We cannot unwish the joy
of rivers that rise softly
as sleepers nudged by vague sense of the dawn
seeping from nowhere,
from some gland of the continent;

CHAPTER NINETEEN

grateful above all for the progress of rivers
which, facing no obstacles, yet make their own time
signing the plain with stately meanders,
or descending the slopes in a wide wilful slalom,
as though in love with the land
unwilling to part from the Earth.

CHAPTER 19

WATER QUALITY

For many years, and increasingly over the past decade, water and waste authorities in Australia have recognised the value of artificial and natural wetlands for improving the quality of water. Local councils and other agencies are now constructing and rehabilitating wetlands for water treatment in many different settings, ranging from large-scale natural wetlands to much smaller, purpose-built urban wetlands. However, this revival of interest in the value of wetlands for water treatment has not yet expanded to include whole river floodplains, which are among the largest and most important water-treatment zones in the natural landscape (Chapter 6).

Conserving and rehabilitating floodplains will improve the quality of river water, removing much of the silt and many of the nutrients that help cause cyanobacterial blooms. The most effective way to rehabilitate floodplains is to restore their natural flooding cycle, in combination with revegetation programs.

LIVING ON FLOODPLAINS

However, natural floodplain wetlands should not be used as treatment sites for human wastewater. Ideally sewage effluent and other polluted wastewater, including irrigation drainage, should be dealt with off the floodplain. Augmenting a natural wetland is not an alternative to installing a proper water treatment process, even though that process may include constructing artificial wetlands. However, scientists stress that natural wetlands should continue to be valued even if they have been considerably altered by past practices. Even the most severely degraded wetland can perform some water-treatment and other functions, and should be conserved.

Watertables

Salinity in all its manifestations is threatening floodplains, as it is much of the rest of the Murray-Darling Basin (Chapter 15). Any efforts aimed at slowing or halting the creep of large-scale dryland salinity in the Basin, such as catchment tree planting and re-establishing perennial pastures, will also aid floodplains.

On a local scale, floodplains may suffer from the same sorts of salinity problems that affect irrigated crops, and the same suite of remedial actions should be applied wherever possible. Where it is impossible to lower watertables by any other means, it may be necessary to resort to major engineering works, such as the proposal to construct some 15 tube-wells to pump groundwater from under the Chowilla floodplain. (65) In most situations the best solution is to return river flows to a regime much closer to their natural cycle, to remove unnecessary flow impediments and to address the accelerated recharge of groundwater, rather than its discharge.

There are now trends throughout the Basin toward better management of irrigation, and a growing appreciation that the salinity should not simply be relocated — that it must be dealt with on-farm. However, there is still a long way to go, and it is important that undeveloped areas of floodplains are not viewed as sacrificial zones for dumping salt, either above or below ground, as they have been in the past.

Weeds

Most discussion of weeds in Australia now focuses on agricultural pest plants rather than those causing environmental problems. Indeed, some species promoted for agriculture have proved to be damaging environmental weeds, a problem that is likely to be repeated in future. Of particular concern on Murray-Darling floodplains are some of the introduced tropical grasses now being promoted for use in wet, ponded pastures in northern parts of the

Above: Electrofishing for carp on Lake Moodemere, Victoria. Scientists from many different fields are researching a range of issues – from carp control to the response of invertebrate communities to floods – in a bid to better understand how our freshwater systems operate. Better understanding is fundamental to better decision making, and it needs to be available to everyone. Photos: *Karen Markwort, CRCFE*

Below: Studying the effects of water fluctuations on macroinvertebrates and aquatic plants in experimental billabongs near Albury.

Basin. More attention needs to be paid by Federal and State authorities to the potential for such proposed agricultural plant species to escape and cause environmental problems.

However, with some 1,500 introduced weed species already rampant in Australia, and with many more potential weeds now being used in gardens, aquariums and for agriculture, future weed invasions on floodplains are inevitable. State agencies should cooperate to develop fast-acting contingency plans to deal with new outbreaks of the worst weed threats, such as some of the more rampant introduced waterweeds.

