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Restoration journey of the Piccaninnie Ponds Karst Wetlands, South Australia

By Mark R. Bachmann

A restoration programme to reverse degradation of this important wetland ecosystem was first proposed in the 1980s but only became a reality a decade ago. Recovery of key functional groups of fauna, such as birds and fish, illustrates the value of wetland restoration, providing particularly useful insights for threatened species management and recovery.

Key words: *alkaline peat fen, karst rising-springs, Piccaninnie Ponds Conservation Park, Ramsar, wetland restoration.*

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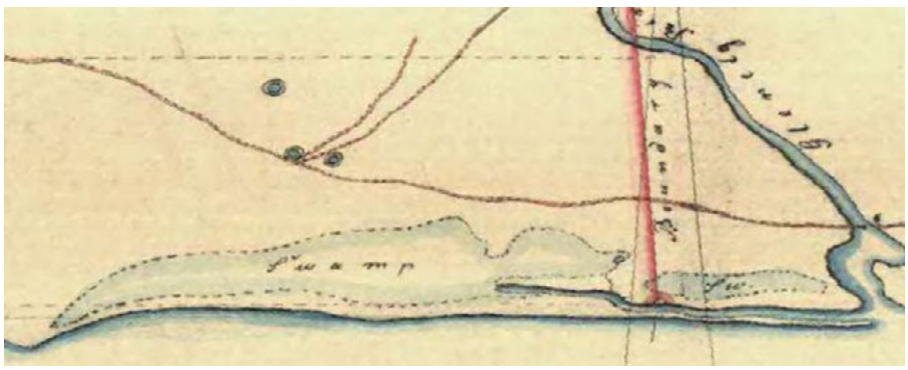

Figure 1. The Piccaninnie Ponds wetland complex as first broadly mapped by William Blandowski (1851). The red line shows the boundary between what were then the relatively new colonies of South Australia and Victoria.

Introduction

The Piccaninnie Ponds Karst Wetland system predominantly occurs in South Australia but straddles the state border between this state and Victoria. It is home to a continuous stretch of fresh, coastal wetlands that are hydrologically dependent on ground water via rising-spring discharges from the local unconfined tertiary limestone aquifer.

A permanent creek originally flowed eastward from these wetlands into the Glenelg River estuary in Victoria until its course was diverted to the sea in 1906, the first of many changes to system hydrology that would follow. Several decades later in 1969, the central third of the wetland system became a Conservation Park, preserving both its biodiversity values and an internationally renowned cave diving site. However, the overall wetland complex had been degraded by artificial drainage works and development over the preceding decades, leaving the 11-kilometre-long system in a compromised state.

This account describes the purpose, process and outcomes of a long-term ecological recovery project designed to address the legacy of changes threatening this important wetland complex, providing useful insights for those interested in tackling complex wetland management challenges elsewhere in Australia.

Site Character and History

The Piccaninnie Ponds wetland system is a rare Australian example of an alkaline peat fen. This wetland type was originally uncommon and has fared poorly as a result of artificial drainage activities that commenced after European settlement. In the South East region of South Australia, alkaline peat fens are associated with near-coastal fresh ground water discharge from the region's underlying limestone aquifer and only occur in a limited number of locations where the right landscape and hydrogeological factors come together (Bachmann 2002).

European settlement of the Mount Gambier region in the lower South East of South Australia began in the 1840s, and it was not long before settlers began to demand government assistance with the impact that inundation was having on transport routes and agricultural activities. Official drainage programmes commenced in the 1860s and have continued semi-continuously ever since, resulting in over 90% of the region's wetlands now being drained to facilitate development (Taylor 2006a).

Piccaninnie Ponds Conservation Park became a protected area in 1969, now managed by the Department of Environment, Water and Natural Resources (DEWNR). However, its reserved status and impressive list of resident threatened species were disguising the fact that the wetlands of the Park had been in a state of slow decline as a result of earlier changes to the hydrology of the broader wetland system. Re-instating the hydrology of drained or altered wetlands was first raised by two local park rangers who worked in Mount Gambier in the 1980s, Richard Coombe and Michael Hinsliff. Their investigation ultimately led them to seek support for undertaking major hydrological restoration works at Piccaninnie Ponds, a concept that was promptly dismissed by other more senior staff in head office, on the grounds that any changes might compromise the contemporary values for which the Park was proclaimed. This resulted in the maintenance of the status quo for a further two decades until 1999, when local senior ranger Tim Collins brought the relevant files to the author's attention. After reviewing the files, it became clear that Piccaninnie Ponds might provide the only realistic opportunity in this part of Australia to protect and restore a wetland of this rare type (a karst rising-springs peat fen) in its entirety. With that simple goal in mind, from that point forward began the process of research, planning and on-ground works that began to deliver results in 2004 and has continued until today.

