It creates a general 'environmental duty' of care.

Jurisdiction	Details of Legislation	How legislation protects wetlands
Australian Capital Territory	*Water Resources Act, 1998*	Provides for the management and use of the ACT's water resources in a way that sustains the physical, economic and social well being of the people of the ACT while protecting the ecosystems that depend on those resources.
	Land (Planning and Environment) Act, 1991	The primary statute for administration of land, provides for environmental assessments and inquiries, protection of heritage places and establishes the Territory Plan. The Territory Plan defines land use zones and associated development and use policy (including constraints). It is also the mechanism for reservation of Public land for a range of purposes including environmental conservation. Land use policy objectives for the Territory's open space system specifically address conservation of natural habitat diversity, wildlife corridors, stream flow and ecological resources and functions including wetlands.
New South Wales	*Aboriginal Land Rights Act, 1983*	Vacant Crown land not required for essential or residential purposes is returned to Aboriginal people. Aboriginal land rights aim to redress past injustices when Aboriginal people were dispossessed of their land by colonisation.
	Catchment Management Act, 1989	Provides a framework for catchment management and allows for more community involvement.
	Coastal Protection Act, 1979	An Act to constitute the Coastal Council of New South Wales and to specify its functions; to make provisions relating to the use and occupation of the coastal region; and to facilitate the carrying out of certain coastal protection works.
	Coastal Protection Amendment Act, 1988	Provides a new definition of the coastal zone defined by map references outlining the coastal zone, and extends three nautical miles out to sea.
	Contaminated Land Management Act, 1997	Where site contamination is considered to pose a significant risk of harm to human health or the environment, the Act has powers to direct the investigation / remediation of polluted land and water.
	Crown Lands Act, 1989	Provides a regime for the ownership and management of Crown Land.
	Environment Planning and Assessment Act, 1979	Specifies environmental impact assessment requirements and procedures for some developments and activities. Allows for the creation of policies and plans, including State Environmental Planning Policy No. 14 – Coastal Wetlands (SEPP14), which protects coastal wetlands.
	Fisheries Management Act, 1994	Establishes responsibility for management and protection of marine and estuarine fish resources and their habitats. Requires permits for fish habitat destruction. Provides for development of habitat plans and creation of habitat reserves.
	Heritage Act, 1977	Protects natural heritage features.
	Local Government Act, 1993	Requires approval for building, waste management and sewerage and stormwater drainage.

Jurisdiction	Details of Legislation	How legislation protects wetlands
New South Wales	*Mining Act, 1992*	Creates responsibility for development, management and use of mineral resources.
	National Parks and Wildlife Act, 1974	Relates to all areas reserved as national parks, historic sites, nature reserves, Aboriginal areas, state recreation areas and regional parks. Licence required to destroy protected plants or to take or kill any protected fauna.
	Native Vegetation Conservation Act, 1997	Manages Native Vegetation clearing through the development consent and planning process.
	Noxious Weeds Act, 1993	Specifies landholder responsibilities to control noxious weeds. Outlines licence requirements for herbicides and their use.
	Protection of the Environment Administration Act, 1991	This Act is given general environmental responsibilities – ie to protect, restore and enhance the quality of the environment in NSW, having regard to ecologically sustainable development.
	Protection of the Environment Operations Act, 1997	The Act has powers to license activities that pollute water. There are heavy penalties for unlicensed pollution.
	Threatened Species Conservation Act, 1995	Establishes a process for classifying and protecting endangered species and critical habitats.
	Water Act, 2000	Covers all water resources in the State.
Western Australia	*Conservation and Land Management Act, 1984*	To make better provision for the use, protection and management of certain public lands and waters and flora and fauna thereof, to establish authorities to be responsible therefore, and for incidental or connected purposes. This includes management (and management planning) of national parks, nature reserves, conservation parks, State forests, timber reserves, marine parks, marine nature reserves and marine management areas.
	Wildlife Conservation Act, 1950	To provide for the conservation and protection of wildlife. This includes protection of flora and fauna, including provisions for special protection of declared threatened (declared rare) flora and its habitat on all land classifications and for threatened fauna wherever that fauna occurs.
	Environmental Protection Act, 1986	An Act to provide for an Environmental Protection Authority, for the prevention, control and abatement of environmental pollution, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing.
	Environmental Protection Policies for i. the Swan Coastal Plain Lakes, and ii. the South West Agricultural Zone Wetlands.	These are prepared under Part III of the Environmental Protection Act 1986. Once approved by the Minister for the Environment, they have the force of law. These are prepared for specific purposes.
	Rights in Water and Irrigation Act, 1914	To enable conditions to be put on abstraction licenses where the proposal can have an environmental impact.

