The Murray Darling Wetland Working Group Ltd acknowledges the Traditional Custodians across the Murray-Darling Basin and pays its respects to Elders, past, present and future.

Ngangaana-gu birrimal karrai billa, dya birrimal karral billa durai ngangaana ngingu

Look after the bush, land and the rivers, and the bush, land and the rivers will look after you

Words provided by Senior Wiradjuri Elder Wongamar (Wungamaa) Pastor Cec Grant: (used with permission)

AGAINST THE FLOW

How the Murray Darling Wetlands Working Group pioneered the restoration of wetlands along the Murray and Lower Darling rivers through 25 years of innovation, research and collaboration

Compiled by Adrian Wells

to celebrate the 25th anniversary

of the Murray Darling Wetlands Working Group

To go against the flow:

To do or say the opposite of what most people are doing or saying

Cambridge Advanced Learner's Dictionary and Thesaurus, Cambridge University Press, 2017

Murray Darling WETLANDS WORKING GROUP LTD

2018

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This book is dedicated to the memory of Vin, Roger and Rhonda

While this book documents and celebrates the achievements of the Murray Darling Wetlands Working Group, its 25-year history has not been without disappointments and sadness, particularly the untimely passing of three of its stalwarts. Each of these three people made significant, but different, contributions during important periods in the life of the group.

Vin Byrnes was one of the earliest members of the group's committee and helped the organisation pioneer much of its early work. An irrigation fruit grower, Vin brought years of practical knowledge to the group. Roger Good joined the group at a time when the group was expanding from just the Murray to other catchments. Roger had a background in science and encouraged the group's investment in research as well as thinking about climate change. He also helped the organisation change from a working group to a company. Rhonda Sinclair joined the new company as a member of staff in 2013. She developed the governance and operating procedures required of a company as well as managing its projects and communication.

Vin passed away in 2014, Roger in 2015 and Rhonda in 2018. All were strongly committed to wetland rehabilitation and brought new ideas to the organisation over 25 years. Their personalities, thinking and legacies, as well as their optimism and good humour, are firmly embedded in the culture of the current organisation. They are missed.

FOREWORD

I congratulate the Murray-Darling Wetlands Working Group on having achieved 25 years of success and accomplishment. During that time, the Working Group has become a model of best practice in managing wetlands rarely seen in Australia or, indeed, elsewhere in the world.

We should all pay tribute to the people who have contributed to the success of the Working Group since its establishment in 1992. They have consistently demonstrated that by combining science, community knowledge, old fashioned common sense and partnerships, there are significant dividends for our waterways, wetlands and natural environments that exceed the sum of the parts.

I pay a particular personal tribute to the former chair of the group, Howard Jones, for his determination, leadership, passion and unrivalled knowledge of our rivers and wetlands. He is a mentor to many and an inspiration to us all. Much of what we know as national water policy is a result of Howard and the group's members and staff showing us the way.

Over the years, the Wetlands Working Group has made an art form of challenging, and sometimes forcing the rules to be rewritten in order to deliver the objectives of environmental, social, cultural and economic benefit through superior wetland management.

This history tells a story of early hopes, long-standing success and celebrating achievement. It documents how going 'against the flow' established new ways of tackling the rehabilitation of wetlands. The document also serves as a roadmap to those who aspire to manage our precious natural resources in sustainable and inclusive ways to benefit all. Most importantly, the story of the Working Group demonstrates that water management in Australia need not be tarnished by conflict and argument. The recognition, awards, the impressive list of wetland programs and the universal respect in which the Working Group is held are all testaments to which it can be justly proud.

May the group's legacy continue to be seen in the improvement of our precious wetlands.

The Hon Craig Knowles AM
Independent Chair, NSW Natural Resources Access Regulator
Immediate past chair, Murray-Darling Basin Authority
Former NSW Minister for Natural Resources

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INTRODUCTION

The Murray Darling Wetlands Working Group began over 25 years ago based on the idea that there could be opportunities for a community-government partnership to rehabilitate wetlands. The initiative brought together volunteers with local community, irrigation, water and environmental knowledge but with an abiding interest in wetlands, to form a practical working group.

What set this group apart was its willingness to trial new and effective approaches in the sometimes controversial area of managing water for the environment. What is now common practice of using environmental water to support waterbird breeding, protect endangered vegetation or rehabilitate stranded wetlands in irrigation areas, was first pioneered 20 years ago by the Wetlands Working Group. It achieved this by working with many willing partners including irrigation companies, farmers, environmental groups, traditional owners and government agencies.

More recently, the Working Group formed a company to move into the area of water business to reduce our reliance on government funding and to influence commercial environmental outcomes. This led to a rejuvenated and enlarged board and a new surge in innovation, demonstrated with the establishment of a water trust and our participation in a consortium to restore the Nimmie-Caira floodplain.

This book documents these activities and pays tribute to the dedicated volunteers of the Working Group and the highly-respected staff over 25 years. It documents how the journey of innovation, leading by example, good science and striving to influence good outcomes for wetlands across the Murray-Darling Basin, has been a successful model. It shows how community-government partnerships can deliver good environmental outcomes.

This history also invites the willing to continue to take the journey with us.

Ian Davidson
Chair, Murray Darling Wetlands Working Group Ltd

PREFACE

Australian history is … full of surprises, and adventures, and incongruities, and contradictions, and incredibilities; but they are all true, they all happened.

Following the Equator, *Mark Twain (1897)*

In 2017, I turned 70. To celebrate, Diane and I invited family members to camp with us by the Murray River, next to Hattah-Kulkyne National Park. This national park in northwest Victoria includes numerous lakes that make up a wetland complex of international significance. During our stay, the lakes were filling with water and thousands of waterbirds from the northern hemisphere were starting to arrive. Trees were weighed down with blossom and wildflowers were everywhere.

I enjoyed explaining to family members the social, economic, cultural and environmental importance of this wetland. Our grandchildren revelled in the beauty of the area as they played in the water, smelt flowers, canoed, listened to birds, observed animals and enjoyed the serenity. I explained that they were experiencing the results of rehabilitating a wetland. During the same week, we also visited Thegoa Lagoon, Fletchers Lake, Bottle Bend and Gol Gol Lake in New South Wales, all of which are in various stages of rehabilitation.

These wetlands demonstrate how far we have come with restoring wetlands across the Murray–Darling Basin since I first saw many of them in 1968. The significance of wetlands was first described to me in 1993 by Dr Terry Hillman from the Murray-Darling Freshwater Research Centre in Albury. Terry described wetlands as 'the kidneys' of our river systems, similar to our own kidneys in many ways but contributing to the health of rivers and floodplains. And like our own kidneys, wetlands deserved much greater understanding and care.

Improving wetlands in the past 30 years has required innovation, research, partnerships and money. It has also needed community engagement to explain why these areas, which many people still regard as inhospitable swamps, are so important. The infrastructure that provides water for Hattah Lakes cost millions of dollars. Rehabilitating Thegoa Lagoon, Fletchers Lake and the Gol Gol Wetlands cost a fraction of that amount. And these are just five of 30,000 wetlands across the Murray-Darling Basin. Government agencies and community groups have been working since the 1990s to restore degraded wetlands. It is doubtful that we will ever return them to their original natural condition but they can be improved to contribute to the health of the basin's rivers and communities.

This book is about one such community group, the Murray Darling Wetlands Working Group, which celebrated its 25th anniversary in 2017. This group pioneered many of the strategies for rehabilitating wetlands that have been adopted over the years by governments, catchment management organisations and community groups. Much of the group's success was due to partnerships, recognising and harnessing the knowledge, skills and expertise of researchers, community groups, industry and Aboriginal elders. The group showed that even relatively small amounts of money can produce spectacular results. The group also demonstrated that interest and ownership can be generated amongst landholders who have slowly accepted that rehabilitating wetlands can add value to farming.

Having read through the group's archives, reports and publications, it wasn't too difficult to compile 25 years of achievement. But it would have been a pretty dull document. Delving into the lives and experiences of the people involved through interviews was a greater challenge but, I hope, has made it a far more interesting narrative. The interviews also revealed that since its formation, the Wetlands Working Group went 'against the flow'. The organisation did the opposite of what was the common practice (or indeed no practice at all) when it came to managing wetlands. In doing so, the group pioneered effective wetland restoration strategies along the Murray and Lower Darling rivers.

I hope this document reflects how the American author, Mark Twain, described histories of Australia over 100 years ago - it is full of 'surprises, and adventures, and incongruities, and contradictions, and incredibilities; but they are all true, they all happened'.

Adrian Wells
Leneva, Victoria - 2018

AUTHOR'S NOTES

Not a strict chronological history
While I tried to maintain a chronological order of events with this history, it does not follow a strict timeline. There was so much happening that the impact of the group's initiatives might have been lost by following a strict chronological order. However, a timeline is included in Part 7.

Agency names
Throughout this publication, names of some government departments keep changing. For example, the Department of Water Resources underwent half a dozen name changes. It was a sign of the times!

Style guide
My mother was very particular about grammar and I inherited that passion. To help me, I followed style guides for Australian authors by John Wiley & Sons, and the Murray-Darling Freshwater Research Centre. These documents guided how I spelt the names of organisations, plants, animals and titles in this publication. Only where specific quotes are used, have I deviated from this.

The Murray River
Numerous documents that I read to compile this history record the same river in Australia as both the Murray River and the River Murray. Unless I have quoted from a specific document, I have used the term Murray River (although in South Australia, the waterway is officially known as the River Murray). Be assured, it is the same river!

Reports on projects
Reporting on every initiative of the Wetlands Working Group would have taken hundreds of pages. The activities reported on were chosen by me to provide a 'flavour' of the scope and diversity of projects. Details on projects can be accessed through the Working Group's website or reports. If your favourite project has been omitted, blame me!

Abbreviations
The title 'Murray Darling Wetlands Working Group' takes up nearly half a line of writing. Continuous use of the phrase would have used lots of space and spoilt the narrative. I also don't like acronyms. I therefore used the term 'Wetlands Working Group', 'Working Group', or simply, 'the group' in this document. I have also abbreviated New South Wales most of the time to NSW.

Photographs
Unless noted, photographs are the property of the Wetlands Working Group, its' staff or board members.

ACKNOWLEDGEMENTS

I was delighted when the Murray Darling Wetlands Working Group invited me to write this history to help celebrate the group's 25th anniversary. Much of the basic material was drawn from minutes, correspondence, plans, project and annual reports. Thanks to Deb Nias, Rhonda Sinclair and Sarah Ning for helping to locate this material. I then interviewed past and present committee, executive, board and staff members of the Working Group and those who worked with the group over the years. I appreciated their willingness to let me record their memories and experiences to add richness to the narrative. Many others, including Rosie Busuttil, Leon Broster, Paul Childs, Freddie Dowling, David Dunn, Martin Driver, Max Finlayson, Andrew Hull, Trevor Jacobs, Digby Jacobs, Amanda Liefting, Ray Najar, Danny O'Neill, Tony Piggin, Janet Pritchard, Homer Reith, and Geoff Thomas contributed ideas, information and photographs and encouraged me. Journalist, Margrit Beemster, allowed me to use some of her media stories and photographs from several years ago.

Thanks to Dieuwer Reynders, Ben Slingsby, Graeme Enders and Working Group staff and board members who commented on drafts as they developed. Deidre Bowman completed the much-appreciated final edits. Aboriginal elders along the Murray, Murrumbidgee, Darling, Edward Kolety and Wakool rivers allowed me to include material that they shared with me. Most importantly, thankyou Diane for your love, patience, encouragement and advice on grammar over these two years.

The Murray Darling Wetlands Working Group also thanks the following for their generous support for and contributions to the preparation of this history:

The NSW Office of Environment and Heritage

NSW GOVERNMENT Local Land Services

PART ONE

The Wonder of Wetlands

Wetlands: an area in which the soil is frequently or permanently saturated with or under water, as in a swamp, marsh, etc.

Macquarie Concise Dictionary, 2016

1

WETLANDS AROUND THE WORLD

Wetlands are amongst the most important and productive natural environments in the world. According to a 2013 international report, *Managing Water and Agroecosystems for Food Security*, wetlands cover at least six percent of the earth's surface, with most occurring in Asia and Africa. These wetlands contain a wealth of biodiversity and account for about 45 percent of the total economic value of all global ecosystem services. As the shallow waters and nutrients of wetlands combine, there is an explosion of biological productivity that provides important breeding and nursery areas for aquatic animals, fish and birds. Many commercial and recreational fisheries depend on wetlands for their existence. Wetlands recycle nutrients, support plant growth, prevent floods and help to stop excessive nutrients and sediments from entering rivers. They play a critical role in the provision of freshwater for human consumption, agriculture and food security as well as reducing rural poverty. Wetlands are in fact, an essential component of local, regional and national economies. However (and ironically), it is agriculture that has been the greatest threat to wetlands through excessive water use and drainage for farming purposes.

The Ramsar Convention

The global significance of wetlands was recognised in 1971 when an international agreement on wetlands, the Ramsar Convention, was adopted. Many people are surprised to learn that Ramsar is not an acronym but the name of a small town in Iran where the agreement was negotiated by government and non-government organisations. The agreement grew out of international concerns over the increasing loss and degradation of wetland habitats for migratory waterbirds. The convention came into force in 1975 and was the first modern global intergovernmental environmental agreement. One hundred and sixty-nine countries are current signatories to the convention which seeks 'the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world'.

The Ramsar convention uses a broad definition of wetlands. It includes lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peatlands, oases, estuaries, deltas and tidal flats, mangroves and other coastal areas, and coral reefs. Under the convention, signatory governments agree to work towards the wise use of their wetlands; designate suitable wetlands for listing as

internationally important; ensure their effective management; co-operate internationally on cross-border wetlands, shared wetland systems and shared species. The agreement was amended in 1982 and 1987.

The well-being of people and wetland conservation

In 2011, Max Finlayson and Pierre Horwitz observed that too often, wetlands and their environments had been managed in isolation and disconnected both physically, and as part of government policies, from their associated river systems. Finlayson and Horwitz concluded that consideration of wetlands in decision-making has been 'weak … (and) one of the major factors leading to their degradation' In 2013, a report published by the Secretariat of the Ramsar Convention and the World Health Organisation examined whether there was a link between the health and well-being of people and wetland conservation. The *Ramsar Technical Report No 6*, noted that as wetlands were places where people established their livelihoods and lifestyles, they were also places that determined the health and well-being in many cultures and societies. Wetlands were identified as places where the core requirements for human health and well-being, food and water, were sourced and managed. 'Water, wetlands and the cultural, social, economic and political nature of human well-being are linked in this way'.

The report urged governments to make the relationship between wetland ecosystems and human health a key component of national and international policies, plans and strategies. As such, managing wetlands should take into account the capacity of wetlands to adapt to climate change; should recognise the knowledge residing in local communities and traditional cultures; seek new partnerships of government, non-government and business organisations; and avoid wetland management that impacts on human health and well-being.

Don't discount artificial wetlands

The Ramsar Convention also includes human-made wetland sites such as fish ponds, rice paddies, reservoirs and salt pans. In his book, *Living Waters: Ecology of Swamps, Rivers, Lakes and Dams,* Nick Romanowski, acknowledged the importance of these artificial wetlands. He argued that while such wetlands are not rich in species and diversity, they are 'still potential habitats that could be used to repair some of the damage we have caused over the past two centuries'. Romanowski also argued that an increasing number of studies showed that fencing off farm dams and using alternative watering techniques to prevent contamination by livestock not only increased animal health and growth, but could also provide significant wetland assets that may help 'to replace much of what we have drained or otherwise destroyed'. He

believed that the use of these artificial wetlands should not be discounted, even converting 'ageing dams into potentially valuable (wetland) habitats'.

Wetlands in Australia

Australia was not only one of the first nations to sign the Ramsar Convention, but was the first country to designate a wetland of international significance. Since 1975, Australia has identified 65 wetlands of international importance, covering a combined area of nearly eight and a half million hectares. Kakadu, in the Northern Territory, is probably the most well-known of these sites in Australia. Australia also has over 900 nationally important wetlands.

For many years, Australia has also had obligations under the Japan-Australia Migratory Bird Agreement; the China-Australia Migratory Bird Agreement; and the Republic of Korea-Australia Migratory Bird Agreement to protect listed migratory bird species and their wetland habitats across Australia. However, while community awareness, knowledge and appreciation of wetlands in Australia has grown in the last 30 years, many people still regard them simply as an ordinary (and even an unimportant) part of the landscape or an impediment to development.

2

WETLANDS IN THE MURRAY-DARLING BASIN

The rivers … rely on the billabongs (and wetlands) in the same way that people rely on food cupboards and shops when their food supply becomes depleted.

Murray-Darling Freshwater Research Centre, 1997

The Murray-Darling Basin has over 30,000 wetlands covering about 25,000 square kilometres in total. Of these, 16 are designated as Ramsar wetlands because they represent a particular wetland type, they support a significant number of animals fish or plants, or because they provide important habitat for migratory birds.

The characteristics of wetlands in the basin make them somewhat different from wetlands elsewhere in the world. Basin wetlands receive highly variable flows of water, including floods that are often followed by long periods of drought. In their natural state, a large number of the wetlands are ephemeral, that is, they are wet for only part of the year, but the flooding and drying periods are both essential for their health. Many wetlands also experience unusual stresses, such as blackwater events, salinity and the development of acid soils which not only impact on their environments but have led to their degradation. These features have also affected the way communities regarded wetlands since white settlement. But they have also created a growing impetus to better understand and rehabilitate these natural features.

In 1999, a study led by Dr Richard Kingsford of the University of NSW, mapped wetlands in the NSW part of the Murray-Darling Basin. Using nine years of aerial surveys, satellite data, flood images and rainfall records, the project showed that wetlands covered a total area of just over six million hectares (about six percent of the basin's land surface). And most of these were ephemeral floodplain wetlands. However, the plants and animals surviving in these wetlands had adapted to flooding and drying cycles over millions of years. Kingsford found that in many cases, the wetland plants and animals were dependent on this wetting and drying cycle to regenerate and sustain the broad diversity of wetland life.

The most important event of the floodplain

Like their national and international counterparts, Murray-Darling Basin wetlands are among the most productive and biologically diverse environments, providing essential breeding and feeding habitat for many

kinds of organisms including waterbirds, native fish, invertebrates and plants. When the floodplains are dry, there is very little decomposition or recycling of nutrients from the accumulated material on the floodplain floor or in the dry wetland depressions. However, when these floodplains are inundated with water, significant ecological events occur.

In his 2014 book, *Flooded Forest and Desert Creek,* Matthew Colloff described the filling of wetlands with flood waters as 'one of the most important and dramatic events … (on) the floodplain. Nutrients and organic compounds are leached out of the wet leaf litter and dissolved in the floodwater … the dissolved organic matter provides the river with carbon and nutrients that are rapidly incorporated into the aquatic food web'. It is during this process that wetlands make their huge contribution to the life of the adjacent rivers. The wet and broken-down floodplain litter becomes food for micro-organisms and invertebrates that are, in turn, consumed by other invertebrates. These then become food for the waterbirds, frogs, fish and reptiles, many of which also become food. Thus wetlands are prime contributors to the productivity and health of rivers and floodplain. More permanent wetlands provide refuges for birds and fish and itinerant animals during droughts. They are also essential breeding and nursery areas for native fish, crustaceans and waterbirds.

In his 1994 book, *Living on Floodplains*, David Mussared observed that most people would find it hard to get passionate about the survival of a minute native midge, a species of algae or bacteria in wetlands, yet the cleaning services and food they provide in their billions are essential for healthy rivers and ultimately, healthy communities. What is most surprising is that until white colonisation, all of this occurred in thousands of wetlands that were flooded and then dried out regularly over tens of thousands of years.

A tiny fish, one insect and an aquatic plant

Mussared's observations were echoed in May 2018 by South Australian ecologist, David Paton, during an interview with ABC radio. Paton claimed that while the large Ramsar-listed estuarine wetland at the end of the Murray River, the Coorong, was reputed to have the greatest wealth of waterbirds, its health relied on a tiny fish (hardyhead), a small insect (a coronomid) and an aquatic plant (Ruppia tuberosa). Paton observed that while it didn't sound like a rich habitat, 'this bare-bones foundation can support a huge number of birds', including the critically-endangered Curlew sandpiper that visits the wetland each year from Siberia. The Coorong is also the only permanent breeding ground for pelicans in South Australia. Paton said that the tiny fish, small insect

and insignificant aquatic plant thrive in the Coorong's salty environment, making the wetland a rich habitat for local and migratory birds.

Blackwater

The only downside to these important wetland processes is when leaf litter and organic matter builds up on the floodplain and water temperatures rise during droughts. When a flood event finally occurs, the amount of carbon leached into the river from the debris can be so great that it stimulates significant increases in the population of microbes. As they grow and reproduce, the microbes consume so much oxygen from the water that it leads to what is commonly referred to as a 'blackwater' event, or to use the correct scientific phrase, 'hypoxic blackwater'. Such an event was experienced in the summer of 2010-11 along 2,000 kilometres of rivers in the southern Murray-Darling Basin following a 10-year drought and inundation of floodplains by high river flows. In some cases the blackwater persisted for up to six months, causing widespread death of aquatic microorganisms, large native fish, Murray crays and yabbies. The most recent blackwater events were in the early-summer of 2016 following floods downstream of Deniliquin and Echuca.

Such events always create concern and even anger in river communities but blackwater events are not a recent phenomenon or something that arrived with white settlers and irrigation. Some Aboriginal elders have shared stories of blackwater events that have been passed down over thousands of years. In some cases, the events were seen as beneficial as they killed off older native fish (such as Murray cod), giving younger fish a chance to become established. Since 2011, the Murray-Darling Freshwater Research Centre and La Trobe University have undertaken a series of research projects to try to predict and lessen the impact of blackwater events.

Kidneys and cupboards

In the Murray-Darling Basin Commission's 2004 publication, *The Darling,* Dr Richard Kingsford from the University of New South Wales, contributed a chapter on wetlands and waterbirds. Kingsford wrote that 'whereas rivers are sometimes described as the arteries, wetlands are the kidneys of a catchment'. Kingsford emphasised that without wetlands 'there would be few aquatic plants …frogs, reptiles, native fish and waterbirds. This would make an extremely dull environment' resulting in 'no fishing, hunting, bird watching, frog spotting or even sightseeing'.

An educational poster on wetlands and billabongs produced in 1997, *Billabongs: A Swag of Biodiversity,* produced by the Murray-Darling

Freshwater Research Centre and the Murray Darling Association, described the rivers that created the wetlands and billabongs as relatively poor in food resources, relying on wetlands to replenish those resources 'in the same way that people rely on food cupboards and shops when their food supply becomes depleted or when there are special events'.

However, as Kingsford noted, the building of dams and diversion of water from rivers since the 1950s 'has seen the greatest ecological impact on wetlands', resulting in the decline of waterbirds, native fish and floodplain eucalypts. 'The great southern rivers of the Murray and the Murrumbidgee have lost most of their environmental complexity'. Because of river regulation, floodplains no longer received as much flood water, impacting not only on floodplain and wetland environments, but also on farmers, tourism, recreational and cultural pursuits. Kingsford concluded that if such development continued 'we will have fewer waterbirds, frogs, native fish species, tortoises and floodplain eucalypts and fewer wetlands … then we might understand that prevention is better than the cure'.

Rehabilitation of the basin's permanently flooded wetlands has been shown to improve the efficiency of water supply. Given the generally dry, but highly variable, climate of the basin, wetlands act as environmental buffer areas. During wet periods, they spread flood peaks and store floodwaters, releasing them gradually and reducing the effects of flooding.

White colonisation

Since the start of white colonisation and settlement (in the 1840s), wetlands and floodplains have played key roles in providing grazing, cropping and forestry opportunities; controlling agricultural pests; providing fisheries; and in recent years, have been identified as contributing education, research, recreation, tourism, heritage, cultural, landscapes and aesthetic values. However, many of these activities have also degraded wetlands. Over the past 120 years, many of the Murray-Darling Basin's rivers have been harnessed for river boats, water storage, irrigation, power generation and water supply. According to David Eastburn's 2004 publication, *Flooded Country Below Hay*, while Aboriginal communities along the Murray-Darling Basin's rivers considered wetlands as 'the richest and most diverse parts of the Australian landscape', European settlers regarded wetlands as one of least valuable natural resources. Eastburn noted that 'as a result, most have been degraded in some way and a huge number have been lost'.

The wetting and drying cycles of wetlands have changed dramatically to the point where some wetlands are now permanently full of water, while

others have been drained or denied natural replenishing flows from adjacent rivers. As early as the 1880s, wetlands along the Murray River were drained and reclaimed for valuable agricultural land. At the same time, pollutants (such as effluent, excessive nutrients and fertilisers, agricultural chemicals and rubbish) added to the degradation of some wetlands.

According to the Murray-Darling Basin Authority, the degradation or loss of wetlands within the basin has brought with it significant economic costs. The regulation of river flows through structures such as dams, weirs and levee banks has changed natural flow patterns, reducing the amount of water that flows into some wetlands while keeping too much water in other wetlands. Introduced fish including Common carp, Goldfish and Eastern gambusia compete with native fish. Introduced animals such as pigs, cats and foxes threaten native animals while introduced plants can affect wetlands by rapidly spreading and competing with natural wetland plants. Uncontrolled grazing of livestock in wetlands can also be devastating.

While river erosion is a natural process, it has been accelerated by changing river flows, resulting in loss of riverbank vegetation and unrestricted stock access. In river channels that are deepened and widened by erosion, larger flows are needed to get water naturally onto floodplains and into wetlands. The impact of climate change on the basin's rivers and wetlands is uncertain. However, what is known is that unnatural changes in climate can change water availability and timing of river flows which in turn will affect wetlands and the birds, animals and plants that rely on them.

An unusual wetland

Far western NSW features some wetlands that are quite different from other wetlands in the basin. They consist of depressions or shallow lakes with sand dunes (lunettes) on their eastern edges. They were formed during the past 500,000 years through wind erosion and the deposition of clay by flooding rivers during wet periods. Although these wetlands only fill irregularly with water during floods, they provide habitat for a range of dryland and wetland animals in a very harsh climate. These lakes also support different animals from those that live in surrounding areas of woodlands or shrubs.

Restoring land and water environments

In the past 60 years, increasing efforts have been made to rectify the enormous changes in the landscapes of the Murray-Darling Basin since white settlement. A small start on restoring land and water environments began in the late-1930s. This was followed by an emergence of

restoration activity in the 1970s, followed by a second wave in the 1980s in response to fragmentation in agricultural landscapes and a serious decline in the health of waterways.

The decline of water quality and biodiversity was particularly noticeable in the basin where rivers had been managed for irrigation. In parts of the basin, river regulation isolated wetlands from natural flooding and drying cycles which were then invaded by non-aquatic vegetation. Research in the 1980's demonstrated the clear link between wetland health, river health and water quality. As a result, governments and communities in Australia became increasingly aware of the need to set aside water for the environment. In the Murray-Darling Basin, this was expressed in the establishment of the Murray-Darling Basin Ministerial Council's *The Living Murray* initiative in 2002, and the Murray-Darling Basin Authority's *Basin Plan* in 2012.

A degraded wetland

3

WETLANDS ALONG THE MURRAY RIVER

We hurried on and were soon sharing his joy at the swirling waters. A cheer went up when Mr Hume said he would name the river after his father.

Tom Boyd (1824 - *as recorded by Hamilton Hume in Brief Statement of Facts)*

The Murray River starts in the Australian Alps, about 40 kilometres south of Mount Kosciuszko. From here, Australia's longest river travels 2,530 kilometres, descending westward through alpine and hill country, then meandering in a north-westerly direction across riverine plains and the semi-arid Mallee where it meets the Darling River. After this, the river flows west into South Australia before abruptly turning south at Morgan and emptying into Lake Alexandrina and the Southern Ocean near Goolwa. Before joining the Darling River, other rivers, including the Tooma, Swampy Plain, Mitta Mitta, Kiewa, Ovens, Goulburn, Campaspe, Loddon and Murrumbidgee, flow into the Murray.

Although the Murray is the 15th longest river in the world, it is an ancient waterway with a low average annual flow compared with many overseas rivers. Similar to other rivers in the Murray-Darling Basin, the Murray meanders across an extensive floodplain that is between two and 10 kilometres wide, but up to 25 kilometres wide at one point. These features are the result of the river's evolution over millions of years.

Following the creation of the basin about 60 million years ago, rivers began to make their way from the east to the sea. Over the next 20 million years, the basin's eastern mountains (what is now the Great Dividing Range) slowly rose while the western edge sank. The climate fluctuated, oceans invaded and retreated. Meanwhile, the rivers grew larger and flowed across plains, depositing sediment and providing homes for plants and animals. About six million years ago, rivers fanned out into many streams down the western slopes of the Great Dividing Range, instead of concentrating into just a few as they do now'.

In his 1994 publication, *Living on Floodplains*, David Mussared noted that the modern channels of the Murray and Darling rivers were probably determined 'perhaps 50,000 years ago' when rivers started flowing again after a dry period. The Murray River experienced its most recent significant change about 25,000 years ago when an 80 kilometre ridge rose about 14 metres between the current towns of Echuca and Deniliquin (the Cadell Fault) damming the river and creating a huge lake. About 8,000 years ago, the river cut a new channel southward to

join up with the Goulburn River, east of where Echuca now stands. As the lake drained, it left behind a huge floodplain that became a vast River Red gum forest wetland (that included the Barmah and Moira lakes).

Sweeping meanders

The original Murray and Darling rivers were larger than they are today but as the climate became drier again (about 10,000 years ago), flows declined. The rivers became slow-flowing and meandered across their flat floodplains, depositing mostly fine, suspended clay. The large sweeping meanders of the two rivers gradually created depressions on the floodplains that regularly filled and emptied creating anabranches, lakes and dried-up channels. Variable flows, floods and droughts also formed new river channels, leaving some meanders cut off from the rivers, creating billabongs. As Peter Crabb noted in his 1997 book, *Murray-Darling Basin Resources,* 'the nature of the Murray-Darling Basin and its rivers as they meander over the vast plains … is a major reason for the large number of wetlands'.

Today, there are thousands of wetlands of varying types along the Murray River's floodplain. They include small depressions, swamps, billabongs, lakes, woodlands, bogs, forests, salt marshes and lakes, lagoons and the shallow margins of deeper lakes and impoundments. Although diverse in character, these wetlands are all critical and valuable components of the river systems, something still not well understood by the community. The wetlands also include those declared internationally significant under the Ramsar Convention - Banrock Station's Wetland Complex (South Australia); the Barmah Forest (Victoria); the Coorong and lakes Alexandrina and Albert (South Australia); the Gunbower Forest (Victoria); the Koondrook-Pericoota Forest (NSW); the Hattah–Kulkyne Lakes (Victoria); the Kerang Wetlands (Victoria); Campbells Island (NSW); the Millewa Forest (NSW) and the Werai Forest (NSW).

Not wet all the time

Because of their descriptive name, many people assume wetlands have to contain water all of the time. But permanently full wetlands actually result in a smaller diversity of plants and animals. Maintaining constant water levels prevents many aquatic plants from completing their life cycles, changing their abundance and altering the food chain. This in turn influences the types of animals, insects, birds and fish visiting and living in the wetlands. Permanently full wetlands also create ideal conditions for invasive plants and fish (such as Common carp) to not only breed and dominate wetlands but to impact negatively on native fish, animals and plants.

To be really productive and healthy, wetlands along the Murray and Darling rivers need to go through both wetting and drying cycles. If they are allowed to complete their life cycles through wet and dry periods, wetland plants will provide basic food for a whole range of wildlife. Even after they die, they create a compost of dead material that feeds countless small animals which in turn provide food for larger animals, fish and birds. The dead remains also provide many smaller creatures with homes and shelter.

The action below

Wetlands along the Murray River support a huge number of birds, both local and migratory birds from the Northern Hemisphere. According to Parks Victoria, the river's wetlands support more than 350 species of birds as well as many species of mammals, reptiles and fish. A 2016 publication of the Corowa District Landcare Group, *Beauty, Rich and Rare,* notes that about 30 percent of the birds in the area between Albury-Wodonga and Yarrawonga-Mulwala depend on wetlands for shelter, food, resting perches and nesting sites. The large trees that fringe the wetlands provide year-round habitat (or homes) for wildlife, corridors for birds to forage in and travel through, as well as drought refuge for migratory birds. The publication points out that the still surfaces of wetlands in the area hide from view 'the action below where native fish, insects, crustaceans, turtles and amphibians make their homes, careful to avoid the attention of herons, ducks, darters and cormorants'.

Mapping wetlands

By the 1980s, as river communities were starting to understand the important relationship between the Murray River and its floodplains, billabongs and lakes, there was very little knowledge available on the number and extent of wetlands along the river. In 1983, the River Murray Commission initiated a survey of all wetlands below Lake Hume. The commission also wanted to investigate the changed river flow patterns and to explore the potential of offsetting changes to river flows by controlling water levels in wetlands. Environmental consultant, Bob Pressey, undertook the mapping project.

In 1986, Pressey presented his report, *Wetlands of the Murray River Below Lake Hume,* to the River Murray Commission. The survey also included the Edward River, a major anabranch that leaves the river in the Barmah-Millewa Forest and rejoins the Murray 400 kilometres further westward. Pressey's survey identified over 7,000 wetlands. He noted that their combined area was about 2,000 square kilometres, about 40 times the area of Sydney Harbour! The largest wetland area was in South Australia, but of the floodplain wetlands, the largest

number, 3,631, were in New South Wales. Pressey reported that most of the wetlands were small, being 10 hectares or less. Pressey's report included mapping and classifying wetlands as well as indicating wetlands with potential for improved water management.

Degrading wetlands

Pressey's report showed that most of the Murray River's wetlands had been affected by white settlement and were in various states of decline. This had been caused by changes in natural river flow patterns, reduced water quality, the impact of land use, introduced plants and animals, and the growing use of wetlands for recreation. The report also noted that the degradation was continuing. In its first strategic plan (prepared in 1993), the NSW Murray Wetlands Working Group carefully documented the reasons why wetland degradation was occurring, many of which were included in Pressey's report. The reasons were any or all of the following:

- River regulation (building dams, weirs and storages to provide town water, stock and irrigation supply and navigation) altered flow patterns in the river which affected wetland health.
- High river flows in summer months prevented wetlands from drying out or were reducing fluctuations in water levels necessary to maintain the diversity of wetland health.
- Structures to reduce the impacts of floods (weirs, dams and storages) prevented all but the largest floods from passing down the river. Consequently, many wetlands remained dry.
- Rising groundwater tables, caused by land clearing and the influence of weirs, resulted in salt affecting many wetlands and creating conditions where native plants could no longer survive.
- Urban expansion encroached on wetlands, increasing pressure and sometimes resulting in effluent finishing up in wetlands.
- Many wetlands had been drained and surrounded by levee banks to provide agricultural land. The levees permanently excluded floodwaters which provided the water and nutrients that made the land valuable for agriculture in the first place.
- Over-grazing by domestic stock, native and introduced animals, reduced the regeneration of native plants while introduced plants, animal and fish (including willow trees, rabbits and carp) had dramatically altered natural processes in wetlands.

Not five minutes to midnight

In 1990, Pressey wrote a chapter on wetlands in the Murray-Darling Basin Commission's new book, *The Murray.* Despite his 1986 report on wetlands, Pressey was relatively optimistic about their future. 'On a chronological scale from pristine to completely ruined, it is not five minutes to midnight (for Murray River wetlands) but still before lunchtime'. However, Pressey stressed that there was no reason for complacency and no excuse for inaction. 'With better understanding and a commitment to environmental concerns, there will be many opportunities to maintain the present values of wetlands and to offset past impacts'.

Documents written were not matched by action on the ground.

By the early-1990s, despite the signing of the Ramsar Convention, the designation of Australia's internationally significant wetlands, and Pressey's survey work, nothing seemed to be happening to address and rehabilitate degraded wetlands. People interested in wetlands were becoming increasingly frustrated that the growing number of reports and papers about wetlands did not match any action on the ground. Part of this was due to the variability of wetland types across the Murray-Darling Basin; the need to match local knowledge with the lack of scientific knowledge available at the time; poor knowledge on exactly what needed restoring; and what a rehabilitated wetland might look like. Appreciating wetlands was a relatively new phenomenon; trying to understand, value and rehabilitate wetlands was almost unheard of. Most importantly, there was a need for an innovative approach given how challenging wetland restoration was likely to be. The time was ripe for someone or some group to step in and take a leadership role.

Kings Billabong, an important wetland on the Murray River's floodplain, south of Mildura

PART TWO

Since the Dreaming

The storm clouds gathered away to the east
And the mountains were covered with rain.
Which ran down the slopes and along the deep grooves
That the snakes had left 'cross the plain.

The more the rain fell, the more rain ran down the hills
And the deeper the grooves became
Till they all became creeks and joined up as one.
It was all as Gunyuk had planned.

When the creeks reached the groove where the snakes had gone
And travelled in one single line.
The clan all shouted Tongarla (big river)
And the water flowed deep and wide.

In the thousands of years that have followed since then
The rivers and creeks grew in size,
And Tongarla became the Mighty Murray
The river that never runs dry.

Freddie Dowling, *Tongarla: The Murray River (2014)*

Murray River Dreaming
(Courtesy of David Dunn, Wiradjuri artist, Albury, NSW)

4

FROM THE BEGINNING

It is very appropriate that the word for Australia's First Peoples, *Aboriginal,* comes from two Latin words meaning *from the beginning*. Many Aboriginal people believe that all living things were created in the beginning of time which they describe as their Dreamtime. This was when powerful ancestor spirits descended from the sky or emerged from the ground to journey across a featureless landscape, creating mountains, rivers, plants, animals and people. The spirits also delivered the law. After creation, the ancestors merged into the landscape but continue to have a powerful spiritual presence and creative force through the Dreaming. The humans were made guardians of the land.

The Wamba Wamba people in southern NSW (centered around the Edward Kolety River and Deniliquin) regard the word dreamtime as an English word, preferring to use the term 'Yemurraki'. As described in the 2018 teaching resource, *First People's Culture within the Murray Region of New South Wales,* Yemurraki 'represents the never-ending cycle of creation and existence and is a fundamental part of the community's spirituality and strengthening of links with the land'.

Stories passed down over thousands of years

Stories of the Dreaming have been passed down over thousands of years in songs, stories, dance and rituals. In her 2009 book, *Murray River Country*, Jessica Weir described these stories as 'rhythms of a song passed on from one generation to the next, each being interpreted and interwoven within the cycle of life of which water is life's blood'. Weir explained that these rhythms stressed a particularly close relationship between traditional owners and the sustainable productivity of landscapes, rivers, animals and plants. As well as being told and retold down through the generations over thousands of years, each story also contains a lesson about life that was (and still is) very important in Aboriginal culture.

There are relatively few Dreamtime or Yemurraki stories that tell about the formation of wetlands along the Murray River, although there are plenty of such stories that tell about the value of wetlands. In the 2010 book by Naiura, *Even more tales of my Grandmother's Dreamtime*, there are many references to the value and importance of billabongs. Naiura's story of *The Spirit Birds* tells how after a very dry year, the great spirit, Baiame, filled the waterholes, allowing trees to bear fruit and

plants to shoot, an explosion of growth that produced more than enough food to sustain the people.

In the Murray-Darling Basin Commission's 1990 book, *The Murray,* a Dreamtime story tells how the Murray River created a new channel and vast forest wetland after the Cadell Fault (south of present-day Deniliquin) dammed the original river and formed a huge lake. The local Aboriginal community was forced onto a sandhill but the elders dug a new channel with their digging sticks,. As the water drained south from the lake in a new channel (now called the Barmah Choke), a huge floodplain was left that became the Barmah-Millewa Forest.

One of the largest concentrations of Aboriginal people

It is believed that Aboriginal people (increasingly referred to as the First Peoples), moved into the Murray-Darling Basin and settled along the rivers at least 50,000 years ago. In his 2013 book, *First Footprints*, Scott Cane estimated that between 5,000 and 10,000 years ago, possibly one sixth of Australia's Aboriginal population lived in the basin. Cane claimed that these people not only developed highly specialised and sophisticated hunting and gathering techniques along the rivers but it was also a time of settlement 'in the true sense of the word', with social alliances, land-management regimes and subsistence strategies.

In 1830, the explorer Charles Sturt noted that the area between Wentworth and Lake Bonney in South Australia had the densest population of Aboriginal people he had seen anywhere along the Murray. In 1838, Joseph Hawdon made similar observations. The lower part of the Murrumbidgee River was also believed to have had one of the largest and most stable concentrations of Aboriginal people in Australia over thousands of years. This was due to the availability of resources created by the rich floodplains and wetlands along the lower reaches of the Murray, Murrumbidgee, Lachlan, Edward and Wakool rivers.

Providing food, medicine, clothing … and spiritual well-being

Aboriginal communities along the Murray and Darling rivers have always regarded, and continue to regard, water as being connected to the land. And because Aboriginal people viewed themselves as an integral part of the landscape, they have always felt a strong connection to, and responsibility for, river and wetland health. Over that time, wetlands became very valuable to Aboriginal communities, providing food, medicine, clothing, fuel, transport, identity and spiritual well-being.

In his 2014 book, *Dark Emu*, Bruce Pascoe recorded that when Peter Beveridge and James Kirby first took cattle to the Murray River in 1843 (near present day Swan Hill), they noted a series of dykes built across

the river's floodplain by Aboriginal people to keep water and fish in wetlands to prevent them from returning to the river. Beveridge recorded that some of the clay dykes were over one metre high and extended along the river 'as far as the reedy plains'. Pascoe intimated that Kirby referred to the arrangement as part of 'the automatic fishing machine'.

Aboriginal occupation concentrated on wetlands

In his 1838 report, *Three Expeditions into the Interior of Eastern Australia*, Major Thomas Mitchell recorded a landscape 'not observed by me in other places' of tall and extensive mounds of burnt clay created by long and intensive Aboriginal occupation. Mitchell wrote that 'the Balyan or bulrush-root which is the chief food of the natives there, is prepared in those kilns, when a family or tribe are together'. In 1889, Peter Beveridge, one of first squatters in the Swan Hill district, observed similar oven mounds which were heated to help cook food. Between 1864 and 1868, Beveridge also observed similar mounds in the lower reaches of the Murrumbidgee, Lachlan and Darling rivers.

