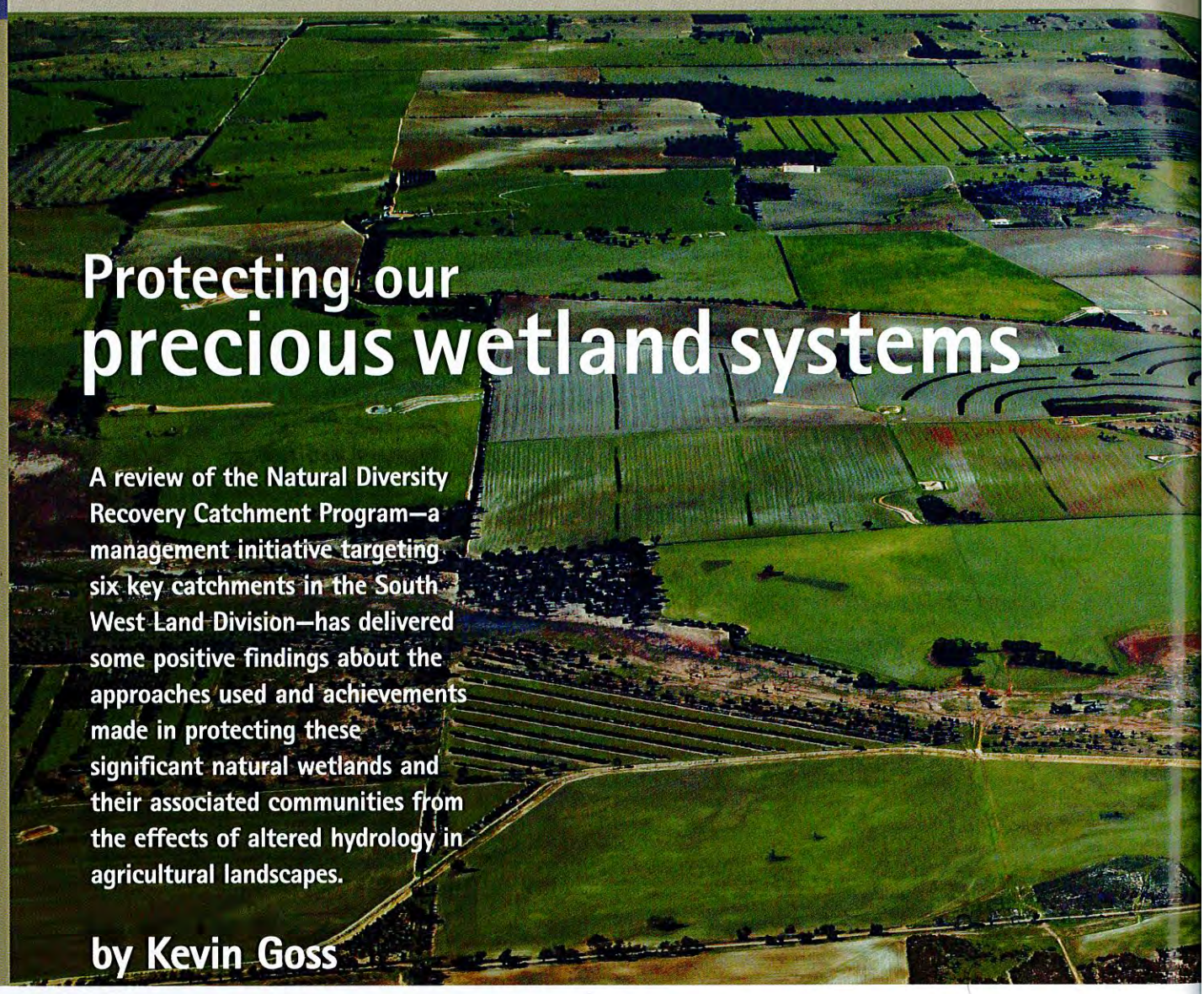


Protecting our precious wetland systems

A review of the Natural Diversity Recovery Catchment Program—a management initiative targeting six key catchments in the South West Land Division—has delivered some positive findings about the approaches used and achievements made in protecting these significant natural wetlands and their associated communities from the effects of altered hydrology in agricultural landscapes.