Jurisdiction	Details of Legislation	How legislation protects wetlands
Western Australia	*Soil and Land Conservation Act, 1945*	An Act relating to the Conservation of Soil and Land Resources, and to the mitigation of the effects of Erosion, Salinity and Flooding.
	Petroleum Act, 1967	An Act relating to the exploration for, and the exploitation of, petroleum resources, and certain other resources, within certain lands of the State; to repeal the Petroleum Act 1936, and for incidental and other purposes.
	Mining Act, 1978	An Act to consolidate and amend the law relating to mining and for incidental and other purposes.
	Land Administration Act, 1997	Relating to the Conservation of Soil and Land Resources, and to the mitigation of the effects of Erosion, Salinity and Flooding.
	Water and Rivers Commission Act, 1995	Establish a Commission with functions relating to water resources, including functions under various written laws, and for connected purposes.
	Waterways Conservation Act, 1976	Make provision for the conservation and management of certain waters and of the associated land and environment, for the establishment of a Rivers and Estuaries Council and certain Management Authorities.
	Western Australian Planning Commission Act, 1985	An Act to establish a body with responsibility for urban, rural and regional land use planning and land development and related matters in the State, and for connected purposes.
	Town Planning and Development Act, 1928	An Act relating to the planning and development of land for urban, suburban, and rural purposes.
	Statements of Planning Policy (SPP)	SPPs are legally enforceable and must be incorporated into local government town planning schemes. SPPs formulated for protection of conservation and landscape values would rely, in part, on statutes contained in other legislation such as the Conservation and Land Management Act, 1984, the Environment Protection Act, 1986 and the Soil and Land Conservation Act, 1946.

Appendix Two: Commonwealth and State/Territory Wetland Related Policies and Initiatives

(No information provided the Northern Territory)

Jurisdiction	Details of Policy, Strategy or Plan (name & date)	Brief Details
Commonwealth	National Water Reform Framework - Council of Australian Governments, 1994	This framework relates to the management, use, protection and, where necessary, restoration of health of water resources and water dependent ecosystems.
	Wetlands Policy of the Commonwealth of Australia, 1997	The purpose of this policy is to integrate wetland management within the broader context of environmental management, with the goal of repairing and managing wetlands wisely.
	National Strategy for Ecologically Sustainable Development, 1992	This Strategy sets out principles and objectives for achieving ecologically sustainable development in Australia.
	National Strategy for the Conservation of Australia's Biodiversity, 1996	The strategy sets out principles that underpin objectives and actions that are required to protect Australia's biodiversity.
	National Principles for the Provision of Water for Ecosystems, 1996	This policy aims to sustain and, where necessary, restore ecological processes and biodiversity of water-dependant ecosystems by ensuring the provision of water for ecosystems.
	National Water Quality Management Strategy, 1992	The objective of this strategy is to achieve sustainable use of the nation's surface and groundwater resources by protecting and enhancing their quality while maintaining economic and social development.
	National Dryland Salinity Program, 1993	Program to prevent dryland salinity.
	National Principles and Guidelines for Rangelands Management, 1999	Provides for sustainable management of Australia's rangelands.
	National Action Plan for Salinity and Water Quality, 2000	Addresses the issue of salinity and water quality in priority areas.
	Natural Heritage Trust (extension 2002-2007)	The Trust aims to stimulate regional activities to conserve, repair and use sustainably Australia's natural resources. Rivers, coasts and wetlands are a major focus.
	National Land and Water Resources Audit, 1997	Comprehensive nationwide appraisal of Australia's land, water and vegetation resources.
Inter-Governmental Agreements	Victoria-South Australia Groundwater (Border Agreement), 1985	The groundwater resources of the Otway and Murray-Darling Basins along the South Australian and Victorian borders are the subject of this agreement. Extraction from the shared groundwaters is limited to permissible annual volumes specified for a number of management zones along the borders.