In 2011, as part of her doctorate, Sarah Martin examined the remnants of oven mounds along the Lower Murray, Murrumbidgee and Lachlan rivers. The mounds, adjacent to wetlands, revealed what foods were cooked by traditional owners over 5,000 years ago. The mounds identified significant remains of wetland birds, eggs, and wetland plants. Martin concluded that the consistent amount of remains in the mounds 'suggests that wetlands were the focus of exploitation'. Martin's research built on observations by explorers and travellers 'linking Aboriginal women to specialised knowledge of wetland management, plant harvesting and preparation, and co-operative cooking … of carbohydrate-rich wetland plant foods'.

In 1993, surveys of the Gol Gol and Wentworth areas of southwest NSW by Harvey Johnson, an archaeologist with the NSW National Parks and Wildlife Service, showed that Aboriginal occupation in that area concentrated not on the Murray River but on ephemeral wetlands and lakes away from the river. Johnson cited Fletchers Lake, north of Wentworth, as the most pronounced example of this occupation pattern. His observations are also reflected in the discovery of permanent Aboriginal dwellings, burial grounds, artefacts and middens around other wetlands in southwest NSW, including Lake Victoria, the Euston Lakes, Lake Mungo and Fletchers Lake.

The observations by Mitchell, Beveridge, Johnson and Martin on the importance of wetlands to Aboriginal people were also supported in Matthew Colloff's 2014 book, *Flooded Forest and Desert Creek*. Colloff argued that apart from the River Red gum forests, it was wetlands that 'provided such a concentrated diversity of vital resources for Aboriginal

people living on the floodplains of the Murray–Darling Basin: food, fibre, weaponry, utensils, shelter and hiding places'. Colloff saw wetland plants as not only the source of products essential for the existence of Aboriginal people, but they 'provided the basis for the exchange of goods with other clans'.

A life of comparative ease

In her book, *Echuca: A History*, Susan Priestley recorded that in the area now known as the Barmah-Millewa Forest 'the mild environment and abundant food meant that Murray natives enjoyed a life of comparative ease'. Priestly described how the 'natives' used nets and traps across small floodplain creeks and wetlands to catch 'larger hauls of native fish'. She also wrote how 'the thousands of waterfowl which lived in the marshes and lagoons were keenly sought after using a net stretched across a narrow part of the wetlands'. The birdlife (in what is now the Barmah-Millewa Forest) was also noted by early settlers and explorers. In 1838, Captain Charles Sturt, wrote about the wetlands among the River Red gums trees with huge colonies of ducks, egrets, cormorants and swans.

This relationship between Aboriginal people and wetlands before white settlement was also noted by Gillian Hibbins in her 1978 history of the Nathalia Shire (which included the Barmah Forest). Hibbins described how the Bangarang people 'poisoned small lagoons with fresh gum tree branches so that in a few hours dead but edible fish would float to the surface'.

Hunting for food in wetlands

In his book, *No More the Valley Rings with Koorie Laughter*, Aboriginal elder, Freddie Dowling, described how Aboriginal people hunted for food in wetlands along the Ovens River, a tributary of the Murray River. Drawing on stories that his grandmother and father told him, Dowling described an event where elders were teaching children how to catch turtles in shallow lagoons. 'The hunters would spread across the weedy, thigh-high deep water side by side to form a human net and with their hands ever-moving and groping, they would feel for turtles ... whoever caught the turtle would hold it up proudly, and throw it onto the bank where an eager child would grasp it and stack it into a dillybag'.

In the same book, Dowling described how the men and women caught ducks living on wetlands. The women stretched a large woven net across a small creek leading into a wetland. 'At about midday, when the net was in full shade and almost invisible … the men and older boys stealthily crept in a semi-circle to the timbered edge of the swamp upstream of the creek. Silently the men threw their returnable

boomerangs out and across the open swamp where hundreds of ducks had congregated to enjoy their meal of all the small water creatures that had also gathered in the swamp'. The ducks flew low towards the creek, believing they were heading for a safe area but 'crashed blindly into the net, and straight into the waiting hands of the eager and very agile women and children'.

Dowling also described how larger nets (up to nine metres long) were dragged through wetlands to catch fish and turtles. To prevent the fish from escaping, boys were taught to keep the net snug against the bottom of the lagoon by 'hooking their big toe through it, thus keeping it firmly down'.

A vast treasure-trove

In his 2015 book, *The Story of Australia's People: The Rise and Fall of Ancient Australia,* Geoffrey Blainey wrote that early explorers noted the ideal spots for Aboriginal people along the Darling River to set up fish traps were 'in those narrow channels where swamp waters, at the end of a flood, flowed back into the main river'. Blainey also wrote about the significance of wetlands to Aboriginal communities living along the Murrumbidgee River. 'The wide swamps filled by the cold overflow during spring, and ducks and other waterbirds bred in the reedbeds in their thousands'. Later, as the wetlands 'dried out and the rivers were narrower and the birds concentrated onto shrinking expanses of water', the bird catching began in a similar way to that described by Dowling. In 1838, the explorer Major Mitchell, described nets to trap ducks along the Murray River as 'wide enough to cover a cricket pitch and many were almost five times as long as a pitch'.

In Jessica Weir's book, *Murray River Country*, Yorta Yorta man, Lee Joachim, described a large wetland in the Barmah-Millewa Forest as 'the kidney of our people' which was activated by a 'flooding regime that needs to come through those kidneys and out to the land, flush the land, cleanse it'. Weir noted how Joachim's blending of kidney and lakes reflected the value placed on wetlands by Aboriginal people, not just as a resource but a way that combined nature with culture and humans with rivers.

Denied access to wetlands

White colonisation from the 1840s onwards saw many Aboriginal communities increasingly denied access to wetlands as these areas were fenced off or drained. In his 2007 book, *Convincing Country*, Bruce Pascoe lamented the draining of the wetlands, believing that 'if the colonists had followed the example of Indigenous True Hunters they wouldn't have drained … the swamps and today would be eating …

(geese) for our birthdays and Christmas'. Pascoe observed that in the period following colonisation 'draining wetlands was the surest way to get you a knighthood, shooting geese for dogfood or just the fun of slaughter was seen as good, manly sport'.

The loss of access to wetlands by Aboriginal people was expressed in stories, music, dance and art. In 1994, the late Lin Onus, an Aboriginal artist, painted the Barmah Forest. His painting depicted a large forest wetland surrounded by tall River Red gum trees that were reflected in the still waters. However, four sections of the picture were removed, cut out in the shape of pieces from a jigsaw puzzle. The removed pieces represented fish, birds and plants that Onus saw as missing from the forest wetland, leaving it degraded.

A word of caution

Apart from the Dreamtime stories, some of the earliest written records on Aboriginal use of wetlands and floodplains came from the diaries, journals and reports written by early explorers and white settlers. However, the motives for such records were not always honourable. This is repeatedly stressed by Bruce Pascoe in his 2014 book, *Dark Emu*. Pascoe acknowledged the debt owed to explorers and white settlers in recording and even publishing their observations of Aboriginal lifestyles. He wrote that 'these journals revealed a much more complicated Aboriginal economy than the primitive hunter-gatherer lifestyle we had been told was the simple lot of Australia's First People'.

However, Pascoe also pointed out that while many of the reports were written by people 'fascinated by Aboriginal life', the same people were also 'united in their assumption of superiority and entitlement'. Their exploration and consequent reports, usually backed by colonial governors or wealthy patrons, were often stepping stones to justify seizing land and displacing Aboriginal 'society with a more complex economy'. Some reports to governments were even censored. Editing out references to violence committed against Aboriginal people and the clear evidence of their established villages and economy 'was not uncommon'. Pascoe concluded that the economy and culture of Aboriginal people 'had been grossly undervalued'.

Aboriginal occupation affected wetlands

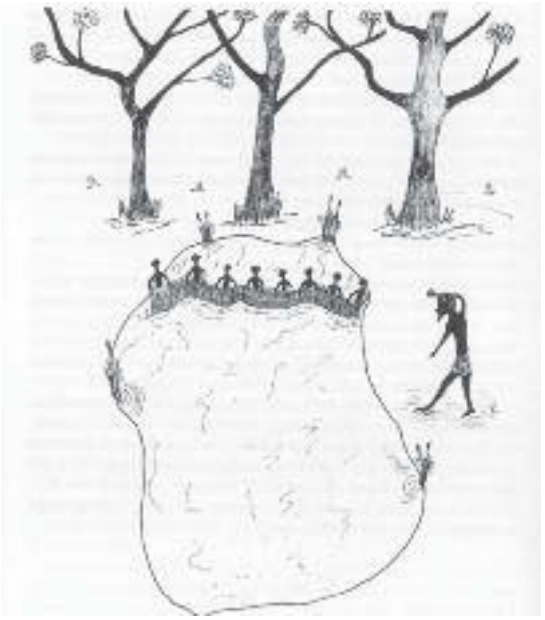
In his chapter on wetlands in the Murray-Darling Basin Commission's publication, *The Murray,* Robert Pressey wrote that although changes to Murray River wetlands were often associated with the impact of white settlement, 'it is likely that Aboriginal occupation had previously affected the flora and fauna of Murray wetlands'. Pressey noted, as an example, that there was evidence to suggest Aboriginal burning in the Barmah

Forest well before white occupation, influenced the regeneration of River Red gum trees and the distribution of reed beds. However, Pressey concluded that there was no doubt 'that the overall effect of European settlement on wetlands had been much more dramatic than that of Aboriginal activities'.

Destruction is not to our demise

In the foreword to Jessica Weir's book, *Murray River Country,* Yorta Yorta woman, Monica Morgan, acknowledged the devastating effect and destruction of 'our rivers and wetlands' by river management since white colonisation. However, Morgan also acknowledged that such destruction 'is not to our demise … indeed our identity as Traditional Owners will prevail for we will adapt and survive as we have over many thousands of generations'. Morgan saw potential for new and honest dialogue between all river users, improved understanding, as well as changing practices as essential not only for the survival of the Murray River, 'but for life itself'.

Despite their loss of access and connection to wetlands and country, many of the basin's traditional owners continue to value wetlands and are now contributing their cultural knowledge to help rehabilitate and manage these valuable sites.



Aboriginal boys drag large nets through a
Murray Valley wetland to catch fish and turtles.
(Drawing courtesy of Bangarang Elder, Freddie Dowling, Jerilderie, NSW)

5

AFTER COLONISATION

We suddenly found ourselves on the banks of a noble river … an unbroken sheet of water, evidently very deep, and literally covered with pelicans and other wild fowl … here was a river that promised to reward all our exertions.

Captain Charles Sturt on reaching the Darling River (1829)

The colonisation or European settlement of the Murray-Darling Basin began in the 1830s as white settlers followed the footsteps of Hume, Hovell, Sturt, Mitchell and other explorers. Interest in birds, a major indicator of wetland health and the focus of efforts to rehabilitate wetlands, started along the Murray River almost from the time the river was first seen by white explorers in 1824. In the 1975 book, *The Book of the Murray*, a chapter written by John Eckert noted that the explorers Charles Sturt and Thomas Mitchell were competent ornithologists and often found water by watching birds. According to Eckert, Sturt is credited with sending to England the first specimens of the Yellow rosella 'the only bird endemic to the Murray and its tributaries'.

Until the 1970s, scientists largely ignored floodplains

In 1838, Charles Sturt travelled along the Murray River with stockmen in what is now the Barmah Forest. Sturt observed the wetlands and 'small creeks on the floodplain that were now dried up until replenished once more in spring by the water from the melting alps'. He also recorded that 'flocks of White-faced herons stand sentinel over swamps', as well as egrets, Bell-miners, honey-eaters, Nankeen Night-herons, brolgas and bustards.

The first biological exploration along the Murray and Lower Darling rivers took place in 1858 when William Blandowski and Gerard Kreft collected over 17,000 plant and animal specimens, including many new species. Many of these were collected on the floodplains and around wetlands. According to David Mussared's 1994 publication, *Living on Floodplains*, until the mid-1970s, plant and animal species collected from inland river systems were 'unceremoniously lumped together, no matter where they were found' while scientists largely ignored floodplains and focused on river channels. But then, according to Mussared 'subsequent research turned all that on its head' and floodplains started looking more important. He calculated that floodplain

waters ‘harboured at least 100, and perhaps 1,000, times more species than do the rivers that flow past them’.

Mussared noted that while the number of native fish in the Murray and Darling rivers were relatively small compared with some large overseas waterways, the unseen diversity in floodplain wetlands ‘can be biological treasure troves, so rich in tiny species that some scientists compare them favourably with the giant of freshwater biodiversity, the Amazon River’.

Lessening the impact of floods

The role of wetlands in reducing the impact of, and damage caused by, floods is now well-documented. One of the earliest observations of this feature was recorded in 1861 by Dr Hermann Beckler, the medical officer who accompanied the ill-fated Burke and Wills expedition across Australia. Beckler’s journal, *A Journey to Cooper’s Creek*, was only discovered in Germany in 1967 and translated and published in 1993. In his diary, Beckler described the Darling River with great enthusiasm, recording the rivers ‘numerous and very short windings … (with) magnificent stands of eucalyptus’. He also described wetlands along the Darling River between Fort Bourke and the Murray River as ‘a safety measure’. Beckler wrote that because of the wetlands, ‘the river does not flood large areas whenever there is considerable rainfall since they take the Darling’s extra water at these times and so prevent untold damage’.

Draining wetlands in South Australia

According to David Eastburn’s 1990 book, *The River Murray: history at a glance,* some of the first wetlands to be reclaimed along the Murray River were in South Australia. In 1881, the governor of South Australia, Sir William Jervois, established the first reclaimed wetland near Wellington as a scheme for irrigated dairy farms. Twenty-three years later, South Australia’s government started draining wetlands at Burdett and Mobilong, near Murray Bridge. In 1929, the government drained wetlands between Mannum and Wellington to create further pastures for a still-growing dairy industry.

The first campaign to protect a wetland

The story of possibly the earliest attempt to protect floodplain wetlands in the Murray-Darling Basin is outlined at Balranald in southwest NSW. Interpretive signs at the historic woolshed in Yanga National Park explain that the Lower Murrumbidgee floodplain between Balranald and Hay has a place in Australia’s environmental history as the focus for the first campaign to protect wetlands. During the late-1800s, water engineer Hugh McKinney, often regarded as the father of irrigation in

New South Wales, was an active advocate for irrigation (McKinney had assisted a royal commission in 1884 to investigate water conservation in NSW). Yet McKinney was adamant that developing irrigation should not be at the expense of floodplain wetlands. In his first report on the potential of irrigation to the NSW Government in 1891, he proposed that along with irrigation, 'environmental compensation weirs' should be constructed along the Murrumbidgee River to raise river levels below irrigation schemes to allow the water to spread out across floodplains as it would have done under natural flows. McKinney believed in managing rivers to maintain harmony between irrigation and environmental interests.

In 1899, eight years after McKinney's first report and following increasing diversions upstream along the Murrumbidgee River, communities at Hay, Maude and Balranald raised concerns about the declining volumes of water available to sustain the extensive wetlands west of Hay. In July 1899, representatives of these communities met at Hay to consider possible action. The meeting led to an enquiry by the NSW Public Works Board of Reference. In December 1901, the board released a report, acknowledging that 'the water diverted in the past and proposed to be diverted in the future, has had and will have, a deleterious effect on the low-lying lands below Hay'. The report also acknowledged that a weir could be constructed above Maude to divert water onto the floodplains.

Wetlands should not be sacrificed

Two years later, a detailed plan was announced for large scale irrigation along the Murrumbidgee River that would require a huge amount of water to be diverted. This later became the Murrumbidgee Irrigation Area (MIA) scheme. In response, the Hay community commissioned a private engineer, John Monash, to survey the floodplain between Hay and Balranald. Monash was also asked to make suggestions on ways to lessen the impact of the proposed water diversions on floodplain wetlands. While Monash supported irrigation, his 1904 report acknowledged that existing natural assets (like floodplains) should not 'be sacrificed in somewhat vague expectations that you may create prosperity elsewhere'.

Monash's report pointed out the importance of connectivity between the river and floodplains through flood runners, and that anything 'which will materially interfere with this natural irrigation (from river flows) spells ruin alike to large and small holdings, to townships and to all directly or indirectly dependent'. Using diagrams, Monash showed that there was no biophysical or engineering reason why the Lower Murrumbidgee

wetlands should not be sustainable while also supporting irrigation up-stream.

An absolute waste of water

After 1902, the NSW Government passed legislation that empowered it to finance irrigation and drainage works, allowing the start of the Murrumbidgee Irrigation Area in 1908. Consequently, the concerns of the Lower Murrumbidgee communities as well as the reports prepared by McKinney and Monash were initially ignored. Leslie Wade, the engineer given the responsibility to develop the Murrumbidgee Irrigation Area, regarded these concerns as not fitting in with his 'engineering vision'. In his report to the NSW Legislative Assembly in 1905, Wade stated that providing water for wetlands was 'an absolute waste of water' and that the only way to use water was to adopt 'an industrial approach', using the water solely 'for intensive cultivation'. Wade also recommended that no 'ecosystem compensation weirs' should ever be constructed.

Weirs were a compromise

It wasn't until the late-1930s that some efforts emerged to start restoring land and water environments. And, despite Wade's unequivocal comments in 1905, this included the building of two weirs in the Lower Murrumbidgee for water supply as well as allowing water to flow onto floodplains. The Redbank and Maude weirs were built in 1937 between Balranald and Hay. The weirs were a compromise to the large number of compensation weirs recommended by McKinney in 1891.

These small moves of rehabilitating the environment were followed by a mushrooming of activity in the 1970s, largely in response to the degradation of urban bushland and overdevelopment along Australia's south eastern coastline. A second wave began in the 1980s in response to fragmentation in agricultural landscapes and a serious decline in the health of waterways. In 1986, the NSW Government made an allocation of water specifically for the Macquarie Marshes in north central NSW (the marshes are a wetland of international significance). In 1993, the Murray-Darling Basin Ministerial Council authorised an annual allocation of 100 gigalitres of water to another wetland of international significance, the Barmah-Millewa Forest.

However, it was to be another 60 years before Wade's dismissal in 1905 of efforts to protect and conserve wetlands by using infrastructure, were to be re-considered.

PART THREE

The Wetlands Working Group

Perhaps that's what dreaming rivers leave you with, he says,
the feeling that this time
you might begin to understand your own story, as a part of mine,
and mine as part of yours –
and notwithstanding appearances, he says, a story never
quite begins at the beginning,
never ends at the end, but sets out, as it were, or starts closing in,
somewhere in the middle …

Homer Rieth, *Canto Extramural*, *The Garden of Earth (2016)*

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ESTABLISHING A WORKING GROUP

People interested or involved in wetland management had seen too many reports, policy issues and options papers since the release of Pressey's report. Unfortunately the number of documents written has not been matched by action on the ground.

From the first strategic plan of the NSW Murray Wetlands Working Group (1993)

It has been a long-held view by many past and current members of the Murray Darling Wetlands Working Group that when the group was established in 1992 (as the NSW Murray Wetlands Working Group), it was 'an initiative of the Murray and Lower Murray Darling Catchment Committees'. This statement has been widely used for 25 years in annual reports, newsletters, project submissions, presentations and workshops as well as to introduce group speakers at conferences. However, a review of original documents, minutes and correspondence of that period as well as interviews with people involved in the early years, reveals a somewhat different story. It is true that the two catchment management committees recognised the degradation of wetlands along the Murray and Lower Darling rivers and that the Working Group was established to develop and implement management plans for specific wetlands. It is also correct that the two catchment committees were very much involved in the Wetlands Working Group and their members were strong advocates for wetland rehabilitation.

Records show that the Working Group was created as a partnership of communities and government agencies that involved, but was not exclusive to, the two catchment management committees. In 2017, former members of the Murray Catchment Management Committee, Martin Driver of Deniliquin and Tony Piggin of Corowa, recalled that the group 'was originally nurtured and auspiced under the catchment management committee's total catchment management (TCM) banner'. They also acknowledged that while there was catchment committee membership on the Working Group right from the start, there was also outside involvement. However, the Working Group 'was definitely seen and promoted as a non-government entity but with interagency support and endorsement through the TCM process'. Driver also recalled that 'the success of the wetlands working group model led to the establishment of a complementary nature conservation working group to address the Murray catchment's terrestrial environmental needs'.

The Wetlands Working Group was a relatively new concept at the time but one that has stood the test of time. Also, the story of the Working Group in no way detracts from the remarkable story of the organisation, its strong links to catchment management organisations and its significant achievements since 1992.

A government wetland working group

In 1987, in response to Pressey's 1986 report on wetlands along the Murray River, the NSW Government established a Murray Wetlands Working Group with senior representatives from NSW government agencies. The group was asked to consider specific management options for wetlands in NSW as identified in Pressey's report. It was also asked to make recommendations on managing wetlands in the Murray-Darling Basin to the new Murray-Darling Basin Commission (established by the Commonwealth, Victoria, New South Wales and South Australia governments).

The group's members soon realised that the amount of information known about each of the 3,631 floodplain wetlands was insufficient to develop general management principles and plans. Consequently, the group resolved to select a group of wetlands representing a range of land ownership, management, habitat values and water arrangements. Fourteen wetlands were selected and their management options documented. The 14 wetlands were Eight Mile Creek, Croppers Lagoon, Bullanginya Lagoon, Gulpa Creek and associated wetlands, Moira Lake, Wee Wee Creek, Yallakool Creek, Jawbone Creek, the Poon Boon Lakes, Waldaira Creek, the Lake Benanee complex, Fletchers Lake and Fletchers Creek, Lake Gol Gol and the Gol Gol Swamp, and the Frenchman's Creek complex. The final report of the working group, *Draft report of the NSW Murray Wetlands Working Group*, was released in January 1991. Having completed its task, the group was disbanded a few months later.

To improve the environment, you had to do it yourself

In 1992, senior staff of the NSW Department of Water Resources based in Dareton and Deniliquin in southern NSW, decided to build on the work of the Sydney working group and establish a group based along the Murray River. A member of staff with the department at Dareton was David Harriss. Harriss was born in Adelaide and educated in Canberra. In 1989, he was offered a position as a resource manager in western NSW. The title 'environment' was to have been used in his job title, but as Harriss later recalled, 'environment was a bit of a dirty word in western NSW and was better left out of a job title at the time!' Harriss had completed a post-graduate qualification in water management during which he had (in his own words) 'become a little fascinated by

wetlands'. While not part of the Sydney-based wetlands working group, Harriss noted that 'no-one was doing anything about the state of wetlands' in the Murray and Lower Darling area. He recalled that 'in the early-1990s, if you wanted to do something about improving the environment, you had to do it yourself'. So, in his words, Harriss decided to 'get out and do something'.

The right thing to do

In 1991, Harriss put together a consultative group from NSW, Victoria and South Australia to develop a contingency plan should the serious blue-green algae outbreak stretching 1,000 kilometres along the Darling River reach the Lower Darling. He recalled that his locally-devised concept worked despite some departmental criticism and it 'seemed the right thing to do'. It gave Harriss the confidence to consider a similar model to improve wetlands along the Murray River.

Harriss first went to Canberra and met with Tony Sharley, convenor of the Murray-Darling Basin Commission's Wetlands Management Working Group. Created in 1988, the commission had a charter to manage floodplains where the wetlands were situated, an activity that was not part of the work of the former River Murray Commission. Sharley's group was to also develop a floodplain wetlands management strategy. But as Chris Guest noted in his 2016 book, *Sharing the water,* this and a range of other commission strategies were to be implemented 'as far as is practicable' or 'when possible', making them 'light-handed, with limited funding to underpin their delivery'. Guest observed that the various strategy topics were not only immense but their preparation would have been expensive while 'effective implementation would have required considerable resources and commitment by the states'.

Nevertheless, Harriss and Sharley discussed putting together a group of community and government representatives along the Murray River through the Murray and Lower Murray-Darling catchment management committees. These new committees were operating under the Total Catchment Management (TCM) philosophy which had been adopted throughout NSW. The TCM philosophy was to promote the coordinated use and management of land, water, vegetation and other natural resources on a catchment basis. Community involvement was also a major part of the TCM philosophy.

Harriss and Sharley believed that the new group should develop and then implement a strategy to manage wetlands along the Murray River in NSW. Implementation was seen as the key to the strategy. In 2017, Harriss reflected that while improving the management of natural resources was not a new concept in 1991 'there were no arrangements to make it happen'. Harriss also felt that the Murray-Darling Basin

Commission might be a good source of funds to get the new group 'off the ground' and start some projects. His thinking was vindicated when he secured funding through the commission's Natural Resource Management Strategy program to employ a wetlands project officer in early-1992.

A working group, not a committee

To determine if his wetland group idea would receive community support, Harris called a public meeting in Dareton. He expected four or five people to turn up and was surprised when 35 people attended. Harriss recalled that the meeting agreed that the concept 'sounded fair and said - just do it!' Judy Frankenberg of Howlong, a founding member of the Murray Wetlands Working Group in 1992, felt that participants at the public meeting probably warmed to the idea because it was to be a working group, not a committee. 'A committee implied more talking, while a working group meant action'. Cr Paul Trevethan, chair of the Murray Catchment Management Committee, also told Harriss that the concept was a good one.

Harriss was also keen to start tackling the environmental state of several wetlands near Dareton, including Lake Gol Gol, Gol Gol Swamp and Fletchers Lake. In 1992, the Murray River had been in flood and there was water available to put into these degraded wetlands, demonstrating to the community that it was a working group interested in rehabilitation action, not a committee.

Ensuring community involvement

Because community involvement was a major objective of total catchment management in NSW, the Murray and Lower Murray-Darling catchment management committees were invited to provide representatives for the new working group. It was also envisaged that whilst the Department of Water Resources would set the initial agenda and work program, directing the group's work over time would become the responsibility of the two catchment management committees. In fact, the intention was for the group to become a sub-committee of both catchment committees as both committees had identified wetland management as needing to be addressed as part of their catchment strategies.

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THE FIRST MEETING

The NSW Murray Wetlands Working Group held its first meeting on 9 September 1992 in the office of the NSW Department of Water Resources at Dareton. Those attending were Judy Frankenberg (representing the Murray Catchment Management Committee); Alan Whyte (representing the Lower Murray Darling Catchment Management Committee); Tony Sharley (Murray-Darling Basin Commission); David Harriss and Ken Harris (Department of Water Resources); John Brickhill (National Parks and Wildlife Service); Phil Craven (Department of Conservation and Land Management); David Wilson (NSW State Forests); and Robert Black (Department of Planning). In 1993, David Harriss acknowledged the group 'was a large enough committee to start with'.

Harriss chaired the first and subsequent meetings of the group, although there was no record in the minutes to formally record his election to the position. The agenda for the first meeting included site inspections of Lake Gol Gol and Fletchers Lake. For the next 25 years, a formal meeting followed by site tours became the standard format for Working Group meetings.

Also attending the first meeting was Allan Lugg, a Murray Wetlands Officer. Although Lugg is often remembered, and sometimes documented, as the group's first staff member, he was actually employed by the NSW Department of Water Resources, six months before the group's first meeting. Born in Gippsland (in southeast Victoria), Lugg had developed a keen interest in wetlands while working on salinity management plans in the Goulburn-Broken and Loddon-Avoca catchments of north-central Victoria.

Lugg's position, based in Deniliquin, was funded by the Murray-Darling Basin Commission. His work mainly focused on the priority wetlands along the Murray floodplain. As Harriss later recalled, Lugg 'was an obvious choice to slip naturally into the position as an executive officer cum project officer to undertake the initial work of the Working Group'.

Determining wetland priorities

At the group's first meeting, Lugg was asked to prepare a matrix to help determine priorities for wetland management. His report was prepared by October 1992 for consideration at the group's next meeting. To help the group determine priorities, Lugg developed a list of criteria. These were:

- Existing degree of wetland degradation based on physical and hydrological changes which had occurred - the least degraded wetlands should receive higher priorities for rehabilitation.
- Urgency of action - it was assumed that degraded wetlands that were relatively stable or not actively degrading, should receive a lower priority for action.
- Ease of hydrological management – some wetlands would be easier to manage than others depending on how many landowners had to be consulted. Lugg rated wetlands in state forests or on public land as 'easy'.
- Degree of public support - wetlands with significant community support for restoration or management of environmental values should be given priority.
- Degree of public opposition - it would be easier to achieve results where public opposition was minimal, although Lugg noted that 'a high degree of public support did not necessarily mean a low degree of public opposition'.
- Management constraints – this assumed that wetlands with few or no constraints (such as irrigation, extraction, river regulation, agricultural use, etc.) would be easier to manage and should therefore receive priority.
- Demonstration/educational value - this referred to the value of the wetland as a demonstration site or where the location was close to major centres and might be used for education.
- Value for money – this was based on the likely cost to achieve rehabilitation and on-going management. Wetlands offering high value for money invested were to be given priority.
- Environmental value – wetlands that were in higher natural states; representation or uniqueness; diversity of flora and fauna; and high productivity, were to be given priority.

How do we move from words to effective action?

Lugg gave each wetland a score of one, two or three for each criteria (a score of one was a low rating, a score of three was high). The scores for all criteria were added and the totals used to guide the group in determining priorities. In his report, Lugg noted that most of the wetlands were also identified in Pressey's report but that he had included some 'which seem (to me) to be important'. Using his criteria and matrix, Lugg recommended that the following wetlands should receive the highest priority - Moira Lake complex; St Helena Swamp; a swamp in the Boomanoomana State Forest; Croppers Lagoon; Lake Tooim; Lake Coomaroop; Waldaira Creek; Lake Caringay; and Fletchers Lake. Lugg noted that the second, third, fifth and seventh priority sites were not included in the original list of 14 wetlands. Mindful of earlier comments by people interested in wetland management that they had seen too many reports since the release of Pressey's report and not much action on the ground, Lugg concluded his report with the following comment: 'The challenge for the future is how do we move from this situation (a lot of words on paper) to effective implementation of management actions on the ground?'

Terms of reference

The Working Group decided from the outset to work in a well-structured and strategic way. In 2017, whilst reflecting on the Working Group's achievements, the group's first chair, David Harriss, felt that having terms of reference and a strategic plan right from the start was one of the keys to the success of the group over the 25 years.

The minutes of the first meeting noted that while basing its work on the *Draft Report of the NSW Murray Wetlands Working Group* (that had only met in Sydney), the new Working Group needed to consider much more than the management of water in wetlands and that an integrated approach was required, particularly with reference to groundwater. To achieve this, the group established clearly-defined objectives for wetlands along the Murray River as documented in the group's first terms of reference. They were:

- Develop and promote an integrated approach for the management of wetlands which includes managing land, surface water, groundwater, flora and fauna and public use.
- Develop and implement a strategic approach to determine priorities for management of specified wetlands and wetland complexes.

- Develop management options for wetlands and wetland complexes, including reviewing management options by government agencies and the community as well as ensuring the consideration of broader implications (including those interstate).
- Initiate and implement programs for restoring and rehabilitating degraded wetlands.
- Develop and implement a continuing work program to investigate and report on the status of wetlands.
- Establish general principles for wetland management, consistent with broader NSW and Murray-Darling Basin Commission policies, and promote these principles to local government, state government agencies and the community.
- Develop and implement strategies to increase community awareness of wetland issues and values and involvement in regional wetland programs.
- Identify sources of funding and seek sponsorship for implementing wetland programs.
- Liaise with the Murray-Darling Basin Commission's Wetlands Management Working Group to review the work of the Wetlands Working Group.

A strategic approach

As well as its terms of reference, the Working Group developed a strategic plan during 1993. The document, *A Strategic Plan For The New South Wales Murray Wetlands Working Group: 1993–1996*, was underpinned by the belief that before any strategies could be developed to slow down or reverse the degradation of wetlands, the causes and effects had to be identified and documented. Thus, right from the start, the group had a structured process to identify and establish its priorities. The plan also identified the process for community input and involvement in managing wetlands. It also outlined an approach to be recommended for local government councils adjacent to the Murray River for the consideration of wetlands and wetland values in their regional planning process.

Membership of the new group

The group's first strategic plan also listed the membership of the new organisation. It included Judy Frankenberg, Janet Field and Bill Mulham (from the Murray Catchment Management Committee); Robert Ridgewell and Alan Whyte (from the Lower Murray Darling Catchment

Management Committee); Tony Sharley (Murray-Darling Basin Commission); David Harriss and Ken Harris (NSW Department of Water Resources); John Brickhill (NSW National Parks and Wildlife Service); Phil Craven NSW Department of Conservation and Land Management); David Leslie (NSW State Forests); John O'Donnell (NSW Environment Protection Authority); Jenny Burchmore (NSW Fisheries); and Peter Adrian (NSW Department of Planning).

It is worth recording that at the group's second meeting, members of the two catchment committees expressed concerns that 'they may not be able to attend regular meetings' because unlike agency representatives, they were 'not paid' (they did not receive a sitting fee).

Over the years, membership of the Working Group changed, expanded and contracted but the group continued as a strong community-government partnership. The group's longest serving member was Judy Frankenberg of Howlong who had been involved with the group since its first meeting. A scientist with expertise in floodplain and wetland management (and also a farmer), Frankenberg maintained her involvement with the group because she saw it as such a worthwhile thing. In 2013, she explained that being involved with the group gave her 'a wonderful opportunity to make a difference and actually do something, not just talk or write about things'.

Frankenberg noted that over the years, the people that made up the Working Group were diverse with different backgrounds and experiences but they 'all got on well together and all focussed on trying to make things happen'. She also saw the group as very stable 'with new people always bringing new skills and experience'.

David Harriss

Judy Frankenberg

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THE PRIORITY WETLANDS

The life of rivers is never done with, but endures as something miraculous.
Nothing else lives if rivers do not – it is they that give life.

Homer Reith, *Canto 50: Sylvania, The Garden of Earth (2016)*

In Pressey's 1986 report, wetlands along the Murray River were mapped, classified and identified as to their potential for improved management. Following on from that work, the Sydney-based working group chose 14 priority wetlands from more than 3,500 that were surveyed. The new NSW Murray Wetlands Working Group included the 14 wetlands in its first priority assessment. Because the group included community and government people with extensive knowledge of the Murray and Darling rivers, other wetlands were included in the review. Forty-seven wetlands were eventually reviewed by Lugg and from that list, eight were finally chosen by the group for rehabilitation.

A mistake in the criteria

Lugg presented his assessment report to the second meeting of the Working Group at Deniliquin in February 1993. Lugg was commended by the meeting for his work but Ken Harris from the NSW Department of Water Resources 'kindly pointed out mistakes in the (criteria) ratings which would affect the final score'. Adjustments were made accordingly. A suggestion that the size of the wetland be a criterion to determine priorities was rejected by the group.

The meeting noted that for some of the eight wetlands selected by the group, preliminary investigations had been completed or were currently underway. For others, additional information and investigations would be required before considering rehabilitation options. This information would then be reviewed and sent to community groups and local, state and federal government agencies for comment. The options were drafts only and could be revised in consideration of responses received.

The following is a brief description of the priority wetlands requiring rehabilitation. The issues they faced were also representative of many wetlands, not only along the Murray River but across the Murray-Darling Basin. The description of each wetland was derived from a series of one-page summaries prepared by Lugg in early-1993. Additional material came from reports and management proposals prepared during the first year of the group.

Croppers Lagoon

Just downstream of Corowa on the Murray River, Croppers Lagoon was a shallow lagoon of 86 hectares fringed with rushes and River Red gum trees. The lagoon was used to dispose of treated effluent as well as for drainage, irrigation, stock and domestic water. Although it was kept almost permanently full and most of the lagoon's edges were grazed, the lagoon was relatively healthy with only minor degradation. The main problem was the lack of drying regimes and no control over stock movement across the lake bed. (In 2001, Croppers Lagoon was listed in a directory of important wetlands in Australia by the federal government).

Gulpa Creek system

This wetland system, five kilometres southeast of Mathoura, comprised permanent and semi-permanent freshwater swamps, lagoons and creeks supporting rushes, reedbeds and River Red gum forest. It was representative of floodplain creek and wetland systems with significant waterbird breeding sites and native fish habitat. Improving the wetland system required finding a compromise between the demands of local irrigators and domestic water as well as a healthy environment.

Moira Lake

Fourteen kilometres southeast of Mathoura, this large open floodplain lake of 1,400 hectares, had been permanently flooded for at least 50 years by the high summer flows from the Murray River. The lake bed was surrounded by Giant rush, Moira grasslands, reed beds and River Red gum forests. The lake provided important habitat for native plants, fish and animals and was frequently used by waterbirds for nesting sites. Regulators had been installed on three of the lake's four inlets from the Murray River. But without a final regulator on Moira Creek, the lake lacked drying phases and fish passage to the river. This resulted in a major decline in the lake's environmental values, impacting in particular on waterbird and fish breeding, and creating a very high population of the highly-invasive Common carp fish.

Poon Boon Lakes system

This large system, 15 kilometres southeast of Tooleybuc, comprised a series of connected permanent and semi-permanent freshwater lakes with grasslands and River Red gum trees. The system was kept full of water as often as possible by the Poon Boon Water Trust to provide irrigation, stock and domestic water. Lake edges were grazed and lake beds were cropped as water levels receded each year. The lakes provided a drought refuge for birds and habitat for native fish. However, they had also been impacted by rising salinity and groundwater,

especially in the terminal basins while grazing and cropping were affecting native vegetation and water quality.

Lake Caringay

This 350-hectare lake was one of the three lakes that made up the Lake Benanee complex, east of Euston. Before river regulation, the lakes played an important role in mitigating floods. Murray River water would enter the three lakes and then partially drain through connecting creeks. During floods, Lake Caringay provided important habitat for native plants, fish and waterbirds. However, by 1991, about half of the lake bed was under an irrigation lease while the remainder was leased to another landholder for grazing. Earthen block banks across Caringay and Washpen creeks, constructed in the 1960s, prevented natural flooding and drying regimes in the lake bed and its surrounds. The lake and surrounding areas were severely degraded and the lignum, River Red gum and Black box trees were declining. In 1991, NSW government agencies and the two lessees agreed that improved environmental management was required. In December 1992, in response to correspondence from the Sunraysia-Mallee Branch of the Australian Conservation Foundation, the NSW Minister for Natural Resources asked the Working Group to address the matter at its next meeting.

Gol Gol Swamp and Gol Gol Lake

Situated on the eastern edge of Gol Gol township, this freshwater swamp and lake supported lignum shrubland, River Red gum forest and Black box woodland. The swamp and lake were linked to each other and the Murray River by Gol Gol Creek. Before river regulation and irrigation, the wetland was inundated during spring flooding, drying out over summer and autumn. The wetlands were highly productive, supporting significant populations of rare and migratory birdlife. The lake and creek also contained significant Aboriginal cultural sites. However, the blocking of the creek, the infrequent flooding and drying as well as the impact of irrigation and salinity, had endangered the wetland.

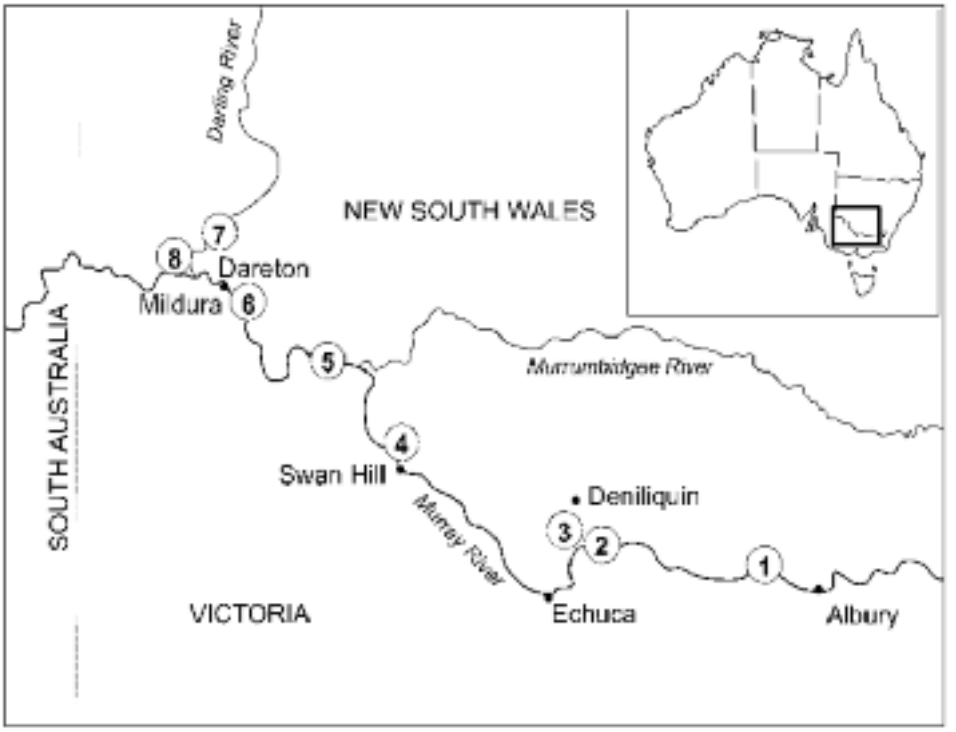
Fletchers Lake

Located five kilometres north of Wentworth, this 815-hectare wetland included two large and five smaller basins, all isolated from the Murray and Darling rivers (and natural flooding) by block banks since the mid-1970s. The semi-permanent open water bodies had also become a discharge area for the region's irrigation drainage, resulting in a considerable amount of salt accumulating on the lake bed. The lakes were representative of an off-river deflation basin and were an important

destination for Japanese and Chinese migratory birds. Although a highly productive wetland when flooded, the wetland was degraded.

Thegoa Lagoon

Situated on the western edge of Wentworth township, this ephemeral wetland was just downstream of the junction of the Darling and Murray rivers. The lagoon covered about 110 hectares with a surrounding flood plain of 400 hectares. Since 1956, water had been allowed to run into the lagoon all the time, keeping it almost permanently full and making it a useful water supply for irrigation. While the lake also added to the attraction of Wentworth, the lagoon's water quality and surrounding landscape were becoming badly degraded.



The initial priority wetlands:
1 Croppers Lagoon; 2 Moira Lake; 3 Gulpa Creek; 4 Poon Boon Lakes;
5 Lake Caringay; 6 Gol Gol Swamp; 7 Fletchers Lake; 8 Thegoa Lagoon

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ENGAGING THE COMMUNITY

Even before the first meeting of the Wetlands Working Group in 1992, the Department of Water Resources recognised that community engagement would be the most important component of any wetland program. It was also the department's hope that the new group would eventually be taken over by catchment management committees that recognised the importance of communities endorsing wetland management plans.

Community input to Working Group activities was to be actively encouraged and sought throughout all stages of the development and implementation of wetland management options. However, the new group acknowledged that community engagement and involvement would vary depending on the location and attributes of the wetland. These features were recognised in the model consequently adopted by the group and included a series of key principles.