Hydrology – From Natural Condition to Degraded State

Prior to European settlement, water that discharged from karst rising-springs into the coastal wetlands of the Piccaninnie Ponds system flowed eastward across the State border into the Glenelg River Estuary, along a watercourse situated between the dunes called Freshwater Creek (also known at various times as Glovers, Albrechts and Eel Creek), discharging near what is now the township of Nelson, in far south-west Victoria. The flow path and general area were first mapped by William Blandowski, government-appointed surveyor of pastoral leases in the South East of South Australia, in 1851 (Fig. 1).

Then in the 1890s, the land was again visited by South Australian surveyors who were tasked by the government with defining smaller parcels of land for closer agricultural settlement. What they saw and mapped (Fig. 2) was the last preserved perspective of the system prior to drainage and development.

The Freshwater Creek flow path (dashed line) commenced in the vicinity of the main ponds area, and flowed behind the dunes all the way to the Glenelg River Estuary, discharging near the River Mouth, although this particular image ceases at the state border. Notably, this was the only natural outlet from the wetland, and there were substantial areas of open-water and sedgeland habitat, as indicated in Figure 2. The narrow band of dunes was only lightly vegetated, with substantial areas of open drifting sand, and a large area of dense, wet alkaline peat fen tea tree (*Leptospermum lanigerum*) shrubland habitat was also present.

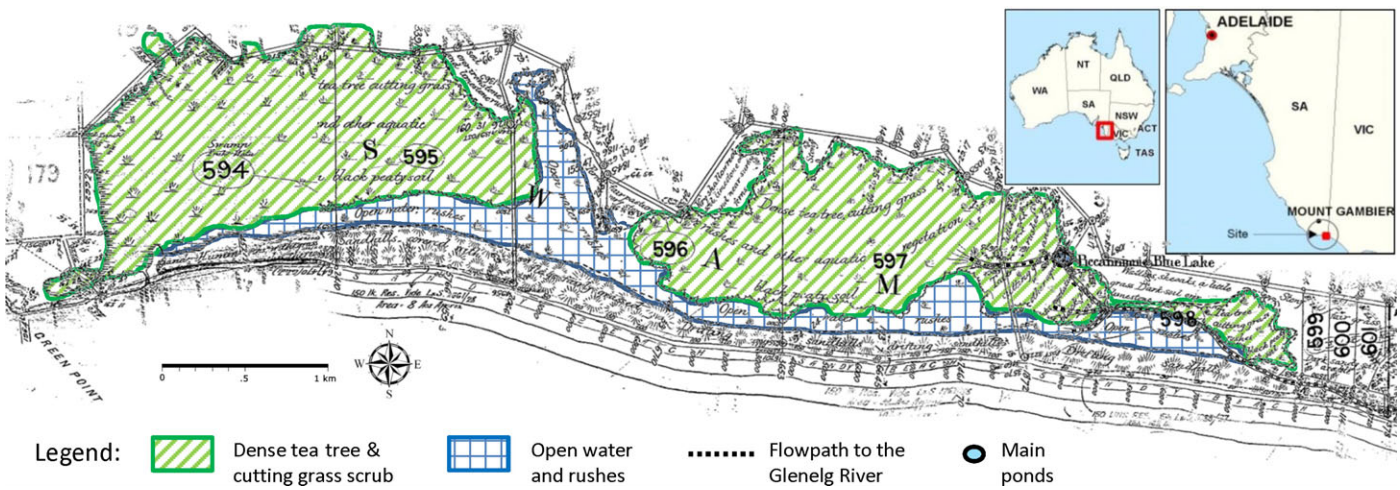

Figure 2. A modern interpretation of the broad habitats of the South Australian portion of the Piccaninnie Ponds wetland complex, superimposed on the original survey maps from 1896.

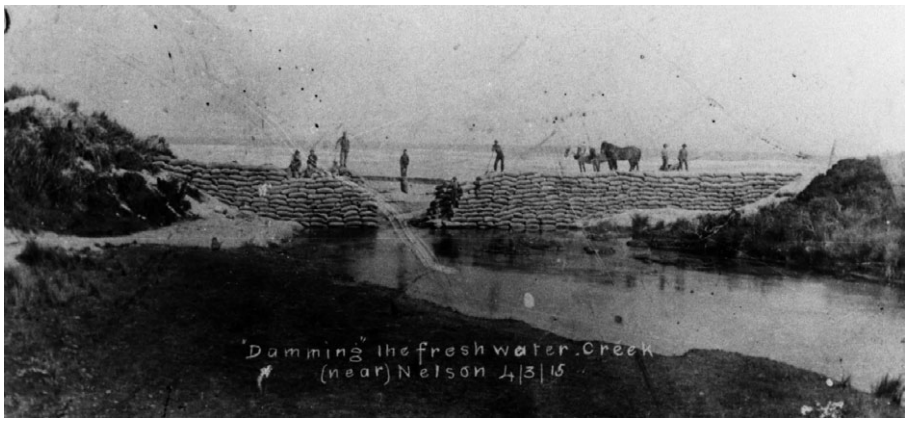

Figure 3. The 1915 damming of Freshwater Creek at the location of the 1906 artificial outlet to the sea, just inside the Victorian border, near the township of Nelson. (Image courtesy of the Les Hill Collection, Mt Gambier Library).

