From Infrastructure to Icon: a Historical and Archaeological Analysis of the Randell Dry Dock.

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Abstract

On the banks of the Murray River in the small township of Mannum, South Australia, lies an impressive and rare feat of early colonial maritime infrastructure; the Randell Dry Dock. Originally constructed as a timber floating dock in 1873, it was purchased by Captain William Randell and towed to Mannum. The imposing structure docked over half of all the paddle steamers on the Murray-Darling river system before being superseded in 1927. It is now only one of a handful of timber docks from this period still existing internationally. Archaeological investigations have been minimal on maritime infrastructure sites along the River Murray. A heritage trail has been implemented by the SA Department of Environment and Natural Resources and the SA Tourism Commission. The Randell Dry Dock is part of this trail and on the State Heritage Register. Archaeological investigations have revealed new information about the dock's unique construction. This paper will outline the history and construction of this architectural gem, the seriousness of its current condition, and the ongoing fight against the clock by archaeologists and the local community to protect this rare and significant example of South Australian Murray River history.

Introduction

The Murray-Darling Basin river system in Australia began to take shape over forty million years ago. Encompassing three-quarters of New South Wales, over half of Victoria, an area of Queensland and the south-east corner of South Australia; it is approximately one-seventh of the entire Australian continent (Bennett 2004:8). The Murray River combines environmental beauty, rich cultural heritage and is the world's sixteenth longest river at 2,530 kilometres (Griffiths & Jeffery n.d.). Rising water levels in the Murray are good news for the river's health, but for Flinders University archaeologists working to conserve the unique nineteenth century Randell dry dock in the small riverside town of Mannum, South Australia, it creates an added sense of urgency. The project was first brought to the attention of the Flinders University Archaeology Department by the Mannum Dock Museum, because of their concern regarding the long term conservation and management of the dock.

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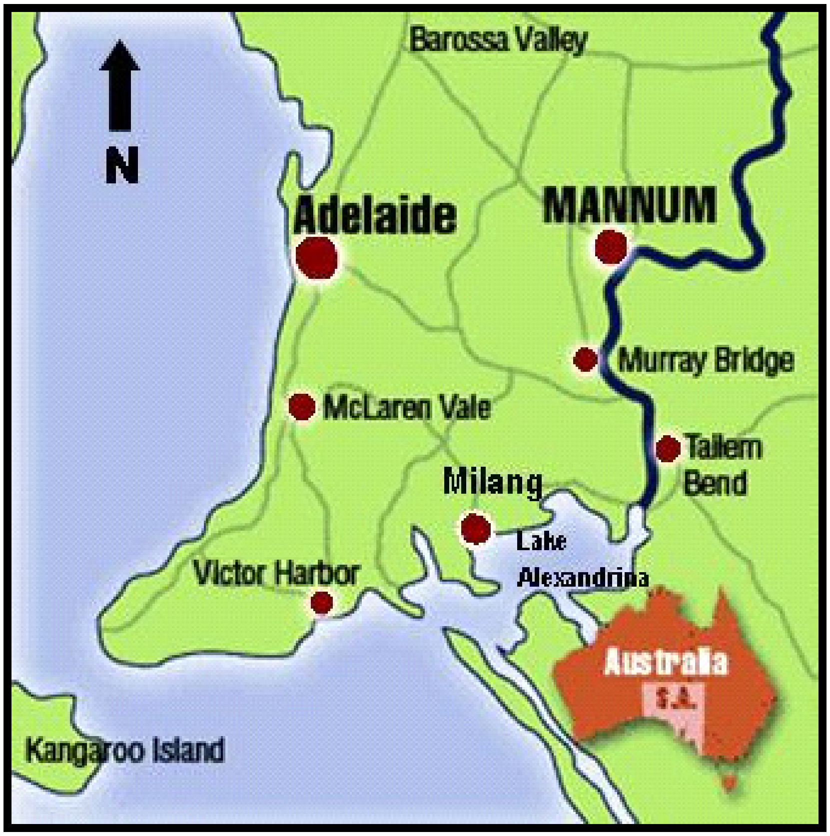

Figure 1. Locality map, South Australia. The dock is located approximately 85 kilometres east of Adelaide (Image courtesy of H. & J. Griffiths, 2010 <www.jestercruises.com.au>).