by Kevin Goss

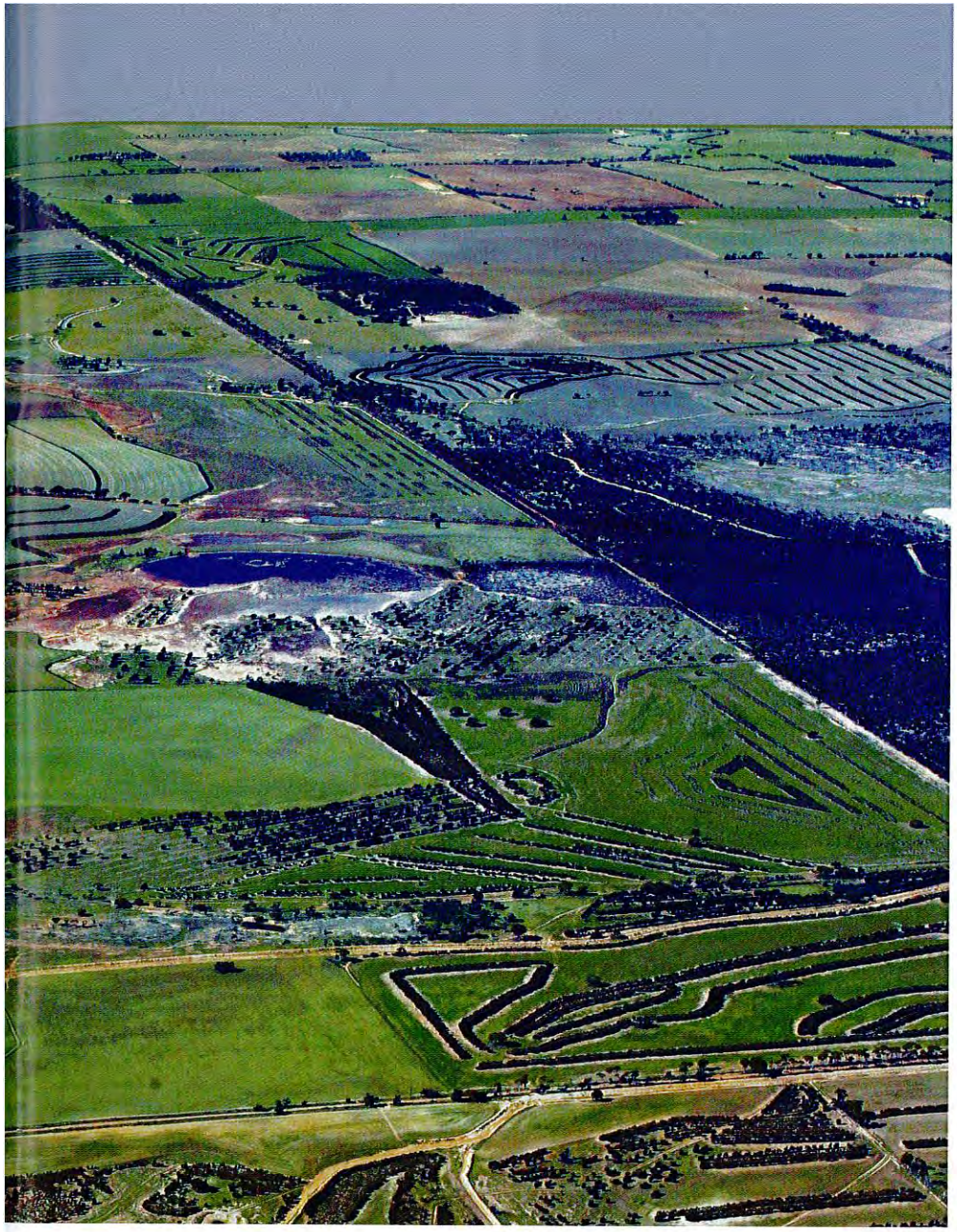
It's rare to hear good news stories about concerted government and landholder action making headway against the dryland salinity threat to our precious Western Australian environment. Yet this is the case with the Natural Diversity Recovery Catchment Program managed by the Department of Environment and Conservation (DEC). A recent review of the program confirmed that despite decline in condition of some wetlands, threatened species and important ecological communities are persisting in six wetland systems within the program that are under pressure from altered hydrology in agriculture-dominated landscapes.

Tackling salinity and other changes in landscape hydrology is a challenging, ongoing task; even slowing and arresting biodiversity decline are significant achievements in an environment of broadscale landscape changes and a highly variable climate. The success of the recovery program owes much to the foresight and persistence of DEC and one of its predecessor departments, the Department of Conservation and Land Management (CALM), for maintaining funding for the program as national priorities shifted away from salinity. Through the program, ongoing partnerships among rural landholders, natural resource management boards, community groups and government officers have turned research into action.