This is how the system remained until 1906, when the first of several attempts to drain the wetlands of Piccaninnie Ponds directly to the sea occurred. The instability of the dunes, and the short distance (a single dune width) between Freshwater Creek and the sea, seems to have presented local landholders with a ready opportunity to cut a direct channel through the primary dune. (This would make more land available for grazing, by lowering water levels throughout the system.) Hence, at this time, in an apparent deliberate act, Freshwater Creek was diverted to the sea just inside the Victorian border.

However, rather than being the beginning of comprehensive drainage, what ensued was a turbulent 9-year period during which the community, led by local fisherman, lobbied the state governments in both South Australia and Victoria in an attempt to have the creek redirected to the Glenelg River. It seems that the often estuarine lower reach of the Glenelg River was a hot spot for fishing, and the locals had noticed a dramatic decline in their catch since the permanent freshwater flows from Piccaninnie Ponds were lost to the estuary.

This early form of environmental activism was rewarded in 1915, when the state governments agreed to share the cost of damming the new outlet through the dunes (Fig. 3) and constructed an alternative channel to the Glenelg River. This was necessary because the original flow path between the dunes had been consumed by drifting sand.

It was not long before the new flow path caused controversy however, with landholders at the western end of the system vigorously complaining that the water level was now higher than prior to 1906 and was impacting on the viability of their grazing enterprises. A short time later in 1917, with water levels high and the dunes still unstable, it appears they took matters into their own hands and in another suspected act of sabotage, a new outlet was cut near the state border.

The difficulties encountered in such an unstable coastal environment, and problems in securing interstate co-operation to meet the costs, then led both governments to abandon any further plans for flow path restoration, enabling the *ad hoc* drainage and development of portions of the wetland system to commence by private landowners or lessees.

By the time the first aerial imagery was flown in the 1940s, a further artificial outlet had been constructed (taking the main flow of water from the ponds directly to the sea) and the development and drainage of land at either end of the system had begun in earnest. Substantial sand drifts, which were a common natural feature of the coast in this part of south-eastern Australia at the time of settlement, are also evident and have reduced the wetland extent.

The 1917 outlet subsequently ceased to flow approximately 50 years ago, around the time the main outlet to the sea was deepened by the then grazing lease holder of the area, who literally blew-up a reef of outcropping limestone in what was the third (and still current) artificial outlet channel of Freshwater Creek (later also known in its new location as Ellards Creek, after the lessee at the time) (Bachmann *et al.* 2015). This act removed a feature from the outlet that locals had come to know as 'the waterfall', beneath which eels were known to congregate.

At the time the Park was proclaimed in 1969, two artificial outlets were draining wetlands of the system in South Australia directly to the sea, and a third (in an area known as Pick Swamp, now named after another past lessee, Edgar Pick) was cut in the early 1970s. The locations of these three outlets in 2003, from west to east, are marked as follows on Figure 4:

1 Stoney Drain at Green Point;

2 Boundary Drain at Pick Swamp; and

3 Ellards Creek (Piccaninnie Ponds outlet drain) which takes the main flow from the Ponds directly to the sea, cut prior to 1945 to replace the 1917 outlet near the state border.

The contraction in the wetland area and a change in its character (less open aquatic habitat) can also be seen by comparing Figures 2 and 4. Both the South East Association of Field Naturalists and local ranger staff took an active early interest in the hydrology of the area after its reservation, by advocating for the restoration of flows to the Glenelg River and in the process also restoring Holloways Swamp, the drained wetland situated in Victoria between the State border and the river.

However, the final, filed correspondence on the matter from the 1980s shows that scientific officers based in Adelaide refused to support the