Jurisdiction	Details of Policy, Strategy or Plan (name & date)	Brief Details
Inter-Governmental Agreements	Murray-Darling Basin Agreement, 1992	Collaborative arrangements between the Commonwealth, New South Wales, Victorian and South Australian governments for the regulation and sharing of water within the Murray-Darling Basin. The Queensland and Australian Capital Territory governments are also a part of what has become known as the Murray-Darling Basin Initiative.
	Lake Eyre Basin Agreement, 2000	This agreement is a constituted statement of good faith towards proceeding with the development of a formal agreement for the sustainable management of the Cooper Creek and Diamantina River catchments.
	Great Artesian Basin Strategic Management Plan and Consultative Council, 2000	A consultative council to coordinate the effective management of the Great Artesian Basin. The management plan sets the framework for taking a long-term approach to sustainable use of the groundwater resources, while promoting and protecting the socio-economic, environmental and heritage values of the Basin.
South Australia	Our Seas and Coasts: A Marine and Estuarine Strategy for South Australia, 1998	This provides a framework for management and conservation of the State's marine and estuarine environments.
	State Water Plan, 2000	Wetlands – The Government will develop a Statewide wetlands management Strategy to improve the management of wetlands across the State. Riparian Zone – Catchment Water Management Boards as part of their catchment water management plans, will prepare and implement riparian zone management plans for all larger watercourses. Floodplain – The Government will develop a State Floodplain Committee to develop a policy and review and revise legislation or actions.
	State Wetlands Strategy – draft	This Strategy is an action from the State Water Plan and is currently being drafted. It will aim to improve the management of wetlands across South Australia.
Queensland	Policy for the Development and Use of Ponded Pastures, 2001	This policy was introduced to limit the use of ponded pastures. (Ponded pastures are created through the construction of banks, or the modification of naturally wet areas to grow exotic plant species suitable for grazing). It recommends that further development of ponded pastures should not occur in areas that are: (1) below the Highest Astronomical tide, (2) in or adjacent to natural wetlands, (3) in areas of high nature conservation value, or (4) in areas of high fish habitat value.

Jurisdiction	Details of Policy, Strategy or Plan (name & date)	Brief Details
Queensland	Policy for the Development and Use of Ponded Pastures, 2001	(Cont.) Development of ponded pastures should occur in other areas only where the proponent can demonstrate that the proposal will have minimal and acceptable environment impacts.
	Environmental Protection (Water) Policy, 1997	The purpose of this policy is to regulate environmental impacts on waters.
	State Policy for Vegetation Management on Freehold Land, 2000	Provides a framework for management of vegetation on freehold land that is consistent with ecologically sustainable development.
	Broadscale Tree Clearing Policy for State Lands, 2000	Provides a framework for management of vegetation on State land including leasehold land that is consistent with ecologically sustainable development.
	Strategy for the Conservation and Management of Queensland Wetlands, 1999	Provides a framework to guide State agencies responsible for wetland management and sets out initiatives to encourage and assist landholders to sustainably manage wetlands under their control.
	Queensland Greenhouse Policy Framework: A Climate of Change, 2001	Sets out State Government's vision, principles, actions and directions upon which to base future policy making.
	Queensland Integrated Catchment Management Strategy, 1991	Aims to achieve sustainable and balanced use of land, water and related biological resources.
	Queensland Wastewater Reuse Strategy, 1998	Provides a framework to maximise reuse of urban, rural and industrial effluents in an efficient, economic and ecologically sustainable way.
	Code of Practice for Sustainable Cane Growing in Queensland, 1998	Provides guidelines for enhancing sustainability and minimising off-farm impacts of cane growing practices.
	Guidelines for Land and Water Management Plans, 2001	Sets out requirements for Land and Water Management Plans which are required prior to the use of water for irrigation.
Tasmania	State Coastal Policy, 1996	Provides for the protection of natural processes and landforms in coastal areas.
	State Policy on Water Quality Management, 1997	Controls the pollution of waterways.
New South Wales	NSW Coastal Policy, 1997	Environmentally sustainable development of the coast through water quality management, regulation, protection, restoration, State Environmental Planning Policy No. 14 - Coastal Wetlands (SEPP14), State Environmental Planning Policy No. 26, conservation, reserve systems, Acid Sulfate Soil management, planning, cultural heritage protection, monitoring research & management.
	NSW Estuary Management Policy, 1992	A component policy of the NSW State Rivers and Estuaries Policy 1993 for the protection and management of estuaries.