Agriculture's legacy

It is less than 100 years since most of the Western Australian wheatbelt region was opened up to agricultural development. In that time, major technical advances in farming soils that are low in nutrients by global standards have resulted in reliably profitable crop production from variable rainfall. However, this economic and social success has come at a great cost to the environment. Of the 18 million hectares of farmed land in the South West Land Division, about one million hectares are salt-affected as a result of the clearing of native vegetation for agricultural land use.

From as early as the 1970s, the visible scar of salt-affected land in WA became an emblem of the dilemma faced by landholders, farming communities and governments—how to achieve profitable food and fibre production for domestic and export markets through sustainable use of natural resources. Within a decade there was a significant social and policy response in the form of new land conservation legislation, the rapid rise of land conservation districts and government-supported



Main Revegetation with mallee belts and other native plants to the north of Toolibin Lake (lake not pictured here) and associated nature reserves (far right). This vegetation helps to protect farmland and downstream wetlands from increasing salinity.
Photo – Wingsphotographics/DEC

Above top Toolibin Lake in 2006 when rainfall filled the lake, resulting in substantial bird breeding.
Photo – DEC

Above centre Fresh water being diverted into Toolibin Lake.

Above Recovery of sheoak (*Casuarina obesa*) on the floor of Toolibin Lake.
Photos – Sam MacWilliams/DEC

tree planting to address the salinity crisis on farms (see 'Greening the Wheatbelt', *LANDSCOPE*, Winter 1986).

However, a major turning point in the characterisation of the dryland salinity threat was the biological survey of the WA agricultural zone. This survey was a required action of the 1996 *State Salinity Action Plan* and involved field surveys from 1997 to 2001 by a large, multidisciplinary team of scientists drawn from CALM and the WA Museum. Its twin conclusions were compelling—450 plant species and 400 animal species (including aquatic invertebrates) were at risk of global or regional extinction due to salinity, and the biological richness of the wheatbelt was greater than previously thought. Concerted action, over and above changes in farm practices, was justified.

Integrated strategies to manage salinity

Before 1996, when the *State Salinity Action Plan* was released, the focus of salinity management actions was vegetation management. This focus was based on the assumption that by tackling the causal process of vegetation clearing leading to altered hydrology, salinity could be controlled. Clearing controls for agricultural land were introduced in 1986 and, by the 1990s, the criteria for regulation against clearing were dominated by salinity risk, to the point that, by 1998, the rate of clearing was at a very low level. However, in the already heavily cleared central wheatbelt, there was no longer scope for this to be an effective management strategy by itself.

The *State Salinity Action Plan* advocated diverse ways to manage water in the landscape. Its core management strategies included increased water use by crops, pastures and deep-rooted perennials; management of surface water and groundwater; and the protection of native vegetation remnants. Such an integrated approach to water management has proved very difficult to implement at catchment scales. However, it is the cornerstone of work in recovery catchments.

Left Landholder Jack Stone inspects surface water flow in the constructed grassed water-way immediately after the one-in-45-year rainfall event in the Buntine-Marchagee Recovery Catchment in December 2007. This helped give landholders confidence that actions on their land can improve water management.
Photo – Kathy Stone

Below left Successful on-farm revegetation in another part of Buntine-Marchagee Recovery Catchment, part of integrated water management.
Photo – Gavan Mullan

Between 2002 and 2006, the Salinity Investment Framework was developed to provide better analysis and decision-making on where public investment should be made. It recommended that public funds should be targeted where the highest-value assets were at risk, where the full range of salinity options were evaluated and where there was the greatest net benefit in applying the funds to their adoption. The Salinity Investment Framework principles have been applied in the Natural Diversity Recovery Catchment Program.

Six wetland systems chosen

Much of the agricultural region is a flat landscape with ancient drainage lines. Among these are wetland systems that may be fresh, saline or brackish, and permanent or ephemeral, in their natural condition. Although most of these wetlands are now severely degraded, some retain a good number of their natural biological assets. Including now-uncommon biological communities and threatened species, these areas are of high natural diversity value. They require careful management to avoid the fate of so many wetlands following land clearing and settlement.