At the time Randell's dock was built, iron was the prominent material for dock construction. This research is significant because few timber floating docks have survived into the modern era, and relatively little is known about their construction. Over one hundred years and countless physical changes later, it appears that elements of the dock's original construction remain. As a result, it has the potential to yield information about the construction and development of timber floating docks.

Historical Background

The pattern of settlement and development along the River Murray from the 1850s onwards was determined by distance from large trade centres (like Adelaide) overland and the methods of transport available. Transport by water was very cost effective, and the River Murray provided the opportunity to open up huge areas inland (Swanbury Penglase 2002:9). 1848 saw the arrival of Albert Henry Landseer to South Australia. He capitalised on the huge expansion in river trade during the 1860s and 1870s (Swanbury Penglase 2002:11). After relocating his headquarters to Milang at the mouth of the Murray River, Landseer proposed a floating dock to provide an alternative to the slip at Goolwa (Southern Argus

22nd August 1873: n.p.). Constructed in 1873, the dock was originally designed as a floating dock for use on Lake Alexandrina (Swanbury Penglase 2002:14). A floating dock is a structure that can be submerged to permit the entry and docking of a vessel, which is then raised to lift the vessel from the water for repairs (Gaythwaite 2004:446).

Referred to as 'the largest floating dock ever built in the southern hemisphere' (Southern Argus 19th September 1873: n.p.), the Randell dry dock was the only floating dock active on the Murray-Darling river system. Built of red gum, an abundant source of reliable timber along the Murray, it contained framing and two layers of planking very similar to the structure of a wooden vessel. Historical sources suggest that the original length of the dock was 144 feet long, 40 feet wide, 9 feet deep and was estimated to carry 1000 tons (Southern Argus 19th September 1873: n.p.). As relatively new technology in Australia, there were only two similar facilities in the colony at the time the dock was built: the floating dock at King George Sound in Albany, Western Australia built in 1866 (Perth Gazette and West Australian Times 4th May 1866: n.p.) and Maggie, a Tasmanian wooden floating dock constructed in the 1880s (Richards 2003:145).

Not suited to the shallow waters of Lake Alexandrina, the dock was purchased by Captain William Richard Randell, a prominent river pioneer, for use as a dry dock at Mannum. Randell arrived at Mannum with the dock after a harrowing trip up the Murray. He reported that the dock 'moved like a snake' because it had no keel, making navigation extremely difficult (Swanbury Penglase 2002:16). In order to install the 43.89 metre long structure, the river bank had to be excavated. It was eventually floated into place in February 1876 and officially opened on 5th June (Southern Argus 17th February 1876: n.p.). Over its forty-seven year commercial life about half of the steamers on the Murray and Darling Rivers spent some time in the dock (Swanbury Penglase 2002:5). It was officially closed with the introduction of a new slip upstream at Morgan (Swanbury Penglase 2002:5). The dock gradually silted up until the late 1980s when it was rediscovered and cleaned out by the local community with the aim of using it to dock and restore the paddle steamer PS Marion. After the restoration of the Marion, a pump kept the dock free of water so it could become the centrepiece of the Mannum Dock Museum (Swanbury Penglase 2002:29).

Archaeological Investigations

Four archaeological investigations for this research were carried out over a two year period beginning in 2009. Initial non-invasive investigations consisted of visual and GPR surveys as well as the creation of a full site plan. Two field seasons followed, which led to excavation on a number of areas in and around the Randell dry dock, photographic documentation, a second GPR survey and further site and feature drawings.

December, 2009

Excavations in December 2009 yielded some of the dock's structural secrets. The largest trench (Trench 1) was opened on the northern side of the dock. This focused on excavating to the base of the dock (two metres down) to assess the condition of the timbers and identify any original floating dock features. Trench 1 revealed the beginning of prominent structural features including a walkway and retaining wall (visible in historic photographs). The vertical posts running along the northern perimeter have attached joists. The wooden beams uncovered throughout the trench were in a similar pattern as those found immediately to the north-west and as such constitute part of the same structure. A cavity at a depth of 0.70 metres had a joist forming the south-eastern hip of the cavity which was supported by a large horizontal pile, 0.47 metres in diameter. This pile also supported the joist in the north-west corner. Excavation also commenced underneath three of the newer floor planks (Trench 3), which revealed three large vertical pylons. In between the pylons were a series of flush planks, still in very good condition due to their muddy and wet environment. They are assumed to be the final layer of planking or the 'base' of the dock.