Jurisdiction	Details of Policy, Strategy or Plan (name & date)	Brief Details
New South Wales	NSW Fisheries Policy and Guidelines – Aquatic Habitat Management and Fish Conservation, 1999	Provides background material and description of fish habitats and resources, relevant policies and legislation. Identifies activities that impact on aquatic habitats, compliance activities, guidelines for mitigating impacts, conservation activities and appropriate environmental assessment.
	NSW Groundwater Dependent Ecosystems Policy – draft	Protection of groundwater dependent ecosystems, including groundwater dependent wetlands. Applies five management principles covering values, extraction, quality, precautionary principle and appropriate use and development.
	NSW Weirs Policy, 1997	Aimed at halting and where possible reducing and remediating the environmental impact of weirs. Eight management principles outline construction, removal, modification, regulation, maintenance, riparian protection, rehabilitation and respect for the impact of weirs.
	NSW State Rivers and Estuaries Policy, 1993	Developed for the improved management of rivers and estuaries and their floodplains. The policy sets out six principles for sustainable management.
	NSW Wetlands Management Policy, 1996	Sets out the objectives and nine management principles for the management of wetlands. Overseen by the NSW State Wetland Action Group (SWAG), a whole-of-government committee.
	State Environmental Planning Policy No. 14 (SEPP14) - Coastal Wetlands, 1985	Protects mapped wetlands in the coastal zone of NSW (outside the Sydney metropolitan region). Requires development consent for the clearing, draining or filling of wetlands, or levee construction.
	State Environmental Planning Policy No. 19 (SEPP19) - Bushland in Urban Areas, 1986	Protection of natural bushland in local government areas listed in the schedule, which are reserved for public open space purposes. Development consent must be obtained before bushland is disturbed.
	State Environmental Planning Policy No. 44 (SEPP44) - Koala Habitat, 1995	Protection of Koala habitat, including Swamp Mahogany, commonly associated with wetlands. The policy applies to the local government areas within the known geographic range of Koalas. Councils may not issue development consent without investigating core Koala habitat.
	Local Environmental Control Plans and Development Control Plans	At the local level, development in wetlands is managed by the application of Local Environmental Plans and Development Control Plans. Both plans rank lower than State Environmental Planning Policies and Regional Environment Plans. They are however, more specific in terms of spatial controls and the definition of activities that may be permitted.

Jurisdiction	Details of Policy, Strategy or Plan (name & date)	Brief Details
Australian Capital Territory	ACT Wetlands Policy, in preparation	A policy framework for conservation of the ecologically significant wetlands of the ACT.
	ACT Weeds Strategy, 1996	Establishes mechanisms for determining areas of priority concern to both agricultural production and the maintenance of ecological integrity and outlines a ten year strategy for implementing a coordinated program for controlling weeds in the ACT.
	ACT Nature Conservation Strategy, 1998	Establishes a policy framework for conservation of biodiversity and the protection of ecological processes and systems with strategic objectives for targeted areas of concern.
	Integrated Catchment Management Framework for the ACT, 2000	Provides the basis for implementing an integrated approach to natural resource management in the ACT.
	Water Resources Management Plan, 2000	Provides a decision-making framework and strategic direction for the long -term management of the ACT's water resources.
	ACT Environmental Flow Guidelines, 1999	Outlines the basis of determination of environment flows for ACT rivers and streams and to specify the flows consistent with protecting ecological processes and other values in streams, riparian zones and floodplains.
Victoria	Victoria's Biodiversity Strategy, 1997	Contains policy for managing wetlands in Victoria.
	Victorian Coastal Strategy, 2002	The 1997 Victorian Coastal Strategy was revised in early 2002. The new strategy includes objectives to protect marine and estuarine environments, including intertidal wetlands.
	Code of Forest Practices for Timber Production, 1996	The Code ensures that timber growing and harvesting practices are compatible with the conservation of the wide range of environmental values associated with forests and promote ecologically sustainable management. The Code requires timber growing and harvesting operations to be planned and conducted in accordance with environmental care principles which include measures to protect water quality and stream and to preserve important biological, archaeological and historic sites.
	State Environmental Protection Policy: 'Waters of Victoria' (State of Victoria 1988).	Provides for the protection of surface waters throughout Victoria.