- Identify all directly-affected landowners and community groups with potential interest in management of the wetland (interest groups could include field and game associations, field naturalists, bird observers, conservation groups, regional progress associations, local government, bush walking clubs, etc).
- Discuss with landowners and groups particular uses, interests and concerns for current and future wetland management.
- Prepare and distribute draft options for managing wetlands.
- Hold meetings for landowners and interested parties to present research and details of suggested management strategies.
- Consider recommendations from community groups. Depending upon the degree of community interest, public meetings may be appropriate.
- Suggest that catchment management committees organise a community reference group to work towards implementing community-endorsed management options.
- Community reference groups were to be drawn from landowners, special interest groups, and community members only and will not include government agency representation.

- Community reference groups must work with the Working Group (which operated in a technical advisory capacity) in developing preferred management options.
- It was proposed that no management strategies for managing any wetland for environmental purposes be undertaken without endorsement by both the community reference group and the Wetlands Working Group. Similarly, the community reference group was not to undertake work that was not technically sound in environmental management.
- Once a proposed management program was endorsed by both groups, the community reference group would find funds to undertake works which may be required in achieving the wetland management objectives.
- The Working Group was to ensure that all legislative and statutory responsibilities associated with the proposed management program were satisfied.
- Community reference groups and the Working Group were to oversee the design and construction of works and the implementation of the management program.

Some misgivings

In early-February 1993, wetlands officer, Allan Lugg, visited the Gol Gol wetland to follow-up on the flooding three months earlier. It had been a successful event with Murray River water 'diverted to the swamp until a pre-determined height was achieved'. However, during a discussion with the secretary and president of the Sunraysia Field and Game organisation about the watering, Lugg tried to explain what the group was doing, its objectives and how the community could get involved. The response by the secretary and president was that 'we are basically shooters and not interested in planting trees!'

In a hand-written note to David Harriss, Lugg expressed his fear 'that I and maybe others have misjudged the requirements of the Murray Wetlands Project'. Lugg had 'perceived that there was a strong desire to restore/rehabilitate wetlands … I thought my role was to document the problems, provide viable options for solving them and then facilitate their adoption and implementation'. Lugg then confessed that 'I think my assessment was wrong, there seems to be little community or departmental interest or desire to rehabilitate wetlands. Obviously, the desire needs to be generated'. This, concluded Lugg, indicated that the Working Group should bypass the executives of relevant community groups and 'get to the grass-roots membership… the response may not

be any better but it's at least worth a try'. Lugg then prepared a new information and options paper for Gol Gol. He explained there was 'nothing new in it, just briefer, expressed more in laymen's terms and full of pretty pictures'. Lugg was confident it would 'also illicit a response … hopefully it will help stir up a bit of interest'.

Local Government

In the Working Group's terms of reference, strategic plan and community engagement proposals, local government was also recognised as being a key participant in wetland rehabilitation and management. By the early-1990s, NSW's catchment management committees involved local government in their work with the appointment of councillors to the committees. At the same time, the capacity of local government to be involved in all aspects of managing the environment was being defined and gaining pace. In 1990, the Australian Local Government Association undertook a study on the role of local government in land conservation. The report used the Murray-Darling Basin as an example to demonstrate that while local government was a big investor in managing the environmental and natural resources, it was in danger of being ignored in institutional management arrangements. This initiated several environmental initiatives by association members across Australia as well as a local government group along the Murray River.

Pilby Creek

For a number of years, the Murray Darling Association had been pursuing a greater role and recognition for local government as a legitimate contributor to managing land and water resources along the Murray and Darling rivers. In 1992, the association, a local government consortium of most councils along the two rivers, initiated a project to rehabilitate a wetland on South Australia's Chowilla floodplain.

The idea was first raised by local freshwater anglers and duck shooters who had noticed the degradation of wetlands on the Chowilla floodplain. They had also observed a corresponding decline in waterbirds and native fish and an increase in carp. The anglers discussed the issue with the association's local government members in South Australia's Riverland region who decided to try and rehabilitate one of the smaller degraded wetlands, Pilby Creek, by manipulating water levels and removing carp. The association's 2014 history, *Up and Doing*, described how as well as building a regulator to flood and drain the wetland, the association engaged a research student from the University of Adelaide to monitor progress. The researcher not only reported an improvement in the wetland's environment but identified the return of a number of insects and birds not seen for many years. He also recorded the return

of a leech, an important indicator of improvement in the water quality of the wetland. The success of this project encouraged the association to prepare a management plan to rehabilitate wetlands in the Morgan Conservation Park of South Australia.

A guide for local government

Acknowledging that it needed local government support to rehabilitate wetlands, the Wetlands Working Group developed a document: *Wetland Management: Guidelines for Local Councils in the Murray Region of NSW*. The 21-page booklet, developed in late-1993, documented much of the group's philosophy and action in words and pictures. The amount of work involved was reflected in a faxed (tongue in cheek) note from Allan Lugg to David Harriss in November 1993: 'For your approval. Don't dare suggest any changes – I'm sick to death of the damn thing. Any suggestions of how many I should print?'

In October 1993, the group's two representatives from the Lower Murray-Darling Catchment Management Committee commended Lugg for preparing 'a very good guide for local government'.

Aboriginal engagement

There was no mention or acknowledgement of Aboriginal engagement, use of traditional cultural knowledge or active participation in wetland management in the Working Group's first terms of reference, strategic plan or community engagement proposals.

In 1993, Lugg mentioned the significant Aboriginal cultural heritage at Gol Gol Lake and Gol Gol Swamp in a one-page summary prepared for the Working Group. However, it was not until January 1994, that cultural heritage issues were first mentioned by the group. In a discussion paper on Fletchers Lake, a section was written by Harvey Johnston, an archaeologist with the NSW National Parks and Wildlife Service. Johnston wrote that cultural surveys in the Gol Gol and Wentworth areas showed that traditional Aboriginal occupation concentrated not on the Murray River but on ephemeral wetlands and lakes away from the river. He cited Fletchers Lake as 'the most pronounced example of this occupation pattern'.

Regardless, it would still take several more years before active and meaningful engagement with Aboriginal people began.

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PROGRESS REPORT: END OF 1992

On 19 and 20 October 1993, a two-day meeting of the Wetlands Working Group was held at the Hume Dam (east of Albury) to reflect on the first 13 months of the group. The Working Group's two representatives from the Lower Murray-Darling Catchment Management Committee prepared a comprehensive report to their committee. Their report reflected the group's commitment to on-ground action and noted the following achievements:

- The flooding of Lake Gol Gol had been successful with plans to fill it again during the spring with flood water from the Murray River.
- The Department of Water Resources was undertaking a preliminary investigation of Thegoa Lagoon at Wentworth.
- Funds for a regulator at Moira Lake had been sourced from the NSW Environment Protection Authority's trust to build the structure in 1993-94, river levels permitting.
- There were 11 community responses to the Poon Boon Lakes rehabilitation proposal, most in opposition. The Working Group will aim to reach an agreement on management with the trust. Another eight piezometers are to be installed to get information on groundwater levels.
- A management plan for Gulpa Creek was being drawn up to address water levels of reed beds. The proposal is to clean out the creek and construct sills into wetland areas that would be above the regulated creek flow, expected to start in 1994-95.
- Normal river flows resulted in Croppers Lagoon near Corowa being full all year. It would always have to contain some water but there was room for improvement.
- The *Wetland Management Guidelines for Local Councils in the Murray region of NSW*, prepared by Allan Lugg, was a good result.
- High water levels in the Dry Lake are of concern from adjacent landholders to the Lake Caringay proposals. More information was required on likely groundwater impacts with the plan.

- The proposal to try and convert Fletchers Lake into a nature reserve had run into trouble due to lack of consultation.
- Funding priorities are the Gol Gol Swamp regulator; investigations on the flow through the Gol Gol Swamp and back to the river; Gulpa Creek regulators; the Poon Boon Lakes management plan; Allan Lugg's funding; and a flow management plan for the Murray River.

Wetland management in our region is advanced

The Working Group considered that some of its initiatives would result in substantial water savings and the concept of a water trust to manage some of those savings (as outlined in a discussion paper by David Harriss) was seen as having merit. The idea of selling the water was also seen as a good concept as the proceeds could be used on wetland capital works.

The report finally raised concern about the growing number of wetland plans. This had occurred during the Working Group's development of plans that 'seem to mesh fairly well together' with a strategy on managing wetlands prepared by the Murray-Darling Basin Commission. The problem was that the policy section of the Department of Water Resources in Sydney 'had resurrected an earlier attempt at a state-wide policy and in the process, has confused the matter no end. The department's approach in comparison with the others mentioned is very basic to the extent of being naïve'.

The report concluded that 'wetland management in our region is more advanced than in others'.

11

NEW STAFF AND NEW CHAIR

We have made some useful progress

In May 1994, the Working Group's wetland officer, Allan Lugg, announced that he would resign his position on 2 June of that year. In his farewell letter, Lugg noted with satisfaction the progress and achievements of the group since September 1992. 'I think we have made some useful progress towards better management of wetlands … it will be easier to pass judgement in 3 or 4 years' time when the plans that have been prepared are fully implemented'.

Not only had Lugg helped the group identify the priority wetlands for rehabilitation but the watering of the Gol Gol Swamp was successful and work had started on the Moira Lake regulator. He had secured funds and prepared management plans for Cropper's Lagoon and Moira Lake as well as prepared an application for the group to 'undertake wetland mapping … to consolidate and rationalise all wetland databases in the Murray and Lower Murray-Darling catchments'.

Lugg resigned because 'I missed the coast and the hills' but he was confident he would be replaced relatively quickly and that he would 'end up sitting on the Working Group as the NSW Fisheries representative – you probably haven't seen the last of me'. Lugg's final words were 'If I ever get to see 10,000 waterbirds on Moira Lake at some time in the future, I will be satisfied we achieved some good'.

Project officer for the Wetlands Working Group

Paul Lloyd was appointed in 1994 to replace Lugg. The three-year position was again funded by the Murray-Darling Basin Commission and Lloyd was employed by the NSW Department of Water Resources. However, the newspaper advertisement specified that the position was for a 'Project Officer for the NSW Murray Wetlands Working Group' and a key role was to 'enable the implementation of the NSW River Murray Wetlands Management Program'.

Born in Queanbeyan, Lloyd started work as a chemist with CSIRO in NSW and Queensland. He moved to Mildura in 1993 and worked for six months with landowners on how water could be better managed along the Great Darling Anabranch following the 1991 flood. Interviewed for the Working Group's project officer position over the phone, Lloyd started work in late-1994. He was initially based at Deniliquin and later at Albury.

Lloyd attended his first Working Group meeting at Deniliquin on 8 December 1994. Surprisingly, there was no official welcome or endorsement of his appointment recorded in the meeting's minutes. Neither did the minutes acknowledge Allan Lugg's departure, even though, as predicted in his resignation letter, Lugg attended the meeting as a representative of NSW Fisheries.

In 2013, Lloyd reflected that he took on the job with the Working Group because 'it seemed a good opportunity. One of the things that stood out and made me stick around for so long was the practicality of the job … it also had a great level of autonomy, of being able to develop ideas, put them to the working group and then see them through. (The group) … wanted to get on and get things done and didn't want to be held back by some of the limitations that government agencies are often bound by'. Lloyd remained as the group's project officer until 2001.

Never formally recognised as chair

Since September 1992, David Harriss had chaired the Wetlands Working Group. According to the group's minutes, he was never elected and his position was rarely acknowledged or recorded in any agendas or minutes. However, by 1994 he was occasionally signing letters and funding submissions as 'David Harriss, Chairperson, Murray Wetlands Working Group'. At the same time, he was actively (but quietly) looking for a community person to chair the group. That opportunity finally arose in 1995.

Group will need a good negotiator in the future

In mid-1995, the chair of the Lower Murray-Darling Catchment Management Committee advised the Working Group that the committee's two representatives would be replaced by Vin Byrnes and Howard Jones. Harriss had been considering Jones as a potential chair for some time even though some members of the group were starting to talk about a conservationist for the role. Harriss had observed that 'Jones was pragmatic, an irrigator, understood water movement (hydrology), was well respected, had a commercial sense, and was a good negotiator. I anticipated that the Working Group would need a really good negotiator in the future'.

Jones was born in Victoria's Wimmera and started work as a telephone technician. In 1980, he bought a small irrigated vineyard at Coomealla in south-west NSW. He enjoyed hunting and fishing, quietly observing the state of wetlands, lakes and dams and becoming aware of salinity and other environmental issues. Jones became a successful grape grower and was a founding director of Western Murray Irrigation.

A duck shooter was a distinct advantage

During his dealings with Western Murray Irrigation, Harriss had already found Jones to be a 'hard-nose negotiator'. Harriss also felt that Jones's hobby as a duck shooter and fisherman was a distinct advantage. 'He will know and understand how wetlands work', said Harriss. Jones also recalled Harriss telling him 'to turn up to the group's next meeting'. Jones and Byrnes attended their first meeting of the Working Group in December 1995. Years later, Jones admitted that initially, he was 'somewhat sceptical of the group and its motives', but he soon made a strong commitment to the group and its aim of preserving wetlands. 'I found them to be good people'.

At the same meeting, David Harriss reported that he was recently appointed as regional director for the NSW Department of Land and Water Conservation and could no longer 'continue as chair of the Working Group'. He called for nominations, suggesting a community representative would be the most appropriate. The meeting minutes recorded that 'No nominations were received'. At the group's next meeting at Albury in July 1996, Harriss again called for nominations for a new chair. Judy Frankenberg of Albury nominated Howard Jones, Vin Byrnes seconded the nomination and Jones was elected unopposed.

No-one knew more about water than Vin

Vin Byrnes joined the Working Group at the same time as Jones and continued as a member until his untimely death in July 2014. Byrnes was raised on a grazing property near Wentworth in south-western NSW. In 1950, he bought an irrigation property at Coomealla and grew grapes for wine and dried fruit for 45 years. He was a member of the Australian Dried Fruit Association's board of management and a member of numerous water and salinity committees. Jones often commented that 'no-one knew more about water in the Lower Murray Darling than Vin'.

Howard Jones
(Photo courtesy of Margrit Beemster)

12

FUNDING

The Wetlands Working Group began its life with no funds and no bank account. However, it was clear that the strategies adopted by the Working Group to improve wetlands would require significant funding. Funds would be needed to undertake investigations; for community engagement; to develop and implement management options; and for monitoring progress.

The Working Group's view in 1992 was that the issues relevant to each wetland were best identified by community interest groups and then referred to the Department of Water Resources or other relevant agency to undertake (and fund) preliminary investigations. The department or agency would then refer the issues back to the Working Group. Detailed investigations for the first two years were funded by the Murray-Darling Basin Commission's Natural Resources Management Strategy. However, to enable the work of the group's project officer to continue, the group recognised that further and sustainable funding 'will need to be forthcoming'.

The Working Group wanted community reference groups to implement wetland management plans while funding for on-ground works was to be secured from any source. The group considered that the most appropriate funding sources available at the time were government programs (such as Greening Australia, the Natural Resources Management Strategy, the Environment Protection Authority and Save the Bush); corporate sponsors; or private sponsors (such as Ducks Unlimited).

The group insisted that monitoring to determine the effectiveness of on-ground actions was to be a vital component of all management strategies and was to be included in all funding submissions. While not part of the strategic plan, self-funding was also considered by the Working Group. However, it was not until preparing its written proposal to manage the NSW Government's water for environmental purposes several years later that the group took self-funding seriously.

To incorporate or not

In late-1994, the Working Group first discussed the idea of becoming incorporated. To help the process, the project officer, Paul Lloyd, prepared a paper on the idea. At the group's meeting in June 1995, Lloyd outlined the requirements of incorporation. The benefits included the ability to apply for and manage funds, employ staff, reduce liability

and to receive payment from water savings. The disadvantages included increased financial and administrative responsibilities.

A long discussion revealed a general reluctance by the group to seek incorporation. The main disadvantage was that incorporation might impact on the ownership of water and that the group could forfeit the planning exemptions that it currently enjoyed through its relationships with government agencies. The group felt that only if it wanted to expand its activities interstate would incorporation be an advantage. Also, under the current arrangements, the group's project funds were held and managed by the NSW Department of Land and Water Conservation. The group was also involved with building structures to dry out wetlands on public land. As reported in the meeting's minutes, Harriss noted that 'this provides a safety net for the Working Group in such difficult situations'. As Lloyd recalled in 2017, staying unincorporated 'simplified a lot of things'.

Not at this stage

In a motion moved by Janet Field and seconded by Ken Harris, the Working Group unanimously resolved to 'not become an incorporated body at this stage'. Incorporation was not to occur until 1999. However, the idea was referred to three years later in the group's *Business Plan: 1998 - 2001*. The plan noted that the group was not a legal entity although that status 'may change in the future if necessary and beneficial through incorporation'.

Years later, an original member of the Working Group, David Leslie, reflected that, in his view, this decision held the group back. 'In my view, real success only came after the group became incorporated and truly independent'.

PART FOUR

First Projects

Moira Lake

Moira Lake after a wetting and drying
phase was re-instated
(Photo courtesy of Amanda Lavender, NSW National Parks & Wildlife Service)

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GOL GOL LAKE AND SWAMP

Rehabilitating Gol Gol Lake and Gol Gol Swamp was always known as the Working Group's first project although a start had already been made before the group was established. Located on the eastern edge of Gol Gol township, the area consisted of a freshwater swamp and lake linked to each other and the Murray River by a creek. Before white settlement, the two areas were inundated during spring flooding from the Murray River and dried out over summer and autumn. After white settlement, the area became a popular destination for family outings, picnics and swimming. With the introduction of irrigation, the connecting creek was blocked causing less-frequent flooding and drying, endangering the environmental health of both the lake and swamp. Despite this, by 1992, the wetlands were in relatively good condition and supporting significant populations of migratory birdlife. The area also contained significant Aboriginal cultural sites.

Stunning results

In the words of David Harriss, the results of the first watering in 1992 were 'stunning'. At a meeting at Albury in June 1993, the group's project officer, Allan Lugg reported that 'the experimental floods in the Gol Gol Swamp provided useful information on the potential of the wetland and provided an important example to the community'. Lugg was also excited by 'the soup of invertebrates' in the swamp following the first watering and the 'covering of Red milfoil after the second watering (a good sign of wetland health). The lignum also kicked on'. However, a suggestion from Lugg that flooding Gol Gol Lake was opposed by Harriss who argued that it was likely to exacerbate 'the groundwater problem and irrigation commitments made to landholders'.

Harriss's concerns about salinity were vindicated as the flooding started to have a marked negative impact on the vegetation, particularly the Black box trees and lignum plants. A study found that saltwater intrusions to the groundwater were caused by permanent water in the irrigation channel, irrigation practices and the impact of the Mildura weir pool. A fish survey undertaken soon after the first flooding revealed the presence of young Murray cod. Lugg felt that the area could be significant for native fish but that without a suitable fish passage, fish breeding in the wetlands would be limited. It was also going to be difficult and costly to add fish passage to the existing structures. By 1996, funding from the Murray-Darling Basin Commission had been used to improve the stability and capacity of regulators at the Three-

Way Split including box culverts and concrete wing walls. The funding was also used to assess the groundwater problems.

It was becoming clear that despite the positive result of the initial waterings, rehabilitation was going to be far more complex than the group initially thought. In the group's 2000-01 annual report, chair Howard Jones, reported that there were no easy or cheap solutions to the difficult and complex rehabilitation of the Gol Gol wetlands. 'Unless there is some capital funding found for pumping or the Mildura weir pool is lowered, the long-term future of these wetlands does not look favourable'.

Achieving improved outcomes for the wetland.

By mid-2003, progress had been made towards achieving improved outcomes for the wetland. The Murray-Darling Water Management Action Plan Committee, Western Murray Irrigation Ltd and the Working Group funded a study to look at the feasibility of an irrigation pipeline from the Gol Gol Creek. This would provide an emergency water allocation to severely stressed wetland vegetation around the lake. The project also aimed to determine the effectiveness of delivering 2,500 megalitres of environmental water to the Gol Gol Lake.

In 2009, project management was jointly undertaken by the NSW Department of Environment, Climate Change and Water, the Office of Water, the Gol Gol Creek irrigators and the Wetlands Working Group. By December 2010, three quarters of the lake bed was covered with an environmental flow. Water quality readings were acceptable, although outbreaks of blue-green algae were noted during the project. River Red gum, Black box and River cooba trees all showed positive responses to the watering with new leaves. Up to 50 bird species were observed, including a juvenile Sea eagle, a species not commonly found in the area. Unfortunately, Common carp were the only fish found in the lake.

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MOIRA LAKE

Small creeks on the floodplain that were now dried up until replenished once more in spring by the water from the melting alps … flocks of White-faced herons stand sentinel over swamps … egrets, Bell-miners, honey-eaters, Nankeen Night-herons, brolgas and bustards

Observations of the Barmah Forest by Captain Charles Sturt, 1838

Right from the start, the Wetlands Working Group believed that improving wetlands was not just about improving water management at specific sites. The group also saw the possibility of taking water out of one wetland and using it somewhere else, improving both sites. This was demonstrated with the Moira Lake project and led to one of the Working Group's most significant initiatives. The project also established a framework for wetland rehabilitation for the next 24 years.

In 1993, chair of the Working Group, David Harriss, believed that to convince the community of the new group's value, a 'high profile and accessible project' was needed. While Lake Gol Gol was close to a major highway and the first watering was a 'stunning result', there were a number of risks associated with the project, mainly the threat of salinity. For this reason, Harriss recommended that the Working Group promote Moira Lake as its first 'landmark' project.

Moira Lake is an open floodplain lake southeast of Mathoura in the Millewa Forest. In the 1991 publication, *Barmah Chronicles*, by Gillian Hibbins, there is a reproduction of an engraving of the lake as it appeared in the *Illustrated Australian News* in March 1869. The engraving depicted the lake surrounded by River Red gums and covered with ducks, herons, spoonbills, geese and ibis. In the same magazine, the owner of Moira Station, Edward Curr, explained that the lake was not named after Lord Moira but that 'all the blacks call it Mira and this, its original name, being corrupted by early explorers and surveyors, has crept into government charts of land listing as Moira'. There is no doubt that with an unregulated river in the 1850s, the lake filled regularly as the river flooded and then drained as the river levels fell. This was noted when the McDonell family sold their Upper Moira Station lease in 1853 because 'the river flooded upper Moira constantly'.

Permanently flooded for 50 years

By 1992, the lake had been permanently flooded for at least 50 years due to the high regulated summer flows in the Murray River while areas adjacent to the lake were suffering from reduced flooding. The lake and surrounding forest wetlands were listed as a Ramsar wetland of international ecological and cultural significance and were renowned for their bird-breeding events. Other smaller wetlands and flood-runners like Duck Lagoon and Gulpa Creek were equally important breeding sites for waterbirds such as spoonbills, ibis, egrets and ducks. Also by 1992, structures had been built on three of the lake's four inlets from the Murray River to try and reinstate more natural wetting and drying phases. However, without the fourth regulator, the years of inundation over summer and autumn allowed the environment to continue declining, impacting in particular on waterbird and fish breeding.

Science is easy, the people bit is a real challenge

While Harriss argued that the Moira Lake project would be the better first landmark project, it was also going to have challenges. David Leslie, the NSW Forests representative on the Working Group, was concerned that an irrigation channel passing very close to the lake was leaking, discharging water into the lake throughout summer and autumn. In 2017, Leslie recalled that 'meeting the needs of the irrigators and funding the proposed regulator needed large community input and a strong community voice to resolve an issue which, left to government agencies, would never have been resolved … science is easy, the people bit is a real challenge'. Nevertheless, the Working Group agreed to proceed with the project. The site was in a state forest, was accessible, only required one additional regulator and most of the assessments of the likely impacts had been completed. Harriss also noted that the project would result in water savings of at least 8,000 megalitres of water. The group wrote to the Murray-Darling Basin Commission about the proposed project but the commission's response was that 'it would cost millions to achieve and would upset the local irrigators'.

The Working Group secured most of the necessary funds in 1993 from the NSW Environmental Trust. Later, and despite its earlier misgivings, the Murray-Darling Basin Commission provided additional funds for the project. Building the regulator was not easy as it rained regularly during construction and specialised earth-moving equipment was needed to complete the job. The Working Group and NSW Forests also installed a concrete wall at 'the breakaway', a spot where a high river would often break its banks and flood the lake. Several temporary repairs of breaches in the irrigation channel at the southern end of the lake were also undertaken.

By late-1994, the regulator was completed and the lake began to dry out for the first time in 50 years. However, the repaired irrigation channel was vandalised in early-1995 and the lake filled during summer. Someone also tampered with the new regulator indicating that not everyone was happy with the decision to re-introduce wetting and drying phases to the lake.

Drying phase had an almost immediate impact

The implementation of a drying phase had an almost immediate impact as well as a longer-term and unanticipated impact. Duncan Vennell, a project officer with the Working Group, talked enthusiastically to the media about the regulator's impact. 'The drying phase changed the vegetation diversity of the site. There was a significant influx of waterbirds with an estimated 1,000 pelicans observed. Important feeding areas such as the Moira grasslands which had been over-flooded and encroached upon by River Red gums, began to recover'. The drying phase also checked the spread of the phragmities and juncus reeds that liked wet conditions. These native plants grow from rhizomes and when conditions are favourable, spread and close in on open water. This was denying key habitat for waterbirds that preferred nesting where the phragmities and juncus plants met open water.

From a carp-filled cesspool to a beautiful mosaic

An additional environmental benefit from drying the lake was the opportunity to remove large numbers of Common carp that had been colonising the lake each summer. Vennell explained that by opening the new regulator to drain the lake, the carp could be caught and removed. 'The first time this was done, in 1994 at the Moira Creek regulator, NSW Forests and contractors caught 80 tonnes of carp. The second time the lake was drained in 2003-04, 14 tonnes of carp were caught'. In 2007, NSW Forests designed and installed screens to go in front of the regulator to stop large carp in the lake from re-entering the river. In 2013, Howard Jones, chair of the Working Group (a keen angler), explained that 'Up until we put the regulator, the lake was a carp-filled cesspool! Now, when you fly over it, it is like a grandmother's quilt, a beautiful mosaic'. In 2013, Jones, noted that the 'ecological improvements at Moira Lake since its management had been altered were considerable'

Aboriginal engagement

In 1995, the Yorta Yorta Local Aboriginal Lands Council opposed some of the rehabilitation activities at Moira Lake and the adjacent Gulpa Creek. During the initial rehabilitation phase, the lands council had lodged a native title claim in southern NSW that included Moira Lake.

Land council elders, Col Walker and George McGee, were invited to the Working Group's meeting in June 1995 to discuss their concerns. The only reference in the meeting minutes about any discussions was that 'Col Walker should be part of the negotiations process'.

In 2017, the group's former project officer, Paul Lloyd, recalled that while the elders had a strong cultural connection to Moira Lake, it was to a lake that river regulation had kept full for as long as they could remember (over 50 years). Lloyd recalled that Monica Morgan from the lands council was able to carefully and respectfully explain to the elders why the lake and the floodplain environment would be better off if they were returned to a more natural state. She and Lloyd explained why the works were required to meet the long-term aims of rehabilitating both the lake and Gulpa Creek. Lloyd also took members of the lands council to see the lake and the new regulator. After this, the elders were happy for the work to continue.

First award

In 1995, the Moira Lake rehabilitation project won a NSW Rivercare 2000 Silver Award. As a gesture, the Working Group passed the award onto NSW State Forests in recognition of the contribution made by the department's staff and resources towards the project.

One unanticipated outcome of the Moira Lake project was a realisation that by better regulating the water going in and out of the lake, a significant amount of water would be 'saved' each year. This 'saved' water through reduced evaporation from the lake over summer, could remain in the Murray River. As early as September 1993, the Working Group had prepared a discussion paper on the issue for the NSW Department of Water Resources. The paper proposed that an allocation of the saved water be given to the group to manage to rehabilitate and improve other wetlands elsewhere along the Murray and Lower Darling rivers. The paper argued that the allocation should be the equivalent of the water saved by installing the regulator at the lake, estimated by the Working Group to be 8,000 megalitres annually (see chapter 19).

Stage 3

More work was envisaged to rehabilitate Moira Lake as set out in the group's management plan. However, by 2006, the Barmah-Millewa Forest had become one of the Murray-Darling Basin Commission's *Living Murray* icon sites. It was also obvious that a review of the original plans would be needed due to changes to fish management and the construction and operation of regulators. By 2014, Moira Lake and the Gulpa Creek wetlands were part of the new Murray Valley National Park, managed by the NSW National Parks and Wildlife Service. Both

wetlands became part of multi-site watering events that had access to several sources of environmental water as well as a whole-of-system approach to watering (see chapter 47).

The fourth Moira Lake regulator installed by the Working Group

Wetlands Working Group project officer, Duncan Vennell,
at the sign commemorating the completion
of the Moira Lake rehabilitation project
(Photo courtesy of Margrit Beemster)

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THEGOA LAGOON

And down by Wentworth, the Darling spreads in unexpected ways
across the sun-child land, gone almost underground …
opening onto a leafy billabong, flecked with wildflowers
of charcoal burn and mad passionate pinks …
the lean country, refuge of red gums.

Homer Reith, *Canto 5: Rousers. The Garden of Earth (2016)*

Between 1956 and the late-1990s, Murray River water had flowed uncontrolled into Thegoa Lagoon at Wentworth, leaving it in a semi-permanent to permanent state of inundation. This had also allowed water to be extracted for irrigation and, as reported by David Harriss to the Working Group in 1995, 'an expectation of supply had developed among adjacent landholders'. Although the lagoon was identified by the Working Group as one of the eight priority wetlands in 1992, it was considered to still be in reasonably good condition.

Between 1993 and 2000, a number of studies were undertaken in the lagoon, including a study of eco-tourism by a local Aboriginal community group. In 1995, the Working Group and the Department of Land and Water Conservation prepared a discussion paper pointing out that the wetland should not remain permanently filled and that regulated river flows should no longer enter the lagoon. But the paper also pointed out that extended dry periods could exacerbate the lagoon's salinity problems. It was therefore suggested that any management plan should aim to recreate natural fluctuations in water levels to improve biodiversity in the lagoon and its surrounding environment.

Changing the operating rules

In the late-1990s, the Department of Land and Water Conservation changed the operating rules for the lagoon. Drying phases were reinstated by using a regulator, resulting in either complete or partial drying which was monitored by the Working Group. From 2000 to mid-2003, the lagoon was allowed to dry out completely for the first time since the 1970s. In 2003, the Working Group established a steering committee to implement a management plan. It included representatives from local residents, irrigators, the tourism industry, the local council and government agencies. In a media interview, the Working Group's project officer, Paula D'Santos, said that a local resident described

Thegoa Lagoon as somewhat 'like the Murray-Darling Basin with all of its various issues concentrated into this one little site'.

Water quality was pretty good

Between January and September 2004, the lagoon was allowed to partially dry out before receiving a small amount of water in spring. This pattern was repeated in 2005 but with more water. In 2006, the lagoon received 140 megalitres of environmental water in spring before the group was asked by the Department of Natural Resources to stop the watering because of the extremely dry conditions.

The Lower Murray Darling Catchment Management Authority funded the refurbishment of a concrete regulator on the western end of the lagoon to improve native fish passage when natural flow events occurred. The Working Group monitored water quality at different stages and noted that it was usually 'pretty good'. The group concluded that the lagoon could last for about two and a half years between waterings and that it was not susceptible to ground water intrusion.

Increase in native birds and plants

After 2009, the lagoon was managed by the Department of Environment, Climate Change and Water (later renamed the Office of Environment and Heritage). The rehabilitation and watering program, begun by the Wetlands Working Group, continued. Paula D'Santos, a former project officer with the Wetlands Working Group, has worked with the Office of Environment and Heritage since 2009. In 2017, she explained that 'through a management change over recent years, we've seen an increase in bird numbers as well as an increase in the diversity of native wetland plants. Up to 80 percent of the plants that grow on the lagoon bed when it is dry or wet are now native plants'.

Thegoa Lagoon drying out after a watering

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THE OTHER PRIORITY SITES

Poon Boon Lakes

By mid-2002, it was clear that little progress was being made in rehabilitating this lake system, situated southeast of Tooleybuc. The Wetlands Working Group was occasionally asked by the Department of Land and Water Conservation for advice but progress on any works was hampered by a lack of funding and no available staff. During the group's annual general meeting at Albury in November 2002, it was noted that many of the management targets that the group and the department had suggested 'have been disregarded'. The removal of some structures and earthworks throughout the lake system had also changed the hydrology of the lake with some lakes no longer able to be filled or draining too fast.

Croppers Lagoon

Since this wetland was identified by the Working Group as requiring rehabilitation, further studies showed that the regulated Murray River had radically altered the wetting and drying of this lagoon, which in turn had impacted on the wetland's plants and animals. The Working Group believed that the lagoon would always have to contain some water but there was room for improvement. To rehabilitate the lagoon, the group decided that a regulator was needed to manipulate water levels in the wetland. However, while the lagoon was on crown land, the inlet channel between the river and the lagoon was on private property. The Working Group's project officer, Paul Lloyd, offered two options – put a regulator elsewhere (which would have made construction difficult) or negotiate with (and perhaps compensate) the landowner. The group had already secured $165,000 from the NSW Environmental Trust to build the regulator but Lloyd's negotiations were unsuccessful. For Lloyd, it was frustrating and time-consuming with no positive outcomes.

It was then that the NSW Department of Water Resources stepped in. Old survey maps identified a road reserve close to the lagoon which could provide access to a suitable construction site for a regulator. The department's regional director, Kim Alvarez, inspected the area with Lloyd. Lloyd noted that Alvarez was keen 'to force the issue for the public good'. Not long after, 50 metres of road reserve was formalised and a small area of land for the regulator was compulsorily acquired. However, the landowner was still unhappy. On one occasion when Lloyd was explaining to the landowner the idea of using the road reserve as a right of access, Lloyd thought that he was going to be set upon by the owner's dog!

The following year, the regulator was built using steel sheeting and drop logs. The new regulator at last prevented high river flows in summer from entering the lagoon, helping to re-establish a more natural wetting and drying pattern. The native vegetation improved, including regeneration of River Red gums and the emergence of aquatic species such as milfoils, pondweeds and Giant rush. As Lloyd reflected in 2017, 'persistence eventually paid off'.

Croppers Lagoon

Lake Caringay

This lake, located east of Euston, is part of the Euston Lakes wetland and floodplain system. The vegetation around the lake and its floodplain was dominated by River Red gum, Black box and lignum, but by 1992, all were in poor health. Local landholders and the Wetlands Working Group observed the vegetation continuing to decline rapidly due to the lack of natural flooding. The presence of large River Red gum trees close to the centre of the lake bed suggested that before river regulation, the lake filled every two or three years. However, in the early-1960s, large earthen block banks were built across the Washpen and Caringay creeks to allow agricultural development on the lake bed but stopping inundation of the wetland.

To help guide the project, the Working Group formed a steering committee with representatives of agencies, researchers, Aboriginal

groups and landholders. The aim was to start rehabilitating the lake by providing a trial environmental flow to the lake bed, determine the area of inundation that might be achieved, the amount of water required and the location and dimensions of proposed earthworks. However, the project ran into trouble. Working Group project officer, Paul Lloyd, prepared a discussion paper on improving the management of the lake. To promote the concept more widely, the document was published in the Swan Hill newspaper, *The Guardian,* generating a great deal of angst in the wider community who, up until then, had not been consulted. Lloyd recalled fronting up 'to a very angry public meeting' and learnt a very important lesson about the strength of community reactions to proposed changes to water management arrangements after decades of river regulation. Nevertheless, Lloyd thought that the meeting was very constructive to highlight the impacts of river regulation to the community, allow community members to 'clear the air' about water management in the area, and to clarify specific concerns.

The Murray-Darling Freshwater Research Centre was contracted to carry out fish and frog surveys and the Working Group completed a vegetation survey by October 2006 (with further surveys scheduled for 2007). The research centre found four freshwater catfish in Washpen Creek, indicating that the lake would have provided important habitat for native fish and waterbird breeding. Once the preliminary preparations had been conducted, the Working Group intended to deliver a trial environmental flow to the lake by pumping water down Washpen Creek, using up to 1,000 megalitres of water.

Expanding the priority list

By 1995, the Wetlands Working Group was starting to achieve a great deal although the rate of progress on four of the eight wetlands identified as priorities in 1993 but rehabilitation of the other wetlands had slowed for a range of reasons. Some work was just starting, additional information was still being gathered, management plans were subject to studies by the Murray-Darling Basin Commission, and community discussions were on-going.

At the same time, pressure was building to expand the list of priority wetlands to include Boomanoomana Swamp (west of Mulwala); wetlands along the Edward River; Lake Tooim; and Lake Coomaroop. During the group's meeting in Albury on 13 June 1995, project officer, Paul Lloyd, reported that the four additional wetlands had been included for background studies and the development of management plans. Lloyd also pointed out that during the group's initial review of priorities in late-1992, the new 'wetlands had a comparable rating to the original eight selected'.

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INCORPORATION

When the issue of incorporation was first raised in 1995, the Wetlands Working Group decided not to proceed. However, at the group's meeting at Moama in July 1998, project officer, Paul Lloyd, gave another presentation on the benefits of incorporation and the group unanimously reversed its earlier decision. At the following meeting at Wentworth in December 1998, the model rules for incorporation in NSW were adopted along with procedures for holding meetings twice a year. Howard Jones was elected president, Judy Frankenberg vice president, Paul Lloyd treasurer and Heather du Plessis secretary. Paul Lloyd was also appointed public officer. The meeting noted that, as an incorporated body, different consent forms would be required for on-ground works in wetlands but the existing links with the relevant agencies would continue to allow the smooth approval processes for rehabilitation works when appropriate. It was also resolved that the group would remain a sub-committee of the Murray and Lower Murray-Darling catchment management committees.

A certificate of incorporation was issued on 27 January 1999. By the end of 2001, the group had an Australian Business Number, was registered for the Goods and Services Tax and had lodged its first Business Activity Statement with the Australian Tax Office. The group's business year, initially from October to September (to coincide with federal Natural Heritage Trust funding), was changed from July to June. At the 2001 annual general meeting, Lloyd, reported that 'the financial procedures of the MWWG have been made more rigorous'.

A logo

During the incorporation process, Lloyd arranged for a logo to be developed for the Working Group. It was designed by a woman in Howlong who came up with the ribbon design. Lloyd suggested the blue and brown colours that depicted water and land and symbolized the temporary flooding and drying nature of most Australian wetlands. Apart from some minor adjustments to the wording and up-dating the design over the years, the logo remained virtually unchanged.

Constitution

In May 2002, the constitution of the NSW Murray Wetlands Working Group Inc was adopted. However, the group decided to continue using the Murray Catchment Management Authority's financial arrangements as the authority also held the group's funds.

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STAFF CHANGES

By 1997, the activities of the Wetlands Working Group were rapidly escalating, forcing the group to advertise for a second project officer to be based at Dareton (Paul Lloyd had moved his office from Deniliquin to Albury). After receiving 29 applications and holding six interviews, the group selected Ms Heather du Plessis who had been working in South Africa on community-based wetland rehabilitation.

Like Lloyd, du Plessis was interviewed over the phone for the position and the group sponsored her migration to Australia. Du Plessis was appointed for a three-year term and arrived at Moama on 23 July 1998, just as the Working Group began its meeting. She was still wearing the same clothes she had on when she had left South Africa!

Du Plessis was employed with Natural Heritage Trust funding, responsible to and directed by the Working Group but with the funds channeled through, and managed by, the NSW Department of Land and Water Conservation. Although both du Plessis and Lloyd were called project officers, Lloyd was the senior staff member. However, on 12 December 1999, du Plessis resigned from the Working Group to take up a position with Wetland Care Australia. In her resignation letter, du Plessis (now Heather Shearer) said that her 'decision to resign related only to her personal circumstances and not due to any dissatisfaction with my work … for the Wetlands Working Group'.

Farewell Paul

In January 2001 the Working Group farewelled Lloyd who moved to Darwin for personal reasons. Lloyd had worked for more than six years with the group and was seen as a driving force behind many of the group's early projects and initiatives. The group recognised his 'phenomenal knowledge and expertise of wetland systems' between Albury and Wentworth, and noted that his commitment and invaluable contributions were going to 'be sorely missed'.

Lloyd was replaced by Dr Deborah Nias who had been coordinating the Great Darling Anabranch Management Plan. Nias had a doctorate in the ecology and carbon dynamics of wetland systems. She had been employed as an aquatic ecologist by South Australia's fisheries department and worked as a laboratory technician at several universities.

Nias saw the Working Group as 'entering a new and exciting phase', observing that the group was 'getting bigger and there are increased responsibilities associated with the (NSW Government) water we have custodianship over. We have great potential to achieve some positive ecological outcomes such as the recent Barmah Forest flooding'.

Western project officer

Also appointed in 2001 was a western project officer, Paula D'Santos, who was based at Buronga. D'Santos had a science degree in zoology and botany, completing her honours year studies on stream invertebrate ecology. She believed that there was 'so much we can do … to promote wetland rehabilitation. One of the most important steps is educating the community and industry of the vital role that wetlands play. We already have a good support network and we need to build on this to have a greater influence and impact in the future'. D'Santos was employed to manage a number of projects as well as promote wetland rehabilitation and demonstration sites on properties within the Lower Murray Darling region.

Both Nias and D'Santos were introduced to the Wetlands Working Group executive at its May 2001 meeting in Gol Gol. At the same meeting, it was noted that no formal presentation had been made to the retiring project officer, Paul Lloyd, to recognise 'his contribution and dedication to the MWWG for the past 6 years'. Lloyd was later sent a photograph and plaque.

Fee for service

In 2001, the group's first newsletter, *Wetland Dreamings,* was produced and sent to 100 individuals and groups. That same year, the group also resolved to charge a fee for services 'if requested from an outside source to ensure that data is of high quality and covers the project officer's time spent on the task'.

Deniliquin project officer

In February 2004, the Working Group appointed a further project officer, Duncan Vennell, based in Deniliquin. Vennell was employed to help manage the project of watering wetlands on private property (see chapter 32) as well as assisting with a number of other projects in the Deniliquin region. Vennell completed a Bachelor of Applied Science, had gained valuable experience in natural resource management as a Green Corps team leader, and had assisted in a fish-breeding program run by NSW Fisheries at Narrandera.