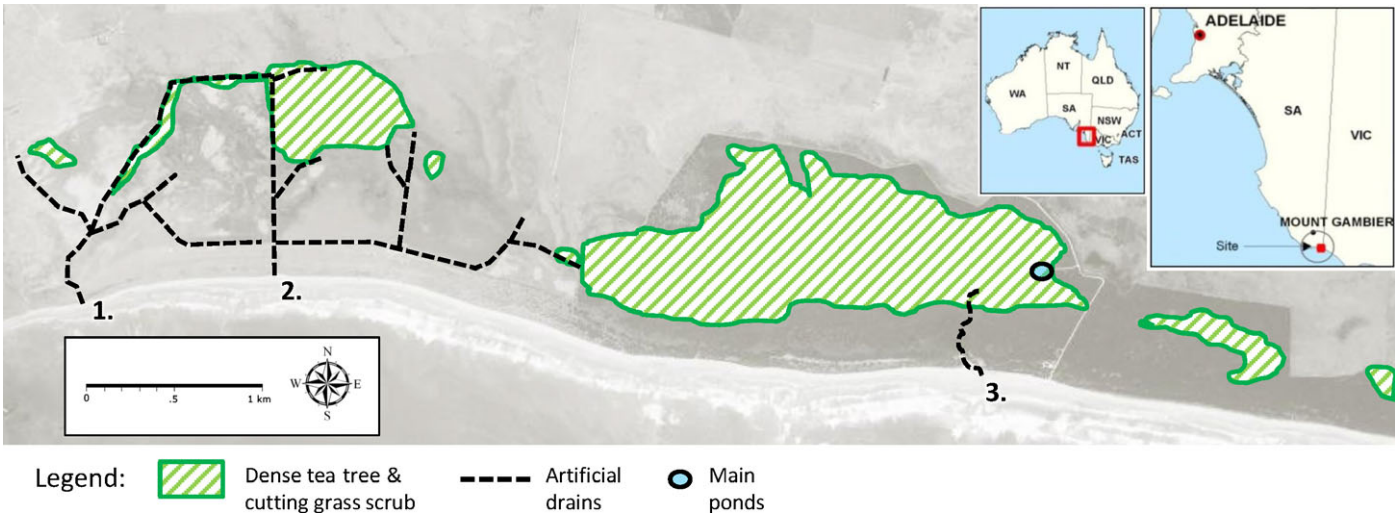

Figure 4. A broad depiction of habitats within the Piccaninnie Ponds wetland complex in 2003, showing the same area displayed in Figure 2, 110 years later.

proposals on the grounds that a change to hydrology may cause disturbance to terrestrial vegetation in the Park. The matter subsequently remained closed for two decades.

Towards a Restoration Proposal

The Nature Conservation Society of South Australia delivered a regional project between 1999 and 2001 that negotiated with farmers to fence off areas of remnant coastal wet heath from stock grazing in the South East of South Australia (Bachmann 2002). This project confirmed that stock grazing was indeed having a detrimental impact on remaining areas of this rare habitat and could readily be addressed through fencing. However, more importantly, this work also highlighted the fact that altered water regime caused by artificial drainage was actually a more insidious but less recognised threat. The areas being fenced off were only typically small fragments of what were once much larger coastal wetland systems and more than simply excluding livestock was needed to secure their effective conservation.

The Piccaninnie Ponds restoration project began somewhat opportunistically. In May 2000, a survey was undertaken of Pick Swamp, to the west of the original Conservation Park boundary, to record occurrences of the Swamp Antechinus (*Antechinus minimus maritimus*), an endangered species in South Australia (Bachmann 2001; Bachmann & van Weenen 2001). As well as recording the presence of this important species, these visits highlighted the existing conservation values and restoration potential of the property. This led to successful surveys for other threatened species over subsequent years, including fish (*Nannoperca obscura* and *Galaxiella pusilla*), orchids (*Pterostylis tenuissima* and *Corybas* sp. aff. *diemenicus*) and reptiles (*Lissolepis coventryi*).

It was during this period, in 2002, that the owner indicated he would soon be selling after 30 years of developing his portion of the swamp into a cattle grazing enterprise. Despite being largely drained and cleared by this time, the property still retained an excellent, representative area of *Leptospermum lanigerum*-dominated wet heath, the patch of habitat where the Swamp Antechinus and several other threatened species were recorded. This area remained largely intact thanks to elevated ground water being fed (under pressure) by permanent spring discharges that, despite several efforts, had not been effectively drained. These characteristics provided cause for confidence in the wider restoration potential of the property. This was reinforced by the fact that the recent severe declines in the volume and permanency of ground water discharges at similar spring-fed systems further to the west (especially those situated between Port MacDonnell and Carpenter Rocks) did not appear to be as serious at this location. It became clear, therefore, that the site could provide the first and possibly only chance to seriously attempt hydrological restoration at the whole-of-property scale, in a system of this type in the South East region of South Australia.

The property was eventually placed on the open market in 2003, and, after a lengthy internal discussion within the Department at the time, the South Australian Government made an offer to purchase. Because there were two interested parties, each was asked to provide their highest and best offer in a sealed envelope by a given date. This process led to the South Australian Government being significantly outbid, and the property officially changed private hands in November 2003, with the new owner immediately investigating the further devel-

opment (subdivision) potential of the land (given its coastal frontage) and entering into a long-term grazing lease with a third party. The first opportunity to secure the site for restoration has been lost.

However in 2003 and 2004, based on advice from the Department's regional manager at the time, John Schulz, a wider proposal was developed outlining how the entire Piccaninnie Ponds wetland system might progressively be restored in a logical, staged fashion. The document formed the basis of two successive grant funding submissions to the Australian Government's Natural Heritage Trust, Regional Competitive Component. Despite being overlooked for federal funding at that time, this document (Bachmann 2004) provided a blueprint that paved the way for a series of positive developments over the following years. The concept outlined five phases, each with associated protection, enhancement and management activities that would contribute towards the overall vision of a restored wetland system.