Introduced waterplant infestations remain a major threat, and improved public education is needed to dissuade aquarium owners and industry outlets from releasing new problem weeds. More research needs to be done on likely biological controls for existing and potential environmental weeds. All floodplain rehabilitation programs need to include practical plans for controlling weeds. The value of native plant species for ornamental and agricultural uses needs to be better recognised, and research and extension work in this area should be encouraged.

Pest animals

Feral predators, especially foxes, are very damaging to native wildlife, and were in part responsible for the wave of mammal extinctions which swept through inland Australia late last century and in the first half of this century. Most of the medium-sized native mammals which once grazed floodplains probably fell victim to foxes, and to competition from rabbits and other introduced mammals, including livestock (Chapter 14). The vast majority of tortoise eggs are taken each year by foxes. Wild pigs and feral goats cause severe soil damage in some areas, and should be priority targets for control. Rabbits feed voraciously on floodplain seedlings, and in many areas their burrowing in sandhills along river valleys is a major local cause of soil erosion. There is little point in easing livestock grazing pressure on floodplains if feral animals simply take over where the cattle left off, so plans to lighten the impact of floodplain grazing must always include some control of feral animals, and probably of woody weeds as well.

Introduced fish and other aquatic species can be enormously damaging to river systems and the life they support, especially when released into ecosystems which have already experienced considerable ecological disturbance (Chapter 14). Introduced fish have the potential to spread new viruses and other diseases to native fish and to other animals, and may have already done so in the Murray-Darling system. Aquarium species should never be released into floodplain or river waters, especially to billabongs or similarly semi-isolated waterbodies. Aquarium water should always be disposed of away from the floodplain.

Even introduced fishes which have been established in inland waters for many years, such as carp, trout, goldfish, redfin perch, gambusia and weather loach, can cause considerable damage if they are introduced into areas previously free of them. Fresh releases of introduced fish species to waterways in which they are already plentiful can also add new genetic traits to wild populations. For example, carp were present in Murray-Darling waters for many decades before the introduction of a new variety led to their rapid spread and population explosion in the 1970s.

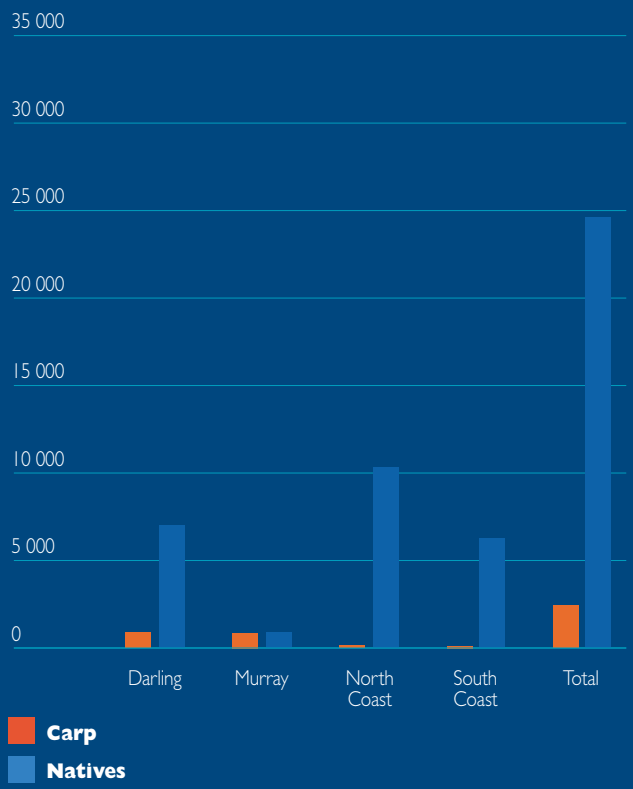
Conservation and heritage

River floodplains are natural wildlife corridors and refuges in the arid Australian landscape, and are therefore high-priority areas for conservation. They support many more species than either the dry country that surrounds them, or the river channels that flow through them. The floodplains of the Murray-Darling Basin also include many sites of past and present cultural importance to Aboriginal people, and many of these are of international