Jurisdiction	Details of Policy, Strategy or Plan (name & date)	Brief Details
Western Australia	Conservation and Land Management Act 1984	To make better provision for the use, protection and management of certain public lands and waters and flora and fauna thereof, to establish authorities to be responsible therefore, and for incidental or connected purposes. This includes management (and management planning) of national parks, nature reserves, conservation parks, State forests, timber reserves, marine parks, marine nature reserves and marine management areas.
	Wildlife Conservation Act 1950	To provide for the conservation and protection of wildlife. This includes protection of flora and fauna, including provisions for special protection of declared threatened (declared rare) flora and its habitat on all land classifications and for threatened fauna wherever that fauna occurs.
	Environmental Protection Act 1986	An Act to provide for an Environmental Protection Authority, for the prevention, control and abatement of environmental pollution, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing.
	Environmental Protection Policies for the Swan Coastal Plain Lakes, and the South West Agricultural Zone Wetlands.	These are prepared under Part III of the Environmental Protection Act 1986. Once approved by the Minister for the Environment, they have the force of law. These are prepared for specific purposes.
	Rights in Water and Irrigation Act 1914	To enable conditions to be put on abstraction licenses where the proposal can have an environmental impact.
	Soil and Land Conservation Act 1945	An Act relating to the Conservation of Soil and Land Resources, and to the mitigation of the effects of Erosion, Salinity and Flooding.
	Petroleum Act 1967	An Act relating to the exploration for, and the exploitation of, petroleum resources, and certain other resources, within certain lands of the State; to repeal the Petroleum Act 1936, and for incidental and other purposes.
	Mining Act 1978	An Act to consolidate and amend the law relating to mining and for incidental and other purposes.
	Land Administration Act 1997	Relating to the Conservation of Soil and Land Resources, and to the mitigation of the effects of Erosion, Salinity and Flooding.
	Water and Rivers Commission Act 1995	Establish a Commission with functions relating to water resources, including functions under various written laws, and for connected purposes.

Jurisdiction	Details of Policy, Strategy or Plan (name & date)	Brief Details
Western Australia	Waterways Conservation Act 1976	Make provision for the conservation and management of certain waters and of the associated land and environment, for the establishment of a Rivers and Estuaries Council and certain Management Authorities.
	Western Australian Planning Commission Act 1985	An Act to establish a body with responsibility for urban, rural and regional land use planning and land development and related matters in the State, and for connected purposes.
	Town Planning and Development Act 1928	An Act relating to the planning and development of land for urban, suburban, and rural purposes.
	Statements of Planning Policy (SPP)	SPPs are legally enforceable and must be incorporated into local government town planning schemes. SPPs formulated for protection of conservation and landscape values would rely, in part, on statutes contained in other legislation such as the Conservation and Land Management Act, 1984, the Environment Protection Act, 1986 and the Soil and Land Conservation Act, 1946.

Appendix Three: Australian Resource Information Covering Wetland Management

Australian resource information on the management of wetlands	
Resource information	**Holding authority**
• ***Oil spill prevention and clean-up***	
National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances	AMSA[3]
National marine Oil Spill Contingency Plan, National Plan.	AMSA
REEFPLAN: Oil Spill Contingency Plan for the Great Barrier Reef	GBRMPA[4]
'Coastal Resource Atlas for Oil Spills' for each region of the NSW coastline describing the value of habitats and prioritising the sensitivity of each area	NSW EPA[5]
ACT Emergency Plan and Sub-plan	ACT Govt.
Water Information Sheet 1	ACT Govt.
Western Port (Western Shores) shoreline oil spill response manual, Wardrop Consulting & Marine and Freshwater Research Institute, 1999	NRE, Vic[6]
Victorian Marine Pollution Contingency Plan (VICPLAN), 1997	Vic Govt.
Western Port Marine Pollution Contingency Plan, 1996	Vic Govt.
Wildlife Response Plan for Oil Spills, revised in, 1997	Vic Govt.
Environmental Protection Agency Southern Region – Oil Spill Response Plan, 2000	Qld Govt.
Oil Spill Risk Assessment for the Coastal Waters of Queensland and the Great Barrier Reef Marine Park	Qld Govt.
• ***Agricultural runoff***	
National Water Quality Management Strategy, ARMCANZ and ANZECC	AFFA[7]
Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000	AFFA
Australian Guidelines for Water Quality Monitoring and Reporting 2000	AFFA
Rural Land Uses and Water Quality- A Community Resource Document 2000	AFFA
Effluent Management Guidelines for Dairy Sheds	AFFA
Effluent Management Guidelines for Dairy Processing Plants	AFFA
Effluent Management Guidelines for Intensive Piggeries	AFFA
Effluent Management Guidelines for Aqueous Wool Scouring and Carbonising	AFFA
Effluent Management Guidelines for Tanning and Related Industries	AFFA
Effluent Management Guidelines for Australian Wineries and Distilleries	AFFA
State Environment Protection Policy (The Waters of Victoria) (1988)	Vic Govt.