In brief, the restoration proposal involved the following key overarching elements:

- Improving the condition of existing wetland habitats in the existing Conservation Park, as the core remaining environmental asset in the wider modified wetland system.
- Building on the core protected area, with the gradual purchase, restoration and addition of the remaining four parcels of land (situated to the east (2) and west (2) of the Park) within the wider wetland system.
- Restoring water levels in the system by regulating or blocking artificial outlets, improving the quality and connectivity of wetland habitats, leading to the eventual reinstatement of the original flow path to the Glenelg River.

Over time, the restoration proposal and the vision it promoted, gained traction within the region and the Department generally, including (crucially) at the executive level, leading to the gradual implementation of some of the key first steps proposed in the plan.

On-ground Implementation

The subsequent implementation phase is summarised in the following timeline of key events:

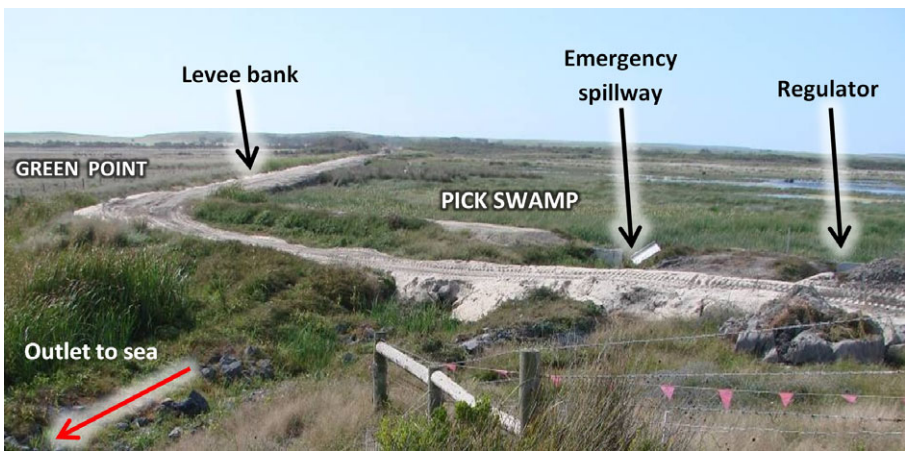

Figure 5. The levee bank, between Pick Swamp (right of image) and the drained and developed former wetland at Green Point (top left of image), under construction in 2009. The bank enabled water levels to be restored in Pick Swamp, while the Boundary Drain (situated along the outside of the levee bank) remains functional and continues to protect the neighbouring property from inundation.

2004

The South Australian Government purchases the small (24 ha) but strategically located 'Lapatha' property between the eastern end of Piccaninnie Ponds Conservation Park and the state border. This property contains previously grazed native grasslands and wetlands and is located within the zone that could enable the original flow path to eventually be reinstated.

2005

After the failed purchase attempt in 2003, South Australian Government staff undertake a successful strategic negotiation with the new owner of Pick Swamp, resulting in the 2005 purchase of this 230 ha property, situated adjacent to the western end of Piccaninnie Ponds Conservation Park. Active restoration works do not commence immediately, with an existing third-party grazing lease remaining in place over the property until mid-2007.

The process of halting the decline in wetland condition in the vicinity of the core area of Piccaninnie Ponds itself begins with a technical investigation in 2005 (Taylor 2005). The investigation recommends (from Taylor 2006b) a structure to:

- prevent any further fall in the water surface elevation in the ponds and the surrounding wetland;
- enable a future managed rise in water surface elevation (i.e. eventual restoration of historical levels);
- maintain fish passage between the ponds and the sea via the existing (artificial) outlet; and
- enable complete closure of the existing outlet should restoration of the original flow path eventually become possible.

2006

Works occur in the autumn of 2006 (Taylor 2006b), with the stage 1 weir and fishway installed on the outlet

drain to regulate water levels at Piccaninnie Ponds for the first time.

Also during 2006, as a result of a successful grant funding application to the Australian Government via the South East Natural Resources Management Board, Steve Clarke is employed as a restoration ecologist to coordinate the planning and implementation of works in Pick Swamp. This appointment initially culminates in the preparation of a restoration plan for the property (Clarke 2007).

2007

After minor trial works in 2006, the formal hydrological restoration of Pick Swamp commences with blocking of internal drains across the property in June 2007. However, the drain along the western side of the property (the 'Boundary Drain') is not blocked at this time, to ensure the neighbouring drained agricultural land to the west (Green Point) remains protected from inundation.

2008

Receipt of additional funding enables the construction of a regulating weir and emergency spillway near the exit point of the Boundary Drain at Pick Swamp.

2009

A levee bank is constructed to tie into the regulating structures built in 2008, providing full water management control at Pick Swamp and ensuring the neighbouring property (Green Point) is protected from inundation associated with the restoration works, as shown in Figure 5. These works allow the Boundary Drain to remain open without adversely impacting upon the ability to independently manage water levels in Pick Swamp.