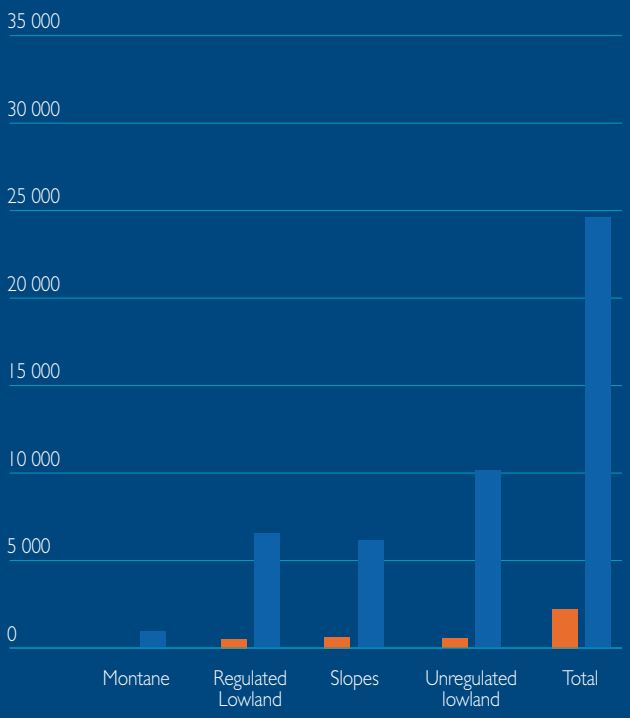
Planting drought-resistant and high-yielding saltbush and eucalypts around cowals (billabongs) on a cleared floodplain near Narromine in New South Wales. This buffer zone of vegetation will help protect the Macquarie River from agricultural runoff and other pollutants.

Photo: *David Eastburn, MDBC*

NSW RIVER SURVEY:
the proportion of carp to native species by region



NSW RIVER SURVEY:
the proportion of carp to native species by river type



Fish and Rivers in Stress: The NSW Rivers Survey, the most comprehensive look at freshwater fish resources conducted anyway in Australia, found that the introduced, pest species, carp, was the most common fish in the Murray and Darling river systems. (66)

significance. Indeed, in a very real sense the whole Basin is a site of international significance, representing one of the world's great river systems and a largely unexplored repository of biodiversity (Chapter 5).

A priority throughout the Basin is to establish, wherever possible, corridors of native vegetation along the banks of all streams and waterways. This is a major task that will confront Australians for many years to come. Usually it means restricting access to within about 30 metres of waterways, creating a buffer zone of native vegetation. The costs of fencing and providing off-river-watering points are significant, and this is an area in which landcare-style projects — with support from local communities and governments — may be able to assist landholders. The wider floodplain should not be neglected, but can be managed less intensively in most places. As has been stressed repeatedly in this publication, the crucial issues are returning floodplains to their natural flooding cycle and regenerating native vegetation. Although floodplains are naturally disturbed ecosystems, and are therefore prone to weed invasion, a more natural flooding cycle and increased vegetation cover should give perennial native species a competitive advantage over introduced plants.

Research

Australian floodplains remain mysterious places. Researchers believe they have a better grasp now than ever before of how river systems work, and almost every new scientific insight makes floodplains appear more important. Researchers admit there are large gaps in their knowledge, and that many of their suppositions are best guesses — 'unproven hypotheses', in scientific jargon. That said, science does offer crucial insights into floodplain processes, and into the actions needed to maintain them.

For example: no fish biologist yet claims to know exactly how native fish behave and breed in the wild. But all agree it has something to do with flooding and floodplains, and that the best way to restore native fish is to restore their natural habitat and its cycles. Similarly, botanists have detailed ecological knowledge about only a few native plants, but they know enough to plead for natural flooding cycles to be restored.

There is a pressing need — scientific, economic, environmental and cultural — for Australia to continue to expand its existing research into floodplain ecosystems. Scientifically, Australia's system of inland floodplain rivers remains one of the great-unstudied natural systems

of the world. It is home to thousands of unique species, even if no-one can yet say even within an order of magnitude how many there are, and the peculiarities of the Australian climate and geology make it an extraordinarily interesting place. The ecosystems which nature has forged from such harsh raw materials contain many lessons, and perhaps some new resources, for Australians trying to scratch a living from our thin soils and wild weather. They also contain many important new insights into how nature works.