[3] Australian Maritime Safety Authority. This plan is accessible via http://www.amsa.gov.au/me/natplan/Natplan1.htm
[4] Great Barrier Reef Marine Park Authority
[5] New South Wales Environment Protection Authority
[6] Department of Natural Resources and Environment
[7] Commonwealth Department of Agriculture, Fisheries and Forestry – Australia

State Environment Protection Policy (The Waters of Western Port Bay and Catchment) (1979), revised 2001	Vic Govt.
Code of Practice for Agriculture 1998	Qld Govt.
FARMCARE - Code of Practice for Sustainable Fruit and Vegetable Production in Queensland 1998	Qld Govt.
Code of Practice – Sustainable Cane growing in Queensland 1998	Qld Govt.
Code of Practice for the Storage and use of Chemicals at Rural Workplaces	Qld Govt.
Natural Resource Monitoring Guide	Qld Govt.
Rehabilitation of saline sites in south-east Queensland	Qld Govt.
Great Barrier Reef Catchment Water Quality Action Plan 2001	GBRMPA
Basin Salinity Management Strategy 2001-2015	MDBC[8]
Salinity and Drainage Strategy: ten years on,1999	MDBC
The Pilot Interstate Water Trading Project	MDBC
Salinity Audit: Community Summary 1999	MDBC
Salt Trends 1997	MDBC
Groundwater - A resource for the future	MDBC
GIS and Irrigation: An inventory of Projects in the Murray-Darling Basin 1997	MDBC
Review of Nutrients in Irrigation Drainage - Series 11, 1994	MDBC
Dryland Forum 1998	MDBC
• ***Urban/Industrial discharges***	
Australian Guidelines for Urban Stormwater Management 2000	AFFA
Guidelines for Sewerage Systems- Effluent Management	AFFA
Guidelines for Sewerage Systems- Acceptance of Trade Waste (Industrial Waste)	AFFA
Guidelines for Sewerage Systems-Use of Reclaimed Water	AFFA
Guidance for the Use of Herbicides Near Waters	NSW EPA
Managing Urban Stormwater	NSW EPA
Stormwater Pollution from Building Sites	NSW EPA
Nutrients in Rural Waterways	NSW EPA
Waste Dumping Fact Sheets	NSW EPA
Stormwater Pollution Prevention – Code of Practice for the Community	SA Govt.
Stormwater Pollution Prevention – Code of Practice for the Building and Construction Industry	SA Govt.
Stormwater Pollution Prevention – Code of Practice for Local, State and Federal Government	SA Govt.
Guidelines for Major Solid Waste Landfill Depots	SA Govt.
South Australia Reclaimed Water Guidelines – Treated Effluent	SA Govt.
Site and Facility Environmental Management Plans	DoD[9]
Pollution control on residential building sites	ACT Govt.
Disposal of Oils, Oily water, Solvents and Associated Wastes from the Automotive Servicing Industry	ACT Govt.

[8] Murray-Darling Basin Commission
[9] Commonwealth Department of Department of Defence

Keeping Stormwater Clean to Protect our Lakes and Rivers	ACT Govt.
Urban Stormwater, Edition 1, Standard engineering practices manual.	ACT Govt.
State Environment Protection Policy (The Waters of Victoria) 23/2/88, Gazette 26/2/88, 15/3/88 - as varied 6/2/90, Gazette 6/2/90	Vic Govt.
State Environment Protection Policy (The Waters of Westem Port Bay and Catchment) No. W-28,6/2/79, Gazette 9/2/79	Vic Govt.
State Environment Protection Policy (The Waters of the Western District Lakes) No. W-34B,12/1/81, Gazette 11/2/82	Vic Govt.
Stormwater quality control guidelines for local government, 1998	Qld EPA/DNR[10]
Model urban stormwater quality management plans and guidelines, 2001	Qld EPA
Logan, Coomera and Southern Moreton Bay Regional Wastewater Management Study – Environmental Monitoring Program, 1996	Qld Govt.
Sydney Regional Coastal Management Strategy, (1998).	SCCG[11]
Regional Policy and Strategy for Water Quality Monitoring (1998).	SCCG
Coastal State of the Environment Guidelines for Sydney, (1996).	SCCG
Water Quality Guidelines for Sydney's Estuarine, Fresh and Groundwaters, (1996)	SCCG
Options for Cleaning Sydney's Estuarine Tidal Baths and Ocean Rock Pools for Local Government: A Discussion Paper, (1996)	SCCG
Preventing Cigarette Butt Litter: A resource package for local government (2001)	SCCG
Regulating the Use if In-Sink Waste Disposal Units - Issues Report, 1999	SCCG
Benchmarking Stormwater Quality Management Programs, (2000)	SCCG
Stormwater Pollution Interception and Treatment System, (1998)	SCCG
Urban Stormwater Management Model Policies and Guidelines (1995) (to assist local councils in strategic planning issues and policy development.)	SCCG
On-site Stormwater Detention Guidelines for Urban Councils (1995) (to protect downstream property from increasing flooding problems.)	SCCG
Urban Stormwater Quality Management Guidelines (1994) (focusing on Council properties and activities.)	SCCG
Stormwater Pollution Control Code for Local Government (1992) (focusing on source control from private premises).	SCCG
• ***Invasive species***	
AQIS Decision Support System – guidelines for controlling ballast water in ports	AQIS[12]
Exotic Trees Along Watercourses	SA Govt.
Woody Weed Control Along Watercourses	SA Govt.
Managing Vertebrate Pests: Principles and Strategies (AUS$15.00)	AFFA
Managing Vertebrate Pests: Feral Horses (AUS$24.95)	AFFA
Managing Vertebrate Pests: Rabbits (AUS$24.95)	AFFA
Managing Vertebrate Pests: Foxes (AUS$24.95)	AFFA