2010

The 2004 and 2005 land purchases (the Lapatha and Pick Swamp additions) are proclaimed in November 2010, formally expanding the boundary of Piccaninnie Ponds Conservation Park, as shown in Figure 6.

2013

After successful implementation of stage 1, the stage 2 weir and fishway on the main artificial outlet from Piccaninnie Ponds are installed and wetland levels further increased (Fig. 7).

The works also involve upgrading other infrastructure, such as increasing the elevation of the Piccaninnie Ponds Road and installing new culverts under the road, as well as creation of a new flow path reconnecting the eastern and western wetland basins of Piccaninnie Ponds (Fig. 8). These wetlands had been separated for several decades by a combination of lower water levels, sand drift and the footprint of the road.

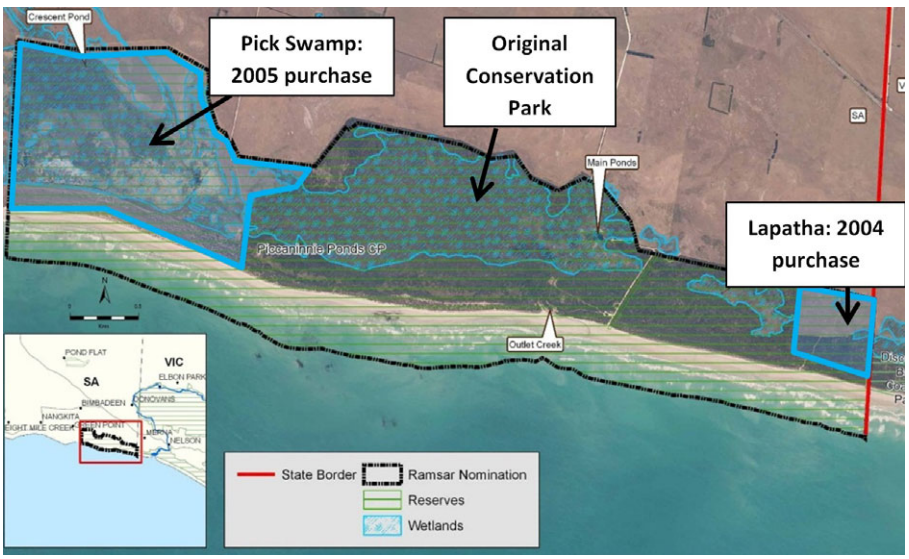

Figure 6. The Piccaninnie Ponds Karst Wetlands site, with land additions outlined in blue. The expanded protected area was proclaimed a Conservation Park in November 2010 and designated a Ramsar site in December 2012.

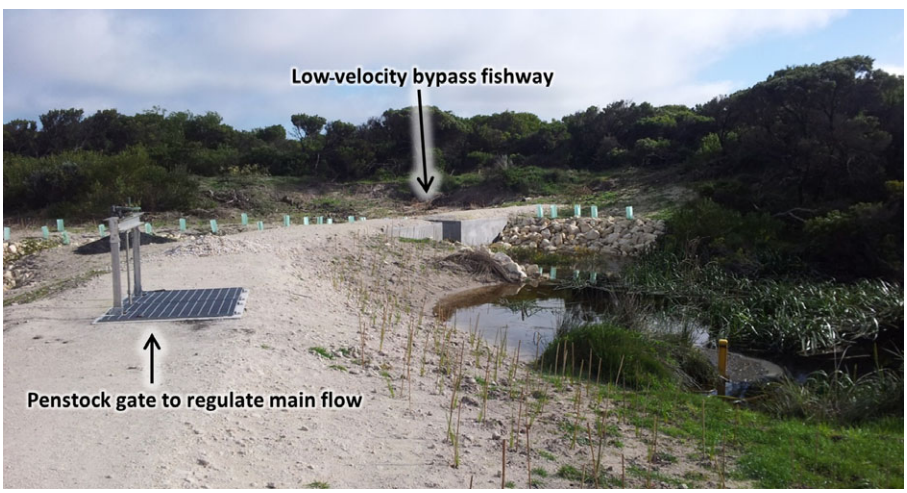

Figure 7. The lifted and redesigned stage 2 weir and fishway on the main artificial outlet at Piccaninnie Ponds, upon completion in 2013. High-velocity flows (under too much pressure to allow fish passage) discharge through a concrete pipe beneath the penstock gate that is used to regulate wetland levels, while a low-velocity bypass fishway enables diadromous species of fish to maintain their natural movement and migration patterns.

Figure 8. Aerial imagery showing the reconstructed flow path and culvert location under the Piccaninnie Ponds Road. Above – Preconstruction image from January 2003. Below – Postconstruction image from January 2014. Construction occurred in 2013. The main Piccaninnie Ponds (in the western wetland) are in the top left of each image, while Hammerhead Pond (in the eastern wetland) is in the bottom right corner of each image. Also note the increase in open-water habitat to the south of the main Ponds, associated with the installation and operation of the stage 1 and stage 2 weir structures.