There are sound economic reasons for Australia to bolster its research effort into floodplain rivers (Chapter 2). Improved floodplain management could save industry and the public purse tens, even hundreds, of millions of dollars in coming years, as the nation wrestles to solve the desperate problems of its inland rivers. An improved understanding of floodplain processes will help arm Australia with the knowledge to deal with many expensive environmental problems, such as declining native fish and waterbird populations, cyanobacterial blooms, water quality, agricultural sustainability and so on. Restoring native fish populations, for example, could help rescue recreational and commercial fishing industries worth millions of dollars each year to regional economies, and could save government agencies the not-inconsiderable expense of restocking inland waterways with fingerling fish. Restoring floodplain health will help improve river water quality and will enhance the ability of rivers to clean themselves of unwanted chemicals and nutrients. However, floodplain research will not only benefit the economy by tackling expensive environmental problems, it may also yield new products and processes for agriculture, aquaculture, ecotourism and many other industries.

But the need for floodplain research transcends economics. Australia is classified as one of the world's 12 megadiverse regions; the only such region which lies within a developed country. More than 80 percent of Australia's species are found nowhere else. Floodplain ecosystems are especially rich examples of the peculiarity and profligacy of nature in the antipodes. They are world treasures as well as Australian ones. It is a tragedy that in a few generations Australia has shown itself capable of wiping out many of the species and disrupting many of the processes that make floodplains special.

Culturally, our need for an improved understanding of the natural processes at work in our landscape is difficult to overstate. Knowledge and appreciation of Australia's geology and biology are intimately connected to our concepts of national identity, culture, ethnicity and spirituality. Research into the strange and fascinating land in which we live can help fuel our vision of what we are, and there are few parts of that land more strange and more fascinating — and less understood — than Australia's inland floodplains.

Exorcising the swagman's ghost

Australia's floodplains are victims of people's attitudes: for too long we have seen them as unlovely parts of the landscape that are crying out for exploitation. Early European Australians set out deliberately to change the landscape; to 'improve' it in the image of their home countries. Acclimatisation societies tried hard to naturalise exotic plants and animals, sometimes succeeding beyond their wildest dreams. Early European river dwellers felled trees, removed snags, introduced foreign fish and planted willows not just for economic reasons, but also to try and Europeanise a landscape whose innate beauty was invisible to their eyes. But just as European settlers changed Australia, Australia also changed them. New migrants have brought new cultures from different parts of the world, and Aboriginal culture has reasserted itself. The old way of seeing Australia's landscape has faded; and a new way is still emerging.

Native life on the floodplains may seem messy, sporadic, unpredictable, weird and often very difficult to observe at all. But it has extraordinary beauty, if only we can learn to see it. It also has a vital function, if only we can learn to see that. We need to look at Australian floodplains through Australian eyes. A shallow billabong covered with a rusty, maroon mat of floating azolla is a beautiful sight. Under a microscope, the creatures that swarm in its water are as beautiful and as fascinating as are whales in the Antarctic, lions in the Serengeti, or coral on the Great Barrier Reef.

Australia's most famous floodplain figure, Banjo Patterson's jolly swagman, was a traveller in the Australian landscape, who merely camped by his billabong while he was on the road to somewhere else. Perhaps it's time we stopped camping on our floodplains. Perhaps it is time we learned how to live on them, for good.

Success in managing our water resources depends on our understanding that the whole system is interconnected. By monitoring various aspects of our waterways, our level of understanding can be increased and appropriate action can be taken. Photo: ***David Eastburn, MDBC***

ENDNOTES

ENDNOTES

(a): The first poem featured in this book is from *Tilting at Snowgums*, published by Klaus Hueneke's Tabletop Press. The poetry throughout the remainder of the text comes from Mark O'Connor's *Firestick Farming: Selected Poems 1972-1990*, published by Hale and Iremonger.

1: Tim Flannery, *The Future Eaters: An Ecological History of the Australian Lands and People*, Reed Books, Melbourne, 1994.

2: Releasing *Cyrtobagous salviniae* in Sri Lanka saved that country $16 million (in 1987 dollars), according to a cost-benefit analysis (*Biological control of Salvinia molesta in Sri Lanka: An Assessment of the Costs and Benefits:* ACIAR Technical Reports #12, Australian Centre for International Agricultural Research, 1989). Former CSIRO chair Neville Wran estimated that the economic benefits of Cyrtobagous releases worldwide were "at least $100 million, with as much again likely to flow from the research over the next few years". (Wran gold medal goes to water-weed scientist', News Release 91/52, CSIRO Public Affairs Unit, 1991).