Paul Lloyd (left) and Dr Deborah Nias

Western project officer, Paula D'Santos
(Photo courtesy of Margrit Beemster)

PART FIVE

Significant Projects

A wetland suffering from years of no inundation from flood waters

The same wetland after a wetting and drying program was introduced

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MANAGING NSW GOVERNMENT WATER

The report concluded that … management of natural resources by a community group in partnership with government and industry has been widely accepted.

Report on Adaptive Environmental Water in the Murray Valley NSW, 2000-2003

A suggestion that the Wetlands Working Group be given ownership of an allocation of NSW Government water to manage for environmental purposes was first raised by the group in September 1993. A discussion paper to the Department of Water Resources proposed that an allocation of high security water be given to the group to manage. This would be equivalent to the amount of water that would be 'saved' (through reduced evaporation from the lake over summer) by installing the fourth regulator at Moira Lake. The idea was to use the water to restore other wetlands along the Murray River. Chair of the Working Group, David Harriss, went to Sydney to discuss the idea with senior departmental staff.

On 24 March 1995, the NSW Minister for Land and Water Conservation wrote to the Working Group to express his support 'of an allocation to the (group) from the savings in evaporation from Lake Moira'. Despite general agreement for the project, Working Group members were unsure about the implications of their proposal as there was no baseline data and improvements could take years to materialise. By mid-1996, the group had received further support for its proposal from another minister for land and water conservation as well as the Murray Catchment Management Committee.

Improving the group's finances

In 1998, the Working Group prepared another written proposal to manage NSW Government water for environmental purposes. Included in the proposal was the potential for such an arrangement to also improve the group's finances as it had 'less than 12 months of seeding funding remaining'. The submission proposed trading some of the water savings to achieve three outcomes, one of which was to 'ensure the continuation of the (group's) activities as the base for on-going rehabilitation work'. The proposal pointed out that the temporary sale of Moira Lake water savings could generate $80,000 annually.

At the Working Group's meeting in Moama on 23 July 1998, project officer, Paul Lloyd, reported that a NSW inter-departmental government committee had given approval for water savings arising out of the Moira Lake project to be allocated to the Working Group on a two-year trial basis. The approval allowed the group to temporarily trade up to half of the water annually. Lloyd also reported that a memorandum of understanding between the Working Group, the NSW Department of Land and Water Conservation and NSW Forests had been drawn up. The only delay was clarification by the Murray-Darling Basin Commission of the actual volume of water savings. The commission's water modellers were unhappy with the 8,000 megalitres initially requested by the group. Lengthy negotiations followed during which time, the Working Group commissioned a study to clarify the costs and benefits of the project and the exact amount of water savings. In 1999, the group and the commission finally agreed on a figure of just under 2,000 megalitres. After amending some wording, the decision to accept the memorandum was agreed to unanimously.

A two-year trial and new sources of income

In 1999, the Wetlands Working Group, the NSW Department of Land and Water and NSW State Forests entered into a two-year agreement to allow the working group to manage, as a trial, 1,911 megalitres of water savings. The water was held by the NSW Water Administration Ministerial Corporation but any environmental water allocations could only be made with the advice, and on behalf of, the Working Group. A business plan had already been developed in late-1998 which included approval for the working group to temporarily trade up to half of the water allocation if it was not used.

In the 1999/2000 season, the group traded 955 megalitres of unused water, raising $25,000. At the working group's 2001 annual general meeting at Deniliquin, Paul Lloyd was able to report that 'the Murray Wetlands Working Group had established a source of income in addition to grants from funding bodies', an important step in establishing longer term financial stability and sustainability. The Working Group's chair, Howard Jones, noted with pleasure in 1999 that 'the Moira Lake project has continued to display the outcomes that can be achieved with good science and vision'.

From 1,911 to 32,027 megalitres

This trial lasted barely two years but it proved so successful that the water allocation grew from 1,911 megalitres to just over 32,000 megalitres. In 1999, Murray Irrigation Ltd (MIL) agreed to the larger allocation which was obtained through water savings achieved by government investment in seepage control works in Murray Irrigation's

area of operations (around Deniliquin) as well as improvements in infrastructure and water supply efficiencies (part of a process of privatising Murray Irrigation). The chair of Murray Irrigation Ltd, Bill Hetherington, told the Working Group that 'MIL supports the NSW Government's entrustment to the MWWG of the water savings'.

The 30,027 megalitres was owned by the NSW Water Administration Ministerial Corporation and was specifically targeted for environmental purposes in the Murray Valley. The general manager of Murray Irrigation, George Warne, also told the group that in his view, the concept including the capacity to trade some of the water 'was a good thing'.

During a meeting of the Working Group in 1999, David Harriss, now regional director with the NSW Department of Land and Water Conservation, confirmed the agreement but reminded the group that there 'had been much opposition to the (group) owning and trading water savings' that had been allayed only after 'considerable effort and negotiation on all sides'. Harriss explained that the earlier trial had helped 'to allay reservations from some organisations and to allow appropriate procedures to be refined'. Under the agreement, the Working Group could not own the water as the group did not own land, a requirement of the new NSW Water Act 2000. The group could only manage the water on behalf of the NSW Government.

A very innovative arrangement

In May 2001, the NSW Minister for Land and Water Conservation, Hon Richard Amery, officially presented the 32,000 megalitre allocation to the Working Group. The water allocation for a three-year trial, was for wetland rehabilitation along the Murray and Lower Darling rivers and the Great Darling Anabranch. The Working Group's chair, Howard Jones, described the decision as providing 'unique opportunities and challenges to the Group in relation to its management of water'. In late-2000, some of the water had already been used to supplement floods in the Barmah-Millewa Forests and Wanganella Swamp.

The initiative was formally described as the Adaptive Environmental Water (AEW) project. Under what was a very innovative arrangement at the time, the Working Group was given an allocation of 32,027 megalitres of water to manage each year. Of this, 2,027 megalitres of high security water was guaranteed annually while 30,000 megalitres was tied to the Murray River allocation under the government's water-sharing plan. Again, the Working Group was allowed to trade a portion of the water on the temporary market if it was not used but the funds raised were to be used to improve wetlands along the Murray Valley.

Interestingly, there was no contract or memorandum of understanding prepared or signed between the NSW Government and the Working Group. Years later, David Harriss said this was because the Working Group was a NSW Government initiative and the government would always have the final say on the use of the water but would act on the advice of the Working Group. Harriss thought that there may have been an exchange of letters but their whereabouts are unknown.

Largest environmental flow in Australia

The first three years of the project was a trial period. However, because of the dry conditions created by what later became known as the Millennium Drought, it was many years before the Working Group received its full quota of water. In the first year of the project (2000-01), environmental conditions along the Murray River were favourable and 26,000 megalitres of the AEW water were used by the Wetlands Working Group to enhance a flood event in the Barmah-Millewa Forest. This contribution became part of the largest environmental flow implemented within Australia at the time, flooding over 12,000 hectares in the forests and resulting in a huge bird breeding event. Some birds had not been seen in the area for many years. In addition, the Working Group traded 2,500 megalitres of water, the proceeds of which were invested in developing a wetland database and a wetland monitoring guide, both initiatives of the group.

Bold in its vision

In the second year, the Millennium Drought began to take hold, resulting in low rainfall and reduced river flows. With water allocations limited to both irrigators and the Working Group, only a small amount of water could be allocated to several small wetlands. However, the group used its small allocation to trial the watering of wetlands on private property which had not been watered for years (see chapter 32). In the first year of this new project, the Working Group allocated its water to 11 wetlands on private property. As the Working Group's executive officer, Deb Nias, reported in 2005, the initiative 'was bold in its vision and highly successful in its outcomes … and provided the basis for further expansion of the project into other irrigation areas'.

The water savings hoopla

Also in 2001, the Working Group traded 15,000 megalitres of water, raising half a million dollars. Widely reported in the regional media, the trade attracted criticism from members of the Murray Valley Community Action Group. A Deniliquin irrigator was interviewed on a national talk-back radio program during which questions were raised as to why a community group was managing and trading NSW government water.

The group's chair, Howard Jones, responded that the group was 'only doing what irrigators were allowed to do and was not breaking any laws'. A national newspaper article also inferred that Working Group members were personally benefitting from the sale, even though all proceeds were invested in the group's wetland projects.

In November 2001, representatives of the Murray Valley Community Action Group were invited to meet with the Working Group's executive at Deniliquin to discuss what the minutes of the meeting referred to as the 'water savings hoopla'. The action group felt that the water trading should have been more transparent and that the group's communication 'could be improved'. There was agreement on both sides regarding the need to improve communication and better explain to the public how the funds generated from water trading were being used. The chair of Murray Irrigation Ltd, Bill Hetherington, had made similar comments to the Working Group at the same meeting earlier in the day.

Project suspended and more controversy

The dry conditions continued over the 2002-03 irrigation season and the Working Group suspended its AEW project. However, watering of wetlands on private property continued with the cooperation of Murray Irrigation Ltd. Despite the previous year's water savings 'hoopla' and both the NSW Government and Murray Irrigation Ltd seeking a suspension of the AEW project, both organisations endorsed the Working Group trading 23,000 megalitres of water. This raised $3.8 million. But again, even though consulting extensively with the board of Murray Irrigation and receiving a letter from its general manager urging the group to proceed, the trade created controversy with some irrigators around Deniliquin. They saw the sale as being opportunistic at a time when irrigation was severely restricted.

Other criticisms raised questions of equity and accessibility. In 2001, the initial water sale had been undertaken by a water broker. Some irrigators argued that such water trading restricted access by all irrigators. In response and for the next three years, Murray Irrigation's Water Exchange was used, providing a more open and accessible trading process although it was only open initially to Murray Irrigation shareholders. However, the water exchange relaxed its rules regarding access by outsiders and some water was put aside for irrigators who could not access the water exchange.

There were also criticisms from irrigators about glutting the market with a considerable amount of water and the slowness of the NSW Government to approve the price and volumes (a requirement of managing the AEW water). This resulted in the Working Group recommending to the government that if a community group was given

responsibility for managing water trading, then it (and not the government) should determine the most appropriate methods. The group also argued that if government approval was required, delegation should be done at the local level to allow for a quicker response, including the ability to adjust prices and volumes according to market fluctuations.

In 2005, the Working Group's senior project officer, Deb Nias, reported that raising the $3.8 million in 2002 should have been 'regarded as an exceptional circumstance and unlikely to be repeated in the near future'. Nias also reported that the funds were placed in a special account within the Department of Infrastructure, Planning and Natural Resources to allow the Working Group's 'program of wetland management and rehabilitation to continue'. There were to be some unanticipated consequences for the funds raised several years later in 2009.

Investing in communities rehabilitating wetlands

The 2003-04 year experienced good late-winter rains and higher river flows, providing opportunities to restart the AEW program. The Gulpa Creek wetlands; Pollack Swamp in the Koondrook-Pericoota Forest; Thegoa Lagoon; and private wetlands received a total of 10,610 megalitres of water. Nearly 12,000 megalitres were traded. These funds were deposited in a special account held by the Murray Catchment Management Authority.

During the year, the Working Group also decided to invest some of the money raised from water trading in two schemes to give community groups opportunities to rehabilitate wetlands. These were the Wetlands Incentive Scheme and the Wetlands Rehabilitation and Investigations Program (see Chapter 29).

Initial lessons learnt

The outcomes and lessons learnt from managing the AEW water over three years were reported to the NSW Government in 2005 by the Working Group. The report, *Adaptive Environmental Water in the Murray Valley NSW, 2000-2003,* set out the environmental benefits and outcomes, the successful community and landholder engagement, and the lessons learnt in administering the project. The report concluded that while managing the water had identified some concerns, it showed that 'management of natural resources by a community group in partnership with government and industry has been widely accepted and is now forming the model on which other arrangements are being based'. Such an arrangement could also successfully generate support from irrigators and the government with direct and indirect benefits for the environment.

Important lessons from the trial were that the NSW Government needed a policy on managing environmental water; the entire process required funding (particularly the delivery charges that government and industry imposed and which could be a barrier to such a program in the future); and the need for flexibility so that any unexpected changes could be responded to in timely and effective ways. Chair of the Working Group, Howard Jones, acknowledged that the project had provided 'unique opportunities and challenges in relation to the management of water' and that the group had 'learnt much through this opportunity'. Jones also acknowledged the huge partnership involved to make the trial successful, including government agencies, landholders and communities in the Murray and Lower Murray-Darling regions.

The Gulpa Creek wetlands, east of Mathoura

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WANGANELLA SWAMP AND THE WERAI FOREST

Wanganella Swamp is situated in Forest Creek, about 30 kilometres north of Deniliquin in southern NSW (see map on page 110). It was a major breeding ground for waterbirds. In spring 2000, staff of NSW State Forests noted that waterbirds were breeding in the swamp but the water levels were falling too quickly. Adult waterbirds were abandoning their nests and other species were leaving the wetland. It was obvious that for successful bird breeding, more water was required.

Wanganella Swamp fell within the Forest Creek Management Plan that proposed an environmental flow when certain triggers were met. Although the flow trigger had not been met in 2000, bird breeding had begun and was in danger of failing. A joint effort between the Wetlands Working Group, NSW State Forests, Murray Irrigation Ltd. and the NSW Department of Land and Water Conservation enabled some of the Working Group's AEW water to enhance the existing water.

Fifteen hundred megalitres of water from the Working Group's environmental water allocation and 1,000 megalitres from the Murrumbidgee Environmental Contingency Allowance were provided as Forest Creek is supplied by both Murray and Murrumbidgee rivers. Although there was an initial drop in water levels before the water reached the swamp, most of the birds remained. It was a highly successful breeding event for thousands of waterbirds, including Straw-Necked ibis, Australian White ibis, Glossy ibis and Royal spoonbills.

Working in partnership to improve Werai wetlands

Before river regulation, the Werai Forest wetlands would have received water nearly every year, providing abundant habitat and food for forest animals. The forest is 40 kilometres northwest of Deniliquin on the Edward River (see map on page 110). However, river management had resulted in the wetlands being flooded less-frequently. In 2001, the Wetlands Working Group undertook a trial watering of the forest wetlands in conjunction with NSW Forests and the Murray-Darling Basin Commission. In mid-November, the forest's wetlands received up to 4,000 megalitres of the group's AEW water.

The three-week watering was restricted to shallow wetlands at the eastern end of the forest that contained extensive areas of Common reed, Water ribbons and milfoil growing beneath a canopy of River Red gum trees. The wetlands had one of the largest areas of reeds within the Edward-Wakool River system and were believed to be remnants of

more extensive reed beds. At the time of the watering, the Werai wetlands (along with several other wetlands in the Central Murray Forests) were nominated as a Wetland of International Significance under the Ramsar Convention.

Wetlands Working Group project officer, Damian Green, was instrumental in the success of the project. In a media interview, Green commented that the project had managed to not only inundate wetland areas within the forest but that 'from this trial, we now have a better understanding of the river height (or commence-to-flow level) required to flood wetlands, as well as how floodwaters move within the forest'. This was important as Green was also employed by the Working Group to map Murray River wetlands, including the all-important commence-to-flow data.

The Werai Forest trial was very successful and again showed how a community group and government agencies could work together to improve wetlands. The project was also a good example of how the Working Group used NSW Government water to help rehabilitate a small but important wetland.

Wetlands Working Group committee and staff discuss watering the Werai Forest with Aboriginal elders

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A WETLAND DATABASE

The earliest mapping of wetlands along the Murray River was undertaken in 1986 by environmental consultant, Bob Pressey. While Pressey's report had been pivotal in providing early direction for the Wetlands Working Group, it gave little or no details on when each wetland would start to fill with water as the rivers began to rise in spring and early summer. Such information was becoming increasingly necessary for the group to improve wetland health. In 1994, the Working Group prepared an application to 'undertake wetland mapping and to consolidate and rationalise all wetland databases in the Murray and Lower Murray-Darling catchments'. Whether the application was ever used is unclear.

Determining when wetlands begin to fill

In 1996, Pressey's mapping was updated into an ArcView database as part of the Murray-Darling Basin Commission's River Murray mapping project. A year later, the NSW Department of Infrastructure, Planning and Natural Resources initiated a project to assess over 600 wetlands in the Edward-Wakool river system. This included an estimate of the river levels when each of the wetlands would begin to fill with water (commence-to-flow). Such information was becoming important, particularly with efforts to determine environmental flows for the Barmah-Millewa Forests. Dr Damian Green was appointed project officer and noted that the term *environmental flows* used in the project brief was 'a very new term at the time'. As part of the project, Green also looked at the potential of manipulating water levels in Stevens Weir to manage salinity and improve the health of wetlands.

Born and raised in Wakool on an irrigation farm, Green was educated in Wakool and Melbourne and obtained his PhD studying blue-green algae in northern NSW. The Working Group's project officer, Paul Lloyd, met with Green in 2000 and asked him if he was interested in using his experiences of the Edward-Wakool project to determine the commence-to-fill levels for wetlands the length of the Murray River. Green joined the Working Group in January 2001 and used information and methods developed in his Edward-Wakool study as the foundation for the new database.

The Working Group and Victoria's North East Catchment Management Authority secured Natural Heritage Trust funds to determine the commence-to-flow levels for wetlands along the Murray River in NSW and Victoria and document the information in a comprehensive

database atlas. The first step was to map the wetlands from Lake Hume to Boundary Bend (between Swan Hill and Robinvale). In 2002, the Murray-Darling Basin Commission provided funds to survey wetlands between Boundary Bend and South Australia's border. (Similar mapping had already been completed along the Murray River in South Australia).

Mapping Billabong Creek wetlands

The funds were also used to incorporate the recent mapping of wetlands along the Billabong Creek, in the Upper Murray and in the Murray Irrigation Ltd area of operations into the database. Mapping the wetlands of the Billabong Creek and Murray River upstream of Hume Dam, was a joint venture with the Murray Catchment Nature Conservation Working Group. The project took four years to complete and was funded by the NSW State Wetland Advisory Committee and the Wetlands Working Group. Mapping the creek showed that the majority of wetlands had suffered only minor to moderate disturbances. Less than 10 percent were considered to be extremely disturbed. The results were encouraging as it suggested that many of these wetlands had the potential to be rehabilitated.

Trish Alexander, another Working Group project officer who concentrated on the area between Hume Dam and Tocumwal, assisted Green in his work. Alexander was employed on the project for 12 months on a part-time basis. However, she had been employed by the Working Group since August 1999. Alexander was also in the last stages of completing her honours degree at Charles Sturt University, focussing on waterbird ecology.

Using new satellite image analysis

To help develop the database, Green and Alexander used newly-available satellite image analysis of five flood events to determine commence-to-flow levels for wetlands between Euston and South Australia's border. The database, a geographic information system, was based on the Murray-Darling Basin Commission's River Murray mapping program. The document was developed so it could be constantly up-dated. Information for the database came from landholders, field assessments, satellite image analysis and information collected by Working Group project officers.

In 2018, Green described the on-ground work that he and Alexander undertook during the project. 'There was a huge amount of field work. This involved us identifying and visiting wetlands, measuring water levels, talking to landowners, and working in all sorts of environments and weather over six years'. Green recalled the great pleasure of travelling along various rivers and through wetlands in boats to

undertake the required investigations and research. ‘There was never a dull moment’.

Completed in 2007, the database was the first time that the information about commence-to-flow levels for individual wetlands had been collated. This meant that rehabilitating wetlands using environmental flows could be better managed, particularly in different catchments. If the wetland was low on the floodplain and inundated by summer flows, the database provided an idea at what height to install a regulator. If the wetland was higher up on the floodplain, the database indicated what level of flow was needed in the river to fill the wetland. The database was a valuable new tool for river managers and those involved in wetland rehabilitation. It also contained detailed maps and a summary of the wetlands, aerial photographs and photographs of wetland vegetation. The document was published in a hard-copy format with a protective glaze on all pages so it could be used in the field.

Designed to be constantly up-dated

The *River Murray Wetlands Database Atlas* was launched at the Hume Dam on 12 October 2007, by the chief executive of the Murray-Darling Basin Commission, Dr Wendy Craik.

Damian Green (left) and Trish Alexander (right) at the launch of the wetland database and atlas by Dr Wendy Craik, Chief Executive of the Murray-Darling Basin Commission

With the completion of the database, Green resigned from the Working Group and took up a position with the commission on the sustainable rivers audit. However, he continued his relationship with the group for some years as the commission's representative at Working Group meetings. Following the launch, copies of the database were made available for sale to try and recoup some of production costs (that exceeded $60,000). Within four months, $10,000 had been raised from sales to councils and catchment management authorities. There were also enquiries from various landholders who wanted to buy a map that showed just their properties but the cost was too expensive.

The database has been used by the Working Group state agencies, catchment management organisations, researchers, CSIRO, universities, consultants and the Murray-Darling Basin Authority on a range of projects, including *The Living Murray* and the *Basin Plan*. Its use has varied from working on a particular stretch of a river or floodplain to a whole catchment.

In August 2017, the retiring executive director for river management with the Murray-Darling Basin Authority, David Dreverman, commented on the value of the database. He observed that as *The Living Murray* and the *Basin Plan* had become key initiatives for the authority with their demand for environmental flows, the database had been invaluable. Dreverman also commented that Damian Green, who had developed the database and had been an employee of the authority for 10 years, was always consulted on commence-to-flow levels for wetlands 'not so much for the larger wetlands but the multitude of smaller wetlands for which, until the atlas was produced, there was no reliable data'.

Green admits that there have been limitations with the database. 'It only mapped areas that held water and not areas where water was disbursed through floodplains, creeks or drainage areas and which are also important parts of wetland and floodplain management'. However Green also acknowledged that the database could be updated as new information came in from the field or from computer modelling. 'We need to focus on the entire floodplain, not just individual wetlands and ensure that the operations of the Murray, Darling, Edward and Wakool rivers are operated in more environmentally-friendly ways while still ensuring water for communities and productive agriculture'.

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WETLANDS WATCH

A lone white heron knee-deep in a billabong edged with green rushes. I know nothing more wonderful than a red gum forest when the shallow lagoons are full and the sun-dappled ground is damp and green with new grass … The forest was being flooded and the water had triggered a bird and frog breeding frenzy.

Danny O'Neill, *Ancestral Streams: Notes from the Murray Valley (2005)*

In 2001, chair of the Wetlands Working Group, Howard Jones, announced that the group was testing a new field guide to help community members monitor wetlands. Jones described the guide as 'a user-friendly publication designed for landholders who are keen to learn more about the environment and watch what happens'. The *Wetlands Watch* guide was compiled by Trish Alexander, a Working Group project officer who also worked on the wetland database. The guide was designed to assist landholders, community groups and interested people to monitor wetlands on private property or public land. Alexander said that 'monitoring was an important part of managing wetlands. We need to record the changes that happen to get a better understanding of how specific wetlands, and wetlands overall, operate'.

The publication was much more than just a monitoring guide and contained a great deal of information on wetlands and their management. The draft guide was field-tested by landholders and a community group in the central Murray region. They included landholders who participated in watering wetlands on their properties as well as members of the Barham Landcare Group who were monitoring Pollack Swamp. Once the 'road-testing' was completed and the landholders' comments and suggested changes were taken into consideration, the guide was published. In October 2002, the Member for Farrer, the Hon Sussan Ley MP, officiated at the launch of the *Wetlands Watch*.

Several editions of the guide were printed over the years and the guide is one of the most sought-after publications developed by the Working Group. The guide was revised and reprinted in 2003. The third edition of nearly 100 pages, was released in 2013 and was a joint effort between the Working Group, the Mallee, Murray and Murrumbidgee catchment management authorities, and the Murray-Darling Freshwater Research Centre.

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PROGRESS REPORT: 2001

The 2000-2001 year was one of transition for the Wetlands Working Group. Incorporation had been completed with receipt of an Australian Business Number, GST registration, and the first annual audit. The executive was about to be expanded with three additional members in keeping with incorporation guidelines. Senior project officer, Paul Lloyd, retired to be replaced by Deb Nias, and the three new project officers, Damian Green, Trish Alexander and Paula D'Santos, had settled in.

The previous year had been the first of managing the 32,000 megalitres of environmental water allocated to the group by the NSW Government. As the annual report explained, the water was 'entrusted to the NSW Murray Wetlands Working Group Inc. for a three-year trial to support environmental improvements in wetlands'. The first year saw 26,000 megalitres provided to the Barmah-Millewa Forest to prolong a significant bird breeding event and 1,500 megalitres provided to the Wanganella Swamp for similar purposes. The watering at both sites were recorded as 'highly successful with many birds breeding in these wetlands that had not bred in the area for nearly 20 years'.

The funds raised from temporarily trading the remaining water allocation was being used to develop a wetland database, a wetland monitoring kit, and a wetland vegetation guide for the Upper Murray. The funds were also contributing to a more sustainable source of income for the group. Meanwhile, two years of funding from the federal government's new Natural Heritage Trust program was assisting the group to manage wetlands and to support the senior project officer in Albury.

Work had started on a new program of watering wetlands on private property in conjunction with Murray Irrigation Ltd and watering was expected to start during the coming irrigation season. Work was continuing on rehabilitating five of the original priority wetlands.

In his chair's report, Howard Jones, noted that 'staff and executive members have continued to represent the Group on a wide cross-section of State and National environmental issues, as exemplified by the Group being incorporated into the draft NSW Murray Catchment Action Plan'. He also recorded that the recent (controversial) issue in relation to the trading of water 'highlighted to me the strength of this Group, all rallying to the cause'. He also noted that the group's work created 'continued interest in our activities – some wanted, some not. But even the unwanted put our Group's name in lights!'.

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THE TENTH ANNIVERSARY

In September 2002, the Wetlands Working Group was 10 years old. In early-2003, 70 people attended a formal event at Deniliquin to celebrated the 10th anniversary. Attendees included Working Group members and staff, and representatives of communities, Aboriginal groups, irrigation companies, non-government and government agencies. Thirty landholders who had participated in the project to water wetlands on private properties also attended.

During the evening, the Working Group's chair, Howard Jones, outlined several significant projects that the group had initiated since 1992. They included the restoration of Moira Lake; studies of the Gol Gol wetlands; development of the Thegoa Lagoon Management Plan; producing a wetland database atlas and the *Wetlands Watch* guide; incentive schemes for landholders; watering wetlands on private properties; and managing 32,000 megalitres of environmental water on behalf of the NSW Government.

Jones also mentioned the group being a finalist for the 2002 National River*Prize*. He stressed that the group owed much of its success 'to the greater community and especially those landholders who we have worked with so closely, and whose support and enthusiasm has enabled us to achieve so much'.

Outcomes are beyond our wildest dreams

One of the group's project officers, Trish Alexander, gave a presentation on watering wetlands on private properties. Results during 2002 and some early results from 2003 were presented. According to the Working Group's next issue of its *Wetland Dreamings* newsletter, the celebration event 'was a great success! One attendee was even reported to have been heard singing "cockles and mussels, alive alive o" in the wee hours of the morning!'

In the same newsletter, Jones expressed his great pride in the group and its achievement in managing environmental water on behalf of the NSW Government. Jones explained that because of the drought conditions 'there were very few projects in which we could have utilised the water efficiently and wisely. The water was traded on the temporary market … generating substantial funds for the group which will be used for future projects. The wetlands on private properties project has expanded four-fold … the outcomes are beyond our wildest dreams and the potential for this project to expand is sound'.

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DEATH OF A WETLAND

One of the more dramatic, and totally unexpected, impacts of the Millennium Drought was experienced at a wetland in the Gol Gol State Forest, southeast of Gol Gol township (see map on page 110). Bottle Bend is a terminal wetland where the water enters from the Murray River but does not flow anywhere else. While compiling material for the Working Group's wetland database, the group's staff identified Bottle Bend as a site that could benefit from rehabilitation works.

Before river regulation when flows were much lower over summer, the Murray River acted as a drain for the highly saline ground water at Bottle Bend. The salty water simply flowed out of the wetland and moved downstream. Under regulation, the Murray River's water levels were being kept high for much of the time, preventing the groundwater returning to the river. The impact was slowly moving up onto the floodplain because wetlands are one of the lowest points in the landscape and tend to be the first areas to show signs of salinisation from groundwater intrusion.

From fantastic to a disaster

Between December 2001 and February 2002, Bottle Bend lagoon almost dried up and large areas of the wetland's sediments dried and cracked. The first reaction to the drying phase by Working Group project officer, Paula D'Santos, was 'fantastic as this is what we wanted'. But river water flowing into Bottle Bend in 2002 resulted in the opposite of what was supposed to occur. As the wetland filled, the cumbungi plants started to die, something that was unusual for such a hardy plant. Other vegetation died followed by fish deaths. Monitoring revealed that heavy metals such as aluminium and manganese were being released, both of which are lethal to aquatic plants and animals and have flow-on effects for birdlife. For the first time, the Working Group became aware of acid sulphate soils in inland wetlands. What should have been a good thing for the wetland, turned out to be a disaster.

Water like lemon juice

At the same time, the wetland became highly salinised with electrical conductivity (EC) readings of 140,000 ECs (sea water is 60,000 EC). D'Santos explained to the local media that while acid sulphate soils were known to occur in coastal regions, particularly in northern NSW, 'no-one envisaged the likelihood of finding these soils in wetlands in

inland Australia'. As a result of what was happening at Bottle Bend, the Working Group commissioned the Murray-Darling Freshwater Research Centre to survey 30 wetlands along the Murray River to determine how prevalent sulphidic sediments were. The group wanted to know if Bottle Bend was an isolated event or whether there were other wetlands with these sediments which might be susceptible. D'Santos recalled that 'while not in as serious a condition as Bottle Bend, there were other wetlands along the Murray River where something similar could occur'.

The Working Group collaborated with the Murray-Darling Freshwater Research Centre and received funding from the NSW Environment Trust to extend its study to 51 wetlands across the Murray-Darling Basin. Combining the results of the two studies, the centre's scientists discovered more than 20 percent of the wetlands surveyed showed evidence of sulphidic sediments which, if mismanaged, could lead to serious ecological damage.

Working Group project officer, Paula D'Santos, monitoring water quality at Bottle Bend in 2002

What the Working Group and the scientists had discovered was that when soils with sulphidic sediments (associated with intrusions of saline ground water) have been permanently inundated with water, then dry out and are rewetted, a chemical process occurs which releases acid

into the system. At Bottle Bend this caused a massive fish kill as well as the death of vegetation and trees that fringed the wetland.
D'Santos observed that over a four-month period, the water turned as acidic as 'lemon juice, fatal to fish and water plants. While from a distance the lagoon looked blue and inviting, a closer inspection revealed the unhealthy state of its murky waters that were a brown-orange colour. The waters were highly salinised, highly acidic, and highly toxic to most plant and aquatic life'. D'Santos lamented that it was very depressing to not only see a major decline in tree health over the last five years 'but now the young trees were dying as well'. In 2017, Wetlands Working Group board member, Judy Frankenberg, recalled that the pH of the water measured three: 'More like battery acid I vividly recall!'

A sleeping giant

The Working Group alerted the Murray-Darling Basin Commission and researchers to the potential problem it had discovered but there was relatively little interest. The Murray-Darling Basin was in the grip of a serious drought, River Red gum trees were dying on floodplains and along the Murray River, wetlands were being blocked to keep water in the river for human consumption. However, the Working Group's senior project officer, Deb Nias, discussed the issue with Professor Mike Young from Adelaide University and encouraged him to travel to Bottle Bend to see the problem for himself. On his return, Young contacted *The Australian* newspaper, resulting in a major three-page story and giving the issue of acid sulphate soils a national profile.

The federal minister for climate change and water, Senator Penny Wong, asked the Murray-Darling Basin Commission to conduct a one-day forum on the acid soils issue, what she described as 'a sleeping giant'. (Interestingly, near the close of the forum, Nias raised what she saw as another sleeping giant, that of Aboriginal cultural flows, a topic that was not an issue at the time but which Nias predicted 'is coming your way!') Professor Peter Cullen, chair of the National Water Commission, also championed the acid sulphate soils issue, resulting in a significant research project.

In recognition of the seriousness of the potential threat of acid soils to inland wetlands, the Wetlands Working Group once again collaborated with the Murray-Darling Freshwater Research Centre to secure half a million dollars from the National Water Commission to develop tools and guidelines on how to prevent the build-up of acid sulphate in wetlands. The Working Group contributed a further $100,000 and in-kind contributions to the project that was undertaken by the Murray-Darling Freshwater Research Centre. The project led to the development of

national guidelines that are still part of risk assessment processes for managing wetlands in the Murray-Darling Basin.

For Nias, the Bottle Bend experience and the resulting research project showed that a community group could have a serious role to play in wetland management when it persisted. 'Working on-ground, good science and thinking about the bigger picture all played key roles in securing this significant research project', Nias reflected several years later. Nias said that the Working Group had also drawn on its wide community and government networks, asked serious questions and made responsible use of the media to achieve a satisfactory outcome.

Long-term impacts unknown

In 2006, chair of the Wetlands Working Group, Howard Jones, said that sulfidic sediments in themselves were not necessarily a problem unless the management of wetlands changed. Jones observed that while the long-term impacts of acid sulphates on wetlands were unknown, 'in some instances you might get acid pulses, fish kills and lots of dead vegetation. Bottle Bend was something people hadn't considered, but it has highlighted the problem of weir pools as one of the reasons we have such severe groundwater problems in this region. It is an emerging problem across the whole of the Murray-Darling Basin'.

The lesson from the Bottle Bend event was the recognition of a potential problem for groups responsible for managing environmental water. Wetlands that have experienced changes in their natural water regime, particularly under dry conditions, were more susceptible to developing these acid sulphate soils. The observation and action by the Working Group meant that such sites could be identified although what action was required was still unclear.

As D'Santos observed in 2006: 'We need a better understanding of sulphidic sediments before we start putting in structures. We also don't want to waste a lot of money on capital works only to find out that wasn't the best thing to do. It's really very tricky'. Jones added that 'We must learn to understand it and then work towards finding a way that you can still incorporate that wetland into the system, not lock it away as tends to happen with salted areas. Where we find challenging issues such as this, we need to go and get better science'.

Future management

In June 2012, the Working Group entered into a partnership with the Lower Murray Darling Catchment Management Authority to consider future management options for Bottle Bend. As part of this project, the

Murray-Darling Freshwater Research Centre undertook a study of the issues, while consultants did a vegetation survey of the area. In 2013, engineering consultants were invited to submit a tender for a feasibility study on structures to better manage the lagoon system. This included an assessment of potential engineering options to maintain adequate water levels within the Bottle Bend lagoon to prevent acidification and improve floodplain watering for the benefit of vegetation.

Sustainable management isn't possible without good knowledge

During this time, Dr Ben Gawne joined the Wetlands Working Group's executive. Gawne grew up in Melbourne and after gaining his degree, worked his way around Australia, completed a PhD, and took up a post-doctorate position in America for three and a half years. In 1996, he was appointed officer-in-charge at the Murray-Darling Freshwater Research Centre's new Mildura laboratory. He joined the Working Group in 2002. 'It was really rewarding to be involved with an organisation where you can so clearly see the outcomes of its activities. The Working Group and I both believe that sustainable management isn't possible without good knowledge of how they function. The group is using that knowledge to manage and rehabilitate wetlands'.

In a media interview in 2013, Gawne explained that his involvement in the acid sulphate soils project was a good example of how the application of research can produce good on-ground outcomes. 'There was an obvious need for knowledge by the group. We had the expertise, and together we were able to get major government funding to work on the problem. It is a partnership that works well if it is done right'.

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BUILDING ON SUCCESS: 2004 to 2008

Finally a glimpse of wheat watered the land,
Barley webbed beneath and grain dusted the damp ground.
Heaven lay beneath the Australasian Bittern where lignum sprouted out of the ground.
Cumbungi grew as thick as red gums and as green as the ripest lime.
The bird's saviour, Blorey, had filled the wetland with clear, calm water.

Molly Christenson, Katie Arandt, Georgia Mijok, Charley Moorhouse, Emily Headon, Gemma Tassel - *The Flight of the Great Australian Bittern (2013)*

Following on from its success between 2000 and 2003, the Wetlands Working Group continued managing the NSW Government's AEW water. Due to the continuing dry conditions within the Murray Valley, just over 20,000 megalitres of the water was available for use in the 2004-05 season. Additional private wetlands within Murray Irrigation's area of operation received water to help with their rehabilitation. The group delivered about 18,600 megalitres of water to 40 wetlands.

Approximately 7,400 megalitres of water was used to water wetlands on private properties. Nearly 11,000 megalitres was diverted into the Gulpa Creek wetlands to ensure successful bird breeding. Pollack Swamp in the Koondrook-Perricoota Forest received 1,000 megalitres to support the forest's only remaining egret colony. Wetlands in the Boomanoomana State Forest (downstream of Lake Mulwala) received 440 megalitres, helping to map flow paths and calculate volumes required to fill wetlands.

Two more irrigation areas join the program

Also in 2004, the project to water wetlands on private property was expanded to include the West Corurgan and Moira irrigation districts. West Corurgan was bordered by Corowa, Mulwala, Lowesdale, Oaklands and Berrigan. The smaller Moira district took in a region between Mathoura and Moama. After hearing about and seeing the results of healthier wetlands on private properties in the Deniliquin area, representatives from the two districts approached the Working Group to conduct trials within their areas.

Working Group project officer, Trish Alexander, recalled that the two trusts approached several landholders within their areas, resulting in two watered sites in the West Corurgan area and three in the Moira area. 'The wetlands watered within the Moira district were similar to

those in the Deniliquin area, such as Black box depressions, gilgais (undulating ground), and River Red gum flood runners. Plant responses following waterings were consistent with other Black box areas resulting in mainly Spike rush, Common nardoo and juncus species emerging. The West Corurgan sites were completely different and dominated by drumsticks with occasional lignum plants.

Apart from vegetation differences, there were also logistical differences to watering wetlands in the two new areas as water delivery was more reliant on irrigation allocations. Because a minimum of 20 percent general security water allocation was required before the irrigation trusts could start pumping from the Murray River, the trial was delayed until mid-October. The trials resulted in 31.5 hectares and 70 hectares of wetlands successfully watered in the Moira and West Corurgan areas respectively. It again demonstrated what could be achieved through collaboration with landholders and irrigation companies to achieve good environmental outcomes.

Across the border

Also in 2004, the Wetlands Working Group delivered some water to South Australia. Although the Working Group's environmental water was the property of the NSW Government, the Working Group reached an agreement with the NSW and South Australia governments to provide water for stressed wetland forests on the Chowilla floodplain, east of Renmark (see chapter 30).

2005-2006

Improved seasonal conditions allowed the Working Group to allocate just over 10,000 megalitres of water to 22 wetlands on private properties in Murray Irrigation's area of operation; four private wetlands in the Lower Darling region; the Wanganella swamp (north of Deniliquin); and Thegoa Lagoon. The group also helped the Lower Murray-Darling Catchment Management Authority to manage 351 megalitres of water donated by an irrigation syndicate for use in environmental projects in the Lower Murray-Darling region. Just over 14,000 megalitres of water were traded, raising funds for the group's community wetland incentive schemes and its operating costs.

2006-2007

Severe drought conditions only allowed the Working Group to access 1,966 megalitres of environmental water during the year. This restricted water allocations to wetlands on private property around Deniliquin due to lack of channel capacity. But for the first time, the group was permitted to allocate unused carry-over water. This allowed follow-up

watering for three private wetlands west of Wentworth and at Thegoa Lagoon.

Water for critical human need only

During the 2007-08 season, drought conditions became so severe that most of the AEW water allocation (1,510 megalitres) was carry-over from the previous year. Along the Murray Valley, water was allocated only for critical human need. The Working Group suspended watering of wetlands and no water was traded. Funds from previous years were used to support minimal projects under the Incentive Scheme and the Rehabilitation and Investigations Program as well as operating costs.

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BOOMANOOMANA

By the end of 2003 and despite the continuing drought, pressure was again building to expand the number of priority wetlands. One of these was a swamp in the Boomanoomana State Forest, located between Mulwala and Barooga on the Murray River floodplain (see map on page 110).

River regulation, irrigation and levee banks had reduced the flooding frequency in this forest to once or twice a decade. Working Group project officer, Duncan Vennell, felt this had led to a decline in the health and diversity of plants and animals to the point where many aquatic and semi-aquatic plant species throughout the forest were now vulnerable. During October and November 2004, the forest received 375 megalitres of environmental water to mimic a natural high river flow. The watering event covered 72 hectares of wetlands over five months. There was further replenishment from rainfall events in early-2005.

A pleasant surprise

The flooding produced many positive outcomes including increasing knowledge of the forest's flooding characteristics; regeneration of aquatic and semi-aquatic plants; increased frogs and waterbirds; and improved health of the surrounding forest vegetation. Vennell outlined the positives of monitoring the flood event in a media interview. 'The data collected from monitoring the flood can be incorporated into future flooding events ensuring the efficient use of environmental water and the long-term viability of the swamp and forest'.

Vennell reported that 'bird response to the flooding event was also encouraging, including the pleasant surprise of two brolgas. Every attempt was made to allow the brolgas to breed', with Forests NSW starting a fox baiting program and Murray Irrigation transferring extra water to extend the flooding. The monitoring also revealed the presence of 11 Purple-spotted gudgeon, a rare and endangered native fish. Years later, the Working Group was told that it was a very significant discovery as it was the last recording of that small native fish in NSW.

The success of the watering was due to a partnership approach by Forests NSW, Murray Irrigation Ltd, Berrigan Shire Council, the Rural Lands Protection Board, the Murray Catchment Management Authority and the Department of Natural Resources.

Following the watering, Vennell observed that watering the wetland had provided 'valuable habitat and food resources for native animals,

improving the health and regeneration of aquatic and riparian vegetation'. He recommended watering the forest every second year depending on seasonal conditions; establishing photo points; more frequent vegetation monitoring; and exclusion of domestic stock during and after watering.

The Boomanoomana Forest after flooding in early-2005

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LOWER MURRAY-DARLING WETLANDS

But then it rains and my Darling like an army swells and bursts across the land,
And miles of open country now fall under her command.
Defying all opposition as her tributaries expand,
She turns shrunken wetlands into seas.
My Darling carries life along with death within her hand.
She occupies the flooded plains with ease.

And then my Darling withdraws and returns back to her source.
She nestles in her bed without regret, without remorse,
As fragile lands recovers from the fury of her force,
To go about the business of regrowth.

Andrew Hull, *My Darling River (2013)*

In late-2004, the Working Group secured funding from the Lower Murray-Darling Catchment Management Authority to conduct a wetland rehabilitation project in the Lower Murray-Darling region. The project focused on investigations into on-ground works to protect and enhance up to 3,000 hectares of wetland areas on public and private land.