Results of the Restoration Works

The period of time that has passed since some of the earlier stages of restoration commenced enables a brief overview of the results of restoration to be presented here. The works in 2006 at Piccaninnie Ponds had the immediate effect of halting the long-term drying trend previously observed, by increasing inundation immediately upstream of the structure. This caused a positive shift in habitats associated with an increased depth and duration of inundation, as shown in Figure 9, such as the retreat of invading Cumbungi *Typha domingensis*.

Over the same period, the hydrological restoration of Pick Swamp resulted in approximately 130 ha of land being permanently re-inundated, and the aquatic floristic component has recovered to an excellent degree with minimal management intervention in the time since the project commenced (Bachmann & Holland 2015), as shown in Figure 10.

There has also been a significant monitoring and revegetation programme, widely supported by local community volunteer groups, with the latter rapidly transforming habitat on the terrestrial and wetland edge portions of the property. These areas have required more of a helping hand than the true aquatic zone which has undergone a process of entirely spontaneous recovery (as shown in Figure 10). Monthly bird surveys have been conducted at the site by members of BirdLife South East South Australia since May 2007 to help monitor the recovery of the wetland system, with 149 species so far recorded (Haywood *et al.* 2013). The site is now also an important drought refuge in the wider landscape, hosting thousands of waterbirds at key times (DEWNR, unpublished data).

There are now 36 different vegetation associations recorded in the Piccaninnie system (Ecological Associates 2008), and Pick Swamp has become a stronghold for the Australasian Bittern (*Botaurus poiciloptilus*) and Dwarf Galaxias (*Galaxiella pusilla*), both nationally threatened species (Bachmann *et al.* 2014; Veale

Figure 9. The upstream inundation impact and desirable changes to aquatic habitat caused by the operation of the stage 1 weir. The left image is from 2004 (prior to works in 2006), while the image to the right is from 2012.

Figure 10. The restoration of Pick Swamp. Above – May 2007 (before restoration); centre – July 2007 (several weeks after restoration commenced); and below – June 2012 (5 years after restoration commenced). Note the rapid natural recovery of aquatic plants.

& Whiterod 2014). A further demonstration of the success of this ongoing restoration project has been the recent successful reintroduction of two nationally vulnerable species to restored habitats in Pick Swamp, each with very specific habitat requirements: the Yarra Pygmy Perch (*Nannoperca obscura*) (Veale *et al.* 2014) to the true aquatic zone and the Swamp Greenhood (*Pterostylis tenuissima*) to an area of fringing wet heath habitat re-established through successful revegetation works (Thompson *et al.* 2015).

The overall result of the restoration works described can be viewed by comparing Figures 4 and 11.

Discussion

It is worth reflecting on the fact that at Pick Swamp, the wetland communities now present in a large portion of the restored area differ from what occurred at the site before the phase of agricultural development. Fortunately, the large area of the original peat fen tea tree shrubland community was still present in the north-western corner of Pick Swamp and was buffered to some extent against dehydration over the years the property was drained, as a result of elevated ground water discharge from rising springs in the vicinity. However, postdrainage peat subsidence has clearly altered the surface elevation in the nearby, deepest parts of Pick Swamp to the south of this zone. Hence, as well as being a necessary action to protect the long-term hydrology of the remnant peat fen area from peripheral drawdown, hydrological restoration has now resulted in an expanded area of adjacent open aquatic habitat, as can be seen by comparing Figures 2 and 11. Despite this not being consistent with the original distribution of habitats on the property, the newly formed aquatic communities are highly desirable as complementary conservation assets, as they are also widely depleted elsewhere in near-coastal environments in south-eastern Australia.

This approach highlights the value in having a flexible vision for what constitutes wetland restoration success, by evaluating outcomes using an understanding of wetland ecology at both the local and regional levels. Goal setting for wetland restoration projects of this nature benefit from focusing on measures that help managers understand whether they are witnessing a positive trajectory of change through the recovery process, rather than seeking a fixed 'steady-state' outcome (SER 2004). In wetland restoration, change within these naturally dynamic systems is to be embraced (within agreed acceptable limits), carefully managed and, wherever possible, taken advantage of to benefit the ecosystem, species and/or ecological processes being targeted.