3: R. Bedding, 'Biological Control of *Sirex noctilio* using the Nematode *Deladenus siricidcola*'. In Bedding, Ray Akhurst and Harry Kaya (eds), *Nematodes and the Biological Control of Insect Pests*, CSIRO Publishing, Melbourne, 1993.

Bedding estimates that, were it not controlled, sirex wood wasp could cost Australia between $1 billion and $4 billion in a 30-year pine rotation.

4: Sylvia Oliver Inciong, Information Officer, International Rice Research Institute, Philippines, personal correspondence, May 17, 1996.

5: Trevor Jacobs, 'River Regulation'. In Mackay, N. and Eastburn, D. (eds), *The Murray*, Murray-Darling Basin Commission, 1990, p. 45.

6: R.L. Pressey, *Wetlands of the River Murray Below Lake Hume*, River Murray Commission, 1986, pp. 24-36.

7: Phil Cadwaller and Brian Lawrence, 'Fish'. In Mackay and Eastburn, *op cit*., p. 317.

8: Eward O. Wilson, *The Diversity of Life*, Penguin Books, London, 1994, p. 99.

9: Cadwaller and Lawrence, *op cit*, pp. 317-319.

10: David Eastburn, 'The River', in Mackay and Eastburn, *op cit*, p. 9.

11: David Mussared, 'Yabby find proves an important discovery', *The Canberra Times*, December 20, 1993.

12: D.W. Meinig, *On the Margins of the Good Earth: The South Australian Wheat Frontier, 1869-1884*, Association of American Geographers, 1962.

13: P.S. Lake and A. Sokol, *Ecology of the Yabby* Cherax destructor, Australian Water Resources Council, 1986, pp. 25 and 122.

14: Margules & Partners et al, *River Murray Riparian Vegetation Study*, Murray-Darling Basin Commission, 1990.

15: Margules *op cit*, p. 21.

16: L. Bren, 'Red Gum Forests'. In Mackay and Eastburn, *op cit*, p. 231.

17: Joe Murphy, 'Watering the Millewa Forest', *ibid*, p. 247.

18: John Earl and Barry McCleary, 'Mystery of the poisoned expedition', *Nature*, Vol. 368/6473, 1994, pp. 683-684.

19: Cathy Sullivan, 'Phytoplankton'. In Mackay and Eastburn, *op cit*, p. 253.

20: Andrew Scott, *The Creation of Life: From Chemical to Animal*, Blackwell, UK, 1986, pp. 135-169.

21: James Lovelock, *The Ages of Gaia: A Biography of Our Living Earth*, Oxford University Press, UK, 1989, pp. 65-96.

22: M.M. Stevens, 'Biology and control of *Chironomus tepperi* Skuse, a pest of rice in New South Wales'. In Cranston, P. (ed) *Chironomids: From Genes to Ecosystems*, CSIRO Publishing, 1994, p. 239.

23: G.L. Bennison, T.J. Hillman and P.J. Suter, *Macroinvertebrates of the River Murray: Survey and Monitoring, 1980-1985*, Murray-Darling Basin Commission, 1989, pp. 28-29.

24: Paul Boon et al, 'Billabongs'. In Mackay and Eastburn, *op cit*, p. 193.

25: Keith Walker, 'Mussels'. In Mackay & Eastburn, *op cit*, pp 309-314.

26: Lake and Sokol, *op cit*.

27: Cadwaller and Lawrence, *op cit*, pp. 317-319.

28: Lance Lloyd et al, 'Natural Processes within Murray-Darling Floodplain Wetlands'. In Tony Sharley and Clive Huggan (eds), *Murray-Darling Basin Floodplain Wetlands Management: Proceedings of the Floodplain Wetlands Management Workshop*, Albury, 20-22 October, 1992, Murray-Darling Basin Commission, 1994, p11.