[10] Environment Protection Agency/ Department of Natural Resources and Mines (Queensland)
[11] Sydney Coastal Councils Group Inc.
[12] Australian Quarantine and Inspection Service

Managing Vertebrate Pests: Feral Goats (AUS$24.95)	AFFA
Managing Vertebrate Pests: Feral Pigs (AUS$24.95)	AFFA
Managing Vertebrate Pests: Rodents (AUS$24.95)	AFFA
Managing the Impacts of Carp (AUS$29.95)	AFFA
Managing the Impacts of Wild Dogs/Dingoes (AUS$29.95 book; AUS$20 CD-ROM)	AFFA
Commercial Use of Wild Animals (AUS$24.95)	AFFA
Sustainable Use of Wildlife by Aboriginal Peoples and Torres Strait Islanders (AUS$24.95)	AFFA
Scientific, economic and social issues of commercial use of wild animals in Australia (AUS$5.00)	AFFA
Australia's pest animals: new solutions to old problems (AUS$29.95)	AFFA
ACT Pest Management Strategy; the National Management Strategy for Carp Control 2000-2005.	ACT Govt.
The Draft Victorian Pest Management Framework. 2001.	Vic Govt
'Introduction of Exotic Organisms into Victorian Marine Waters' Action Statement (1999) under the Flora and Fauna Guarantee Act 1988.	Vic Govt.
'Interim Victorian Protocol for Managing Exotic Marine Organism Incursions' (1999).	Vic Govt.
Ferns, L.W., Curnow, J.G. (1998). *Codium fragile* spp *tomentosoides* Incursion at Western Port. The Implementation of a Victorian Protocol for Managing Exotic Marine Organism Incursions – A Case Study. (1998). Marine Pest Incursion Management Report Number 1. Department of Natural Resources and Environment. Victoria.	Vic Govt.
Exotic Marine Pests in the Port of Geelong, Victoria. (1998). Victoria. Marine and Freshwater Resources Institute Report No. 8. Victoria. Marine and Freshwater Resources Institute, Queenscliff.	Vic Govt.
Exotic Marine Pests in the Port of Melbourne, Victoria. (2001). Victoria. Marine and Freshwater Resources Institute Report No. 25. Victoria. Marine and Freshwater Resources Institute, Queenscliff.	Vic Govt.
Draft Queensland Weeds Strategy, 2000-2005	Qld Govt.
South East Queensland Environmental Weeds Strategy, 2001-2005	Qld Govt.
Department of Natural Resources and Mines Pests Facts	Qld Govt.
Department of Natural Resources and Mines Weed Strategies	Qld Govt.
Department of Primary Industries Fish Note series on exotic pest fish	Qld Govt.
Algal Management Strategy - Technical Advisory Group report 1994	MDBC
National Management Strategy for Carp Control 2000-2005	MDBC
Eutrophication	MDBC
Ranking Areas for Action: A guide for Carp Management Groups	MDBC
Future Directions for Research Into Carp	MDBC
• ***other, eg. Highway designs, aquaculture***	
NSW North Coast Sustainable Aquaculture Strategy (takes into account the proximity of aquaculture facilities to wetlands)	NSW Govt.
Land transport infrastructure projects guide, 2001	Tas Govt.
Watercourses and Earthworks	SA Govt.