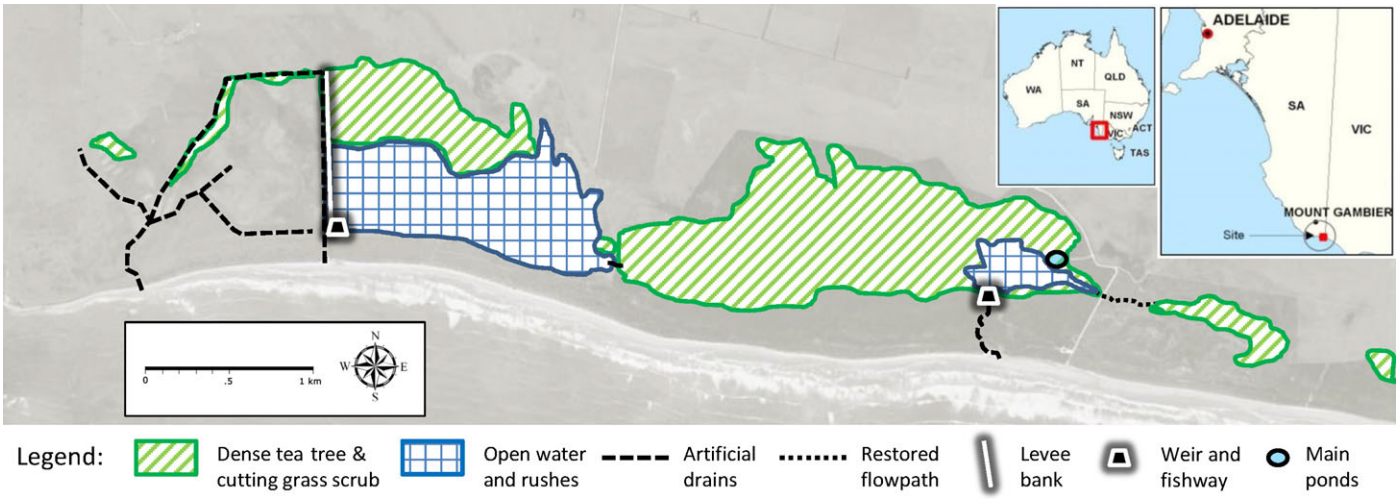

Figure 11. A broad depiction of habitats within the Piccaninnie Ponds wetland complex at the present time, showing the same area as displayed in Figures 2 and 4. The changes shown here summarise the culmination of several years of successful restoration works, including the reinstatement of Pick Swamp, regulation of the main drain from Piccaninnie Ponds to the sea and the recreation of a flow path to the eastern wetlands.

In addition to the obvious hydro-ecological outcomes associated with the works that have now taken place throughout the central portion of the Piccaninnie Ponds system, the most satisfactory outcome of the restoration programme at Pick Swamp in particular has been the level of community participation in the restoration process and the role this wetland now plays as a demonstration site to inspire interest in the concept of wetland restoration across the region and beyond.

In recent years, a number of new hydrological restoration projects have commenced or have been completed in the region on public and private lands (in areas of nearby South Australia and Victoria). The proven success of the works described here has played a key role, by giving investors, landholders and project proponents the necessary confidence in the outcomes that can be achieved when sites are well-understood and strategically selected for restoration.

As with most complex restoration journeys, and despite the significant progress achieved so far, the Piccaninnie Ponds story is far from complete. The original plan outlined for the system since 2003 has now had several key steps successfully implemented over a 10-year period but, due to a current lack of interest from the remaining neighbouring private landholders to the west and east of the expanded Conservation Park, the vision for the entire wetland system cannot yet be realised. However, thanks to the steps that have been taken, the key threats that were imminent back in 2003 are now a distant memory as the hydrological (and thus ecological) sustainability of the expanded protected area has been secured with the measures so far implemented. As circumstances change in the future, opportunities to realise the full vision for the wider wetland system may one day re-emerge.

Some key observations worth sharing from this restoration journey are as follows:

- **The importance of becoming intimately familiar with the history and values of a site,** and planning a staged process of restoration to suit. In the 1980s, the restoration effort focused on immediately restoring flows to the Glenelg River in a single step, but at that time, neither the steps involved nor the ecological justification for action were described in sufficient detail. Staging projects is particularly important when negotiating support through a complex government bureaucracy. Indeed, this and other similar projects have shown that progress in this context relies on implementing a series of thoroughly planned and well-articulated steps that can take several years to materialise.
- **The need to develop and share an inspiring vision.** Telling the story of a site and the prospect of returning it to its former glory will capture people's imagination. If high level support for the overall strategy or vision can be gained, then it is a matter of being ready to act when opportunities arise. While this continues to present some serious timing and logistical challenges when working within, or relying upon, government systems and environmental sector funding parameters – it can be done. However, it does rely on good communication, creative thinking and having dogged persistence.
- **The immense value of involving the community in on-ground success,** as a great way of building momentum and wider support. Over the years, community volunteer groups have played a major part in the restoration works and associated monitoring programmes, and as a result, they are now some of the strongest advocates for wetland restoration activities in the region.

As a final note to the story, throughout the entire period described above (starting in approximately 2001), the Ramsar nomination of the Piccaninnie Ponds Karst Wetlands also successfully progressed, with the expanded Conservation Park formally adopted for inclusion under this international convention by the Australian Government in December 2012, as shown in Figure 6. The site was later publicly announced as Australia's 65th Ramsar site in the region in January 2013 and, for those with an intimate interest in the site, was a fitting end to the long and complex journey of the previous decade. This new status provides the highest level endorsement, not only of the intrinsic values of this unique karst environment, but also, just 5 years after restoration commenced at Pick Swamp, international recognition of the outstanding potential of wetland restoration.

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