29: Peter Gehrke, 'Effects of Flooding on Native Fish and Water Quality in the Murrumbidgee River'. In Jane Roberts and Rod Oliver (eds), *The Murrumbidgee Past and Present*, CSIRO Division of Water Resources, 1994, pp. 60-67.

30: Will Osborne from the University of Canberra contributed to this brief discussion on frogs. Information was also drawn from:

Michael Healey, David Thompson and Alistar Robertson, 'Amphibian communities associated with billabong habitats on the Murrumbidgee floodplain', Australia, *Australian Journal of Ecology*, 22, 1997, pp. 270-278.

Michael J. Tyler, *Australian Frogs: A Natural History*, Reed Books, Chatswood, NSW, 1994.

31: Australia's freshwater *Chelonia* species are usually referred to as 'tortoises', but sometimes also as 'turtles'. Either is correct. Strictly speaking, tortoises are terrestrial animals, while turtles live in the sea. Freshwater chelonians fit neither category. They are known overseas as turtles, but in Australia more commonly as tortoises.

32: This brief discussion of water rats draws on several sources:
Barbara Triggs, *Mammal Tracks and Signs: A Field Guide for South-Eastern Australia*, Oxford University Press, Melbourne, 1984, pp.108-111.

Leonard Cronin, *Key Guide to Australian Mammals*, Reed Books, Melbourne, 1991, p. 142.

Ian Fraser and Margaret McJannett, *Wild About Canberra: A Field Guide to the Plants and Animals of the ACT*, ACT Parks and Conservation Service, 1993.

Frederic Wood Jones, *The Mammals of South Australia: Parts I-III*, 1923-1925, SA Government Printer, 1968, pp. 290-294.

33: There are actually three species of monotremes, the platypus and two species of echidna: *Zaglossus bruijnii* found in Papua New Guinea, where the mainland echidna, *Tachyglossus aculeatus* also occurs. Personal communication, Tom Grant.

34: Information on platypuses was drawn from the following sources:

Anthony Scott and Tom Grant, Impacts of water management in the Murray-Darling Basin on the platypus (*Ornithorhynchus anatinus*) and the water rat (*Hydromys chrysogaster*), *CSIRO Land and Water Technical Report 23/97*, September, 1997.

Australian Nature Conservation Agency, *Platypus*, 1996. The ANCA is now Environment Australia Biodiversity Group.

35: Sue Briggs, 'Waterbirds'. In Mackay & Eastburn, *op cit*, pp. 337-343.

36: Cronin, *op cit*, pp. 34-40.

37: Keith Walker and Martin Thoms, 'Environmental Effects of Flow Regulation on the Lower Murray River, Australia'. *In Regulated Rivers: Research and Management*, Vol. 8/103, p. 103.

38: Margules & Partners et al, *op cit*, p. ii.

39: Australian Nature Conservation Agency, *Wetlands Are Important*, National Wetlands Program, 1996.

40: David Eastburn, *The River Murray: History at a Glance*, Murray-Darling Basin Commission, 1990.

41: Alfred Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900-1900*, Cambridge University Press, 1986, p. 182.

42: Elizabeth Storry et al, *Pictorial History of Renmark: Celebrating 100 years, 1887-1987*, Murray Pioneer, Renmark, 1987, pp. 7-8.

43: Lloyd et al, *op cit*, pp. 15-16.

44: Australian Water Resources Council, *Floodplain Management in Australia: Volume 2, Main Report* , Water Management Series No. 21, AGPS, Canberra, 1992.

45: Gehrke, *op cit*.

46: Tony Sharley and Clive Huggan, *Chowilla Resource Management Plan: Final Report*, Murray-Darling Basin Commission, 1995, p. 93-94.

47: Margules & Partners et al, *op cit*.

48: *Ibid*.

49: Martin Read and Leon Barmuta, 'Effect of Willows (*Salix fragilis*) on Instream Invertebrates', *34th Congress of Australian Society for Limnology*, Jenolan Caves, NSW, September, 1995.

50: Ralph Ogden, 'Potential for the restoration of aquatic macrophytes in billabongs', *National Conference on Stream Management*, 1995.

51: Jane Roberts et al, 'Effect of Carp, *Cyprinus carpio L.*, An Exotic Benthivorous Fish, on Aquatic Plants and Water Quality in Experimental Ponds', *Australian Journal of Marine and Freshwater Research No. 46*, 1995, pp. 1171-1180.