Managing Your Watercourse	SA Govt.
Marine and Coastal and Estuarine Investigation Final Report, Environment Conservation Council, 2000	Vic Govt.
Victorian Aquaculture Strategy 1998	Vic Govt.
Review of regulatory arrangements in the Victorian Aquaculture Industry; Discussion Paper, 1999, by the Aquaculture Regulatory Reform Task Force	Vic Govt.
Queensland Marine Prawn Aquaculture Licensing – Discussion Paper, 2000	Qld Govt.
Native Vegetation Management in Queensland	Qld Govt.
Community-based monitoring of fisheries habitats: a statewide perspective	Qld Govt.
Mosquito control in coastal wetlands	Qld Govt.
EDFISH: The Fisheries and Wetlands Education Project	Qld Govt.
Our Inland Wetlands	Qld Govt.
Wetlands Information about restoring wetlands of fisheries importance	Qld Govt.
Queensland's fisheries habitats: current condition and recent trends	Qld Govt.
Model DCP: Protecting Sydney's Wetlands, (2001), (includes resource folder and associated 1:25,000 wetland maps)	SCCG
Water Pollution: It's Your Choice (designed to target the broader community.)	SCCG
Protecting Wetlands in Sydney Coastal Councils - Stage 1, Background Information and Literature Review Report (2000)	SCCG
Floodplains Wetlands Management Strategy - Nov 1998	MDBC
Integrated Catchment Management in the Murray-Darling Basin 2001-2010	MDBC
Natural Resource Management Strategy- Murray-Darling Basin	MDBC
Guidelines for the Preparation of River Management Plans No. 2	MDBC

Appendix Four: List of Acronyms

ACT	Australian Capital Territory
AFFA	Commonwealth Department of Agriculture, Fisheries and Forestry – Australia
AMSA	Australian Maritime Safety Authority
ANZECC	Australian and New Zealand Environment Conservation Council
APWMTP	Asia Pacific Wetland Managers Training Program
AQIS	Australian Quarantine and Inspection Service
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand (Commonwealth/State/International)
AusAID	Australian Agency for International Development
BHP	BHP-Billiton
CALM	Department of Conservation and Land Management, Western Australia
CAMBA	China-Australia Migratory Bird Agreement
CMA	Catchment Management Authority
COAG	Council of Australian Governments
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CVA	Conservation Volunteers Australia
DNR	Department of Natural Resources and Mines, Queensland
DoD	Commonwealth Department of Department of Defence
EC	Electrical conductivity
EEC	Environment Education Centre
EIS	Environmental Impact Statement
EPA(NSW)	Environment Protection Authority
EPA (QLD)	Environment Protection Agency
EPBC	Environment Protection and Biodiversity Conservation Act, 1999
GBRMPA	Great Barrier Reef Marine Park Authority
GEF	Global Environment Facility
GIS	Geographic Information System
GL	Gigalitre
GPS	Global Positioning System
Govt.	Government
HQ	Headquarters
ICRI	International Coral Reef Initiative
IPA	Indigenous Protected Area
JAMBA	Japan-Australia Migratory Bird Agreement
LOTE	Language Other Than English
MDBC	Murray-Darling Basin Commission
MMCC	Macquarie Marshes Catchment Committee
MoU	Memorandum of Understanding
NCTWR	National Centre for Tropical Wetland Research
NHT	Natural Heritage Trust, of the Commonwealth Government
NPA	National Parks Association
NPWS	National Parks and Wildlife Service, NSW

NRE	Department of Natural Resources and Environment, Victoria
NSW	New South Wales
NT	Northern Territory
NTT	Nusa Tenggara Timur province, Indonesia
NTU	Northern Territory University
PER	Public Environment Report
PNG	Papua New Guinea
QLD	Queensland
RIS	Ramsar Information Sheet
SA	South Australia
SCCG	Sydney Coastal Councils Group Inc.
SEPP (Vic)	State Environment Protection Policy
SEPP (NSW)	State Environment Planning Policy
SPREP	South Pacific Regional Environment Program
TAS	Tasmania
UNDP	United Nations Development Program
USP	University of South Pacific
VIC	Victoria
WA	Western Australia
WLA	Wildlife Allocation
WWD	World Wetlands Day
WWF	World Wide Fund for Nature – Australia