Figure 2. Looking east along the uncovered walkway in Trench 1. (Photograph by B. Burton, 2009).

September, 2010

A team of archaeologists returned to the site with the aim of revealing a section of the outer structure on the northern side of the dock. The project combined surveys and the excavation of two trenches and two test pits in order to expose and document the structure underneath the dock. Reopening Trench 1 revealed a second horizontal pile, similar to the one discovered during the December excavations. The work on the outer wall of the dock revealed 1.5 planks of a substantial size (0.25 metres wide). While obviously dried out and deteriorated, the flushness of the planks indicated that at one time they would have been watertight.

Trench 4 was not in the original excavation plan for the September dig and was added at the request of the Museum. Excavation of the trench ceased when the digger uncovered two timber planks at 1.12 metres. These were horizontal planks running parallel in a north-south orientation, but confusingly did not sit flush with the edge of the outer wall of the dock. The planks were 0.25 metres by 0.06 metres and were at least a length of 1.50 metres but the full length could not be determined as they ran into the southern embankment.

Test pits 1 and 2 contained similar planking to that of Trench 4 but at a shallower depth of 0.62 to 0.70 metres. Test Pit 1 contained two planks 0.25 metres by 0.06 metres, which ran a length of 0.58 metres from the outer dock wall south into the embankment. The wood was in poor condition, appearing very damp and spongy; the result of fluctuating river levels. Test Pit 2 was 2.70 metres long by 0.65 metres wide. Three timber planks were identified at a depth of 0.62 metres. The planks were not straight and had varying widths and sizes. As in Trench 4 and Test Pit 1, the planks were running parallel with a north-south orientation. Similar to the wood in Test Pit 1, the timbers visible in Test Pit 2 were damp, spongy and badly corroded. There appeared to be some sort of black stain on the planks. This could have been caused by the dark clay staining the wood or perhaps evidence of tarring.

Discussion

What remains of the original floating dock structure?

It cannot be said with absolute certainty that there is nothing left of the dock's floatation apparatus. Not reaching the base of the dock during the two excavations means that the remains of a chamber somewhere at the base cannot be discounted. However, it can be deduced that two things do survive from the floating dock era: the vertical outer walls and the walkway. During excavations in Trench 1 and Trench 4, it was found that the vertical walls had a black substance on the outside. This appears to be evidence of tarring which would have been used to keep the dock waterproof. Working in Trench 1 determined that towards the base of the dock, the walls must still be waterproof as river water was leaking into the trench and not out into the dock.

Historical research has found that some wooden floating docks had overhanging side walkways, such as floating dock Alpha in New Zealand. This would allow workmen to move about the dock freely and allow another vessel to berth alongside (Maritime Museum, Port Chalmers, 24 September 2010). The results of Trench 1 suggest that the walkway appears similar in design to that attached to Alpha in New Zealand. Randell's dock has three layers of planking attached to 0.67 metre vertical support beams. However, unlike Alpha, there are no diagonal support beams underneath the walkway to ensure its stability. A more likely scenario is that the walkway was constructed at Mannum. An attached walkway was a possibility for a floating dock and could have been potentially detached, modified and reattached later. It is much more plausible however, that this is a later addition to the site; constructed elsewhere and moved into place on top of the surrounding clay. There are historical photographs showing the walkway on the northern side along with a retaining wall. The vertical piles appear to be the supports for the retaining wall. An additional and unlikely possibility was that it was purpose built. If so, it was an exuberant piece of construction. With three layers of planking at 20 metres long, it would have been quite heavy and therefore have been a nightmare to manoeuvre. What is puzzling about this walkway is that it does not appear to be attached permanently or solidly to the dock. This suggests it may have been a temporary structure that eventually became permanent.