In the Working Group's December 2004 *Wetland Dreamings* newsletter, project officer, Claire Wilkinson, explained that 'due to a number of factors, wetlands in the Lower Murray-Darling catchment are gradually disappearing or slowly degrading. River regulation, salinity, pest plants and animals, agricultural development and a limited understanding of wetland function has contributed to a gradual decline in these areas over the past 50-60 years'.

Murray and Lower Darling wetlands differ

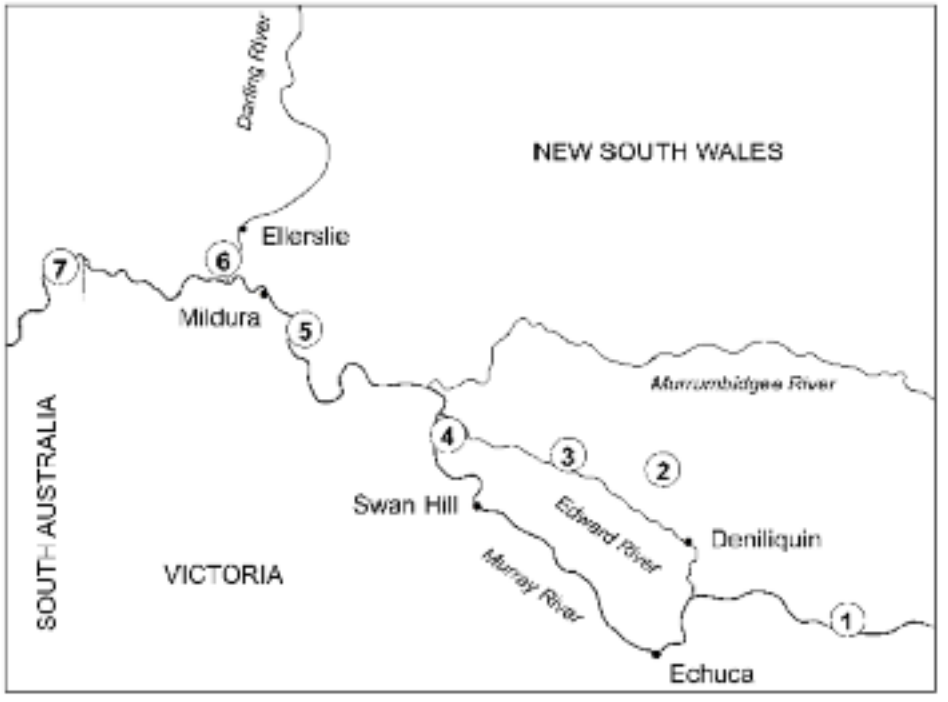
Wilkinson noted that there were a number of wetlands along the Murray River between Euston and the South Australia border that were permanently under water due to the presence of weir pools. This was having a negative effect on wetland vegetation, animals and water quality. However, along the Darling River, the opposite problem was occurring, with wetlands remaining dry even when the river was in flood. Wilkinson reported that 'being either permanently wet or permanently dry can be equally bad news for wetlands in this region because they are adapted to having both wet and dry phases. If one phase is continued for too long, it can result in the loss of biodiversity and we see a gradual decline in wetland health and condition'.

Two-part program

The wetland rehabilitation project ran for 12-months and in two parts. The first part focused on Murray River wetlands and looked at implementing more appropriate wetting and drying regimes. The second part concentrated on wetlands along the Darling River from Menindee to Wentworth, and to develop a priority list of on-ground works.

Project activities included engagement with landholders, conducting aquatic animal surveys, assessing vegetation condition, water quality testing, and groundwater investigations. The information gathered was used to identify what works were needed to improve wetlands and also assist in developing management plans.

The results of the project were implemented in a following three-year project. This included building or removing regulatory structures; fencing off riparian areas; establishing off-stream stock watering points; and designing and providing alternative water supplies. All activities were seen as ways of improving the general condition and health of the wetlands.



1 Boomanomana; 2 Wanganella Swamp; 3 Werai Forest; 4 Wee Wee Creek; 5 Bottle Bend; 6 Andruco Lagoon; 7 Chowilla Floodplain

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SUPPORTING COMMUNITY PROJECTS

Community participation, engagement and involvement was a core component of the Wetlands Working Group's activities since 1992. This included awareness and education activities, something that was not always easy to secure state or federal funds for. However, after 2000, the group started expanding this work to include community-initiated wetland programs. Once the group started managing the NSW Government's environmental water allocation (which included raising funds from trading unused water), community engagement activities accelerated.

The *Bush Telegraph* water challenge

In 2003, the Wetlands Working Group donated 1,000 megalitres of the NSW Government's AEW water to a water challenge, conducted in conjunction with ABC Radio's *Bush Telegraph* program. As 2003 was the International Year of Fresh Water, the radio program wanted to make listeners more aware of water use and asked them to choose one of four options for an environmental watering project – releasing the water down the Murray River; watering the Barmah-Millewa Forest; watering wetlands on private property; or trading the water and using the funds for further wetland rehabilitation work. The options were promoted during the radio program over four weeks which included interviews with landholders, recreational anglers, farmers, Working Group members and staff. At the end of the four weeks, listeners contacted the ABC to nominate their preference.

On 17 December 2003, the *Bush Telegraph* announced the winning option in a program broadcast live from Hume Dam near Albury. Some of the contributors even turned up for the announcement. The preferred use of the 1,000 megalitres by the program's listeners was to add it to an environmental flow planned for the Barmah-Millewa Forest. In an interview on ABC Radio, Working Group project officer, Paula D'Santos, remarked that 'using the water on private wetlands was the least popular option, suggesting that the public is still uncomfortable with public resources being used on private land'. D'Santos also acknowledged that as the majority of wetlands in the Murray Valley were on private properties, the result indicated 'a real need to continue working with landholders and the wider public to show that protecting areas on private land contributes to the greater good for everyone'.

D'Santos acknowledged that the water challenge had been a great way to reach a large audience to highlight the significance of wetlands and explain the complexities of managing wetlands and environmental water. The 1,000 megalitres was eventually added to a 7,800 megalitres allocation of environmental water by the Working Group to the Gulpa Creek wetlands. The water was applied in late-2004 to enhance vegetation and extend the bird breeding season.

Community-initiated programs

The *Bush Telegraph* radio program confirmed growing interest by community groups along the Murray River in wetland rehabilitation. Following on from the program's success, the Wetlands Working Group decided to use some of the funds raised by trading unused water to support wetland rehabilitation initiatives identified by community groups or individuals. These became known as the Wetlands Incentive Scheme (WIS) and the Wetlands Rehabilitation and Investigations Program (WRIP).

In March 2004, the Working Group launched the two schemes for the Murray and Lower Murray-Darling regions in NSW. In its June 2004 *Wetland Dreamings* newsletter, the group's chair, Howard Jones, announced that 'these two funding programs … are one of the most effective ways of helping the wider community to protect and improve their wetlands'. As funding for the programs was generated from trading some of the environmental water allocation, Jones saw the two projects as 'an excellent way of redirecting the money back into the community'.

The Wetlands Incentive Scheme was for community projects costing less than $10,000. The scheme aimed to encourage and provide assistance to landholders or community groups interested in rehabilitating wetlands on their properties or in the community. The scheme provided financial assistance for on-ground works such as fencing; revegetation; minor earth works; small wetland studies; or managing stock. Applications for the scheme could be submitted at any time of the year. The second program, the Wetland Rehabilitation and Investigations Program, was for larger projects costing more than $10,000. Projects could be for on-ground works, investigations or scoping studies that aimed to improve management, understanding and rehabilitation of natural wetlands. Applications for this funding had two deadlines, March and October.

Applicants for both programs were required to undergo a formal submission process based on those of catchment management authorities. Successful applicants were also obliged to sign a contract; contribute supporting funds; furnish reports on completion; and provide a financial acquittal.

A diverse range of programs

In its first year, the Wetlands Incentive Scheme program funded 33 activities between Khancoban and Wentworth. They included school student projects, advice, an oral history, website development, pest control, a fish survey, research, field days, fencing wetlands, watering small private wetlands and enhancing wetland vegetation. In the first year, funds allocated to individual projects ranged from $450 to nearly $14,000. The Wetlands Rehabilitation and Investigations Program allocated funds to seven projects including scientific research, sharing knowledge, on-ground works and infrastructure. Allocated funds ranged from $20,000 to just under $60,000.

In the second year (2005), 38 Wetlands Incentive Scheme projects were supported. The projects mainly focussed on small wetlands resulting in over 1,100 hectares of wetlands being rehabilitated. Funding for individual projects ranged from $260 to $11,500. The Wetlands Rehabilitation and Investigations Program allocated funds to seven projects for research, on-ground rehabilitation works and infrastructure to improve wetland connectivity and fish passage. Support ranged from $20,350 to $59,950 per project.

Due to the severe drought, water allocations in 2006 along the Murray River were minimal and fell even further as the irrigation season progressed, leaving the Working Group with no environmental water to trade. However, there were some carry-over funds from the previous year's trade to allow a small number of community projects to be supported. Twenty-one Wetlands Incentive Scheme activities were funded, mainly for fencing, revegetation and education activities. The Wetlands Rehabilitation and Investigations Program allocated funds to only one project to improve habitat and biodiversity of a wetland in the Upper Murray.

Severe drought conditions continued in 2007, resulting in no water trading of the Working Group's environmental water. Again, some carry-over funds from previous years allowed a small number of community projects to be supported. Five Wetlands Incentive Scheme activities were supported, mainly for on-ground works, resulting in the rehabilitation of 74 hectares of wetlands. The Wetlands Rehabilitation and Investigations Program allocated funds to four projects, including determining a baseline assessment of aquatic fauna before watering wetlands.

Projects

It is impossible to detail every project supported by the Wetlands Working Group through these two programs between 2004 and 2007. They were all detailed in two major and many smaller reports as well as

reports from the participants. The following is a selection of some projects as examples of the large range and scope of projects.

Banyandah wetland

Banyandah is a 160-hectare property on the Murray River near Howlong, west of Albury. The property has a 10-hectare wetland linked to the river by a channel but because of regulated flows, the wetland was nearly always flooded over summer. It was further stressed during the Millennium Drought when the wetland was dry for lengthy periods. The property's owner, Jane Reid, was quick to admit she had been 'on a steep learning curve' when it came to understanding wetlands and the environmental consequences of altered flow regimes of the Murray River.

The Working Group provided funds to re-establish natural wetting and drying regimes of the wetland. Additional assistance from the Murray Catchment Management Authority allowed Reid to fence the wetland and plant 3,000 native species around its edges. Despite several very dry years, the revegetation was very successful and excited Reid who slowly returned 'the wetland back to its natural state. I see myself as the caretaker of this land, not its owner and it is my responsibility to look after it. My efforts to restore the wetland will be successful when I see the wading birds return to the mudflats in summer.'

Banyandah wetland was later selected by the NSW Department of Sustainability and Environment and the Murray-Darling Freshwater Research Centre for a three-year study investigating the impact of various flooding regimes on native fish and wetland habitats. The Working Group also commissioned Charles Sturt University to study how frogs were affected by flooding in managed wetlands. During a 2006 media interview, Deb Nias, the Working Group's executive officer, said that Reid 'was a great example of a landholder who was willing to make the changes needed to improve wetlands on her property'.

Rehabilitating an Upper Murray wetland

In 2006, the Working Group began working with landholders to rehabilitate different types of wetlands in the Upper Murray (above lake Hume). Sphagnum bogs were identified as wetlands because of their structure, vegetation and the role they play. These bogs were originally formed on poorly-drained flats in the headwaters of streams in alpine areas with high rainfall and low evaporation. The high water tables and mossy vegetation associated with bogs made them fragile and sensitive to fire and trampling by livestock.

In 2006, Working Group project officer, Trish Alexander, worked with the Murray Catchment Management Authority to rehabilitate some of these

degraded wetland bogs in areas around Tumbarumba. Alexander noted that the 'bogs act like filtering sponges, intercepting and storing water and then releasing it slowly which helps to maintain a more even moisture regime between rainfall events. The bogs help to stabilise the soil and stream banks and remove sediments and nutrients … playing an important role in maintaining the reliability of water supply and ensuring our catchments are functioning and healthy'. Land clearing and cattle grazing had left many bogs degraded. Once sphagnum bogs dry out, they eventually die'.

With support from the Working Group and the Murray Catchment Management Authority, landholders near Tumbarumba were able to halt and repair erosion of sphagnum bogs. The works kept the stock out and helped these alpine wetlands retain water, allowing existing plants, such as the sphagnum, to regenerate.

Rehabilitating wetlands on travelling stock reserves

In 2006, some wetlands above Lake Hume were being managed by the Hume Rural Lands Protection Board (RLPB) on travelling stock reserves. In recognition of the value of these wetlands, the Wetlands Working Group provided funding to protect and rehabilitate floodplain wetlands on Karara and Appleton's travelling stock reserves (east of Jingellic).

Allan Scammell, an officer with the Hume Rural Lands Protection Board, was confident that while the stock reserves were degraded, they were still ecologically significant. Scammell explained to the Working Group that since 1990, travelling stock reserves had been managed with a more environmental focus as the traditional use of the reserves was dying out. The reserves still had the large old trees with hollows for bird and animal habitat and the ground, although grazed, had never been cultivated.

The Karara Reserve wetland was fenced off and planted with trees. Grazing was excluded except for brief summer periods when cattle were allowed to get rid of excessive vegetation. The regeneration on the reserve was striking with the wetland boasting good stands of native plants. Except for some seasonal short-term grazing, livestock were excluded from Appleton's Reserve. A biologist monitored the site; conducted weed and pest animal control; ensured there was no unauthorised grazing; continued to photograph changes to the sites; and repaired fences. As grazing was excluded, wetland plants started to return.

Allan Scammell and Neale Whitsed at the
Karara Reserve wetland in the Upper Murray

Jane Reid and her Banyandah wetland near Howlong

(Both photos courtesy of Margrit Beemster)

Improved wetland management was a real bonus

In the Working Group's December 2007 newsletter, *Wetland Dreamings,* travelling stock reserve ranger, Neale Whitsed, reported that the group's support for improved management in the Upper Murray wetlands was 'a real bonus. Everything above the Hume Weir seems to be have been forgotten, but … to my mind, rehabilitating a waterway starts with working on your least degraded section to your most degraded. If we can do what we can on Upper Murray wetlands, we can help to maintain river health and regional biodiversity further downstream'.

Knew more about alpine wetlands than any Australian

The growing interest in Upper Murray wetlands led to Roger Good, an alpine ecologist, joining the Working Group's executive. Good, who retired from the NSW Parks & Wildlife Service in 2004, probably knew more about the ecology of alpine wetlands than any other Australian as he spent a lifetime researching and managing these high altitude environments. Good grew up around Griffith but during university holidays, he worked in the mountains. In 1974, he joined NSW National Parks and Wildlife Service as a botanist and worked on restoring alpine ecosystems, particularly, wetlands. Before his retirement, he researched the impacts of climate change on alpine environments.

Good was a member of the Working Group executive between 2007 and 2009. In a media interview he commented that 'In the last decade the interest in catchment hydrology, water yield and environmental flows from the catchments has given new impetus to rehabilitating wetlands affected by fires which swept across the mountains in 2003'. When the new Murray Darling Wetlands Working Group Ltd was formed in 2012, Good was invited to become a director. He remained on the board until his untimely death in 2015.

Tona Station

The 2,000-hectare Tona Station is about 20 kilometres northwest of Wentworth. One-third of the property comprises floodplain wetlands that are adjacent to the Great Darling Anabranch along 35 kilometres. The project supported by Working Group funds was to undertake wetland research and develop educational materials for the community. It was a partnership between the group, Tona Station and the Sunraysia Institute of TAFE in Mildura.

Activities included an audit of animals, birds, bugs, soils and plants present on the floodplain; identifying and linking Aboriginal and European cultural history; preparing a program to undertake studies when flooding occurs; using GPS mapping to develop 3D imagery of the

wetlands and their changing functions; and developing educational materials. Conservation and land management students from TAFE learnt on-ground wetland management skills as part of their education programs.

A booklet and CD on the project, *Understanding and Communicating the Story of Tona Wetlands,* were launched at the Sunraysia Institute of TAFE in December, 2006. The booklet contained scientific, technical and Indigenous information and used story-telling, photographs and text to describe the management programs undertaken to restore the natural balance and work towards greater environmental, economic and social stability.

Watering the Great Darling Anabranch

In 1998, a Darling Anabranch Management Plan Steering Committee had been established to create an economic and environmentally sustainable future along this iconic anabranch. For many years, much of this anabranch in western NSW (an ancient path of the Darling River) had been blocked by landholders to provide access to water for stock and domestic purposes, causing serious environmental degradation Following consideration of various options, the landholders agreed that a pipelined water supply was the best way to deliver water and provide an environmental flow entitlement for the anabranch. Rehabilitation also required the removal of in-stream structures and provision of alternative stock watering points.

In 2005, NSW Government funds were allocated to construct a 219-kilometre pipeline for the 72 landholders along the anabranch. In 2010, the Wetlands Working Group began discussions with residents to initiate the first environmental flow down the anabranch. The Working Group approached the Murray-Darling Basin Authority on behalf of residents and the process of delivering the environmental flow began. Forty-seven gigalitres of water from the Menindee Lakes wound its way down the anabranch to the Murray River, for the first time in a decade. After the environmental water flowed into the Murray River west of Wentworth, other wetlands such as Coombol Swamp and Lake Limbra on the Chowilla floodplain benefitted from the water. The environmental flow down the anabranch improved native fish habitat, bird and frog breeding and the regeneration of vegetation. It was another example of the success of a cooperative watering event by the Working Group and multiple environmental water holders to achieve environmental benefits at a local level.

The Working Group inspecting the Great Darling Anabranch during its first environmental watering

The future

At its February 2007 meeting, the Wetlands Working Group's executive agreed to review the two community programs in the light of increasing community access to funding for improving natural resources from catchment management authorities along the Murray and Lower Darling rivers. Although the list of applications to the group was growing, the staff had raised concerns a year earlier that there could be duplication or competition for funds. The group wanted to know if its limited funds could be better spent in other ways.

The group's executive agreed to extend the two programs for a further year to capitalise on the continuing interest in, and success of, the initiatives. The group agreed to review the programs as part of a major review of its partnership arrangements with the Murray and Lower Murray Darling catchment management authorities. However, the end of the AEW water project, the restructuring of land and water departments in NSW and the move of Working Group staff to the new Department of Environment, Climate Change and water, overtook any proposed reviews. The two community projects finished in late-2008.

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ACROSS THE BORDER

The Wetlands Working Group's environmental water allocation from the NSW Government was specifically for NSW wetlands or related environmental purposes. However, in 2004, the group brokered an agreement between the NSW and South Australia governments to provide water for riverine forests on the Chowilla floodplain, east of Renmark (see map on page 110).

The Chowilla floodplain

Chowilla is at the western end of a huge floodplain complex that extends along the Murray River from Wentworth (in NSW) and Merbein (in Victoria) to Renmark in South Australia. The area had been under threat of permanent inundation when a dam was proposed for Chowilla in 1970, an idea that was abandoned in 1976. It wasn't until the 1990s that the environmental significance of this stretch of floodplain began to be identified, including awareness of the extensive and significant native fish breeding sites, cultural heritage, forests and wetlands.

By late-2004, the on-going Millennium Drought was exacerbating the declining state of the floodplain's vegetation and wetlands. The wetlands had been dry for years, but by 2005, 75 percent of the floodplain's River Red gum and Black box trees were either stressed or dying. A major problem was the difficulty of watering the area because of the floodplain's height above the river.

An historic deal

In 2005, the Wetlands Working Group achieved what ABC Radio News described as an 'historic deal to deliver water to thousands of stressed River Red gums in the Riverland' of South Australia. In 2004, the Working Group was approached by South Australia's Department of Water, Land and Biodiversity Conservation to assist with an emergency watering of some of the most severely affected vegetation on the floodplain. The group provided 1,500 megalitres of water to add to 800 megalitres provided by the South Australian government, watering 50 hectares of wetlands, flood runners and creeks.

Good response to the watering

Monitoring by staff from South Australia's water and environment departments revealed positive responses to the watering. New leaves had appeared on 90 percent of the stressed River Red gum trees that were later classified as healthy. In some instances, new leaves

appeared on the trees as quickly as two weeks after the watering. There had been a rapid improvement in the health of River Red gum trees and increasing abundance and diversity of waterbirds, including the rare and vulnerable Freckled duck, Musk duck and Red-Kneed dotterel as well as the Southern bell frog.

In March 2005, the Working Group's chair, Howard Jones, expressed the hope that the watering would be the first of many partnerships between the two states, providing 'positive long-term opportunities for states to work together'.

Howard Jones (left) and the Hon Karlene Maywald MP, South Australia's Minister for the River Murray, inspect the Chowilla Floodplain just before the watering took place

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PLANNING FOR THE FUTURE

In November 2002, a meeting of the Working Group at Deniliquin initiated a discussion on where the group might be in five years' time. This topic had arisen out of discussions with a financial institution that was providing the group with investment advice. The group had been operating with strategic plans since 1992 and in 2002, the group's finances were healthy. However, the executive felt that its income and expenditure would be much more closely scrutinised in the future 'by many parties and will play a vital role in future decisions … as to whether the group is to continue managing the (NSW Government's) water allocation'.

During the discussion, staff salaries and project officers were seen as the top priorities so that wetland rehabilitation projects could be supported. The meeting requested that the group's executive prepare a five-year business plan 'to interface with the current strategic plan and … was to be completed within three months'. By the next meeting in May 2003, the group's chair, Howard Jones, reported good progress on a business plan which had been renamed as the investment plan for the period 2003 to 2008. The plan was adopted in-principle and completed in late-2003.

At a crossroad

In July 2003, Working Group member, David Leslie, again raised the issue of the group's future. Leslie felt that given the severity and impact of the drought at the time, the NSW Government's AEW water might not be available after the end of 2003, possibly resulting in financial uncertainty.

By early-2004, Leslie felt that the Working Group was at a 'crossroad'. He observed that the drought was starting to have serious impacts on communities and landowners along the Edward, Wakool and Lower Darling rivers. There had been criticisms about the way the group had traded its environmental water and there was the continuing question of the group's financial sustainability, particularly with increasing staff numbers. And while the group had incorporated in 1999, it was still not completely independent of government. Some of the staff were employed by, and based in, catchment management authority offices at Deniliquin and Buronga. The group's core funds derived from water trading were held by the NSW Department of Infrastructure, Planning and Natural Resources. The group had wetland rehabilitation tenders with two catchment management authorities. Added to this, there were

tensions developing between the Working Group and the Murray Catchment Management Authority. While very supportive of the group, the authority's general manager had legislative responsibility for all funds and staff managed by the authority. And that included the Working Group's funds and staff.

Slightly different views

While all of this was occurring, there was a major restructure underway of land and water agencies in NSW, resulting in considerable changes to natural resource management. Chair of the Working Group, Howard Jones, was optimistic about the changes and saw 2004 'as shaping up to be one full of changes both in governmental structures and how we approach the future management of resources such as water'. Jones also noted the discussions about proposed regional water trusts in which the group hoped to have some involvement. But he saw the group's priorities as 'achieving as many on-ground results as we can'.

Working Group staff however, had slightly different views about the changes and were increasingly anxious about their own futures. The group's senior project officer, Deb Nias, was concerned that the restructuring of agencies was going to affect where her staff were located and who they were accountable to. When these issues were raised at a group's executive meeting in March 2004, no decision was reached due to 'a lack of information'. The lack of a clear decision on the future resulted in one of the group's executive members resigning out of frustration.

A month later, Nias distributed a discussion paper to try and focus the executive on the group's future. She saw the group as having four options on staff employment, location, management and accountability from the end of 2004. They were:

- Maintain the employment status quo with the Working Group providing direction.
- Have staff employed by the NSW Department of Infrastructure, Planning and Natural Resources and the group used as a reference group.
- Have the two catchment management authorities employ the group's staff.
- Let the Working Group employ its own staff demonstrating true independence and complete separation from government.

Nias acknowledged that the ultimate decision in relation to employment and administration would depend on negotiations between the Working

Group, the two catchment management authorities and the Department of Infrastructure, Planning and Natural Resources. She updated her paper in 2005 to three options: continue to collaborate with the two catchment management authorities; become partly independent where the arrangements with the two authorities would continue but management of the AEW water would be handed to a new group with its own staff; or become partly independent where the arrangements with the two authorities would continue but management of the AEW water would remain with the Working Group.

But some other issues were complicating consideration of these options. Nias's workload was rapidly increasing and included managing the NSW Government water; liaising with and reporting to four organisations; and oversight of at least 50 annual community wetland projects. A review of the arrangements between the group and the two catchment management authorities had also started.

Completing work in a 'half-arsed' way

Up to this time, the relationship between the Working Group and the two catchment management authorities had been satisfactory but the reporting requirements were starting to become an issue. In November 2005, Nias wrote a letter to Working Group members in which she emphasised that not only was the reporting going to increase but the group was paying her (with high scientific skills in wetland management) $72,000 a year 'to be mainly doing bookwork and reports'. Nias pointed out that she was spending a huge amount of time reporting to the Working Group, two catchment management authorities and a government department, while some of her other work was being completed in 'a half-arsed way!' The reporting issue was not helped when the general manager of the Murray Catchment Management Authority requested more detail in Nias's reports to him.

In 2006, the issues of Nias's workload and the group's future options were again discussed but put on hold by the group's executive until the future of the AEW water was clarified. It would take another two years for the issues to be resolved, creating uncertainty amongst the staff.

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WATERING WETLANDS ON PRIVATE PROPERTY

Agricultural and ecological health are inextricably linked on the floodplain.
Michael Spinks, *organic grain grower, Balranald, NSW (2002)*

The idea of rehabilitating wetlands on private property was first raised with the Wetlands Working Group in September 1995. John O'Donnell, Acting Regional Manager for the Environment Protection Authority of NSW, circulated a newspaper article on how a large wetland on a farm in western Victoria had been restored 'to enhance the environment of the property and bird habitat for not a lot of money'. Writing on behalf of the authority's director-general, O'Donnell asked the group to consider encouraging similar projects along the Murray River. He admitted that the number of wetlands that might fit into this category was unknown but felt 'considerable numbers would be involved'.

The Working Group discussed the proposal at its meeting in December 1995. Some members wondered if this was core business for the group. However, it was decided that the group should canvas the potential demand for such a program, develop some terms of reference and determine how landholders would receive on-farm advice for such a project.

At its next meeting at Albury in July 1996, the group resolved to further explore funding through the federal National Landcare Program. The group also recommended trialing the concept and the group's project officer, Paul Lloyd, was asked to seek expressions of interest for a private wetland watering program. Lloyd was reminded that the wording of any advertising should make it clear that only 'advice will be given … no financial assistance is available yet'. Despite all of this, no progress was made until 2001 when funds were found as part of the group's management of the NSW Government's environmental water.

Small wetlands but enormous diversity

In 2000, the Working Group started managing a 32,000 megalitres water allocation from the NSW Government. The water was originally proposed for the larger and more iconic wetlands identified by the group. However, the group had been discussing the idea of watering private wetlands since 1995 and some preliminary investigations had shown that while many of the wetlands on irrigation farms were quite small, collectively they added enormously to the diversity of the landscape. Many had been dry for up to 30 years, cut off from rivers

because of infrastructure installed for irrigation. At the same time, there had been no large floods for many years. Following discussions with Murray Irrigation Ltd at Deniliquin, the Working Group considered it could probably get water into these private wetlands by using the irrigation company's infrastructure.

New program announced

On 1 November 2001, the Working Group announced a new program of watering wetlands on private property. The group's chair, Howard Jones, noted that most wetlands in the Murray Valley on private property were 'suffering from a severe lack of water due to levee banks and irrigation supply needs. The only way we can start to improve the health of our wetlands, and ultimately the River, is to work with the community and landholders. By providing this water this year, we hope to see a range of benefits, such as improved wetlands, more diverse vegetation, birds, invertebrates and frogs'.

In a media interview, Jones observed that small wetlands were important in the landscape and could retain high biodiversity values even when they were dry for long periods. But as these wetlands had been denied water for many years, the biodiversity of the surrounding area had declined. Jones explained that these wetlands were important breeding sites for rare and endangered birds such as brolgas, Little bitterns and Australasian bitterns. In addition, wading birds such as Sharp-tailed sandpipers, Marsh sandpipers, Little stints, Red-kneed dotterels and Black-winged stilts were also known to be attracted to small wetlands.

During the project launch, Jones confirmed that in the first year, 11 wetland sites on irrigation properties within Murray Irrigation's area of operation had been selected for watering.

Interest in the project has been fantastic

In 2002, the watering project more than quadrupled with 27 landholders participating and 43 wetland sites (totaling 572 hectares) receiving water. Before proceeding with the project in 2002, the Working Group put a lot of thought into whether it should go ahead with the project due to the drought. The group considered however that even if 2002 was a wetter year, the wetlands would still not receive the water they used to due to farm infrastructure and the wetlands being isolated from waterways.

Working Group's project officers, Trish Alexander and Emily Maher, monitored the response in vegetation and bird-life in nine of the wetlands which ranged from Black box tree depressions, open Lignum stands, flood runners and old stream beds. Alexander and Maher

reported that the ‘interest in the project has been fantastic … and all landholders who are involved are very pleased with the early results and the operational processes of the project’.

Improved health

Early results from monitoring of the watered wetlands showed improved health with trees and vegetation producing new growth and flowering. The bird response was also encouraging with Red-Kneed dotterels, egrets, herons, spoonbills, grebes and thousands of ducks being sighted. Even some of the less-frequently seen birds were reported as taking an interest in the small wetlands. One irrigator reporting seeing up to 20 Marsh sandpipers and Latham's snipe, both migratory species from the northern hemisphere. Another property owner observed 10 brolgas on recently watered wetlands. Due to the extraordinarily dry conditions, it was expected that the waterbirds attracted to the wetlands would be much higher compared to 2001.

Interest in the project for the 2003-04 season was huge. Eighty-seven applications (totaling 143 sites) were received. The sites were inspected during May and June in anticipation that watering would commence in September 2003. Starting in 2006, Margrit Beemster, a journalist based in north-east Victoria, prepared a series of media articles on the project based on interviews with irrigators who participated in the program. The following (except the Union Plains story) are summaries of Beemster’s articles.

Watering made a huge difference

Ron McKenzie was a third-generation farmer on an irrigation property north of Deniliquin. Originally his property included a myriad of swamps and depressions amongst the semi-arid plains country. The farm grew beef, rice, wheat and canola crops. The property had three potential wetland sites with remnant Black box trees. McKenzie explained that ‘Dad really liked the swamp, the lowest part of the farm, because in wet years it provided somewhere for excess water to drain too. The irony is that we have more efficient farms … but the downside is that the wetlands didn’t get water anymore’. McKenzie noticed in the years after a re-circulation system had been installed on his farm, ‘trees in the wetland started to look really sick particularly around the edges.

In 2004, one of the three wetlands received 32 megalitres of environmental water followed by a further 37 megalitres in 2005. McKenzie said that ‘The environmental watering has made a huge difference to the health of the trees in the wetland and to the birds and other wildlife. Four weeks after the first water went on you could see the new growth, especially in the trees around the edges. Alongside the

watered wetland in 2005, I grew 80 hectares of rice, giving me a 90 hectare wetland. And you should have seen the birds … even seagulls'.

A watered wetland on the McKenzie property

Working Group project officer, Duncan Vennell (left), and landholder Malcolm Starritt

(Both photos courtesy of Margrit Beemster)

We can return something to the environment

The Starritt family ran a dryland and irrigation pastoral property at Womboota, south of Deniliquin, raising sheep, wheat, canola, peas and oats. Malcolm Starritt identified a wetland that hadn't been flooded since 1996 where the trees were feeling the effects of drought while the understorey was diminishing. With financial assistance from the Cadell Land and Water Management Plan and the Wetlands Working Group, the area was fenced off and earthworks installed to retain water in the wetland. Four small dams were built and a pipeline installed for stock.

'A lot of the birds started to turn up after the initial flooding of 325 megalitres in September 2005, with a top-up in November. The least we can do is return something to the environment so we can truly say we are farming in a sustainably sensible way. Putting the water into the wetland was like turning the lights on. We had just a rush of birds and the native plants that came back were extraordinary. From now on we are looking at careful grazing management, including the management of the fuel load.'

While an advocate of environmental watering, Starritt said there needed to be a balance in environmental watering, sharing water between farmers, urban areas, industry and the environment. 'One can't just have a quota of environmental water that needs to be used every year. We need to balance it with what is happening with the climate and adjust its use accordingly'. Despite the drought, Starritt started to put some of his own water from a dramatically reduced water allocation into his Red Gum wetland (of 132 hectares). He also excluded stock from the wetland.

With my farming, biodiversity is really important

Alan Wragge was a third generation farmer who ran a 3,100 hectare property west of Deniliquin comprising sheep, rice and cereals. He also maintained a third of his property for native vegetation, of which 250 hectares was a series of wetlands. About 18 years earlier, Wragge noticed dieback in the Black Box trees on his property. His first thoughts were that it was caused by salinity and a rising water table but the local Landcare group and NSW Forests discovered that the root zones were very dry on his property.

'My plan of attack was to fence off the trees to prevent stock from getting in so regeneration could occur. The strategy allowed for regeneration but didn't help the older trees that need occasional flooding to stay healthy'. Wragge then heard of the Working Group's scheme to water wetlands on private land and joined the program. He

received financial assistance to further fence off his wetlands into seven different paddocks so they could be managed more effectively.

In 2003 and 2004, two Black box sites (totalling 559 hectares), were watered with 331 megalitres of water. Because Wragge's 250 hectare wetland site was so large, watering the wetland had to be done one section at a time. The following year another 402 megalitres was used to water other sections of the wetland. Wetlands Working Group project officer, Duncan Vennell, noted that 'The older trees leafed up again and other shrubs and bushes came up that I had never noticed before. A lot of young trees indicated that regeneration was occurring'.

Wragge said that 'When I started the project, my initial reaction was that it was too big but with the help of Wetlands Working Group staff and Murray Irrigation, I was able to get my head around it and manage it. With the path of farming I'm trying to go down, biodiversity is really important'.

Difficulties with the program

Union Plains was 20 kilometres northwest of Deniliquin. A wetland on the property was a good example of a Black box floodplain that would have been flooded every five to 10 years but river regulation and other developments had reduced flooding to every 15 to 20 years. In some cases, flooding had ceased altogether and the area was seriously degraded. By 2001, owners Neil and Susan Bull realised that the health of their 16-hectare wetland was extremely poor. They were eager to be involved in the watering program but the broader community was concerned about water being used for environmental purposes when water allocations for irrigators were extremely low. There was also uncertainty as to where the water would go after it was delivered to the wetland. The Bull's however saw significant benefits such as the regeneration of trees and shrubs, replenishing seed stock for future germination, restoring remnant vegetation health, and recovery of Black box trees. The wetland was re-flooded in 2004, further improving tree health. Four years after the second watering, Neil Bull reported that 'the vegetation is still flourishing'.

Watering the wetland at Union Plains highlighted some of the difficulties with the program. While securing acceptance of the need to provide water for wetlands was not easy in the local community, the Bulls observed that 'as the initial response to the flooding occurred within days and increased over the period of inundation, the level of excitement and feeling of warm satisfaction experienced by us was of the highest order. The speed and diversity of these responses make projects of this kind extremely effective for biodiversity education'.

Lower Murray Darling area

In the Lower Murray-Darling area, close to where South Australia, Victoria and New South Wales meet, Nampoo and Cliffhouse stations front the Murray River. However, the lack of natural flooding had been detrimental to the health of the riverine vegetation and water quality. The wetlands on the two properties were the first wetlands in the Lower Murray region to receive water under the program to water wetlands on private properties.

Red gums are looking healthy again

Paul Cohrs owned the 1,300-hectare Nampoo Station southwest of Lake Victoria. In 2004, he explained to the Working Group that the previous owner who lived on the property her entire life had never seen the billabong on the property completely dry until 1996. In 2004 the billabong received 170 megalitres of water with a further 240 megalitres in 2006. Cohrs said there had been huge benefits in putting the water into the billabong. 'The River Red gum trees, up to 80 feet high, were dying, but now after two waterings, they are looking healthy again'. Cohrs also saw the return of the waterbirds, wildlife and frogs. He said that having the environmental water was 'an interim band-aid measure we needed to keep the system ticking along until we get the rains again'.

You could hear all the frogs croaking

About half of Cliffhouse Station's 250 hectares consisted of River Red gum floodplain interspersed with stands of Black box trees. The property had been in Mick Graetz's family for more than 50 years but the wetland had been dry since 1991. The four-hectare wetland received 50 megalitres of water in March 2006, drying up by Christmas. Graetz described the response as 'amazing - the birds have come back, there are swans, ducks … virtually all the waterbirds. The noise from the frogs and the crickets is unreal. The first night, after the water started going in, you could hear all the frogs croaking, something I hadn't heard for years. And the water brought the wildlife back'.

In 2007, a seven-hectare wetland received 48 megalitres of water, transferred from the Murray River by the Working Group's new 12-inch pump. A low retaining bank was also built to ensure the water remained in its allocated site.

Working Group project officer, Anna Chatfield, monitoring the results of watering the wetland at Cliffhouse Station

An early response to watering a degraded wetland on a private property

Outcomes from watering private wetlands

The four-year program of watering wetlands on private property delivered a total of just over 74,000 megalitres of environmental water to 215 wetlands covering just over 67,000 hectares along the Murray, Edward and Lower Murray Darling rivers. As well as the 150 landowners, the project collaborated with Aboriginal groups; irrigation companies; government agencies; and catchment management authorities. Vegetation, particularly the dominant River Red gum trees which had been showing signs of decline, responded positively to the watering. Monitoring demonstrated a vast improvement in vegetation health as well as the number and range of animals, water birds, frogs, reptiles and water plants in the wetlands.

Before the project, there was little recorded information on watering wetlands on private land in the Murray Valley. While the project's main aim was to reinstate healthy environmental functions to wetlands, a secondary aim was to start building a database of information about wetlands to better monitor the impacts of more natural wetting and drying regimes. While it was impossible to reverse the main causes of wetland decline, the watering reduced the impact through targeted water delivery. It was also possible to overcome other contributing factors such as livestock grazing by providing fencing and alternative watering supplies.

A program was designed for each wetland to deliver water under an agreement with the landholder, taking into consideration local conditions or potential impacts such as salinity or sulfidic sediments. Each agreement included an understanding of the purpose of the watering and the permitted stock grazing. Revegetation plans, using advice from the relevant catchment management authority and access to the site for monitoring, were also negotiated on an individual basis.

The co-operation of the irrigation companies was vital to the planning and implementation of the project as they received the initial expressions of interest from landowners and assessed them against local groundwater maps. The irrigation companies also delivered the water through their infrastructure and monitored water use. Landholders contributed by excluding stock, arranging and installing fencing, upgrading infrastructure and managing the delivery of water.

Monitoring

Monitoring demonstrated a vast improvement in vegetation health and the wildlife that used the wetlands. The mature River Red gum trees showed an increase in cover and extent of foliage. In most of the 21 wetlands that received water between 2001 and 2004 (many of which had not been flooded for up to 30 years), re-watering resulted in a

decrease in the number of terrestrial plants present with a significant increase in cover by wetland plants. No increase in the number of wetland species occurred, but whether this was due to natural variation or species loss is unknown.

The aquatic vegetation at various wetland sites provided habitats for waterbirds and amphibians (seven different frogs were recorded at one wetland). The Lower Murray-Darling wetlands provided critical refuge habitat for the endangered Southern bell frog with male and female adults observed in reasonable numbers at one of the watered sites. Numerous aquatic and semi-aquatic plants, macro invertebrates and frogs were observed at one wetland not watered since 1995.

The resilience of wetland plants

Wetlands project officer, Trish Alexander, reported on the 'many positive responses monitored through this project. Trees started to produce new growth and some started to flower. This leads to the possibility of seed being dropped and, with the residual moisture in the soil, regeneration may occur. The increase in abundance of plants and the emergence of new plants after the wetlands received water was remarkable with some plants having a 100 percent increase in abundance'. Alexander said that one of the most positive results of this project was finding plants that were not identified before watering but which were quite abundant after inundation. 'This was a good indication of the resilience of wetland plants and gives us the knowledge that the seedbank of these plants and others will be renewed'. Monitoring also found that as the period of inundation increased, so also did the number and abundance of wetland plant species. An added bonus was that the number of introduced plant species declined.

The response of birds was also positive with 140 species recorded during the monitoring. At most sites, waterbird, shorebird and woodland bird numbers increased after watering. Resident and migratory shorebirds such as Latham's snipe and Black-Fronted plovers favoured the mudflats while Black-Tailed native hens occupied the lignum bushes at the water's edge. Woodland birds seen included species considered to be in decline such as the Red-Capped robins, Chestnut-Rumped thornbills and Jacky winters. Nine bird species recorded were listed under the NSW Threatened Species Conservation Act, and of these, four were considered threatened species under national legislation.

Lessons learnt

There were a number of important lessons learnt from watering private wetlands. These included:

- It was possible to deliver environmental water using existing irrigation infrastructure and pumps.
- Wetlands that had been isolated from their natural water sources for up to 30 years, responded with positive ecological outcomes.
- Varied responses were possibly related to previous management and current climatic conditions.
- Consecutive watering events of wetlands greatly improved tree condition and helped establish a diverse and abundant understorey community. River Red gum trees showed greater benefit when watered at least two to three times in short succession.
- The costs, permits and time involved increased the complexity of watering wetlands.
- The support of landholders and irrigation companies was crucial.
- Management of wetlands improved through landholder action and participation in the project.
- Monitoring was essential.
- The project suggested that to maintain Black box wetlands, drying periods should not exceed 10 years.

Global award

In 2009, the Global Restoration Network awarded the Wetlands Working Group a place in the *Top 25 Australasian Ecological Restoration Projects*. The award was selected following a search for the most outstanding restoration projects in Australia and New Zealand that might inspire and encourage restoration across the globe.

A real landscape changing event

In 2012, long-time Working Group member, Judy Frankenberg, said in a media interview that in her opinion 'the watering project was the best thing that the group did'. Frankenberg said that wetlands on private properties were part of a landscape that was becoming almost extinct in an area that, before white settlement, used to be a really diverse wetland landscape. 'It was wonderful for those landholders because something good happened. Individually, each small wetland wasn't that significant but collectively they were. It was a real landscape changing

event which also changed ideas and attitudes amongst the landholders. It was wonderful how the wetlands came back after being dry for so long'.