52: David Mussared, 'Myxomatosis virus success surprised even the scientists', *The Canberra Times*, February 19, 1993.

53: Peter Bacon et al, 'Floodplain Land Use Issues in the Murray-Darling Basin'. In Sharley and Huggan, *op cit*., pp. 46.

54: Roberts, *op cit*.

54(a): John H. Harris, Environmental Rehabilitation and Carp Control. In Jane Roberts and Richard Tilzey (eds) *Controlling Carp: Exploring the Options for Australia*. Proceedings of a Workshop, October 22-24, 1996, Albury, CSIRO Land and Water, Canberra, 1997, pp. 21-34.

55: Jim Bowler, 'The Murray: The Last 500,000 years'. In Smith, J. (ed), *The Unique Continent*, University of Queensland Press, 1992, pp. 204-213.

56 Margules & Partners et al, *op cit*, p. 29.

57: Sergei Shreider et al, 'Comparative analysis of climate impacts on streamflow for snow-free and snow-affected catchments', *Proceedings of Workshop on Climate Impact Assessment*, Melbourne, 1996.

58: David Mussared, 'Cap on Murray Basin water use', *The Advertiser*, Saturday, July 1, 1995.

58(a): Sue Briggs and Kim Jenkins, *Guidelines for Managing Cropping on Lakes in the Murray-Darling Basin*, Green Words, Canberra, 1997

59: CSIRO Centre for Environmental Mechanics, *Report 1993-1995*, CSIRO Publishing, 1995, pp. 14-21.

60: For example, the wetlands of the Murray floodplain were mapped by Pressey, *op cit*. Similar work is in progress elsewhere.

61: Land and Water Resources Research and Development Corporation, 'Managing Stock on Riparian Lands', No.6. In *National Riparian Guidelines series*, 1996. Available free from LWRRDC. Tel 02-6257-3379.

62: Judy Frankenberg and David Outhet, 'Works to Control Stream-bank Erosion: Planting the Common Reed, *Phragmites australis*'. In *Riverwise* series, NSW Department of Land and Water Conservation, 1995.

63: Victorian Department of Planning and Local Government, NSW Department of Planning and Murray-Darling Basin Commission, *Guidelines for the Preparation of River Management Plans: Under Murray Regional Environmental Plan No. 2* – Riverine Land, 1996.

64: S.V. Briggs, S.A. Thornton and G.W. Lawler, 'Management of Red Gum Wetlands for Waterbirds: *Report on Project N108*. Funded under the Natural Resources Management Strategy, 1990-1994, NRMS 1994.

S.V. Briggs and S.A. Thornton, 'Management of River Red Gums for Waterbird Nesting', *Corella* Vol. 19/4, 1995, p. 132-138.

65: Sharley and Huggan 1995, *op cit*.

66: John H. Harris et al, *Fish and Rivers in Stress: The NSW River's Survey*, the Cooperative Research Centre for Freshwater Ecology and NSW Fisheries, 1997.

FLOODPLAIN MANAGEMENT ADVICE

FLOODPLAIN MANAGEMENT ADVICE

The relevant departments of most State Governments issue 'fact sheets', usually free, giving advice on managing riparian zones. Similar information is also available from some other organisations. Examples include:

Guidelines for floodplain development

Murray-Darling Basin Commission (MDBC), Victorian Department of Planning and Local Government, NSW Department of Planning have jointly published *Guidelines for the Preparation of River Management Plans: Lower Murray Regional Environmental Plan No. 2 — Riverine Land*. Copies are available from MDBC. Tel, 02-6279-0100.

Riparian Management Guidelines

The Land and Water Resources Research and Development Corporation's (LWRRDC) Rehabilitation and Management of Riparian Land R&D Program has published six, non-technical pamphlets, which are the first of a planned continuing series of *National Riparian Guidelines*. The guidelines will include both non-technical and technical material. Copies are available free from LWRRDC. Tel, 02-6257-3379.

Riverwise

NSW Department of Land and Water Conservation has published a series of about 20 fact sheets in its *Riverwise* series. Copies are available free. Contact the Department's Information Centre. Tel, 02-9228-6415.