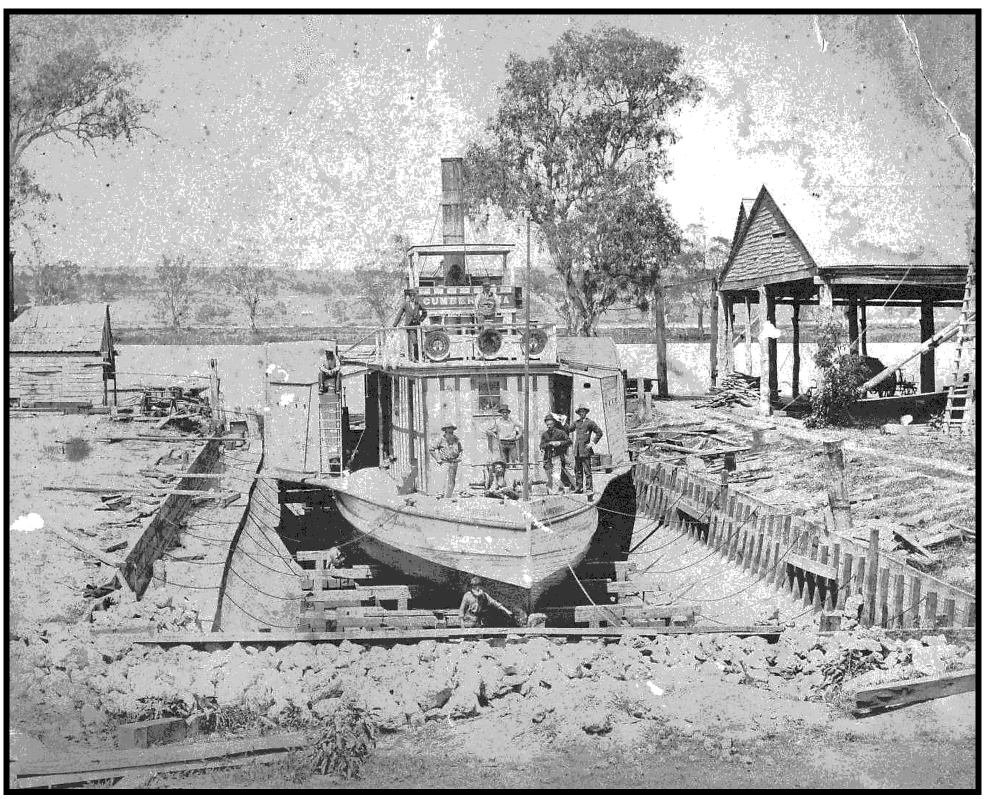

Figure 3. PS *Cumberoona* in the dock circa 1885 showing a walkway and retaining wall on the northern side (left) of the dock. (Photograph in Swanbury Penglase Architects, courtesy of the Mannum Local History Collection No.288, 2006).

The large horizontal piles in Trench 1 were unexpected. With their size and placement, it appears as if they may have been used for structural support when the dock was inserted into the bank at Mannum. Due to the difficulty of manoeuvring the floating dock, Randell would have excavated an area slightly bigger than the structure in order to ensure the insertion process ran smoothly. It is then possible that the large piles were rolled into place on the northern side pushing the dock hard up against the southern side to stop it moving. However, the piles are not lying flush alongside the outer walls of the dock.

Is there evidence of the dock's floating apparatus?

While it has been acknowledged above that little evidence of the dock's floatation chambers survive, it does not confirm or disallow the possibility of such structures during its time as a floating dock. A floating dock, by definition, needs to have pontoons to help it float and they need to be substantial enough to support whatever vessel it is carrying at the time. Due to the minimal tidal movement on Lake Alexandrina, the dock probably would have had watertight chambers on the sides and underneath the floor. The dock has a double floor with 0.20 metres of space between the two layers of planking. This is not sufficient enough to float a dock reputed to weigh 350 tonnes. The cavities created by the sloping walls of the dock are another possibility. However, even if they were part of the original floating dock, they are different sizes and would therefore be uneven in weight and air distribution. If they were the same size, along with the floor; the combined air chambers would still not be substantial enough to raise and lower the dock as well as accommodate any vessels.