By 2010, the use of environmental water was becoming more prevalent in the Murray-Darling Basin and the Working Group's model of watering wetlands on private property was becoming more widespread. Organisations were contacting the group for advice on how to water wetlands. Mobile irrigation pumps to deliver environmental water were also becoming a more common practice. The group's experiences with the program were also being incorporated into large-scale environmental water projects such as the Murray-Darling Basin Authority's *The Living Murray*.

Andruco Lagoon (near Ellerslie) was the first wetland on private property to receive environmental water along the Lower Darling River
(Photo courtesy of Sascha Healy, NSW Office of Environment & Heritage)

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MONITORING FROGS

In 2008, Sascha Healy joined the Wetlands Working Group for 12 months while project officer, Paula D'Santos, took maternity leave. Prior to this, Healy had been studying frogs in wetlands at Charles Sturt University in Wagga Wagga. Her initial activities with the group involved watering the feeder creek into the Gol Gol Lake and Andruco Lagoon near Ellerslie (north of Wentworth - see map on page 110). The lagoon was the first wetland on private property to receive environmental water in the Lower Darling.

Not content to baby-sit projects

However, Healy was not content 'to be left on my own at Gol Gol to baby-sit projects – I wanted to make a difference'. Her big opportunity came when she 'looked through the group's wish-list (the strategic plan) and noticed Wee Wee Creek'. This creek is situated near Kyalite, west of Moulamein at the junction of the Murray and Wakool rivers (see map on page 110). The creek was one of the 14 wetlands listed for rehabilitation by the NSW Government's original (but short-lived) wetland working group in 1990. During high river flows the creek can sometimes connect the Murray and the Wakool rivers, but by 2002 it had completely dried up and stayed dry during the next five years of drought. The creek was known to support catfish, Regent parrots and threatened Southern bell frogs.

In late-2008, Healy met with a very sceptical landowner on Wee Wee Creek who would only comment that 'she seemed to be promising the world but probably won't deliver anything!' Healy recalled years later that the creek 'was small fry in terms of wetlands and the surrounding landscape' but having just watered the creek into Gol Gol Lake and the Andruco Lagoon, I was confident I could water the wetland'. She took the group's mobile pump to Kyalite and set it up to water the wetland over a two-month period. The landowner suddenly became very enthusiastic, supplying fuel for the pump and refuelling it even on Christmas day.

I was good on frogs

The watering put 2,500 megalitres of water into Wee Wee Creek and was the largest environmental watering project undertaken by the Working Group at that time. Healy also set up a monitoring program to

look at frogs, water quality and birds. This was the first time that frogs were monitored by Working Group staff and was a skill that Healy had mastered during her university job. Healy later recalled 'I introduced the group to Sascha's version of frog monitoring which continued with the program of watering wetlands on private property. Trish was good on plants, Emma was good on birds, I was good on frogs!'

Excited as a school kid

In her report to the Working Group executive about the watering, Healy wrote that the landowner she worked with to water Wee Wee Creek 'was as excited as a school kid'. In 2017, she recalled that his sceptical view of the group being yet another 'all talk and no action' organisation, had been dramatically reversed.

Despite being given a 12-month contract, Healy only worked for the group for about eight months. In July 2009, along with the other Working Group staff, she was offered full-time work with the Department of Environment and Climate Change (now the NSW Office of Environment and Heritage). Healy later recalled that the group's focus on working with people in on-ground activities, always looking for partnerships and giving people ownership was a strong and continuing feature of the Wetlands Working Group. She was also delighted that her decision to monitor frogs was vindicated when the Office of Environment and Heritage put on a staff member devoted specifically to Southern bell frogs as part of the *Save Our Species* program.

A Southern bell frog

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MANAGING STAFF

I myself will take up arms. I myself will be your general, judge and rewarder of every one of your virtues in the field.

Queen Elizabeth 1*, (1588)*

The ease with which new staff member, Sascha Healy, used her initiative to tackle the watering of Wee Wee Creek with little supervision, was a reflection of the way that the Wetlands Working Group's senior project officer, Deb Nias, chose and managed her staff.

From her appointment in 2000 as the senior staff member, Nias adopted what she described as a 'go away and do it, please' leadership style, always selecting staff that showed initiative, could work with limited supervision, and were prepared to take risks. Of great help to Nias's leadership style were the group's strategic plans, developed regularly by the executive. The plans, revised every three or four years, laid out the group's philosophy, mission and priorities as well as a list of wetlands requiring research and rehabilitation. Once they were inducted, new staff were expected to study the strategic plan and take initiative in addressing wetland priorities. As Healy discovered in the first month of her employment in 2008, the plans made it relatively easy.

Staff always rose to the challenges

Managing staff was not always easy with Nias's staff based in offices hundreds of kilometres apart in Albury, Deniliquin and Buronga. Staff also had to mainly work by themselves, often in remote wetlands, without (initially) the benefit of mobile phones or global positioning systems. Staff were also expected to engage with landholders, many of whom were not used to negotiating or working with females.

In 2017, Nias reflected that over the years, her staff had 'always risen to the challenges offered'. Even though many of the staff took up positions with the Office of Environment and Heritage in 2009, it was a great source of pride to Nias that those staff were carrying out wetland watering projects trialled by the same staff between 2001 and 2008 when they were employed by the Working Group.

Nias was happy to undertake any field work herself and never asked staff to do what she wouldn't do or hadn't done herself. She also rewarded her staff with freedom, loyalty, training and a commitment to their welfare. She also encouraged the staff to take time to reflect, think

problems through and be innovative. Nias was also proud that the Working Group gave many young women a good start in life for other positions, some very senior.

Professional development

To ensure that the group's staff were well-prepared and safe in their work, Nias offered a range of professional development and training activities for them each year based on their particular activities. The group's annual reports between 1999 and 2009 featured a page of such activities that ranged from first aid, fire safety, and managing vehicles to conflict resolution, fish handling and fund-raising. Knowing that most staff could not stay with the group once their project was completed, Nias also ensured that they were well-prepared for future employment. Professional development therefore included courses on water stewardship, workplace health and safety, cultural heritage, planning, facilitation and grant writing. As the group changed from a committee to a company in 2009, courses on governance, the role of company directors, anti-discrimination and mental health were offered to staff members.

The commitment of Nias towards the welfare of her staff came into sharp focus between 2004 and 2008 when she repeatedly asked the Working Group's executive to consider the reality of likely changes to government departments and catchment management authorities that would impact on staff. She prepared numerous discussion papers on the likely changes but the executive, unsure of the future, were in no hurry to make decisions. Only after staff were offered permanent positions with the new Department of Environment, Climate Change and Water in mid-2009, was Nias satisfied that she had done the best she could.

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LEGACY OF MANAGING ENVIRONMENTAL WATER

How the Wetlands Working Group used the NSW Government's AEW water allocation between 2000 and 2008 depended very much on annual environmental and weather conditions. At the start of each year, the group tried to predict what was likely to happen in the catchments over the next six to nine months and identify as many wetland sites as possible that could benefit from environmental water along the Murray, Edward, Wakool and Lower Darling rivers. The projects were prioritised and water allocated with some held in reserve for other projects.

One of the big unknowns each year was whether or not there would be a flood. If a flood event occurred, the group's first preference was to put additional water into large wetlands to enhance the flood and secure greater environmental benefits. If this was not possible, the group's second preference was to divert water into smaller wetlands. The third option was to trade any residual water once the projects were finished, helping the group to stay financially sustainable.

Using an ecologically sensible framework

In 2013, chief executive officer of the Working Group, Deb Nias, explained that the group tried to use the water 'in an ecologically sensible framework. In the upper catchment area (from Albury to Balranald), spring was the best time to provide water for wetlands as this mimics a more natural wetting pattern. However, further downstream in the Lower Murray Darling region, flooding could often happen in summer or early autumn'.

Because of the Millennium Drought and the severe conditions throughout the Murray-Darling Basin between 2000 and 2008, it was several years before a full AEW allocation was available for use while in some years, no environmental water was available. Nonetheless, up until 2008, the group was very successful in achieving its aims, averaging about 40 projects each year.

Reports

As well as operating a successful and well-documented program, the nine years also produced a series of reports. These included operating and business plans as well as 23 formal reports on watering wetlands. There were also four reports from other organisations on the use of the AEW water. The operation of the first four years was detailed in a formal report to the NSW Government in 2005: *Adaptive Environmental*

Water in the Murray Valley NSW, 2000-2003. The second and final report on the AEW water, *Adaptive Environmental Water Use in the NSW Murray Valley NSW, 2004-2008,* was completed in 2008.

More restructuring of government agencies

As 2008 and the final year of managing the NSW Government's environmental water drew to a close, there was a significant restructuring of land and water agencies in New South Wales. A new Department of Environment, Climate Change and Water was given the role of managing environmental water and took over the Working Group's 32,000 megalitres of AEW water. As part of the restructure, the new department also agreed to employ the five Working Group staff who had been managing the AEW water and watering wetlands on private property.

Four of those staff, Paula D'Santos, Emma Wilson, Sascha Healy and Trish Alexander have remained in the department, now called the Office of Environment and Heritage. The group manages a large number of wetlands on public land and private properties between the Hume Dam and South Australia's border, along the Great Darling Anabranch and the Darling River south of the Menindee Lakes. Many of the priority wetlands identified by the Working Group since 1992, have been managed by this team since 2009 although not all wetlands have final management plans. The group draws on advice from two board members of the Murray Darling Wetlands Working Group Ltd as well as the group's wetland database. The four staff members also work in conjunction with a specialist team within the Office of Environment and Heritage that focusses on threatened and endangered native plant and animal species, many of which rely on the health of wetlands for their life cycles.

The final chapter

What at the time was seen as the final chapter of managing the NSW Government's environmental water was played out in the Sydney offices of the NSW Treasury in 2009. While the NSW Government had allocated the 32,000 megalitres of water to the Working Group to improve wetlands and was very happy with the outcomes of the eight-year project, there was some concern as to whether managing the water had met NSW Treasury guidelines. With changes to the state's land and water agencies, senior management in the new Department of Environment, Climate Change and Water wanted 'to tie up a few loose ends'.

The Working Group's chair, Howard Jones, met in Sydney with treasury officials who were curious about the millions of dollars in the group's

bank account. The money had been raised from trading some of the AEW water between 2000 and 2008, as agreed to under the water allocation. Each sale had been authorised by the NSW Government but now that the AEW program was concluded, the treasury requested that some of the accumulated funds be returned. An agreement was reached whereby about two-thirds of the proceeds from the water sales were returned to the treasury and the Working Group retained one-third.

In reality, there was no 'final chapter' as the eight-year program of managing the NSW water, with all of the knowledge and experience gained, laid the groundwork for a new program that started in 2010. It was based on how the NSW water was used but took the Wetlands Working Group to new levels of wetland rehabilitation.

Between 2000 and 2008, the Wetlands Working Group provided water to a range of private and public wetlands, some of which had not been inundated for over 25 years

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PROGRESS REPORT: 2007

By 2007, the Wetlands Working Group was running eight major programs. They included managing the NSW Government's environmental water (which included watering private wetlands); the Rehabilitation and Investigation Program and the Wetlands Incentive Scheme; finalising the Murray River wetland database; research and development activities; extension; partnership projects with other organisations; and monitoring.

The Rehabilitation and Investigation Program and the Wetlands Incentive Scheme were exceeding expectations and engaging community groups and researchers in a growing number of projects. However, with the increasing funds available for the community through the Murray and Lower Murray Darling catchment management authorities, there was a need to review the program to prevent duplication and add value.

The Murray River wetland database was almost finished, and research into managing acid sulphate soils in wetlands was continuing. Priorities included the rehabilitation of Lake Caringay; implementing the Thegoa Lagoon Management Plan; and documenting the environmental responses to management actions in all of the group's projects.

The group was starting to consider forming a corporation and a trust. Apart from a few projects, most of the group's funds were derived from trading some of its' environmental water, a situation that was considered unsustainable by the executive. The group had a regular electronic newsletter; published annual reports, and prepared annual operating plans to manage the NSW environmental water. The group maintained and enhanced its network of government agencies, non-government organisations, Aboriginal and community groups, researchers, state and federal water agencies. The group continued to contribute advice and expertise to community, government and catchment organisations and committees.

The group employed four temporary employees, administered through two catchment management authorities. Members and staff were giving presentations at conferences, workshops and field days and contributing to state and national field days, newsletters, scientific papers and publications.

In September 2007, in recognition of its achievements, the Working Group won the prestigious Thiess National River*prize.*

PART SIX

The Company and the Trust

Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that ever has.

Margaret Mead

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THE NATIONAL RIVER*PRIZE*

By 2007, the co-operative efforts of landholders and the Wetlands Working Group were making a big difference to the health of wetlands in the Murray, Edward, Wakool and Lower Darling catchments using a range of strategies, community engagement and research. A particular success story had been the program of watering wetlands on private property. The group had also initiated a range of community-initiated projects to benefit wetlands.

It inspires me

In 2007, in recognition of its achievements, the Working Group won the prestigious Thiess National River*prize*, managed by the International River Foundation. The award was presented at the National River Symposium held in Brisbane during September 2007. As well as a cheque, the group received a trophy in the shape of a traditional Aboriginal coolamon, a shallow container used to collect and carry food, water or small children. A follow-up community event to celebrate the award was held at Deniliquin in February 2008, attended by 80 people who had contributed to the group's win. Chair of the group, Howard Jones, said he was particularly pleased that landholders, who he described as 'one of the key ingredients' of the group's achievement, had travelled the length of the Murray River to attend the celebration.

Jones praised the landholders for taking up the opportunity presented by the group to be involved in the program to water wetlands on private land in the Murray and Lower Darling catchments. Jones said that winning the award was a testament to its emphasis on, and the value of, community involvement as well as the vision of the NSW Government in allowing a community group to manage environmental water.

Also attending were representatives from the International River Foundation. Chair, Martin Albrecht, said 'It inspires me to see the tremendous energy of people working together as you are. As you go on your journey the things you experience with private landowners, government agencies and everything else, the chances are that somewhere else, not only in Australia but overseas, other people are experiencing the same challenges you've got'.

It had been able to engage people

David Harriss, now the deputy director general of the NSW Department of Water and Energy, outlined the history of the Working Group. Harriss observed the outstanding success of the group was because it 'did actually get up and do something to improve wetland health. It demonstrated many times it could be done without any adverse impact, while having a positive impact, on the social and economic gains of the area'. Harriss concluded by saying that an outstanding achievement of the group was how it had been able to engage people and communities.

At the celebration, executive manager of the International River Foundation, Amanda Bigelow, pointed out that 'Nature is telling us a lot of things, a lot of things are happening …and it is time for us to be dynamic. A number of people here are stepping-up to the mark….it is also a great time for innovation which the Murray Wetlands Working Group has shown'. Bigelow encouraged the group to share its knowledge and experiences with similar groups in Australia and overseas to help others restore rivers and waterways.

However, the public accolades, smiles for the media and the pleasure felt by Working Group staff and executive members over winning the River*prize,* hid from public view some difficult realities that were going to be challenging for the group in the immediate future. Uncertain times that had been brewing were about to come to a head.

Working Group board and staff members celebrate the *Riverprize*

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UNCERTAINTY

A degree of uncertainty had been developing amongst the Wetlands Working Group since 2005, particularly with the staff. Despite the success of numerous projects, the group's executive continued to delay the development of a plan for the future. This was due to a combination of an increasing number of projects, work pressures, and managing staff. As well as this, decisions on Nias's workload and the staffing options she had placed before the executive over several meetings were put on hold in 2006 until the future of the NSW Government's AEW water was resolved, anticipated to be in late-2008.

At the same time, the NSW Government was exploring options to manage environmental water separately from irrigation water, something that the Wetlands Working Group had been pioneering since 2000. The Murray Catchment Management Authority was interested in taking a leadership role in managing environmental water and it prepared a proposal (in conjunction with several other catchment management authorities) to manage environmental water (the proposal drew on the experiences of the Working Group's environmental water management between 2000 and 2008). This interest was made clear to the Working Group at its executive meeting in March 2009.. The minutes recorded the 'Murray Catchment Management Authority's desire to have a major role in the management of the AEW (water) at a more political level'. The minutes also recorded that a meeting needed to be arranged urgently between the Working Group and the relevant NSW minister to clarify the status of the group's AEW water.

Resolution and new jobs

The AEW water issue was finally resolved in early-2009 after a significant restructuring of land and water departments in New South Wales. Environmental water was to be managed separately from irrigation water in a new Department of Environment, Climate Change and Water. As a result, the new department took over the Working Group's 32,000 megalitres of AEW water, adding it to its own significant water portfolio.

An immediate consequence of this decision was that Nias became concerned as to what was going to happen to her staff who were now facing an uncertain future. However, in mid-2009, the new department agreed to employ the group's entire staff, giving Deb Nias, Paula D'Santos, Emma Wilson, Sascha Healy and Trish Alexander new and

secure permanent positions. While the five employees all mourned their departure from the Working Group, Nias viewed the arrangement as positive, giving the staff security and allowing them to utilise and expand their skills to manage a very much larger portfolio of environmental water of which wetlands would be an important beneficiary.

A major 'down' for the group!

In his 2008-09 annual report, the Working Group's chair, Howard Jones, saw the changes as providing the group with wider opportunities for managing environmental water and influencing water plans in NSW. However, in his final annual report in 2017, Jones admitted that the loss of the AEW water and the relocation of the staff was a major 'down' for the group.

In their new roles, Nias, D'Santos, Wilson, Healy and Alexander were asked to design a program of watering wetlands on public land and private properties between the Hume Dam and South Australia's border, along the Great Darling Anabranch and the Lower Darling. Establishing the process was not difficult but Nias soon started to realise that the freedom of the Working Group with its opportunities to be innovative and creative were rapidly disappearing. As well as this, Nias's ever-increasing workload since 2006 and the onerous reporting and accountability demands placed on her were starting to exact a toll and she resigned from the department.

Years later, reflecting on these events, Nias explained that it was 'always my desire to remain with the Wetlands Working Group to engage in the cutting edge of wetland management. Thus I resigned so I could work directly for the group again, particularly as the executive had agreed that the group could be managed from any location within or just outside the Murray-Darling Basin'. Nias and her family moved to Adelaide.

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FORMING A COMPANY

During 2009, while some of the uncertainties of the previous two years were finally being addressed, the Working Group established a new company. The idea of forming a company had first been raised six years earlier during an executive meeting when the senior project officer, Deb Nias, tabled a briefing paper on such an arrangement. Executive members expressed some nervousness over the proposal, particularly the implications of company directors being sued. However, executive member, Ian Davidson, commented that it 'looks like there is no choice'. Nias reminded the meeting that Wetland Care Australia (with similar objectives as the Working Group) had recently become a company with a smooth transition. The meeting resolved to seek more advice on the idea.

At the same time, the executive started taking an interest in forming a trust to further its aims. In February 2004, the executive had discussed the proposed establishment of regional water trusts in NSW, the aim of which was to improve water management for irrigators and the environment. Irrigators would receive water security and reliability in exchange for finding efficiencies and paying a levy to the trusts which could then purchase water for environmental flows. Several key environmental groups were not supportive of the concept and a briefing paper written by Nias for the Working Group's executive pointed out that 'there are clearly pros and cons' but the 'concept is still muddy'.

Another crossroad

In early-2007, the Working Group was again discussing its future. An executive meeting in February recognised that while the group's management of the NSW Government's water continued to be very successful, the annual water allocation could be coming to an end. The meeting's minutes recorded that 'many groups are now doing some of the work that was traditionally left up to the Working Group'. Catchment management authorities were offering incentives for wetland projects and a new program, *Water For Rivers*, was starting to do some of the work carried out by the Working Group but with much more water and a larger budget. (The Working Group secured funds from the *Water For Rivers* program to develop a management plan for the Forest Creek wetlands).

In considering its future, the group discussed whether to continue providing on-ground and management expertise for wetlands to

catchment management authorities; revisit past wetland sites and see what differences had been made; or 'identify areas where the group can retain its leadership role in wetland management'. The meeting acknowledged that climate change was an emerging challenge along with a recent announcement by the federal government to invest $10 billion in managing natural resources. The group was also looking to expand its operations along the Murrumbidgee River.

The meeting also acknowledged that the group would soon be 'operating on a skeleton staff' as two project officers were terminating their employment while another staff member was commencing maternity leave. The minutes of the meeting did not report on any outcomes from this discussion except that two executive members offered to prepare a paper 'on whether the Murray Wetlands Working Group can hold a license and purchase water'.

More than just wetting things on floodplains

Later in 2007, the Working Group's chair, Howard Jones, urged the executive to again consider forming a company. While the group had a healthy bank balance, Jones felt that it also had a much higher profile thanks to the River*prize*. Jones was keen for the group to build on this profile 'as a means to a greater end, rather than just wetting things on floodplains'. He felt the prize would make the group more attractive for businesses to engage with and invest funds in wetland rehabilitation. Jones also wanted to improve the group's decision-making processes and governance in what he saw as an approaching era of rapid change to land and water management in the Murray-Darling Basin.

Some of Jones's views had been formed following his discussions with The Nature Conservancy in the USA. The Nature Conservancy, a charitable organisation, aims 'to conserve the lands and waters on which all life depends'. The conservancy pursues non-confrontational and pragmatic solutions to conservation opportunities while working with communities, businesses, governments and not-for-profit groups. Founded in 1951, the conservancy works in 69 countries and has protected more than 48 million hectares of land and thousands of kilometres of rivers worldwide.

Jones had also met with Kathy Ridge, the principal of Ridge and Associates, a legal firm in Sydney with a strong interest in environmental issues. Born in Wollongong and raised in New Guinea, Ridge developed a life-long commitment to ensure that culture and nature were protected and conserved. She began her career as a water micro-biologist but gained a law degree and started working with Aboriginal elders to protect parts of coastal NSW from mining. Ridge introduced Jones to Bruce Donald, a barrister who provided the group

with legal advice on forming a company and trust. Donald explained that with deductible gift-recipient status, a trust had the potential to attract corporate and philanthropic funds to invest in wetlands, reducing the group's reliance on government grants and making it more financially sustainable into the future.

A corporation or a company

In February 2008, the Working Group's senior project officer, Deb Nias, presented a draft four-year strategic plan to the executive which included new directions and anticipated outcomes. During the meeting, the executive discussed advice it had received from a legal firm, recommending that the Working Group become a corporation, seek listing as a not-for-profit charitable organisation and obtain approval to receive tax deductible donations. The meeting resolved to clarify the roles and responsibilities of board members and whether the group could become a charity in its own right without having to form a corporation. The meeting also endorsed the setting up of a trust to make use of the National River*prize* monetary award and requested it be included in the group's new strategic plan.

Within 12 months, the group's discussions, progress and achievements over the previous six years plus a great deal of new-found confidence and capacity, resulted in a profound decision and significant new direction. The decision to form a company was first recorded in the minutes of the Working Group's meeting at Jindabyne in March 2009. The minutes noted that the 'Murray Wetlands Working Group move towards Murray Darling Wetlands Ltd is underway – discussion referred to directors … in a separate meeting'. The values of the new company were innovation; accountability and transparency; equity; integrity; a community-focus; and commitment to wetland restoration. The company's new name acknowledged the organisation's ever-increasing work in the Lower Darling catchment. However, the meeting decided not to establish a trust.

A new era

In his 2009-10 annual report, the chair, Howard Jones, noted that establishing the company heralded a new era 'and looks to a new future'. Jones made it clear that the new company would 'operate differently (from the Working Group) with more strategic partnerships with governments, corporates and communities and with a business operation and governance procedures as required with any good environmental organisation … the name may be slightly different but the passion and people who strive to bring sound management of wetlands based on science and community involvement remain the same'.

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RENEWAL

In May 2009, the Working Group registered its new not-for-profit company as Murray Darling Wetlands Ltd. The company, limited by guarantee, became the business arm of the Murray Darling Wetlands Working Group. The Working Group continued to provide technical advice on wetlands to the company and was the means of providing the new organisation with funds.

The minutes of the Wetland Working Group of 19 August 2009, recorded that the new company was 'now fully operational with 52 members. Deductible gift-recipient status has not been granted but … lawyers advise final approval will occur when the (Commonwealth) Minister for the Environment signs off'. The company's address was 491 Smollett Street in Albury, the same as the organisation's auditor.

A somewhat strange experience

Within days of resigning from the NSW Department of Environment, Climate Change and Water and moving to Adelaide, Deb Nias was appointed by the board of Murray Darling Wetlands Ltd as its chief executive officer. The part-time and one-year position was confirmed at the company's first board meeting in Albury on 10 September 2009. It was the first time that the organisation had employed someone in its own right (since 1992, all staff, had been employed through a government department or a catchment management authority).

The 2008 to 2009 period had been a very emotional time, particularly for Working Group staff. The uncertainty about the group's future, the final decision on the AEW water, the employment of the group's staff by a NSW Government department, Nias's resignation followed by employment with the new company, had not been an easy time. But it did have a positive outcome. However, some years later Nias reflected that being a chief executive officer of the new company was 'a somewhat strange experience. I found myself the CEO of an organisation with no office, no staff and no projects, but with a substantial bank account!'

Also, by 2009, the organisation had developed a solid reputation for pioneering and implementing wetland research, rehabilitation, water management and community engagement. It had received some high-profile awards and developed working relationships and networks with communities, local, state and federal government agencies. It also had a well-recognised brand – its name.

With the board of the new company, most of whom were familiar faces, Nias had the confidence and determination to rebuild the group into a totally independent organisation. 'My challenge was to turn the group into a company, revive and reinvigorate it'.

Administrative help

Nias's first task was to get help with managing her office. Following a suggestion from a Working Group member, Nias met with Ray Najar, the general manager of the Murray Darling Association. The 55-year old association was a local government not-for-profit group based in Adelaide and Albury with an interest in natural resource management across the Murray-Darling Basin. The association agreed to provide the new company with employment and salary services, ensuring that Nias no longer had to undertake mundane and time-consuming day-to-day administrative duties. The association purchased and managed the company's first vehicles and mobile phones, and for several years, Nias and her staff shared office facilities with the association in Adelaide and Albury.

This arrangement turned out to be mutually beneficial to both organisations and continued until 2015 when the Working Group took over the Albury office lease from the association and invited the newly-established Petaurus Education Group to share the facilities. In 2016, both groups moved to new and larger offices in David Street, Albury.

New project

The next challenge for Nias was to find some projects as most of the group's projects were finishing and core funds were becoming depleted. In 2012, Nias secured funds from the Commonwealth Government and Murray Local Land Services (based in Deniliquin) to undertake a six-year project to rehabilitate 2,000 hectares of wetlands across the Murray catchment to store carbon. Nias later described the project as 'a good start and an excellent opportunity for the new company'. A few months later, Nias employed Sarah Ning to work on the project. Based in Albury, Ning had previously worked for Victoria's North East Catchment Management Authority as an environmental water reserve officer and a wetlands waterways project officer (see chapter 46).

Next, Nias sought to divest herself of what was going to be some onerous administration and governance duties that had occupied so much of her time between 2002 and 2008. She acknowledged that building the organisation into an effective company would require skills that she lacked. In February 2013, Nias employed Rhonda Sinclair of Bellbridge as the company's first program manager. Sinclair previously worked for 23 years with the Murray-Darling Freshwater Research

Centre in Albury-Wodonga. She also worked briefly at North East Water in Wodonga as a part-time governance officer.

Sinclair's role was to develop standard operating and governance procedures for the new company; manage projects; provide an oversight of quality control for project outputs; manage a website and database; and formulate a communications plan and marketing strategy. Sinclair also managed the company's first watering project (see chapter 44). These two staff appointments finally freed Nias up to think about securing a sustainable financial future for the new company.

From the left: Sarah Ning, Deb Nias and Rhonda Sinclair

The company secretary

The six members of the company's new board were Howard Jones, Judy Frankenberg, Barrie MacMillan, Vin Byrnes, Ben Gawne, and Roger Good. Jones was elected chair and Frankenberg deputy chair. All except MacMillan had been members of the Wetlands Working Group's executive. MacMillan had a strong interest in landscape restoration, fishing, bird watching and wetlands. He brought years of experience in business, finance and governance as well as board experience with Victorian and NSW catchment management authorities to the new company. He was the perfect choice for the company secretary, a position he held for nine years.

MacMillan played a key role in the transition of the Wetlands Working Group (from mainly managing projects) to a company. This included establishing a range of governance functions involving financial reporting, compliance, strategy and corporate legal procedures. He oversaw these changes until he retired in late-2017 but always felt that 'distance and the growing use of teleconferencing were limitations'. Despite this, MacMillan saw experience, good communication, partnerships and passion as well as strategic planning, compliance and good governance as the successful ingredients of the company in its first nine years. Reflecting on his retirement in 2017, MacMillan saw the company's new environmental water trust as having huge potential. 'However, succession planning, greater diversity on the board and new projects must also be key objectives'.

A merger

At the August 2009 annual general meeting of the Wetlands Working Group, there was a discussion about closing down the group because 'confusion currently exists regarding the Wetlands Working Group and Murray Darling Wetlands Ltd as to what the role is for each out in the community'. The meeting resolved to 'begin the process of consideration of closing the Working Group, legal ramifications and how to bring government members of the (group) into the new company as advisors'.

It was not until the 2012 annual general meeting of Murray Darling Wetlands Ltd, that the board of the company and the executive of the Working Group agreed to merge the two organisations. And in recognition of the history and profile of the Working Group, it was resolved that the merged organisation would be named Murray Darling Wetlands Working Group Ltd. As Nias said later, 'it was the recognition of the importance of the words in our original brand name that was going to be vital for our future'. As reported in the company's 2014-15 annual report, the final chapter of the original 'NSW Murray Wetlands Working Group Inc was closed with the transfer of the water access license (held by the Working Group) to the Murray Darling Wetlands Working Group Ltd'.

One outcome of disbanding the old Working Group was the loss of Ian Davidson. Davidson had first joined the Working Group in 1996, representing the Australian Conservation Foundation. Through his own business, he had brought a wealth of wetland management experience and knowledge to the group. At the time, he was also on the NSW Government's Environmental Flows Committee for the Murray River, sitting alongside other Working Group members.

During a media interview in 2013, Davidson commented that the Working Group's members 'would regularly meet with and listen to the ideas that landholders with wetlands had and if they had merit, try and give them a voice. We figured they had something to say that we could learn from. That's what I liked'. Davidson also enjoyed dealing with land managers rather than developing policies, stressing 'that's the way it's got to be to effect practical, on-ground wetland management'. Davidson described the group as having 'a lot of talent and practical knowledge of how irrigation and water systems work; some really solid scientists; a lot of mutual respect; and the ability to tread the line between respect in the scientific world through to individual landholders'.

It was Davidson's choice to not get involved with the new company in 2009 because of the obligations of board members and what he saw as potential conflicts of interest between the new organisation and his own business. However, in 2013, Davidson was invited to become a board member of the new Murray Darling Wetlands Working Group Ltd. And in November 2017, he became the organisation's third chair.

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NEW COMPANY, NEW COMMUNICATION

In April 2013, the Murray Darling Wetlands Working Group Ltd published *Wetlands Unlimited*, its first electronic newsletter. The aim of the newsletter was to report on the latest news within the company, as well as an overview of current projects; proposals submitted and events attended. As outlined by the group's chief executive officer, Deborah Nias, 'with a new company name, new logo and new staff, we felt we needed a new, fresh newsletter'.

Riverspace

In order to enhance the promotion of wetlands and the Working Group's activities, a new interactive website was established in mid-2014. Called *Riverspace*, the website was a joint venture between the group and the Australian River Restoration Centre. The aim was to bring together and showcase the significance of Australia's inland waterways and wetlands in a format that was easily accessible by the general community. The concept was the brainchild of Siwan Lovett of the Australian River Restoration Centre and Deb Nias of the Wetlands Working Group. In the 2014 edition of *RipRap*, Lovett and Nias explained that as the two organisations were not-for-profit and independent, they could provide information about Australia's wetlands free from 'many bureaucratic and political constraints other agencies must operate under'.

The *RipRap* article also stressed the importance of *Riverspace* in featuring a range of tourism and recreation ventures that link to rivers and wetlands and allow people to learn about experiences that connect them to these two vital environments. The article noted that there was 'no equivalent website in Australia (or the world) that combines and presents research and practical information on rivers and wetlands alongside other waterway activities'.

The Working Group appointed Dr Suzanne Watkins of Albury to manage and maintain the website on a contractual basis as well as write stories and seek sponsorship. In 2017, Watkins commented that while the website was a great idea and filled a need because there was nothing like it in Australia, securing funding and time constraints 'were on-going challenges'. Until 2017, the main sponsors were the Murray Local Land Services, the NSW Office of Environment and Heritage, the Murray-Darling Basin Authority as well as a number of smaller sponsors. Also by 2017, there were nearly 140 stories on the website, contributed by 29 different organisations.

Watkins was also required to promote Wetlands Working Group activities and achievements through facebook and twitter to attract them to the *Riverspace* website. Again, it was not easy to maintain a regular flow of stories from month to month as well as seek advertising and sponsorship. Watkins commented that it was always challenging and tricky to get sponsorship. 'While everyone says that the website and the associated social media are great and important and willing to contribute stories, they are often reluctant to make any financial contributions for what is primarily a user-pay system'.

Watkins also played a key role in the final stages of the group's wetland carbon project (see chapter 46). In 2016, the Murray Local Land Services contracted the job of administering the project to Watkins. She was also asked to undertake a review of the project and fine-tune an article about the project for a national publication.

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THE TWENTIETH ANNIVERSARY

The 20th anniversary of the organisation, now called the Murray Darling Wetlands Working Group Ltd, took place at the Wonga Wetlands, near Albury, NSW, on 26 April, 2013. It was a modest event but an opportunity for past and present board and committee members, employees, friends and associates of the group to get together, share their stories and celebrate achievements.

Chair of the new company, Howard Jones, was able to report that the new company had started its first project on storing carbon in wetlands and the first business plan for the new company had been adopted. The company's first YouTube video, *Life flowing Back Into Wetlands,* had been uploaded, which included interviews with landholders talking about the benefits of environmental watering.

Jones also reported there had been some movement in creating an environmental trust and that he and the chief executive officer, Deb Nias, had recently travelled to America to investigate water trusts and their potential in the Murray-Darling Basin. The company had also participated in a workshop in Canberra to explore the role and potential of water trusts. In 2017, Nias reflected that the annual reports around the anniversary were 'a little thin', compared to those in the previous 12 years, but she felt that it was to be expected with a new company being developed 'almost from the ground up!'

Delighted with the huge expansion of the group's work

Among those who attended the anniversary celebrations was Paul Lloyd, the Working Group's second project officer. Lloyd was delighted with the huge expansion of the group's work since his departure and the completion of so many initiatives that he started. Lloyd told the celebration that when he looked back 'I like to think I helped the group broaden it activities and take a more strategic approach rather than focussing on a few particular wetlands. Some of this work hadn't been tried before. One of the enjoyable parts of the job was taking the Working Group's ideas and turning them into something real'.

Jones outlined new staff, projects, consultancies and partnerships. He concluded the evening by outlining what he saw as the big challenge ahead 'doing what we have always done - filling in the gaps between the big (water) players and working in wetland sites that are often overlooked, such as sites on private property'.

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AN ENVIRONMENTAL WATER TRUST

Oh there once was a swagman camped in the billabongs,
Under the shade of a Coolibah tree;
And he sang as he looked at the old billy boiling,
'Who'll come a-waltzing Matilda with me.'

AB 'Banjo' Patterson, *Waltzing Matilda (original words -1895)*

The idea of a foundation or trust to hold and manage environmental water was first raised in 1993 when the Wetlands Working Group realised that rehabilitating Moira Lake would result in water savings. Forming a trust to manage some of those savings was seen by the group 'as having merit', including being able to trade some of the water and invest the proceeds in further wetland projects. The idea was again raised in 2004 and 2008 when the group was considering becoming a company. It took another six years for the idea to become a reality.

Ploughing the ground

In September 2007, following the announcement of the River*prize* during the annual river symposium in Brisbane, the Working Group's chair, Howard Jones, and chief executive officer, Deb Nias, shared a Chinese meal with four guests. They included Kathy Ridge, chief executive officer of the Nature Conservation Council of NSW, and Brian Richter, the freshwater ecology director with The Nature Conservancy of America. Founded in 1951, The Nature Conservancy is the world's largest conservation organisation that works in 69 countries.

Most of the evening was spent trying to convince Richter and the conservancy to get involved in an environmental water trust, a topic featured during several sessions at the river symposium. In 2018, Kathy Ridge, recalled that The Nature Conservancy appeared to lack the confidence for such a venture as it believed that it could only own water if it owned land. Despite this, Ridge felt that the discussions 'ploughed the ground' and set the formation of a trust in motion. Richter also recalled that it was the enthusiasm and commitment of Working Group members to 'stay in those discussions' that eventually led to the formation of a trust.

A momentous day

In early-2013, Richter was writing a book on water management in the Murray-Darling Basin and asked Nias to help arrange a tour for him of

the basin. Richter travelled to Australia and first met with Howard Jones at Coomealla. He then met with Nias in mid-February at a wetland watering event hosted by the Nature Foundation of South Australia. Commonwealth water was inundating a wetland on private property on the River Murray floodplain near Loxton. Nias thought Richter would be interested in the event although she also felt he might find it strange 'given that American environmental flows are largely about leaving water in a river, not sucking it out!' After the watering event, Nias drove Richter to the mouth of the River Murray during what Nias later described (years later) as 'a momentous day'.

A concept investors would love

Near the end of the day's trip, Richter asked Nias to explain the role and activities of the Wetlands Working Group and its future. In 2017, Nias recalled being somewhat pessimistic about the group's future at the time as she was still rebuilding the group from the rapidly changing events of 2009. As well as explaining the group's history and its success with wetland research, rehabilitation and community engagement, Nias explained that to be financially sustainable, the new company ideally needed to own at least 1,000 megalitres of water. She explained to Richter that the company's board was hesitant to buy water because of the initial outlay required (about one million dollars) as well as meeting the on-going costs of managing such a large amount of water. In response, Richter asked Nias if she had ever heard of social impact investment.

Richter explained that in America, successful 'baby boomers' were showing an increasing willingness to invest in areas that provided not only a good financial return but delivered a 'social good or community benefit'. He told Nias that her vision for the Working Group was a 'concept that I think such investors would love'. Nias 'was so astounded' by the response that she kept the discussions to herself mainly because she thought she would never hear from Richter and The Nature Conservancy again. But she was wrong!

Richter contacted Nias several months later explaining that he was planning to take the idea that he and Nias had discussed to the board of The Nature Conservancy. His proposal was that the conservancy buy water in Australia for the environment to create benefits for wetlands through social impact investments. Nias informed the board about the idea and Richter returned to Australia, introducing Nias to Rich Gilmour, who had worked in Australia and overseas in sustainability, environmental and business management. Richter and Gilmour later met with Howard Jones, Kathy Ridge and Bruce Donald. Over the next

12 months, the company undertook discussions and modelling on how to develop a trust and a fund to attract investors.

About this time, Rich Gilmour was appointed director of The Nature Conservancy Australia and became much more actively involved in discussions with the Wetlands Working Group. The enthusiasm shown by The Nature Conservancy and Richter led to a shift in attitude by the group and gave it the confidence to once again consider forming a trust and supporting the social impact investment model. However, to bring the whole idea to fruition, two key ingredients were required - a water trust to secure the water, and a fund to attract social impact investors.

Securing a water trust … for one dollar

The first ingredient was secured almost straight away. In early-2014, the Nature Conservation Council of NSW decided to relinquish its water trust fund. The fund was set up in 2007 to receive, manage and trade water. The council's chief executive officer, Kathy Ridge, had been involved in preparing the NSW Water Management Act in 2000 and discussed the idea of a community-owned trust with Howard Jones and Deb Nias from the Wetlands Working Group. Ridge had heard that Jones and Nias were two of 'very few people in Australia who had actually delivered environmental water and made sure you got a good result from that water at the end of the day'.

The passing of the Commonwealth Water Act in 2007 and the establishment of the Murray-Darling Basin Authority provided some confidence that community-owned water trusts might be feasible. However, no water or financial donations materialised for the council's trust as it didn't own land (a requirement for owning water) and the water sharing plans in NSW were suspended due to drought. However, it was the passing of the Water Act that led to the discussions over dinner in Brisbane during September 2007 between representatives of the Wetlands Working Group, the Nature Conservation Council of NSW and The Nature Conservancy of America.

In early-2014, the Wetlands Working Group was approached by Bruce Donald to consider taking over the Nature Conservation Council's trust. Donald felt that the trust had the potential to attract corporate and philanthropic funds to invest in wetlands as well as reduce the group's reliance on government grants, making it financially sustainable into the future. In March 2014, the Working Group bought the water trust for one dollar, launching it in April 2014 as the Nature Conservation Water Fund Pty Ltd (known as the Environmental Water Trust). The aim was to attract private donations to buy and deliver environmental water to wetlands and rivers across the Murray-Darling Basin. The transfer arrangement followed a complex legal process which included the

development of a 10-year partnership between The Nature Conservancy (in America), The Nature Conservancy (in Australia) and the Wetlands Working Group. The Working Group's chair, Howard Jones, saw the trust as receiving 'water donations to apply to wetlands and as part of a long-term strategy to secure the financial stability of the group'. Nias saw it as 'the vehicle that could make our long-term vision come true'.

First of its kind in Australia

The Environmental Water Trust was the first in Australia dedicated to improving social, ecological and cultural outcomes for wetlands and rivers in the Murray-Darling Basin. The aim was for individuals and organisations to donate money, water licences or property to the trust which had deductible gift-recipient status.

The trust's vision was to allocate water to secure the best environmental, social, cultural and economic outcomes by replicating natural wetting and drying phases of basin wetlands. The priorities were wetlands of high conservation value that were located on private land and which were not targeted by existing state or federal government environmental watering plans. The water could also be used to 'piggy-back' on water provided by governments to extend watering of threatened floodplain systems that ordinarily would not receive water.

The balanced water fund

The second key ingredient required was a fund to attract Australian investors. This was put together over two years by the Wetlands Working Group, The Nature Conservancy America and The Nature Conservancy Australia. In October 2015, the Murray-Darling Basin Balanced Water Fund was launched by the three organisations. They chose Kilter Rural, a water and agricultural fund manager, to manage the fund (Kilter had extensive experience in managing water and its constituents were rural). The balanced fund was the first of its kind in Australia with the objective of generating financial, social and environmental returns to its investors.

The balanced fund aimed to acquire water entitlements for wetland rehabilitation and trade water back into agriculture. It was the first of its kind to offer investor-funded solutions to address water scarcity and account for the needs of farmers, communities, cultural heritage and the environment. The fund enabled traditional investors to invest in large-scale and long-term conservation works while also investing in the Australian water market. It was underpinned by specific financial, environmental, cultural and social objectives. This was the social impact investment model that Brian Richter had explained to Deb Nias in 2013.