The six wetland systems of the recovery program fall into this category and are at risk of altered hydrology. They include Toolibin Lake near Wickepin (known as the Toolibin Lake Natural Diversity Recovery Catchment, or NDRC); wetlands including and in the vicinity of lakes Muir and Unicup, east of Manjimup (the Muir-Unicup NDRC); and lakes in the Lake Warden wetland system immediately north of the Esperance town site (Lake Warden NDRC). The other systems are Lake Bryde, East Lake Bryde and other wetlands in the adjacent Lakelands Nature Reserve, north-east of Pingrup (the Lake Bryde NDRC); clay pans within Drummond Nature Reserve south-west of Bolgart in the Avon River basin (Drummond NDRC); and various wetlands and channels east of Marchagee and west of Buntine in the Northern Agricultural Region (Buntine-Marchagee NDRC).

The surface water catchment surrounding each of these wetland systems is used to define the boundaries of each 'recovery catchment'. Given that surface and groundwater catchments are broadly the same in these areas, this defines a useful area for assessing and managing hydrological threats, and provides the social boundary for bringing together government leadership, landholder support, science expertise and resources to plan and implement management (see map on page 9).

The basis of each recovery catchment's nomination was the value of the biodiversity at risk from altered hydrology, whether this is related to changed water quality—for example, increased salinity—or altered water quantity—for example, prolonged inundation. The three recovery catchments nominated in the original *State Salinity Action Plan* are listed as Wetlands of International Importance under the Ramsar Convention (Toolibin Lake, Lake Warden System and Muir-Unicup) based on conservation criteria that include importance to waterbirds. Three wetland systems were added based on information generated by the 2001 agricultural zone biological survey. These contain important plant and animal communities at risk from altered hydrology and include threatened flora, fish and aquatic invertebrate species. They also meet other important criteria for new natural diversity recovery catchments, including local community support.

Below right DEC officer Kimberley Oswald conducts a Chlorophyll A test on a water sample from Lake Warden as part of the water quality monitoring program. Excess nutrients entering the Lake Warden wetland system, along with excess inundation, threaten its natural diversity. *Photo - John Lizamore*

Management actions which occur through the program are comprehensive. For example, see 'Just add water: the Toolibin Lake inundation experiment' (*LANDSCOPE*, Summer 2011–12).

Catchment management at work

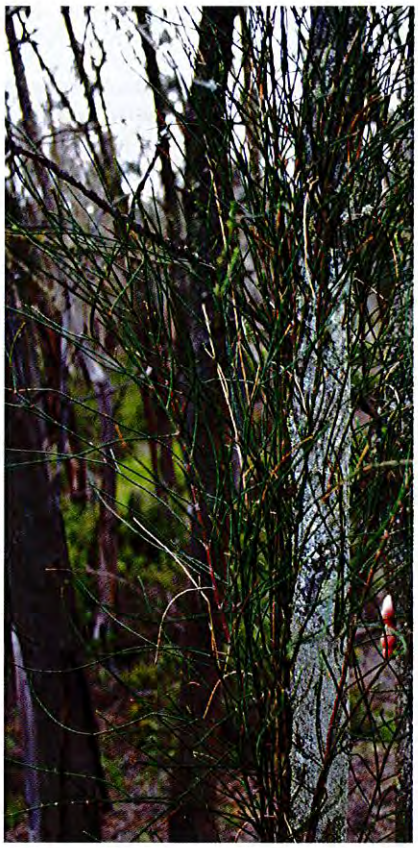
The 2010 review of the Natural Diversity Recovery Catchment Program made some important points. These included that the species and ecological communities threatened by altered hydrology persist in the recovery catchments. In at least one case—Toolibin Lake—the biodiversity values would have been lost without management, and in the case of the Lake Warden wetland system, areas of vegetation and habitat are currently recovering, largely as a result of management actions. Longer-term monitoring is needed to assess the impacts of other major management interventions including constructed waterways.

The review also found that revegetation, surface water management and other management works have improved the likelihood that many other biological communities threatened by altered hydrology will persist. It also noted that better understanding and management of landscape hydrology is essential, not only for biodiversity conservation, but also for continuing to deliver production and other public benefits from our agricultural systems. The review confirmed that recovery work is contributing to improved agricultural land management with respect to altered hydrology in the recovery catchments, which total some 700,000 hectares in area. Additionally, it found that the six recovery catchments, together with water resources recovery catchments managed by the Department of Water, provide the best examples of catchment-scale management in the state.

It was also possible to draw a general conclusion about work to protect natural resources, including land and water, in catchments; namely that success is dependent on long-term commitment by an organisation to the protection of catchment assets. The underlying reason is that, at catchment scales, success depends on long-term resource input over decades. This resource input needed to be focused on end-of-catchment outcomes such as biodiversity in wetlands, or the delivery of potable water.