Conservation Issues

While the dock has been maintained by the Mannum Dock Museum and local community in accordance with the original conservation plan, it became apparent from the dock's rapid deterioration that the original conclusions needed to be reviewed. After it was closed commercially the dock was kept filled so that the bulk of it was generally below river level and in safe anaerobic conditions. After the dock was cleaned out, the timber of the inner lining was virtually crack free, smooth and level. Today the wood of the dock is badly desiccated and undulating with very obvious corrosion. Less obvious but more worrying is the biological deterioration (or rotting) in the cells of the structure.

Deterioration is occurring at a much faster rate than envisaged due to fluctuating river levels. The widespread clearance of native vegetation for agriculture and irrigation has led to an increase in the infiltration of rainfall to the groundwater. This has raised the local and regional groundwater table greatly increasing salinity in the river systems (Harris 1992:2). Over the past few years the river has fallen about 1.8 metres, even though Mannum is 150 kilometres from the Murray mouth (Swanbury Penglase 2006:6). It has recently begun to rise again and once more the dock is completely submersed. Fluctuating river levels are a constant danger to the dock, as they create cycles which increase deterioration and change the surrounding soil from an anaerobic to aerobic environment.

Figure 4. Looking east across the dock (Photograph by M. Fowler, courtesy of the Maritime Archaeology Program, Flinders University, 2010).

Conservator Christopher Payne from Art Lab Conservation in Adelaide voluntarily gave his time regularly throughout the project to assist the Mannum

Dock Museum and the author with an analysis of the condition of the dock's timbers. The principal modes of deterioration have been identified as follows:

Increased rates of weathering

Previously with higher water levels, water evaporating from the surface was being replaced by more water drawn up through the wood. When the underside of the floor was not in contact with water, the topside was drying out badly with deepening cell collapse, showing as deep splitting in the wood (C. Payne, Adelaide, 24 March 2010).

Increased rate of rotting of underside timber

This is due to a change from anaerobic to aerobic conditions in the soil under and around the dock as the water level falls. This provides optimum levels of moisture and air for biological activity, encouraging rotting (C. Payne, Adelaide, 24 March 2010).

Increase in soil activity

An increase in acid sulphate has been reported at many river sites with unstable river levels which rapidly increase weakness in the structure (C. Payne, Adelaide, 24 March 2010).

Increase rate in floor movement

This is due to uneven drying out of soil beneath the dock. Some parts of the dock appear to be still secured to the piles, but others are not. This gives rise to the undulating effect in the floor. Observed over the past two years, this movement is creating greater strains on the structure especially where timber is already damaged by corroding iron fastenings (C. Payne, Adelaide, 24 March 2010).

Future Conservation and Management

With the current rate of deterioration there is an urgent need to support and stabilise the dock's timbers. Conservationists have reassessed the dock and the outlook is bleak. There is a window of less than ten years in which to take major preservative action before the dock becomes too rotten to save due to fluctuating river levels rotting away its timbers from beneath. The active Save Our Dry Dock (SODD) group at Mannum has researched options to slow down the increasing rate of deterioration. These have included treating the dock in situ with boron based wood preservative chemicals or keeping the dock filled with water and introducing biocides to keep it clear and therefore visible to museum visitors. Unfortunately, both of these solutions would cause chemical leakage into the Murray River, and therefore contamination to flora, fauna and a widely used water supply. A more expensive option would be to excavate it entirely, lift it from the area and put it undercover where it can be preserved without risk to the environment. While the significance of the dock can justify the expense, it will ultimately remove it from its historical context. In the short term, the construction of a roof to protect the dock is being considered. With a goal to see the dock on the National Heritage Register and public awareness increased about this rare feat of engineering, it is important that a solution is found and implemented to ensure the longevity of this site. One hundred and thirty seven years on, it is amazing that this incredible example of colonial maritime engineering still survives. With relatively little known about wooden floating docks from the nineteenth century, the Randell dry dock holds vital information about the river trade industry; it is a significant historical landmark for Mannum and is evidence of South Australia's colonial adaptation to the River Murray.

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Abbreviations

DENR	South Australian Department of Environmental and Natural Resources

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