Within three years, the balanced fund had raised $25 million and bought just over eight gigalitres of water in the southern Murray-Darling Basin. Kilter Rural anticipated that over the life of the water fund, an average of 20 percent of the fund's water entitlements would be donated to environmental watering while 80 percent would be traded to produce a return to investors. By late-2017, the balanced fund had raised $34 million.

The Wetlands Working Group and the two nature conservancies wanted the fund's secured water to be allocated 'in a smart way' but which would obviously vary according to the types of water licenses, state requirements and the seasons. In dry years when water is scarce and irrigation demand is high, more water will be made available to irrigators. In wet years when water is abundant and agricultural demand is lower, more water will be available for wetlands.

A unique agreement

A 10-year agreement, gave the environmental water trust access to water and money raised by Kilter's balanced fund. The specific amount each year is determined by state allocations and the types of licences involved. The trust's watering objectives also include providing Aboriginal social and cultural benefits using evidence-based approaches.

Chair of the Working Group, Howard Jones, saw the final establishment of the trust and the balanced fund after 21 years of consideration, as 'visionary and will stand (the group) in the forefront of environmental watering innovations in the world'. Board member, Kathy Ridge, reflected in 2018 that while 'a water trust was no longer a priority for the Nature Conservation Council, the years of planning, discussions with the Wetlands Working Group and the preparation of a framework finally paid off. The water trust and the balanced fund concept finally found a home'. Most importantly, Ridge stressed that despite the difficult and protracted negotiations, the outcomes were achieved 'with patience and integrity'.

An historic moment in Australia's water reform

The relationship established between the trust and the balanced fund was unique. It provided opportunities to create partnerships between communities and governments to achieve environmental, cultural and social outcomes while also demonstrating that co-operation across many stakeholders and jurisdictions was possible. Of greatest significance was that the new market-based approach built on 23 years of pioneering, research, experience and successful on-ground works by

the Working Group's members who saw it as an historic moment in Australia's water reform process.

New board member

In 2011, Kathy Ridge was invited to join the board of the Wetlands Working Group, an offer which she described as 'a great honour'. Ridge and board chair, Howard Jones, became the group's first representatives on the trust. In a media interview in 2012, Ridge said that the overwhelming value of the Wetlands Working Group was its capacity to bridge the divide between all of the stakeholders to actually get things done in wetlands. She described the company as walking 'both sides of the street with integrity and passion and able to get some things done that other people just couldn't do'. Ridge saw her role 'as adding value to the work the group wants to do. I think the Working Group is open enough to take on some of those things that are seen as too hard and do them well'.

Banksia award

In November 2017, the Murray-Darling Basin Balanced Water Fund received Australia's premier environment prize, a *Banksia Award*. The award recognised leadership and excellence in valuing, measuring, managing and investing in Australia's natural capital with the same rigor that all of society's capital is managed. The award was shared between the Wetlands Working Group, The Nature Conservancy Australia, and Kilter Rural.

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NEW WATER TRUST, NEW PROJECTS

Establishing a water trust was one thing, making it work required the formation of committees, processes and protocols to manage and monitor the water and to ensure the operations would meet commonwealth guidelines for environmental trusts.

In 2014, a committee of five trustees was created with two representatives from The Nature Conservancy in Australia, one from The Nature Conservancy in America, and two from the Wetlands Working Group. A Scientific and Cultural Advisory Committee was established a year later to provide independent strategic direction and advice to the trustees. Chaired by Professor Richard Kingsford of the University of NSW, it was similar to a committee established in 2007 by the NSW Nature Conservation Council but with the addition of two Aboriginal Elders to provided cultural advice. This committee assists in ensuring that any watering achieves environmental and cultural outcomes. To assist in its work, the Wetlands Working Group employed an environmental water manager, using donated money from the balanced water fund. The first to be appointed in 2015 was Rick Webster, based in Deniliquin.

Webster was born in Sydney, completing a university degree in marine biology. He worked in various consulting jobs for the university and NSW Forests until a research project on the endangered Superb parrot took him to Deniliquin in 1985, where he decided to settle down. Webster's final job before joining the Wetlands Working Group in February 2015 was with the NSW National Parks and Wildlife Service.

Webster's job was to prepare, implement, monitor and report on the annual watering plan for the Environmental Water Trust. In the field, he also had to undertake compliance, meter and monitor the watering. Monitoring included photographic records and observations on tree health, wetland plant responses, frog numbers, waterbirds and lignum health.

An annual watering plan

To determine its annual watering strategy, the Murray Darling Wetlands Working Group is required to develop an annual watering program for the trust. This process starts in May by consulting with Kilter Rural whose advice is based on the climate outlook, storage in dams, and initial water allocations announced by the various states. Advice on annual water determinations is sought from the Murray-Darling Basin

Authority. Between May and June, a water plan is completed and sent to the trust which then seeks advice from its scientific and cultural committee. The plan must align with a five-year strategic plan and focus on floodplain wetlands on private property. The plan is also interested in developing partnerships with government agencies that manage environmental water with a focus on private land, supplementing public environmental watering programs and efficient delivery of public environmental water. The completed plan is then sent to the Wetlands Working Group which is responsible for implementing the plan, including on-ground works, compliance, metering and monitoring.

First watering event

In late-2015, the Working Group's water trust was ready to deliver environmental water to four sites, although the water used did not come from the trust. It was however, a good opportunity to put into practice the process the group had developed. This large and complex watering event was in the Carrs, Cappits and Bunberoo creek system using commonwealth environmental water. This area, located 45 kilometres west of Wentworth, was on part of the Tar-Ru Group of Reserves comprising the former Moorna, Wangumma and Lake Victoria state forests (see map on page 174). They lie within the Lock 8 and 9 reach of the Murray River (to the south) and Frenchmans Creek (to the north). The area comprised numerous wetlands which were dominated by River Red gum and Black box trees. The natural wetting and drying of the wetlands had been interrupted by river regulation and the installation of concrete weirs and road crossings over many years. The area's creeks, wetlands and native vegetation were stressed, having received no water since 2006.

This project had initially been discussed in 2010 and aimed to restore flows to connect wetlands, creeks and the river, improve the environment and provide fish passage. The Australian and NSW governments provided financial assistance to undertake seasonal fish surveys; hydrodynamic modelling and conduct a feasibility study on structures and fishways.

In late-2015, the Working Group was given approval by the NSW Government and the Commonwealth Environmental Water Holder to conduct the watering of 11 wetlands. This project was a partnership of the Working Group, the Commonwealth Environmental Water Office, the NSW Office of Environment & Heritage, The Nature Conservancy Australia, the Tar-Ru Lands Board of Management, SA Water, NSW National Parks and Wildlife Service, Western Local Land Services, Moorna Station and the NSW Department of Primary Industries.

The area watered was part of the Tar-Ru Lands of the Barkindji Nation that will eventually be returned to Aboriginal ownership and management. As such, the project partnered with the traditional owners in the watering and monitoring, including implementing an eco-cultural monitoring program to determine both environmental and cultural outcomes.

Water flows into the Carrs, Cappits and Bunberoo creek system

Chair of the Tar-Ru Lands Board of Management, Uncle Rex, watches the creek watering program

Watering commenced in early-April 2016 by siphoning water at five different sites from the Murray River and Frenchman's Creek to deliver 950 megalitres of commonwealth environmental water to inundate about 60 hectares. However, modelling predicted that the water would have an ecological benefit of over 760 hectares. Remote bioacoustics (to assess species abundance and biodiversity), motion-activated wildlife cameras and aerial drones were used as part of the extensive monitoring program. The Working Group's chief executive officer, Deb Nias, later wrote that 'without the trust, these sites would not have been watered. The watering was also a demonstration of the value of the trust and its ability to work well with government, community groups and landholders'.

An extremely challenging task

Although Rhonda Sinclair had been appointed by the Wetlands Working Group as a project officer to develop governance procedures and oversee projects for the new company, she was asked to manage the trust's first watering project (this was prior to the appointment of Rick Webster). Using skills and networks developed in previous jobs, Sinclair undertook all of the planning and oversaw the watering and monitoring activities. Chief executive officer, Deb Nias, noted that the watering event was an extremely challenging task for Sinclair and one that was significant in establishing the group's credibility as a responsible environmental water manager with a new range of partners. The head of the Commonwealth Environmental Water Holder phoned Sinclair at the conclusion of the project to personally thank her. Sadly, Sinclair died in early-2018 after a long battle with cancer. Following her funeral, Nias commented that 'Rhonda's management of the first watering for the new trust was her greatest legacy to the group'.

Second year

The Carrs, Cappits and Bunberoo creek system was to have received a second watering in 2016-17. Despite a great deal of planning, no watering occurred as significant rain fell during the year, resulting in extensive inundation of the creek system. As Rick Webster, the Working Group's new environmental water manager pointed out, 'The rain actually did the job that was anticipated by the second watering'. During 2016 and 2017, identification and scoping of numerous wetlands for watering took place in Victoria along the Murray River, the Lower Darling River in NSW, and the stretch of Murray River between Wentworth and South Australia. The Environmental Water Trust accepted the annual environmental watering plan for 2017-18 which identified the need to water the Wingillie Station and Lucerne Day

properties (both west of Wentworth in NSW) and Yambuna Lagoon (north of Shepparton in Victoria).

The floodplain after watering the Carrs, Cappits and Bunberoo creek system

Wingillie and Lucerne Day

Wingillie Station is a not-for-profit private conservation reserve (the Hazel L Henry Farmland Nature Refuges), situated on an old sheep station (see map on page 174). In 2017, work started to transform the property's degraded wetlands by applying environmental water. Semi-permanent and intermittent wetlands on both Wingillie Station and the adjoining Lucerne Day property supported a range of native plants and animals including waterbirds and the endangered Southern bell frog. However, regulation and infrastructure had resulted in a decrease in the frequency, magnitude and duration of flood events along the Murray River. Up until 2016, most wetlands in the region had received no water for many years, resulting in a deterioration of environmental health. Natural flooding in the spring of 2016 resulted in an improvement of floodplain health. The 2017 watering aimed to capitalise on some improvements in bird, vegetation and animal breeding and to continue the rehabilitation process.

The watering event was another 'first' for the Wetlands Working Group as it was the first time that the group worked with a private land trust and was the first time the land trust had worked with the Commonwealth Environmental Water Holder. The local engagement officer with the Commonwealth Environmental Water Holder, Richard Minterns, was

pivotal in creating that initial partnership. Managing the actual watering was a partnership between the landowners, the Wetlands Working Group, the Commonwealth Environmental Water Office and the NSW Office of Environment and Heritage. The aim was to deliver environmental water to five wetland complexes on Wingillie Station and Lucerne Day. Watering began in early-October involving two pumps and gravity to deliver 105 megalitres of water each day on both properties. Some of the water was channelled through recently rehabilitated irrigation infrastructure that was first installed in 1930.

The Wetlands Working Group's chair, Howard Jones, and the environmental water manager, Rick Webster, played key roles in working with the landholders and volunteers to restore earthen block banks, re-license an old irrigation inlet, and maintain water pumps each day. The managers of Locks 7, 8 and 9 on the Murray River helped to provide the 1,300 megalitres of water by raising Lock 8 300 millimetres higher than normal to push water onto the floodplain. Watering concluded in early-November 2017

Webster carried out regular monitoring throughout the event, recording the health of tree canopies, the condition of lignum and the responses by plants, frogs and waterbirds. Spotted crake were reported using the lignum swamps and a Common greenshank (a northern hemisphere migratory bird) was observed feeding in a creek. Regent parrots were also sighted and were thought to be nesting in nearby floodplain forests.

It's bloody marvellous!

An early and exciting find on 10 October, according to Working Group chair, Howard Jones, was that at least two Southern bell frogs were heard calling that 'afternoon in the complex currently being watered from the old irrigation inlet. This is barely two days after water began flowing into this site'.

Owner of Wingillie Station, Ken Warren, initially described the results of the first watering as 'mildly exciting'. Jones responded that this 'was an understatement. There were at least a 1,000 Grey Teal ducks, six majestic Black swans, Maned geese, the odd Grebe, and I could hear a Shellduck … we are going to achieve wonderful outcomes there ... it is a jewel'. In an interview for the publication, *Wetlands Australia 2018*, landowner Ken Warren, looking 'out across an inundated lignum flat listening to the sounds of Southern bell frogs' said 'It's bloody marvellous!'

First use of the trust's own water

When the Murray-Darling Basin Balanced Water Fund was established in 2015, an agreement gave the Environmental Water Trust access to

some of the water and money raised by the balanced fund. The trust received its first water donation from the fund in August 2017 which was used on the privately-owned Yambuna Lagoon, east of Echuca in northern Victoria (see map on page 174). The watering resulted from a relationship between the landowner, the Working Group, Victoria's Goulburn Broken Catchment Management Authority, Parks Victoria, the Victorian Environmental Water Holder and Goulburn Murray Water.

The 11-hectare nationally significant wetland is situated mostly on private property on the Goulburn River floodplain. The Goulburn Broken Catchment Management Authority was keen to see the lagoon watered because it was a wetland of importance under the authority's waterways strategy. As well as supporting various wetland birds and plants, the lagoon was also home to a number of threatened species including River swamp wallaby grass and Floodplain fireweed. It was the first time the lagoon had received an environmental watering of 57 megalitres to help restore its environmental health.

Members of the Working Group inspect
the Yambuna Lagoon after watering

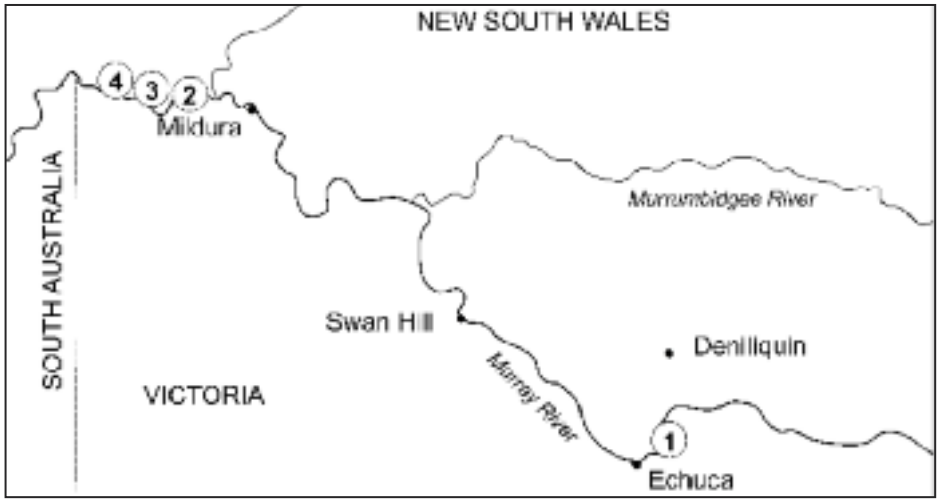
Flow-on public benefits

In a media interview, the owner of Yambuna Lagoon, Jamie McMaster, said that he was delighted to see 'a turtle nest, baby turtles, rare birds and native plants' as the lagoon was 'coming back to life as it flooded'. McMaster said that the water would also have flow-on public benefits as the wetland would feed additional billabongs in a downstream national park. 'The water will flow into those lagoons and the whole of Australia

can benefit from that park and the resources it presents'. Chief executive officer of the Wetlands Working Group, Deb Nias observed that Yambuna Lagoon was the first wetland in Victoria that the group had watered and a great opportunity to start extending the work of the group beyond NSW.

2018-19 year

In May 2018, the Wetlands Working Group Ltd developed its annual watering program for the trust for the 2018-19 year. The plan aimed to divert water into prioritised wetlands and creeks where infrastructure exists or can be constructed. The program was seen as moderate, triggering a 30 percent water donation to the Environmental Water Trust, anticipated to be 2,500 megalitres. However, the volume was dependent on allocation announcements from the Victorian and New South Wales governments. The 2,285 megalitres of environmental water was allocated to five wetland sites, three in Victoria and two in New South Wales. In Victoria, they were the 11-hectare Yambuna wetland on the Lower Goulburn River (100 megalitres); O'Kanes three-hectare wetland near Yarrawonga (50 megalitres); and the 168-hectare Red Gum Swamp near Kerang (741megalitres). In NSW, the recommended watering sites were Wingillie Station (1,310 megalitres); and the eight-hectare Yadabal Lagoon in the Werai Forest (84 megalitres). Watering Yabadal Lagoon and Red Gum Swamp will involve working with traditional owners.



1 Yambuna Lagoon; 2 Capitts, Carrs and Bunberoo creek system;
3 Lucerne Day; 4 Wingillie Station

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PUMPS ON WHEELS

The sweet-scented wattle sheds perfume around,
Enticing the bird and the bee,
As I lie and take rest in a fern-covered nest
'Neath the shade of a kurrajong tree.
High up in the air I can hear the refrain
Of a butcher bird singing his tune,
For the spring in its glory has come back again
By the banks of the Reedy Lagoon.

Anonymous

Between 1993 and 2000, water to rehabilitate wetlands was delivered by gravity. After 2000, as the Wetlands Working Group's management of the NSW Government's water and watering of private wetlands accelerated, it was clear that some sort of mobile pumps would be required where gravity flows were not an option. In the 2004-05 season, mobile pumps were first used by the Working Group to deliver water to wetlands on private property in the Lower Murray Darling area where gravity watering was not possible.

However, hiring pumps that could be moved from wetland to wetland, sometimes over considerable distances, was a very expensive option in 2004. Consequently, in September 2005, the Working Group bought its first mobile pump. The 10-inch pump mounted on a trailer cost just under $6,000 and was able to deliver about 20 megalitres of water a day.

A second pump was then bought to water wetlands in the Deniliquin area. Working Group project officer, Paula D'Santos, named the two pumps *Anna* and *Duncan* after the group's other project officers. Both pumps had 10 four-metre lengths of poly-pipe that could be joined together to make a delivery pipe up to a maximum of 40 metres. The Working Group supplied the fuel, the landowner usually managed the pumping of the water.

The NSW Department of Natural Resources offered to house the Deniliquin pump at its office. One of the first wetlands to be watered with this particular pump was the Wee Wee Creek near Kyalite. The pump operated over two weeks, delivering 2,500 megalitres of water. The activity so excited a local landowner that he supplied fuel for the pump and even refuelled it on Christmas Day.

Three pumps

By 2007, the group owned three mobile pumps, the latest was donated by Western Murray Irrigation in Dareton. The third 12-inch pump was for use in the Lower Murray-Darling region and was stationed at Gol Gol. In late-2005, the NSW Department of Natural Resources sought to use one of the pumps to provide emergency water for stressed River Red gum trees on floodplains where supplying water by gravity was impossible.

At its February 2007 meeting, the group's chair, Howard Jones, reported that the organisation's pumping assets consisted of 'three pumps, two 12-inch, one 10-inch and one 1,000 litre fuel tank'. Jones also reported that all of the equipment had required 'slight modifications to make them more effective'. Over the next 10 years, the group added to these assets. In 2016, the Working Group bought another 12-inch mobile pump from the NSW Department of Primary Industries.

By 2017, the group still had three mobile pumps, complete with pipes, fuel tanks and flow meters. However, joining together 10 metre lengths of poly pipe to water large wetlands west of Wentworth that were remote from water sources was no longer possible. These wetlands needed pipes suitable for delivering water over 100 metres from the mobile pump while also not over-burdening staff or creating unsafe work environments. In 2017, the group's environmental water manager, Rick Webster explained that 'at least 200 metres of pipe was needed to deliver water to deep depressions on two properties'. This meant using lay-flat pipes made of heavy duty flexible plastic that could be rolled up for easy storage and movement.

Searching for the most efficient and cost-effective lay-flat piping, Webster and Jones concluded that the best option was to buy it directly from the manufacturer in China. Jones undertook this task in October 2017 and the 30 centimetre lay-flat pipe was first used successfully to water wetlands on Wingillie Station in late-2017. As a board member commented at the group's 2017 annual general meeting after seeing a video of the new pipes in operation: 'Wouldn't Vin Byrnes (a former board member) have loved to see these pipes achieving something he had always dreamt of!'

Pumping water into Wee Wee Creek

Ken and Anne Warren set up the new lay-flat piping in preparation for pumping water into wetlands at Wingillie Station

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STORING CARBON IN WETLANDS

Started in 2012, this was the first project of the new Murray Darling Wetlands Working Group Ltd. The aim of the project was to rehabilitate and restore 2,000 hectares of wetlands to act as carbon stores. The project was funded through the Australian Government's Clean Energy Future Biodiversity Fund and was conducted throughout NSW Murray Local Land Services region. The Working Group employed Sarah Ning to work on what turned out to be a six-year project.

Wetlands provide the largest storage of carbon on earth

Wetlands provide the largest storage of carbon on earth and are capable of storing 30 to 40 times more carbon than forests. Inland wetlands contain 33 per cent of global soil carbon, despite only occupying eight per cent of the land surface area. Inland wetlands are also the largest source of the greenhouse gas methane although these emissions become negligible over a long period of time. However, degraded wetlands may be less able to sequester carbon. Extensive vegetation clearing and changed management had led to a reduction in the extent and diversity of carbon stores across the Murray region of southern NSW. The Working Group believed that with careful management, wetlands could be a major potential carbon sink while improving productivity and the environment.

An inventory undertaken in 2010 by the Murray Catchment Management Authority found that one-third of wetlands in the Murray region had been cleared of native vegetation. Combined with changes to water regimes and grazing, these impacts were reducing the capacity of wetlands to store carbon and maintain environmental values.

The project, undertaken in conjunction with Murray Local Land Services, targeted wetlands in the central Murray area of southern NSW. The area was identified through technical and community consultation as well as recommendations from the NSW Murray Wetland Inventory and the Murray Biodiversity Management Plan. Sixteen sites were identified covering a mixture of vegetation types, condition and management opportunities. Sites were located in the Balldale, Corowa, Jerilderie, Savernake and Urana areas and covered more than 1000 hectares.

The wetlands included vegetation such as River Red gum and Grey box with grassy understorey, canegrass, sedges, rushes, grasses and lignum. Sites selected ranged from 15 to 420 hectares but all showed potential for improved carbon storage with evidence of an existing or

known native seedbank, different types of vegetation; habitat complexity; and good water connectivity (with less risk of being flushed or scoured and losing carbon). Other criteria considered were the identification of local wetland 'champions' and the opportunity for sites to be used to demonstrate natural resource management benefits to the wider community.

10-year management agreements

Participating landholders entered into a 10-year management agreement which was registered on their land titles. This ensured the security of the long-term investment of on-ground works, stipulated management and monitoring requirements and allowed access to monitor carbon storage and improvements in biodiversity. The project provided funds for the participating landholders to undertake wetland management to store carbon and improve the environment by rehabilitating degraded wetlands and enhancing wetland vegetation. On-ground activities involved planting wetland and terrestrial vegetation; altering grazing management; pest animal and weed control; delivering environmental water where appropriate and feasible; providing resources such as interpretative signs, bird hides; and educational visits.

Monitoring carbon dynamics

An important aspect of the project was to gain an understanding of how rehabilitation and altered farm management activities and revegetation could influence changes in carbon pools and fluxes within wetlands. The initial six-month monitoring program was undertaken by the Murray-Darling Freshwater Research Centre. Deakin University carried out most of the remaining three-years monitoring that provided an improved understanding of wetland carbon dynamics and developed recommendations for wetland management for carbon storage balanced with biodiversity benefits. A series of baseline surveys and analysis were carried out on several wetlands by mid-2014 and was applied annually until 2017 to assist in evaluating and reporting on outcomes from rehabilitating wetlands.

Through the monitoring program, Deakin University's Blue Carbon Lab found that rehabilitation of inland wetlands, through on-ground works such as fencing and revegetation, significantly improved soil carbon stocks. In fact, the longer the wetlands were restored, the longer soil carbon was stored. Furthermore, rehabilitation of degraded wetlands greatly improved carbon stocks, regardless of the degree of degradation, with sequestration capacity returning in as little as five years.

Four funding rounds

Following the success of the first year, nine new sites involving four landholders were selected in Coreen, Corowa, Lowesdale and Rand, covering a total of 143 hectares. The vegetation included sedges, rushes and grasses, River Red gum and Grey box trees. Wetlands sites ranged from seven to 30 hectares and included cropping and grazing properties as well as a tourist park where 27 interpretive signs were installed as part of a wetland walking trail.

Expanding the project

By 2015, the project was gaining landholder interest from outside the initial target area so it was expanded. In 2015-16, six sites (totalling 1,925 hectares) were selected at Stream Plains, Coree, Walbundrie, Walla Walla, Oaklands and the Lake Hume Village. This expansion continued during the project's fourth and final funding round in 2016-17, with five sites selected at Berrigan, Jerilderie, Corowa, Thule and Redlands. The wetlands, ranging between eight and 263 hectares, had a greater focus on building community capacity and working closely with local government and community groups.

Works delivered on these sites included interpretive signs, a bird hide, shade shelters, an outdoor classroom and an educational worksheet. A six-month extension was provided in April 2017 to complete works affected by prolonged flooding in the previous year. Throughout the delivery of the project, funding was also provided for three community projects at Walla Walla, Jindera and Albury. There were events at each project site to engage the community and encourage their participation in caring for their wetlands into the future.

This approach to managing wetlands proved to be successful

By early-2018, this six-year project was having a big impact on communities in the Murray region. The program implemented a successful strategy that built relationships with landholders and community groups, used contractors to deliver on-ground works (rather than landholders), and developed management actions that integrated farming activities, environmental, biodiversity and carbon storage requirements.

According to an article in *Wetlands Australia 2018*, published by the Commonwealth Department of Environment and Energy, this approach to managing the project proved to be successful. This was reflected in the aim of the project to deliver 2,000 hectares of rehabilitated wetlands being far exceeded. By late-2017, 3,750 hectares of wetlands had been rehabilitated more than double the anticipated area. Following are examples of three projects undertaken during the carbon program.

Salvaging a swamp at Savernake

Farmers Bill and Cecile Nixon participated in the project to both store wetland carbon and attract birds back to their Savernake property. Cecile explained that she 'wanted to better manage the area to encourage native vegetation growth and to bring woodland and wetland birds back to the site'. The Nixons were thrilled to be part of the project and were eager to see the changes to the vegetation and wildlife at their eight-hectare wetland which comprised sedges, rushes, grasses and Grey box trees. Cattle had once been able to easily access the area, but with fencing in place, the site was protected from trampling stock, particularly during wet periods. This had allowed a greater diversity of wetland plants to establish.

Doodle Comer Swamp

The Doodle Comer Swamp Nature Reserve is an ephemeral wetland of just over 1,000 hectares near Henty in southern NSW. When full, the wetland attracts large numbers of waterbirds. The wetland is the largest of its type in southern NSW and is listed in the *Australian Government's Directory of Important Wetlands in Australia.* In 2015, the Wetlands Working Group began working with the National Parks and Wildlife Service (who manage the reserve) to increase carbon retention and improve biodiversity by planting more than 10,000 local woodland plants. The installation of bird hides and signage by the Wagirra Indigenous Works Crew (from Albury City Council's Aboriginal employment and training program) also improved the visitor experience.

Birds get a new home at Balldale

With support from the Wetlands Working Group, Ross and Lea McDonald fenced an 82-hectare wetland (Emu Swamp) to manage stock grazing and installed a bird hide and nest boxes. The McDonalds wanted to encourage birds and animals to the wetland and establish more trees around the wetland edges. They consider the wetland to be a really attractive part of the farm. They have installed a bird hide for bird watching so they can learn to identify different bird species. Ross knows of other farmers in the area working on wetland and native vegetation conservation on their properties who together, are building a network of wildlife habitat links. Ross says that 'by each of us doing a little bit we can make a real difference to the local environment'. The wetland has responded well to the altered grazing regime with an improved cover of wetland plants emerging at the site, providing a home for many waterbirds.

Bill and Cecile Nixon's improved wetland at Savernake

Ross and Lea McDonald at their Balldale wetland

A lasting legacy for communities

The health and diversity of wetland and surrounding vegetation at the three sites will continue to be improved through on-going management and monitoring, as will the other 39 project sites under the wetland carbon storage project. As Working Group project officer, Sarah Ning said in a media interview in late-2017: 'The project leaves a lasting legacy for local communities to build on and enjoy the benefits that wetlands have to offer'.

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MANAGING WETLANDS - 2018

In early-2009, the Wetlands Working Group's program of managing the NSW Government's environmental water was taken over by the Department of Environment, Climate Change and Water, now the NSW Office of Environment and Heritage (see chapter 38). Responsibility for managing many of the wetlands identified and initially managed by the Working Group fell under this and several other NSW government agencies. In recent years, a consortium of state and commonwealth water agencies (including the Office of Environment and Heritage), has been delivering environmental flows along the Murray and Edward rivers. This involves trying to manage the rivers, floodplains and wetlands through a whole-of-system approach. In some instances, the Working Group has continued to provide technical advice. The following is an indication of where management of wetlands, first started by the Working Group, continues.

Upper Murray wetlands

Despite some successful early work of rehabilitating wetlands in the Upper Murray (supported by the Wetlands Working Group between 2000 and 2009), the priority for wetland management until 2016 has been for areas below Lake Hume. However, in 2017, the Office of Environment and Heritage started developing a long-term watering plan for wetlands above Lake Hume. As outlined in chapter 29, some of these upper wetlands are sphagnum bogs that require different approaches to wetlands below Lake Hume.

Moira Lake and Gulpa Creek

By 2010, Moira Lake and the Gulpa Creek wetland system had become part of a new Murray Valley National Park, managed by the NSW National Parks and Wildlife Service. Both wetlands became part of multi-site watering events that had access to several sources of environmental water (including *The Living Murray*, the Barmah-Millewa Environmental Water Allocation and the Commonwealth Environmental Water Holder). This has meant treating Victoria's Barmah Forest and the NSW Millewa Forest (which includes Moira Lake and Gulpa Creek) as one entity, rather than separate forests in two states. Carp are still a problem in Moira Lake but there have been big improvements in Murray cod breeding in the creeks within the Millewa Forest.

Boomanoomana and Wee Wee Creek

The Boomanoomana wetland is now managed by the National Parks and Wildlife Service while the Office of Environment and Heritage manages environmental watering when needed. The water, delivered through a Murray Irrigation channel, is leading to improved vegetation and the return of waterbirds. Watering of Wee Wee Creek also occurs as required. The most recent watering by the Office of Environment and Heritage was completed in mid-2018 to boost vegetation and top-up refuge pools for small native fish.

Wanganella Swamp and the Werai Forest

Watering the Wanganella Swamp is now carried out by the Office of Environment and Heritage. The swamp is flooded with water from both the Murrumbidgee River and the Billabong Creek, although managing the water is still a challenge due to the distances water must travel to the wetland, particularly when water levels in waterbird rookeries have to be maintained during mid-summer. Delivering water to the rookeries is expensive and transmission losses and evaporation rates are high. Old weirs and banks along the Forest and Eight-mile creeks can also make water delivery difficult. To overcome this, the use of pumps and the infrastructure of Murray Irrigation Ltd are being in investigated.

The Werai Forest is now managed by the National Parks and Wildlife Service. Because effective watering requires high river flows, the Office of Environment and Heritage and the Commonwealth Environmental Water Holder are investigating the best way to increase water flows (which may involve pumps). The Office of Environment and Heritage is also working with the forest managers, recreational fishing groups and landholders to explore options to reinstate flows to enhance Murray cod and Golden perch populations in the Niemur and Edward rivers, downstream of Stevens Weir.

Lake Caringay

This lake is now managed by the Office of Environment and Heritage as part of an overall program of improving all of the Euston Lakes. These lakes are affected by the water held upstream behind the Euston Weir (Lock 15). The program focuses on manipulating the water levels in the weir pool during the year. As well as improving vegetation along the edges of the river, it is also anticipated that it will assist native fish. The program requires collaboration between the Murray-Darling Basin Authority, the Office of Environment and Heritage, and relevant NSW and Victorian government agencies to meet the requirements of river operations, irrigation demands and community water supplies in two states. Early results have been encouraging. Manipulating weir pools to improve the health of native plants, fish, animals and vegetation is also

being tried with weirs at locks 7, 8 and 9 (downstream of Wentworth) and along South Australia's River Murray.

Gol Gol Wetlands

By the start of 2017, the Office of Environment and Heritage had taken over management of the Gol Gol Wetlands. As envisaged by the Working Group in 1993, the community has retained strong ownership of rehabilitating the wetland and the office works closely with the Gol Gol community and irrigators to ensure that environmental water is provided when needed and put to best use. Salinity and rising groundwater are still challenges and resources have been invested in looking at ways to manage them efficiently, including bores and an interception scheme.

Poon Boon lakes

Despite slow progress initially with rehabilitating these lakes, in recent years, they have been turned into a free-flowing wetland system by the NSW Office of Water. The earthen block banks were removed and the concrete regulator refurbished on the Murray River. Landholders sold their water entitlements to the Murray-Darling Basin Authority as part of *The Living Murray* program. However, the refurbished regulator is now left open to allow flood waters to enter and leave the wetland system naturally. Landholders are able to irrigate when water levels are above a certain height as determined by the NSW wetlands policy.

Thegoa Lagoon

In 2009, management of Thegoa Lagoon at Wentworth was taken over by the NSW Department of Environment, Climate Change and Water (now the Office of Environment and Heritage). However, implementing the management plan, begun by the Wetlands Working Group, continued. Management has changed in recent years due to changing circumstances but has continued to improve the diversity of native wetland plants and waterbird numbers.

Bottle Bend

In June 2012, the Wetlands Working Group and the Lower Murray Darling Catchment Management Authority jointly explored future management options for Bottle Bend (the wetland that started dying in 2002 - see chapter 25). The Murray-Darling Freshwater Research Centre undertook a study of the area while consultants did a vegetation survey. In 2013, consultants were invited to submit a tender for a feasibility study on structures to better manage the lagoon system. This included an assessment of how to maintain water levels within the lagoon to prevent acidification while improving floodplain watering to

benefit vegetation. In 2012, the Office of Environment and Heritage watered the floodplain adjacent to the lagoon, the first time it had been inundated since the 1990s. Temporary earthen banks kept the water away from the lagoon. The response was described by Office of Environment and Heritage staff as 'overwhelmingly fantastic'. Understory vegetation and groundcover, particularly lignum and cane grass improved dramatically, in stark contrast to un-watered areas. And as the water drained back into the Murray River, it took a huge amount of macro-invertebrates with it, a valuable source of food for native fish.

Lower Murray-Darling wetlands

As outlined in chapter 28, the Wetlands Working Group found that wetlands in the Lower Murray-Darling catchment were gradually disappearing or slowly degrading. The group also discovered that many wetlands along the Murray River between Euston and Renmark were permanently under water while in the Lower Darling River, wetlands were staying dry even when the river was in flood. Since 2013, there has been a resurgence of activity by the Wetlands Working Group in managing these Lower Murray-Darling wetlands, either by itself or in conjunction with landowners, communities, traditional owners, state and commonwealth water agencies.

Watering more than wetlands on private property

In early-2009, the Wetlands Working Group's program of watering of wetlands on private property was taken over by the NSW Department of Environment, Climate Change and Water. The program, now managed by the NSW Office of Environment and Heritage, continues but has recently expanded. In 2017, there were about 80 such wetlands being managed each year in conjunction with Murray Irrigation Ltd, the West Corurgan Private Irrigation District, and several private pumpers. The program is still limited by logistics and infrastructure. Continuing a practice supported by the Working Group between 2001 and 2008, landholders continue to put their own water onto their wetlands. As Paul Childs, Senior Environmental Water Management Officer with the NSW Office of Environment & Heritage reflected in early-2018, 'We now have landholders putting their own water on private wetlands to grow Southern bell frogs!'

Following requests from irrigators, the program has also expanded to include degraded ephemeral creeks to improve native fish habitats. Some of this is driven by recreational anglers who are starting to see the benefits of wetlands and floodplains for recreational fishing.

Fletchers Lake

Despite this wetland complex being on the Wetlands Working Group's original list of wetlands for rehabilitation, progress has been agonisingly slow over 25 years. That anything has been achieved was principally due to the enthusiasm and commitment of Working Group member, Howard Jones. The Fletchers Lake complex, just north of Wentworth, had been isolated from the Murray and Darling rivers since the mid-1970s. Earthen block banks were installed so the lake could become a discharge area for the region's drainage water. The construction of Lock 10, just downstream of Wentworth, also created a high water table, resulting in salt accumulating on the bed of the larger lake.

In 1993, the Working Group's first staff member, Allan Lugg, proposed rehabilitating the area by pumping water from the Darling River and using a series of earthen weirs along Fletchers Creek. However, the group's chair, David Harriss, cautioned the group that rehabilitating the large lake was going to be a challenge as bringing back a wetting phase was likely to reactivate the salt on the lake bed. Local irrigators and the Lower Murray-Darling Catchment Management Committee also became concerned about the proposal. In 2017, Howard Jones recalled that in 1992 (when he was chair of the Section 17 Irrigation Management Board), he often argued with Harriss over developing a land and water management plan for the lake. Jones also recalled that there was strong community resistance to the plans because of a lack of consultation. Former Working Group project officer, Paul Lloyd, also acknowledged that the presence of 'too much salt was the reason why Fletchers Lake was put on the backburner' and Thegoa Lagoon was selected as the next wetland for rehabilitation after the success of the Moira Lake project.

In 2013, serious consideration was given to improving some areas of the wetland without aggravating the salinity and groundwater problems. By then, the larger lake had been salinised for too long and the impact of the Wentworth weir pool meant that the lake was probably past 'the point of no return'. A year earlier, the Barkindji Maraura Elders Environment Team (BMEET), based in Dareton, undertook a series of cultural inspections around the edges of the lake. (Some members of the Environment Team regarded the cultural heritage of Fletchers Lake, believed to be around 15,000 to 20,000 years old, as significant as that of Lake Mungo). The team discussed with the Working Group a suggestion to put some water into Fletchers Creek 'and let's see what happens'. Discussions recommended two watering events along the creek that was in a reasonable condition and unlikely to become salinised.

A watering in spring 2014 was followed by a cultural watering in 2015, the first cultural watering undertaken in the region. Western Murray Irrigation was asked to assist with the watering and the Murray-Darling Freshwater Research Centre at Mildura began to develop a program to familiarise the BMEET team with monitoring techniques as an extension of their natural resource management training. BMEET's 2017 publication, *Our Story*, referred to activity as 'working together to develop cultural science, a way of combining the best of cultural practices and western science to appropriately manage country'.

The response along the creek was very positive. Nardoo, River coobas and Black box trees responded and wildlife returned for the first time in years. Since the initial waterings, the Office of Environment and Heritage and the Working Group have continued to work with the Barkindji Maraura Elders Environment Team to look at how to continue improving the environment in a number of small areas, particularly along the creek. Paula D'Santos from the Office of Environment and Heritage says the project is a perfect example of a project where 'western science meets cultural knowledge'. Working Group board member, Howard Jones, believes that by using the group's mobile pumps and longer lay-flat piping, even greater results can be achieved.

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PROGRESS REPORT: 2017

The front page of the 2016-17 annual report of the Murray Darling Wetlands Working Group Ltd included the words 'Celebrating 25 Years'. It reported on another key milestone of an organisation that had stood the test of time through achievement, taking risks, expansion, research, adaptation, disappointments and awards as well as several name changes. The group had local, national and international networks, an unenviable track record, and a history of dedicated staff and members.

Water trust now up and away

In his annual report, the chair, Howard Jones, noted in particular the environmental water trust now being 'up and away … the trust is visionary and will stand the group in the forefront of environmental watering innovations in the world'. Jones was also excited about the forthcoming environmental watering projects that would at last demonstrate the value of the water trust and balanced fund. The group's chief executive officer, Deb Nias, saw the year as 'consolidating our future … and strengthening relationships', particularly with state and commonwealth environmental water holders.

The six-year wetland carbon project was gradually coming to an end. Thanks to the work of project officer, Sarah Ning, the rehabilitation of 3,750 hectares of wetlands had exceeded the project's target by 75 percent. The inundation of the Carr, Cappitts and Bunberoo creek system had been successful and planning was underway to water three properties later in 2017, including the first-ever watered by the group in Victoria. It would also be the first wetland to make use of water donated from the balanced fund. Contributions to the *Riverspace* website continued. The group's website was given a new and fresher look, larger font and simpler categories.

End of an era

In the annual report, Nias also described the year as the end of an era as Howard Jones, chair since 1995, 'signed off'. Nias described Jones as 'hard to keep up with as he seemed to always be coming up with new ideas and solutions, all of which were achievable (as far as he was concerned) with just a few brains and elbow grease!'

New board members

During 2017, the board secured several new members with skills needed to help manage the organisation into the future. They were Michael Maher from Canberra, John Pettigrew from Shepparton, Adrian Wells from Leneva and Nick Lilley from Melbourne.

Dr Mike Maher retired from the NSW Government following a 40-year career spanning research, policy and management of inland wetlands. This career provided opportunities to witness wetlands and their inhabitants across a diverse range of climatic conditions. Maher was instrumental in establishing many wetland reserves in western NSW by combining an understanding of the ecological values of each reserve and developing a trusting relationship with the relevant landholders.

Nick Lilley is a corporate finance professional with over a decade of experience in raising capital for renewable energy projects in Australia and internationally. He has experience in the impact investment sector, having worked on the development of the Murray Darling Basin Balanced Water Fund. Lilley's focus is on the renewable energy and conservation sectors.

Adrian Wells recently retired after 46 years of work in the Murray-Darling Basin in horticultural research and extension; the media; community development; rural education; and Local Government. As part of his jobs, Adrian served on various local, state and commonwealth natural resource management committees and working parties.

John Pettigrew has a long history within the Goulburn Valley fruit industry as a grower and director of SPC Ltd. He served on various industry advisory boards and water service committees. In 2002, Pettigrew was appointed to the board of Goulburn-Murray Water. He has a keen interest in the environment and resource management and has extensive water policy experience.

In late-2017, David Harriss accepted an invitation to join the board after a long and distinguished career in the NSW public service.

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BACK TO WHERE IT ALL BEGAN

For those that love it and understand
The saltbush plain is a wonderland.