Elements for success

The review of the Natural Diversity Recovery Catchment Program identified a range of requirements for achieving nature conservation aims



Above Hooded plover.
Photo – Dave Watts/Lochman Transparencies

Above right Epicormic shooting from swamp sheoak stems at Toolibin Lake. Together with recruitment of seedlings on the lake floor, this was the first sign of potential recovery in this ephemeral wetland. Groundwater pumping, surface water control and a succession of dry seasons all played a part.
Photo – Ken Wallace/DEC

in the face of the salinity threat. In addition to the long-term commitment of an organisation, four other elements identified are described below.

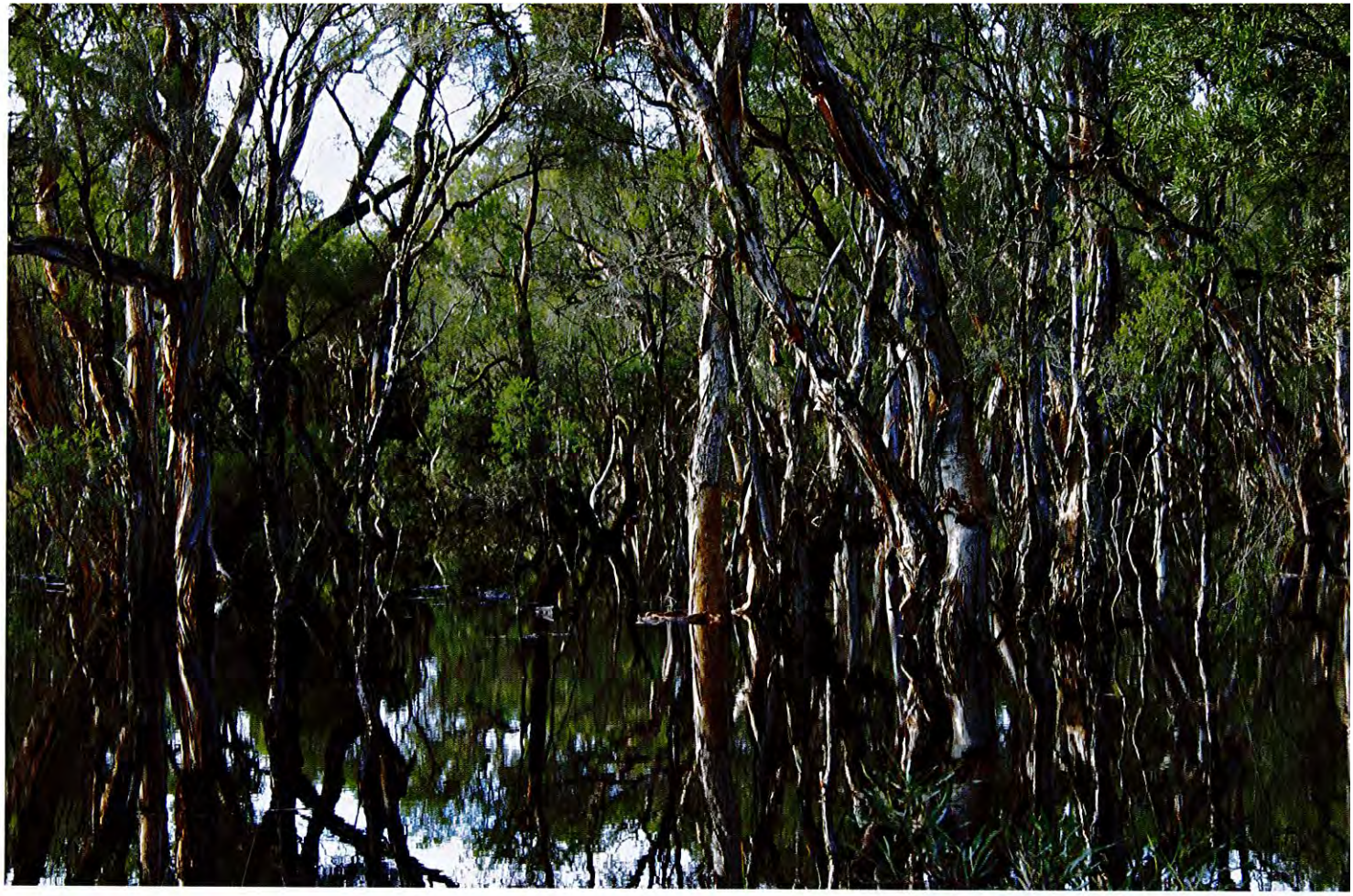
The first of these was the rigorous selection of priorities—strict and consistent processes were applied to designating natural diversity recovery catchments for single-minded attention and ongoing funding. Although the original *State Salinity Action Plan* set the number at an affordable six, only the three Ramsar-listed wetland systems started in that year, with the additional three added after further consideration, drawing on the work of the biological survey group in the department's Science Division.