Waterwise

SA Department of Environment and Natural Resources has published a series of *Waterwise* fact sheets. Copies are available free from the SA Catchment Resource Centre. Tel, 08-8391-7500.

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APPENDIX

OF SCIENTIFIC NAMES

COMMON & SCIENTIFIC NAMES
OF SPECIES MENTIONED IN TEXT

Alligator weed
Alternanthera philoxeroides

Azolla
Azolla filiculoides
Azolla pinnata

Bandicoot
Southern brown
Isoodon obesulus
Long-nosed
Perameles nasuta
Western barred
Perameles bougainville
Pig-footed (extinct)
Chaeropus ecaudatus

Bettong
Aepyprymnus rufescens
Bettongia gaimardi
Bettongia lesueur
Bettongia penicillata

Bilby
Macrotis lagotis

Black box
Eucalyptus largiflorens

Blue-billed duck
Oxyura australis

Bony bream
Nematalosa erebi

Broad-shelled, long-necked tortoise
Chelodina expansa

Carp
Cyprinus carpio

Freshwater catfish
Tandanus tandanus

Cattle
Bos taurus
Bos indicus

Common reed
Phragmites australis

Coot
Fulica atra

Cumbungi
Typha orientalis
Typha domingensis

Cyrtobagous
Cyrtobagous salviniae

Dunnart
Fat-tailed
Sminthopsis crassicaudata
Stripe-tailed
Sminthopsis macroura
common
Sminthopsis murina

Floodplain mussel
Velesunio ambiguus

Fox
Vulpes vulpes

Frogs
Barking frog
Limnodynastes fletcheri
Inland banjo frog
Limnodynastes interioris
Peron's tree frog
Litoria peronii
Plains froglet
Crinia parinsignifera

Gambusia (mosquitofish)
Gambusia affinis

Goat
Capra hircus

Golden perch
Macquaria ambigua

Goldfish
Carassius auratus

Gumleaf skeletoniser
Uraba lugens

Hare wallaby (eastern), extinct
Lagorchestes leporides

Horse
Equus caballus

Kangaroo
Macropus fuliginosus
Red kangaroo
Macropus rufus

Koala
Phascolarctos cinereus

Macquarie perch
Macquaria australasica

Murray cod
Maccullochella peeli

Platypus
Ornithorhynchus anatinus

River Murray crayfish
Euastacus armatus

Musk duck
Biziura lobata

Nardoo
Marsilea drummondii

Para grass
Brachiaria mutica

Pig
Sus scrofa

Planigale
Planigale gilesi
Planigale tenuirostris

Purple-spotted gudgeon
Mogurnda adspersa

Pygmy perch (southern)
Nannoperca australis

Quoll
Tiger quoll
Dasyurus maculatus
Western quoll
Dasyurus geoffroii

Rabbit
Oryctolagus cuniculus

Redfin perch
Perca fluviatilis

Ribbonweed
Vallisneria gigantea

Rice-eating midge
Chironomus tepperin

River blackfish
Gadopsis marmoratus

River mussel
Alathyria jacksoni

River red gum
Eucalyptus camaldulensis

Roach
Rutilus rutilus

Salvinia
Salvinia molesta

Sheep
Ovis aries

Silver perch
Bidyanus bidyanus

Sirex wood wasp
Sirex noctilio

Stick-nest rat
Leporillus conditor
Lesser stick-nest rat (extinct)
Leporillus apicalis

Swan, Black
Cygnus atratus

Tasmanian devil
Sarcophilus harrisii

Tench
Tinca tinca

Tortoises
Common long-necked tortoise
Chelodina longicollis
Murray (or short-necked) tortoise
Emydura macquarii

Trout
Oncorhynchus mykiss
Brown trout
Salmo trutta
Brook trout
Salvelinus fontinalis

Trout cod
Maccullochella macquariensis

Water hyacinth
Eichhornia crassipes

Water rat
Hydromys chrysogaster

Weatherloach, oriental
Misgurnus anguillicaudatus

Western chanda perch
Ambassis castelnaui

Wheat
Triticum aestivum

Willow
Salix spp.

Yabby
Cherax destructor

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