AB 'Banjo' Patterson, *In the Droving Days (1896)*

As outlined in chapter 5, one of the first recorded attempts to conserve wetlands in the Murray-Darling Basin was in the late-1800s when communities tried to protect the Lower Murrumbidgee floodplain between Balranald and Hay. The landholders, communities, local councils, engineers and consultants argued that the Murrumbidgee River should be managed to maintain harmony between irrigation and environmental interests and that floodplain wetlands should not be sacrificed in expectations that irrigation would create wealth elsewhere. However, their efforts were ignored while Aboriginal cultural needs were not even raised or considered. The only concession was the building of two weirs in 1937 which allowed water to flow onto the floodplain when river flows were high.

Since that decision, a great deal of work has been undertaken on the environmental and cultural significance of the area, particularly since 1990. The area is now regarded as representing some of the more diverse systems in the Murray-Darling Basin and is listed in the directory of important wetlands of Australia. It includes large areas of continuous lignum and River Red gum forests, Black box woodlands and semi-arid shrublands. The area supports endangered plant and animal species, has the largest known population of the endangered Southern bell frog in NSW, and includes some of the most extensive waterbird breeding colonies in Australia. The area is also of high cultural, spiritual and economic importance to the local traditional custodians.

A large part of this Lower Murrumbidgee floodplain was Nimmie-Caira. By 2018, these 85,000 hectares of crown land, were held by the NSW Water Administration Ministerial Council. In May 2018, the Murray Darling Wetlands Working Group was part of a successful consortium chosen by the Commonwealth and New South Wales governments to manage the Nimmie-Caira area. The consortium included The Nature Conservancy (Australia), the Nari Nari Tribal Council, the Centre for Ecosystem Science (University of NSW) and the Wetlands Working Group.

The Working Group will contribute to the future management of the wetlands and floodplains, some of which lie on the same area that was a focus for protection by communities in the late-1800s. The 10-year project aims to not only implement land and water management plans but to eventually return the leased property to full ownership by the traditional custodians. On 1 July 2018, the consortium took over the lease of the property under the Nature Conservation Water Fund Pty Ltd, of which two-thirds is owned by the Wetlands Working Group.

During a media interview in May 2018, chair of the Working Group, Ian Davidson, noted that the successful consortium was a partnership 'with the combined expertise necessary to achieve what has long been hoped for in the area, including rehabilitation and management of unique environmental areas, protection of extensive and significant cultural sites and values, and the delivery of economic and social outcomes for the region'. Not only does the project represent a unique opportunity to sustainably manage a vast area of the largest remaining wetland habitats in the Murrumbidgee catchment, but it acknowledged the skills and expertise of the Wetlands Working Group developed since 1992. It also acknowledged the cultural heritage and traditional knowledge of the local Nari Nari people. As such, the area will now be known as Gayini (Nimmie-Caira).

As the management of the area finally passes from government to a consortium of environmental, community, research and traditional custodians, it has indeed gone back to 'where it all began'.

Inspecting the Lower Murrumbidgee floodplain
of Gayini (Nimmie-Caira)

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WHY, HOW AND WHAT WE DO

History … is a larger way of looking at life. It is about who we are and what we stand for and is essential to our understanding of what our own role should be in our time. It is human. It is about people, and they speak to us across the years. It is a source of strengths, of inspiration.

David McCullough, *(The American Spirit, (2017)*

Why has the Wetlands Working Group been so successful over 25 years and are there lessons for it and other community groups wanting to manage land and water resources across the Murray-Darling Basin? Many of the answers have been reflected in presentations, letters, meeting minutes and reports of the Working Group, interviews with the group's members and staff, as well as talking to people and groups associated with the organisation since 1992.

As stated in this book's Foreword, the Wetlands Working Group has pioneered and implemented hundreds of projects to rehabilitate wetlands along the Murray and Lower Darling rivers, benefitting the environment, regional economies and river communities. The Working Group has built relationships and partnerships through collaborative processes, and used the best available scientific as well as traditional knowledge to identify and trial what was possible and achievable.

Core values retained

It's important to acknowledge that the Working Group began its work when the importance of wetlands was only just starting to be appreciated and practical strategies to rehabilitate these sites were almost non-existent. Also, some of the group's activities and achievements continued during a time of significant water reform, a devastating drought and continual changes in government agencies, policies and markets. The group changed its governance and priorities over 25 years but retained its core values, profile and objectives. These values were, and continue to be, fundamental to the way the Working Group has operated and include innovation; accountability; transparency; equity; integrity; community-focus; and commitment.

A problem solver

Over 25 years, the group invested heavily in research, community engagement and wetland programs at a local level. The group became

increasingly identified as 'a problem solver' but also a group of locally-based people who identified and took ownership of wetland issues, using and building-on local knowledge, skills and resources to achieve results. At times, some of this energy and commitment was at the expense of generating media stories and good communication but this is often a failure of new groups who devote their energy and resources to 'get things done'. As the Working Group's longest serving staff member, Deb Nias, observed in 2011, the success of the group was due to a proven record, leadership, integrity, support, adaptive management and community confidence. Nias stressed that this 'legitimacy and acceptance of what we do is the key to why, how and what we do'.

Strategic plans right from the start

Since 1992, the group prepared strategic plans that were reviewed and up-dated every three years. In 2017, the group's first chair, David Harriss, stressed that having terms of reference and a strategic plan 'right from the start was a key to the success of the group'. Such plans were underpinned by a clear understanding that before any wetland rehabilitation strategies could be implemented, the causes and effects of the problems had to be identified and documented. The group has maintained, and will continue to maintain, a commitment to those aims.

Relationships and partnerships

The group's strategic plans also identified a process of community engagement and participation in managing wetlands, a commitment maintained over the years. Importantly, community engagement required not only a commitment to relationships and partnerships but investments in building, valuing and maintaining those relationships, even when at times they were strained. This was demonstrated during the early years of managing the NSW Government's environmental water. Critics were invited to meet with the group in-person to discuss, clarify and resolve issues of concern.

This engagement process also included building relationships with local, state and federal government agencies, businesses, catchment organisations, water authorities, Aboriginal communities and environmental groups. The Working Group has always believed that relationships and partnerships were the key to managing the basin's wetlands, and, as the group noted, also changing how those resources were managed over time. The Working Group was not seen as an arm of government or as a group of 'environmental crusaders'. And importantly, the group did not criticise irrigation or other water use industries.

Although the Working Group was committed to community engagement, approaches and strategies changed over the years. One of the group's more recent projects, storing carbon in wetlands, adopted a different engagement strategy that used contractors to deliver on-ground works (rather than landholders) and integrating the requirements of farming activities, environmental, biodiversity and carbon storage. This approach was not only successful but resulted in almost doubling the number of rehabilitated wetlands.

Integrity

Integrity (being responsible for actions and respectful of community ideas and issues), has been a strong feature of the group, giving it legitimacy and credibility. This was first demonstrated during the Moira Lake project where issues raised by stakeholders against rehabilitating the lake had to be considered respectfully. Integrity was also a key issue with the development of the water trust and balanced fund. They involved lengthy and complex legal processes. In 2018, Working Group board member, Kathy Ridge, reflected that while years of planning finally paid off with the establishment of the water trust and the balanced fund, most importantly, the results were achieved with integrity.

Expertise given so generously

The Working Group's strategy to rehabilitating wetlands required what Nias often described as 'an expert group approach'. This recognised that solutions to wetland issues required skills and experience from many different fields. Over the years, the group enjoyed and valued contributions from hydrologists, ecologists, irrigators, academics, farmers, horticulturalists, educators, lawyers, botanists, water managers, economists, financial analysts, traditional owners, engineers, researchers and social scientists. These contributions added to the group's capacity over time and secured decades of corporate knowledge that Nias noted 'was given so generously'.

Respected

Over the years, the Working Group's executive was mainly comprised of people who lived and worked along the rivers. They were well-known, trusted and respected and gave the group access to additional networks of skills and knowledge that became far-reaching. Individual members were often members of local, state and federal government committees involved in managing natural resources. Members were careful not to get involved with political parties, advocating only for best practice in rehabilitating wetlands. This respect gave the group its recognition as a legitimate, credible and independent organisation to work with.

Water management need not be tarnished by conflict

In the Foreword to this history, Craig Knowles noted that in achieving 25 years of success, the Wetlands Working Group had provided 'a model of best practice in managing wetlands rarely seen in Australia or, indeed, elsewhere in the world'. Knowles also noted that most importantly 'the story of the Working Group demonstrates that water management in Australia need not be tarnished by conflict and argument'. As a former NSW minister for natural resources and a past chair of the Murray-Darling Basin Authority, Knowles is well-qualified to make that observation given his roles in water reform across the basin. While there were tensions and disagreements between the Working Group, agencies, landholders, irrigators, Aboriginal elders and community groups, these were addressed through patient discussions (rather than through the media), quiet negotiations, good communication and looking for shared benefits and outcomes, rather than trying to apportion blame.

Strongly connected to their communities

The Working Group's executive members have all been skill-based people, most of whom lived locally and were connected to their communities. They brought years of experience to the group in natural resource management and understanding wetlands. They were aided by high calibre staff. An important ingredient in that process was time taken to ensure that projects and processes were undertaken correctly and within the constraints of community engagement and expectations. Projects were initiated and managed by the group's executive and staff who were living and working along the rivers and who had to live with the consequences of their decisions and on-ground actions.

Adaptive and flexible

The Working Group always positioned itself on neutral ground between communities and governments, developing on-ground activities that achieved multiple and negotiated outcomes for both wetlands and communities. The group never imposed actions but facilitated acceptable and workable solutions in cooperation with the communities likely to be affected by rehabilitating wetlands. The group worked directly with landholders, sought common ground and drew on the best available science. Where this was unavailable, the group commissioned its own research as demonstrated in 2003 when the group was trying to identify the acid soils problem at Bottle Bend.

In a presentation to the Commonwealth Environmental Water Holder in 2017, Nias emphasised that 'if things change, we change, we are flexible in our approach with landholders …to creatively resolve issues

and focus on a win-win situation that reflects a balance between social, environmental, cultural and economic needs'.

Collegiate leadership style

Maintaining a strong and positive relationship between the Working Group's executive and staff was important for the group. The group has always been a small organisation and the senior staff member and the chair of the committee wanted all involved to be comfortable in each other's company and confident to seek help and advice from each other. Committee members were happy to 'get their hands dirty' and help water wetlands while staff always welcomed board members to their offices or activities in the field.

Think boldly and bravely

Although the number of staff employed by the Working Group since 1992 has always been small, the quality of the staff has been high. This is outlined in chapter 34. However, it was not just the quality of staff but the way that the staff operated and the relative freedom they were given. For the group's 20th anniversary, long-serving staff member, Paula D'Santos, sent a hand-written letter to the group in which she described the group's work culture. 'The staff were encouraged to forge ahead into new directions, look for new opportunities and to think boldly and bravely. This resulted in the work being exciting and extremely satisfying … reflected in the group's many successful projects. I felt very privileged to have worked with such an amazing collection of individuals whose knowledge, expertise and passion was, and is, so inspiring. I often felt that I had landed the best job I would ever have'.

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THE LAST WORDS

Author's note

While writing this document, I read Stuart Macintyre's *A Concise History of Australia*. Macintyre is one of Australia's more recent eminent and well-published historians. In his book, Macintyre commented that while historians once served as an authoritative guide on both history and the future, this approach had now 'fallen into disrepute'. Macintyre argued that because the future would be completely different from what had gone before, 'futurology is the province of the economist, the environmentalist or information scientist', not the historian. Over 25 years, the Wetlands Working Group has changed considerably. As the years have gone by, it has adapted, changed its governance, pioneered and adopted new ideas and strategies. So, following the observations of Macintyre, I have left the final words of this history to the collective thoughts and words of economists, environmentalists, scientists, water managers and public servants that I met while writing this book. I have collated their comments to provide 'the last words'.

An evolving Working Group

Evolution and adaptation have been a strong feature of the Working Group over 25 years. It has changed from a group that initially identified and responded to needs into an organisation that has seen much of the group's experiences and knowledge integrated into the way that state and commonwealth agencies manage environmental water. In recent years, the Working Group has positioned itself as an independent operator in the water market, offering a range of new and existing skills and products. This is reflected in the establishment of the trust and water fund. These can only add diversity to the management and delivery of environmental water in the Murray-Darling Basin as well as continuing to add to the group's opportunities, particularly in areas where governments may have little interest, such as private wetlands. As the Working Group discovered in 2000, while individual wetlands on private property were relatively small, collectively they added significantly to the diversity of floodplains along the Murray and Darling rivers and the health of waterways. Landholders that became involved with watering wetlands on their properties discovered that watering also had economic and community benefits. Continuing to identify situations where partnerships can lead to a range of benefits (like watering private wetlands), will be important for the Working Group's future and is an area that the group is well-skilled in.

A positive future

All people interviewed while writing this book saw a positive future for the Working Group in continuing and even expanding its activities. There was a great deal of praise for the work of the group in raising the profile of wetlands and their significance and more of this work is needed. However, there is also an acceptance that this expansion may be constrained by access to funds and its impact on the few high-quality staff that the group employs.

While governments have acknowledged the distinctive and valuable role the group might play in the future, current institutional arrangements, limited funding and the contested nature of water management across the basin may limit their willingness to collaborate, even though managing environmental water, monitoring and broad community ownership and participation are interrelated. The Working Group sees these features as keys to effective wetland restoration and has a well-deserved reputation in these areas. Despite this, governments need to accept that the group has become a 'group of choice' and when people want to improve wetlands, they have tended to come to the group for advice. This is because the group is prepared to take risks (without being reckless), something that governments are reluctant to do. The is a key to the group continuing to support innovation and develop new wetland rehabilitation strategies.

A risk for the Working Group is that governments may not want to concede responsibilities to manage environmental assets, like wetlands, to community organisations, preferring to engage with communities through advisory groups. This can be seen as a risk but also an opportunity to be proactive. The group has 25 years of extensive experience in being proactive and is well-equipped to work in collaboration with governments on restoring wetlands.

Monitoring needs to be meaningful

Monitoring needs to be relevant and meaningful to communities so it can answer their questions, involve them and provide information in real-time. At the moment, the results of monitoring about some natural resource management efforts are not easy to access and can be disconnected from peoples' experiences. As the Working Group has demonstrated, involving communities in on-ground and community-based monitoring programs can be highly effective as part of local engagement and adaptive management processes. The Working Group has shown that it can form all sorts of effective partnerships and consortiums at various levels to embrace monitoring advances as well as source local skills and experiences. Monitoring and evaluating

projects remains a priority although rigorous monitoring and evaluation remains a challenge without appropriate funding.

More sustainable business focus

While the Working Group has a history of being flexible, adaptable and innovative, one potential downside is that the group continues to be highly dependent on the energy of relatively few staff and even board members, several of whom have been part of the group for over 15 years. While the group's energy has rarely flagged over 25 years and its on-ground activities have strengthened and broadened, the board in 2018 has legal responsibilities far removed from those of a committee. Since 2009, the group's business model has been evolving but it needs to continue strengthening to ensure a more sustainable business focus with strong succession plans for its board members and staff.

Funding arrangements with governments are changing rapidly as some agencies increase their roles in wetland restoration. However, unlike the Working Group, government agencies may be more reluctant to take the sort of risks that the group has taken in the past and can take in the future. This is based on the group's commitment to listening, taking time, respecting local knowledge and offering a depth of knowledge which has been gathered over a long period. The experience of the group shows that landholders are more likely to be prepared to take risks (without compromising safety, health and welfare issues), providing the group with significant opportunities into the future.

Reflect and build on the past

Over 25 years, the Working Group has slowly developed the relationships and experience required to engage communities in wetland rehabilitation. Through that process, the group has also helped governments achieve policy objectives through collaboration and engagement. The Working Group can maintain this role to help in managing government-owned environmental water to deliver good outcomes. At the same time, it will be important for the group to continually reflect on and build on its past. Over 25 years, the group's various projects provided valuable insights and lessons in the identification and prioritisation of wetlands for rehabilitation and the feasibility of different management actions.

Integrate cultural priorities into water management plans

Despite some successes over the years, the Working Group still has much to learn about engaging with Aboriginal people in wetland management. There is still a great deal to understand about how to integrate Aboriginal cultural priorities and knowledge into water management plans while also protecting cultural heritage in wetlands.

The group's membership of the Nimmie-Caira consortium to manage the Lower Murrumbidgee floodplain may provide this opportunity in the future in a project where the traditional custodians are not simply observers or a group to be engaged but are one of the four principal managers. This engagement may also give the group opportunities to promote cultural water issues and support leadership by Aboriginal communities elsewhere in the Murray-Darling Basin.

Still fiddling with wetlands here and there

Since 2010, the way water is managed and distributed across the Murray-Darling Basin (the water business), has been changing in complexity and sophistication. The original environmental water used by the Wetlands Working Group between 2000 and 2008, was derived from water savings and improved irrigation infrastructure. Since 2009, commonwealth and state agencies have been accumulating considerable portfolios of water solely for environmental purposes.

In recent years, there have been calls for catchment-wide or a basin-scale approaches to floodplain watering to achieve longer-term environmental outcomes. This call has been heard from recreational anglers, irrigation groups, landholders, Aboriginal groups, community organisations and universities as well as government agencies and scientists. Increasing numbers of people want to see whole sections of floodplains and wetlands watered, rather than just individual (and often small) wetlands. As a former commonwealth water manager commented: 'We are still fiddling with wetlands here and there – the aim should be broadscale floodplain and wetland watering. We are still waiting to see this happen'. This does not mean huge watering projects or establishing unrealistic expectations. It means co-ordinating watering at larger scales in accordance with current knowledge on how the basin operates as a system and using what water is available.

Undertaking large-scale watering will require the involvement of a greater number of stakeholders, an area where the Working Group can fulfil important facilitation and collaborative roles. The opportunities offered by the group's involvement in the new Nimmie-Caira project and the likely experiences gained will be an important stepping stone in this type of large-scale project.

Protecting wetlands will become more important

The Working Group has certainly helped to change community awareness, perceptions and attitudes to wetlands. The group has consistently demonstrated the value of the environment and that governments and communities should continue investing in its rehabilitation and improvement. This includes convincing people about

the value of wetlands through partnerships and projects that add value to communities and landholders. Water reforms, allocations of environmental water at the state and federal level and the Murray-Darling Basin Plan have all paved the way for sourcing, storing and delivering environmental flows. These, together with community awareness of the importance of wetlands, changing community values and future threats such as climate change, will ensure that protecting these sites will become more important. Again, the Working Group is ideally placed to play a role in this area.

A bridging role

Over 25 years, former committee and staff members of the Working Group as well as landholders, community groups and government agencies, have recognised and praised the group for its role in being able 'to bridge the gap' between communities and governments. The complex process of water reform and other significant local and global changes will continue presenting threats and opportunities to basin communities. Basin communities and individuals have varying degrees of confidence with the Basin Plan. Local, state and commonwealth agencies continue to struggle with the magnitude of the changes required. Many basin communities see decisions about all aspects of their lives (including water) increasingly made in remote capital cities or larger regional centres by people who do not have to live with the consequences of these decisions. The Working Group can help bridge these gaps by facilitating the engagement of local people in managing changes that deliver local benefits as well as national priorities.

Remaining true to its values

The success of the Working Group since 1992 has been underpinned by a clear vision and commitment by members and staff to that vision. In 2016, the Working Group entered a new phase of operation with a water trust and balanced fund that have the potential to support new opportunities, partnerships and projects. However, success will still depend on the group remaining true to its values and being legitimate and relevant to deliver outcomes for the environment. This also means acknowledging its history, valuing its strengths, celebrating its achievements and adhering to its core vision.

Watch the jargon

Since 1992, many government agencies and environmental groups have not only adopted the Working Group's wetland rehabilitation strategies, but new words and phrases on protecting wetlands have emerged. Words like *ecological*, *environmental flows*, *biodiversity* and *habitat* are commonly used but are not

always understood by communities. At the same time, the word *nature* has almost disappeared. There is evidence that some of these new words can scare people. The term *environmental watering* is often misunderstood and has been confused with *flooding*. One of the strengths of the Working Group has been to understand and work with local communities at the same level and speaking the same language. This role has to continue. As scrutiny by communities on river and wetland health increases, the community is entitled to clear, transparent and accountable communication that demonstrates the outcomes achieved through delivering water for the environment. And the information must be in a language that helps to build understanding of why wetlands are important, what is being done to rehabilitate them, how rehabilitation makes economic sense, and how communities can contribute.

Own and manage water entitlements

There were several key times in the life of the Working Group that gave it a new lease of life. One was when the group was given water for eight years to manage by the NSW Government. This encouraged innovation and the blossoming of hundreds of projects, research and wetland rehabilitation by the group. It also gave the group eight years of financial security as the group was allowed to trade some of the unused water. Another key moment was the decision to form a company and a water trust. During that process, the Working Group's chief executive officer, Deb Nias, expressed the view that to continue the group's work and to be financially sustainable, the new company should ideally own a portfolio of water entitlements for use on wetlands and which could also be traded. This is still a vision for the group. It would provide effective on-ground works, generate a financially sustainable future and allow the group to continue investing in innovation, community engagement and science.

Collaboration

Partnerships and collaboration have been important to the group since 1992 and are likely to become even more important in the future. The potential of impact investment, first identified by the group in 2013, is likely to take a higher profile as a way of not only improving natural resources but raising the funds to undertake the work. If government funding for wetland restoration by community groups diminishes, impact investment may well provide the opportunities. However, potential investors will need clarity on the environmental opportunities, outcomes and accountability. As shown by the Working Group, this is best done

by collaborative approaches in what could become an increasingly crowded and competitive market.

Will there be a finishing point?

The final words of this chapter have been reserved for the Working Group's chair, Ian Davidson, who has often pondered if there will ever be a finishing point for the group? Davidson argues that there is so much to be done with wetlands that he doubts there will ever be an end point or finality. Added to this is the reality that the group has mainly focussed so far on the Murray and Lower Darling rivers. 'Science, technology, communication and even communities are constantly changing. There are on-going challenges of climate change, new invasive plant, fish and animal species, and changing land use, all of which will demand new management techniques. Our history shows that often, just when we thought that a particular project was finishing, something popped up to take us in a new and different direction. I believe this will be an on-going challenge and opportunity for the long-term but one that the group is well-equipped to handle'.

PART SEVEN

For the Record

TIMELINE

During the Dreamtime, ancestor spirits created mountains, rivers, plants, animals and people.

60 million years ago, the Murray-Darling Basin started to form and rivers began to make their way from the eastern mountains to the sea.

65,000 years ago, Aboriginal people started to settle along the Murray and Darling rivers.

50,000 years ago, the modern channels of the Murray and Darling rivers were determined. As these two rivers meandered across floodplains, depressions that became wetlands started to develop.

25,000 years ago, a ridge rose between Echuca and Deniliquin damming the Murray River and creating a lake. About 8,000 years ago, the lake drained through a new river channel and the lake bed became a forest.

1824	Hamilton Hume and William Hovell were the first white men to cross the Murray River, naming it the Hume.
1828	Explorer Captain Charles Sturt named the Darling River.
1829	Sturt travelled part of a new river and named it the Murray.
1830s	White settlers started to colonise the Murray and Darling catchments, changing the landscapes and denying Aboriginal people access to wetlands and rivers.
1858	The first biological exploration took place along the Murray and Lower Darling rivers.
1881	The governor of South Australia announced that a large wetland near Wellington had been reclaimed for irrigated dairy farms.
1891	The first recorded attempt by a community to protect wetlands occurred along the Lower Murrumbidgee River.
1904	South Australia's government started draining wetlands near Murray Bridge.
1929	South Australia's government drained wetlands between Mannum and Wellington to create dairy pastures.
1930s	Small community programs began to restore land and water environments across Australia.

1970s	Restoration activities to restore land and water assets grew, largely in response to degraded urban bushland and overdevelopment along coastlines.
1971	Australia signed the global Ramsar Convention to protect wetlands of international significance.
1975	The Ramsar Convention came into force across Australia.
1983	The River Murray Commission commissioned a survey of wetlands along the Murray River below Lake Hume.
1987	A Wetlands Working Group was established in Sydney by NSW government agencies but disbanded in 1991.
1992	The Murray Darling Association rehabilitated a wetland on the Chowilla floodplain in South Australia.
1992	The NSW Murray Wetlands Working Group was established as a community-government partnership.
1992	Watering the Gol Gol wetlands was the group's first project.
1993	The Working Group identified eight priority wetlands for rehabilitation.
1994	The rehabilitation of Moira Lake started.
1995	The group received a *NSW Rivercare 2000 Silver Award* for rehabilitating Moira Lake.
1996	A regulator at Croppers Lagoon was built to improve wetting and drying phases.
1997	The group delivered 10 landholder wetland projects.
1998	The group was offered 1,911 megalitres of water savings from the Moira Lake project to manage.
1998	Rehabilitation of Thegoa Lagoon started.
1999	The group started mapping Murray River wetlands.
2000	The group contributed water to flood the Barmah-Millewa Forest.
2001	The NSW Government gave the Wetlands Working Group 32,000 megalitres of environmental water to manage in a three-year trial.

2001	The group launched a three-year program to water wetlands on private property in the Deniliquin area.
2002	The first wetland guide, *Wetland Watch,* was published.
2002	A wetland at Bottle Bend started to die, revealing the problem of acid sulphate soils in inland wetlands.
2002	The Working Group's decision to sell water because of a severe drought created controversy amongst irrigators.
2004	The group launched two schemes to encourage community wetland projects.
2004	The group began a wetland rehabilitation program in the Lower Murray-Darling area.
2004	The program to manage the NSW Government's environmental water is extended to 2008.
2005	The group bought its first mobile pump.
2005	The group provided some of its environmental water for the Chowilla floodplain in South Australia.
2007	The River Murray Wetland Database was completed.
2007	The Wetlands Working Group won the Thiess National River*prize.*
2007-08	Severe drought stopped the watering of public and private wetlands.
2009	Management of the NSW Government's environmental water concludes.
2009	The group's initiative to water wetlands on private property project was listed in the *Top 25 Australasian Ecological Restoration Projects* by the Global Restoration Network.
2009	Five Working Group staff members were employed by the new NSW Department of Environment, Climate Change and Water.
2009	Murray Darling Wetlands Ltd was established.
2012	Murray Wetlands Working Group Inc. and Murray Darling Wetlands Ltd. merged to create Murray Darling Wetlands Working Group Ltd.
2012	The carbon wetland storage project began.

2014	The group launched an environmental water trust.
2015	The Murray-Darling Basin Balanced Water Fund was launched.
2015	The environmental water trust undertook its first wetland watering west of Wentworth (using Commonwealth water).
2017	The Working Group delivered its first trust water to a wetland north of Shepparton in Victoria.
2018	The Working Group was part of a consortium chosen to manage the Nimmie-Caira area on the Lower Murrumbidgee floodplain.
2018	The group published a history to commemorate its 25th anniversary.

OVERSEAS ACTIVITIES

- In 2009, chair of the Wetlands Working Group. Howard Jones, and chief executive officer, Deb Nias, undertook a study tour of the Mondi Wetlands in South Africa. The tour was supported by the International River Foundation.
- In 2011, Howard Jones and Deb Nias travelled to the United States of America to investigate the role of water trusts and explore the potential of such trusts in the Murray-Darling Basin.
- In August 2015, board member of Murray Darling Wetlands Working Group Ltd, Kathy Ridge, and Deb Nias, were invited to the World Water Week conference in Stockholm, Sweden. They made a presentation on the environmental water trust and the balanced fund in a workshop convened in conjunction with The Nature Conservancy.
- In 2016, Deb Nias was an invited speaker at the World Wildlife Fund Lecture Series on Science in Washington, USA.

RECOGNITION

Recognition received
Since 1992, the Murray Darling Wetlands Working Group both gave and received recognition and awards. Below are some of the more significant awards made to the group and its individuals.

- 1995: *NSW RiverCare 2000 Silver Award* – presented by the NSW Government in recognition of the Moira Lake wetland rehabilitation project.
- 2001: *NSW RiverCare 2000 Diamond Award* – presented to NSW Murray Wetlands Working Group member, Vin Byrne, in recognition of his contribution to healthy river environments.
- 2002: The Working Group was one of four finalists in the *Theiss Services National Riverprize*. This national award recognised excellent work by community groups in managing and restoring rivers and waterways.
- 2007: In recognition of its achievements, particularly the watering of private wetlands, the Working Group won the prestigious *National Riverprize*.
- 2009: The Global Restoration Network awarded the Wetlands Working Group a place in the *Top 25 Australasian Ecological Restoration Projects* for its project of watering wetlands on private property.
- 2011: Chief Executive Officer of the Murray Darling Wetlands Ltd, Deb Nias, was awarded a Churchill Fellowship to investigate water trusts in the United States of America.
- 2015: The Wetlands Working Group agreed to purchase one of seven Australasian Bittern naming rights to support tracking the birds in memory of Working Group member, Vin Byrnes. Tracking the bird will hopefully determine where it lives in the non-breeding season.
- 2017: In November 2017, the Murray-Darling Basin Balanced Water Fund received Australia's *Banksia Award*. The award recognised leadership in valuing, measuring, managing and investing in Australia's natural capital. The award was shared between the Wetlands Working Group, The Nature Conservancy Australia and Kilter Rural.

- 2018: Retiring chair of the Wetlands Working Group, Howard Jones, received the *Environmentalist of the Year Award* from the Wentworth Shire Council on Australia Day.

Recognition given
Early in its life and once it had a relatively secure financial base, the Murray Wetlands Working Group set aside some funds for wetland research awards. One was for university students that worked on projects relevant to wetlands.

- 2001: Hugh Robertson received the student prize, awarded at the Australian Society For Limnology Annual Congress in Echuca, VIC.
- 2002: Stephen Beatty received the student prize, awarded at the Australian Society For Limnology Annual Congress at Murdoch University.

Vin Byrnes award
In 2001, the Wetlands Working Group executive announced its Door Prize award for a person or persons who makes the Working Group's biennial meeting memorable 'for doing or saying something that probably shouldn't be put in print!' Vin Byrnes was the winner of the group's inaugural Door Prize, later renamed the Vin Byrnes Award in honour of the first recipient.

Hall of Fame
In 2014, the Murray Darling Wetlands Working Group established a Hall of Fame to recognise an individual's outstanding contribution to wetland restoration and management in the Murray-Darling Basin. The awards were designed and crafted by Britta Böckmann and have a River Red gum base, symbolic of the Murray and Darling rivers and wetlands.

- On 19 September, 2005, the first award was made to the family of Vin Byrnes at the Coomealla Golf Club.
- 3 November 2005, the work of the long-term water campaigner, the late Henry Jones, was recognised in a ceremony at Clayton Bay on the foreshore of Lake Alexandrina in South Australia.
- In 2016 Ngarrindjeri Elder, Matt Rigney, was inducted for his services to the environment and his advocacy on behalf of traditional custodians across the Murray-Darling Basin.

COMMITTEE OF THE NSW MURRAY WETLANDS WORKING GROUP

The committee of the initial Murray Wetlands Working Group (between 1992 and 1999) did not include a fixed number with specific representation apart from those appointed by catchment management committees. Also, there were no recorded elections for office bearers except for the election of Howard Jones as chair in 1995. Those attending the group's first meeting in September 1992 were:

Judy Frankenberg	Murray Catchment Management Committee
Alan Whyte	Lower Murray Darling Catchment Management Committee
Tony Sharley	Murray-Darling Basin Commission
David Harriss	NSW Department of Water Resources
Ken Harris	NSW Department of Water Resources
John Brickhill	National Parks and Wildlife Service
Phil Craven	NSW Department of Conservation and Land Management
David Wilson	NSW State Forests
Robert Black	NSW Department of Planning

In 1993, the Working Group's first strategic plan identified official membership of the organisation. They were:

Judy Frankenberg	Murray Catchment Management Committee
Janet Field	Murray Catchment Management Committee
Bill Mulham	Murray Catchment Management Committee
Alan Whyte	Lower Murray Darling Catchment Management Committee
Robert Ridgwell	Lower Murray Darling Catchment Management Committee
Tony Sharley	Murray-Darling Basin Commission
David Harriss	NSW Department of Water Resources
Ken Harris	NSW Department of Water Resources
John Brickhill	National Parks and Wildlife Service
Phil Craven	NSW Department of Conservation and Land Management
David Leslie	NSW State Forests
Jenny Burchmore	NSW Fisheries
Peter Adrian	NSW Department of Planning
John O'Donnell	NSW Environment Protection Authority

The only office bearers recorded in the group's minutes between 1992 and 1999 were:

David Harriss	Chair	1992 - 1995
Howard Jones	Chair	1995 - 1999

Until incorporation in 1999, the committee included members from the wider community; NSW catchment management committees; local government; the Murray-Darling Basin Commission; and relevant NSW government departments. Representatives from government departments often changed from meeting to meeting. In the late-1990s, representatives from the Yorta Yorta Lands Council; Victoria's Department of Natural Resources and Environment and Wetland Care Australia also attended and contributed to the committee meetings.

EXECUTIVE OF THE NSW MURRAY WETLANDS WORKING GROUP INC.

Following incorporation of the Working Group in 1999, the group held annual general meetings and elections for office bearers and the executive. Working Group staff were able to be elected as office bearers and four staff members held such positions between 1999 and 2009. In its first two years, the executive comprised the chair, deputy chair, secretary and treasurer. In 2001, the executive was expanded to include three additional members in keeping with NSW incorporation guidelines.

Mr Howard Jones	Chair - Coomealla	1999 - 2009
Ms Judy Frankenberg	Deputy Chair - Howlong	1999 - 2009
Mr Paul Lloyd	Secretary - Albury	1999 - 2001
Ms Heather Du Plessis	Treasurer - Buronga	1999 - 2000
Ms Paula D'Santos	Secretary - Buronga	1999 - 2009
Dr Deborah Nias	Treasurer - Albury	2000 - 2009
Mr Ian Davidson	Executive member - Wangaratta	1999 - 2009
Mr David Leslie	Executive member - Deniliquin	1999 - 2004
Mr Adrian Wells	Executive member - Albury	1999 - 2009
Cr Brian Sharp	Executive member - Moama	2003 - 2006
Mr Andrew Christie	Executive member - Albury	2003 - 2004
Cr Mark King	Executive member - Wentworth	2003 - 2004
Mr Vin Byrnes	Executive member - Dareton	2004 - 2009
Dr Ben Gawne	Executive member - Wodonga	2006 - 2009
Mr Roger Good	Executive member – Canberra	2007 - 2009
Mr James Maguire	Executive member – Leeton	2008 - 2009

BOARD MEMBERS OF MURRAY DARLING WETLANDS LTD

When the Wetlands Working Group established a new company, Murray Darling Wetlands Ltd, in 2010, staff members were not permitted to hold office on the board, except for the position of company secretary.

Mr Howard Jones	Chair - Coomealla	2010 - 2012
Ms Judy Frankenberg	Deputy Chair - Howlong	2010 - 2012
Mr Barrie MacMillan	Company Secretary - Gol Gol	2010 - 2012
Mr Vin Byrnes	Board member - Dareton	2010 - 2012
Dr Ben Gawne	Board member - Bethanga	2010 - 2012
Mr Roger Good	Board member - Canberra	2010 - 2012

BOARD MEMBERS OF MURRAY DARLING WETLANDS WORKING GROUP LTD

When Murray Darling Wetlands Working Group Ltd was established in 2012, staff members were not permitted to hold office on the board, except for the position of company secretary.

Mr Howard Jones	Chair - Coomealla	2012 - 2017
Ms Judy Frankenberg	Deputy Chair - Howlong	2012 -
Mr Barrie MacMillan	Company Secretary - Gol Gol	2012 - 2017
Mr Ian Davidson	Chair – Wangaratta	2017 -
Mr Vin Byrnes	Board member - Coomealla	2012 - 2014
Mr Roger Good	Board member - Canberra	2012 - 2015
Dr Ben Gawne	Board member - Bethanga	2012 -
Mrs Kathryn Ridge	Board member - Manley	2012 -
Mr Ian Davidson	Board member - Wangaratta	2013 - 2017
Mr Nick Lilley	Board member - Brunswick West	2016 -
Mr Michael Maher	Board member - Dickson	2016 -
Mr John Pettigrew	Board member - Bunbartha	2016 -
Mr Adrian Wells	Board member - Leneva	2016 -
Mrs Kathryn Ridge	Deputy Chair - Manley	2017 -
Mr David Harriss	Board member - Narooma	2018 -
Dr Deborah Nias	Company Secretary - Adelaide	2017 -

STAFF OF THE NSW MURRAY WETLANDS WORKING GROUP

Mr Allan Lugg	Wetlands Officer – Buronga	1992 - 1993
Mr Paul Lloyd	Project Officer – Buronga	1993 - 1999
Ms Heather Du Plessis	Project Officer - Buronga	1998 - 1999

STAFF OF THE NSW MURRAY WETLANDS WORKING GROUP INC.

Mr Paul Lloyd	Project Officer – Albury	1999 - 2001
Ms Heather Du Plessis	Project Officer - Buronga	1999 - 1999
Ms Paula D'Santos	Western Project Officer Buronga	2000 - 2009
Ms Trish Alexander	Project Officer – Albury	2000 - 2009
Dr Deborah Nias	Senior Project Officer Albury	2000 - 2009
Dr Damien Green	Project Officer – Albury	2001 - 2006
Mr Duncan Vennell	Project Officer – Deniliquin	2002 - 2006
Ms Claire Wilkinson	Contractor – Buronga	2004 - 2005
Ms Anna Chatfield	Project Officer – Buronga	2004 - 2005
Ms Jessica MacGregor	Project Officer - Albury	2007 - 2008
Ms Emma Wilson	Project Officer – Deniliquin	2007 - 2008
Dr Trish Bowen	Project Officer – Albury	2006 - 2008
Ms Sascha Healey	Project Officer - Buronga	2008 - 2009

STAFF OF MURRAY DARLING WETLANDS LTD

Dr Deborah Nias	Chief Executive Officer - Adelaide	2009 - 2012

STAFF OF MURRAY DARLING WETLANDS WORKING GROUP LTD

Dr Deborah Nias	Chief Executive Officer - Adelaide	2012 -
Mrs Sarah Ning	Project officer – Albury	2012 -
Ms Rhonda Sinclair	Program Manager – Albury	2013 - 2018
Dr Susanne Watkins	Contractor – Albury	2014 - 2018
Mr Rick Webster	Senior Environmental Water Manager – Deniliquin	2015 -
Ms Ali Borrell	Project Officer – Albury	2018 -

REPRESENTATION

Between 1992 and 2017, members and staff of the NSW Murray Wetlands Working Group, NSW Murray Wetlands Working Group Inc, Murray Darling Wetlands Ltd and the Murray Darling Wetlands Working Group Ltd served on a large number of committees across the Murray-Darling Basin, contributing wetland management advice, information, skills and expertise. Some appointments were short-term or for the life of a specific project, while others were long-term appointments. Over 25 years, they included:

- Arrowhead Task Force, Albury, NSW
- Australian River*Prize* Judging Panel, Brisbane, QLD
- Chowilla River Red Gum Watering Project team, Renmark, SA
- Darling Anabranch Management Plan Environmental Flows Committee, Wentworth, NSW
- NSW Department of Environment and Climate Change River Bank Project, Albury, NSW
- Fletchers Lake Management Group, Dareton, NSW
- International River Foundation Board, Brisbane, QLD
- International River Foundation Audit Risk Committee, Brisbane, QLD
- Koondrook-Perricoota Technical Advisory Committee, Barham, NSW
- Lake Caringay Rehabilitation Project, Euston, NSW
- Lake Tooim Management Plan Steering Committee, Albury, NSW
- Lock 8 and 9 Weir Pool Manipulation Project Steering Committee – Dareton, NSW
- Lower Murray-Darling Catchment Management Committee, Buronga, NSW
- Lower Murray-Darling Catchment Management Authority, Buronga, NSW
- Lower Murray-Darling Catchment Management Authority's Environmental Water Management Plan Steering Committee, Buronga, NSW

- Lower Murray-Darling Catchment Management Authority's Aquatic Ecological Communities Project Steering Committee, Buronga, NSW
- Lower Murray Darling Community Reference Committee, Buronga, NSW
- Mallee Catchment Management Authority's Project Management Support Group for Wetland Audit and Prioritisation Project, Mildura, VIC
- Moira Lake Stage 3 Steering Committee, Deniliquin, NSW
- Murray Catchment Management Committee, Deniliquin, NSW
- Murray Catchment Management Authority, Deniliquin, NSW
- Murray Catchment Management Authority's Barmah-Millewa Technical Advisory Committee, Deniliquin, NSW
- Murray-Darling Basin Authority's Strategic Thinkers Group, Canberra, ACT
- Murray-Darling Basin Authority's Native Fish Working Group, Canberra, ACT
- Murray-Darling Basin Ministerial Council's Community Advisory Committee, Canberra, ACT
- Murray-Darling Junction Landcare Group – Wentworth, NSW
- Murray-Darling Basin Commission's River Murray Environmental Flow Project Regional Evaluation Groups, Canberra, ACT
- Murray Corridor Floodplain Rehabilitation Steering Committee, Wodonga, Victoria
- Murrumbidgee Wetlands Prioritisation Process, Wagga Wagga, NSW
- Nature Conservation Foundation SA Water Advisory Committee, SA
- NSW Water Recovery Project Steering Committee, Deniliquin, NSW
- NSW Environmental Water Advisory Group for the Murray Lower Darling, Buronga, NSW
- RiverSmart Advisory Board, Canberra, ACT
- Steering Committee for Murray-Darling Freshwater Research Centre's research project on environmental watering protocols for native fish, Wodonga, VIC

- Steering Committee for CSIRO's research project on water allocations for Murray River wetlands, Canberra, ACT
- Thegoa Lagoon Management Plan Steering Committee, Wentworth, NSW
- Tri-State Hydrogeological Benchmarking Assessment Project, Albury, NSW
- Western Reaches Working Group, Dareton, NSW
- Wetland Care Australia Board, Adelaide, SA
- Wonga Wetlands Community Advisory Management Committee, Albury, NSW
- 17th International River Symposium Program Committee, Brisbane, QLD

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Born in England and educated in Melbourne, Adrian Wells spent his adult life in the Murray-Darling Basin, working in horticultural research and extension; the media; rural adjustment; rural and community education; and local government. From 1993 until his retirement in 2015, Adrian worked across the basin on natural resource management programs with local government, schools and communities.

From an early age, Adrian was fascinated by history and its role in understanding the past and planning for the future. He reads history books, visits museums and watches history documentaries and films. He has also written extensively in all of his jobs since 1969.

Now retired, Adrian lives in northeast Victoria with his wife, Diane. He has travelled widely, visiting over 30 countries. Apart from his family, Adrian's interests are gardening, walking, reading, travel, movies … and history. This is his third published book.