The second element of success was the collection and analysis of sufficient data to develop a working model or hypothesis of catchment processes. Although our very general understanding of catchment processes is adequate, much more detailed information is required to implement effective management action within specific catchments. At least 10 years of trend data is required as a basis for management decisions. Research continues today and is advancing the scientific understanding of the processes at work in these wetland systems and their associated catchments.

A third element of success incorporated clear responsibility for management and a commitment to partnerships. The then CALM was assigned responsibility because it had the vested interest in achieving success under its legislative charter, backed by reporting and accountability requirements. Importantly, the department committed to partnering in an open and collaborative way with other agencies that had relevant expertise, with landholders to achieve complementary actions on private land, and with regional natural resource management groups that shared these objectives and had access to additional resources. Based on a review of expenditure between 1996 and 2006, about 35 per cent of the program's budget went to works on private land, including some land purchases.

Typically, work in each catchment is carried out over three broad phases. First, works such as revegetation or remnant vegetation protection are undertaken, which benefits biodiversity conservation without compromising longer-term goals. At the same time, investigations are carried out and landholders engaged. Second is surface water engineering works. This provides more immediate benefits but must be carefully assessed to avoid unintended consequences. Third, where justified by feasibility studies and environmental impact assessment, more intensive engineering works are completed, such as the pumping at Toolibin Lake and gravity pipeline at Lake Warden (see 'Triple test: recovering natural diversity at Toolibin Lake and Lake Bryde', *LANDSCOPE*, Winter 2010).

The fourth element of success was described as 'embracing integrated solutions'. In contrast to much earlier thinking on salinity management which tended to focus on single solutions—such as either revegetation or drainage alone—the Natural Diversity Recovery Catchment



Above Paperbarks in a small freshwater wetland to the east of Lake Unicup during a recent wet winter in the Muir-Unicup Recovery Catchment. This wetland complex supports more than 60 waterbird species, including 17 migratory species subject to international conventions; two threatened fish species; and a rich suite of aquatic invertebrates.
Photo – Ken Wallace/DEC

Program was pragmatic in embracing a range of practices and solutions that gave the best result or were important stepping stones to get there. Working with landholders and the broader community has been critical in this process. This is best exemplified by the department being prepared to provide incentives for commercial (blue gum) and potentially commercial (mallee) plantings in catchments where this contributed to catchment outcomes. DEC continues to support the nascent mallee biomass industry through research and development and through facilitating industry development. The broadscale revegetation that could result from such an industry would make an important contribution to achieving environmental outcomes.

These are important elements not only for the continued success of the Natural Diversity Recovery Catchment Program, but also for catchment management programs more broadly.

Setting a new standard

The Natural Diversity Recovery Catchment Program has implemented a relatively low-cost series of actions that, over 15 years, have ensured the persistence of important natural values in the agricultural zone of WA. These values range from increasingly uncommon biological communities—such as the valley floor melaleuca communities in the Lake Bryde NDRC and the threatened sheoak-melaleuca community at Toolibin Lake—to improving the habitat of species such as the hooded plover (*Charadrius rubricollis*) at Lake Warden. However, even these species and communities continue to be threatened—while actions to date have provided some respite, the need for ongoing management continues.

The program has been a quiet achievement for natural diversity in the highly cleared agricultural zone. In addition, it has set a standard for catchment management. Through the recovery program's contribution to understanding water in our agricultural landscape, it is also making a critical contribution to land use and management in general. However, much hard work remains to ensure ongoing success.

Kevin Goss recently retired as Chief Executive Officer of the Future Farm Industries Cooperative Research Centre which nationally is working on perennial plant-based technologies and farming systems to more effectively use water in the landscape. It partners with the Department of Environment and Conservation in a number of projects linked to the Natural Diversity Recovery Catchment Program. Before this, Kevin held senior management positions with the Murray-Darling Basin Commission, Department of Agriculture and Food WA and the then Department of Conservation and Land Management. Kevin can be contacted by email (kfgoss@me.com).

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