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Figure 2. The PS *Marion* sitting in the dry dock showing the new planking added to the vessel, and the original planking and trestles of the dock. (Courtesy: Mannum Dock Museum)



Figure 3. The PS *Marion* in its hey day. (Courtesy: E & WS, Berri, South Australia)

the township of Mannum. During the 1850s and 1860s the steamers would unload their cargo at Mannum and, at that time, there would be up to 20 000 bales of wool dropped at Mannum in a season, from where they would be transported by horse teams to Port Adelaide (Bevan & Vaughan, 1978: 14).

By the 1870s the trade of goods and people by river boat at Mannum was thriving. To assist in the river boat trade at Mannum, Randell decided to purchase the Milang-built floating dock and fix it in position and operate it as a dry dock for the repair of steamers and barges.

In 1876, Randell towed the dock from Milang to Mannum using the PS *Nil Desperandum*. He had excavated, over some time, a section of the river bank, just north of the wharf and slip, to take the dock. Only after 'slight alterations' (*SA Register*, 12 June 1876) the once floating dock became a fixed dry dock, although Randell had written to a friend in England and commented on how difficult it was to install the dock in the river bank (Bevan & Vaughan, 1978: 14). A traction engine driving a centrifugal pump was used to empty the dock of water and it could do this at a rate of 40 000 gallons per hour.

On 6 June 1876 the first vessel PS *Lady Daly* entered the dock for repairs. However, it was found through modifying the dock and fixing it within the river bank that it leaked considerably.

The dock was not used much until 1880 when major repairs were made. Another factor which may have contributed to the dock being put to little use from 1876 to 1880 was that William Randell moved to his family's property at Gumeracha due to the death of his father. In 1880 it was William Randell's personal involvement that got things moving once again. In partnership with W.H. Charnock, Randell spent about £1 500 on driving in 130 piles and lining the dock with 50–60 000 feet of red gum. It was also reported that the dock was to be made four feet wider by removing one side and this appears to

have been done by removing the southern ballast tank as the extreme width of the present day dock agrees with original width of 40 feet (12 m). Shipwright, W. Lawrence of Goolwa carried out the repair work on the dock.

The centrifugal pump could now empty the dock in three hours and water was sometimes pumped to water the gardens at *Bleak House*, Randell's house upon the cliff.

In November 1880 the dock commenced a productive 47 years of use, being the only dry dock on the River Murray.

#### The dock in use

The *Adelaide Observer* (4 Sept. 1880) reported that 'the Mannum Dry Dock will be available for river steamers of any size, draught and width of beam'.

William Lawrence was the shipwright who commenced implementing the repair work on the vessels in the dock and from 3 November 1880—beginning with the PS *Corowa*—through to 11 January 1886 the dock was used to repair 69 vessels (Log Book of shipwright W. Lawrence).

It has been reported that about half of the steamers on the Murray and Darling rivers were satisfactorily repaired in the dock with a few notable mishaps:

- In about 1891 one of the trestles collapsed under the weight of the PS *Gem*. 'The *Gem* crashed down onto the floor of the dock. Fortunately it was lunch time' and there were no shipwrights under the vessel;
- In about 1900, a similar experience occurred with the PS *Federal* but a cable fixed under the vessel prevented it falling down onto the dock;
- In 1897, the boiler of the PS *Tyro* exploded blowing out the side of the steamer and injuring Captain Murray Randell, William Randell's son.

Following William Randell's death in 1911, Captain J.G. Arnold took over the dock and the last commercial use of the dock was when the PS *Marion* was repaired in 1927.

To this day there are many remaining evidences of Randell's work and settlement in Mannum, in addition to the dock, and they include:

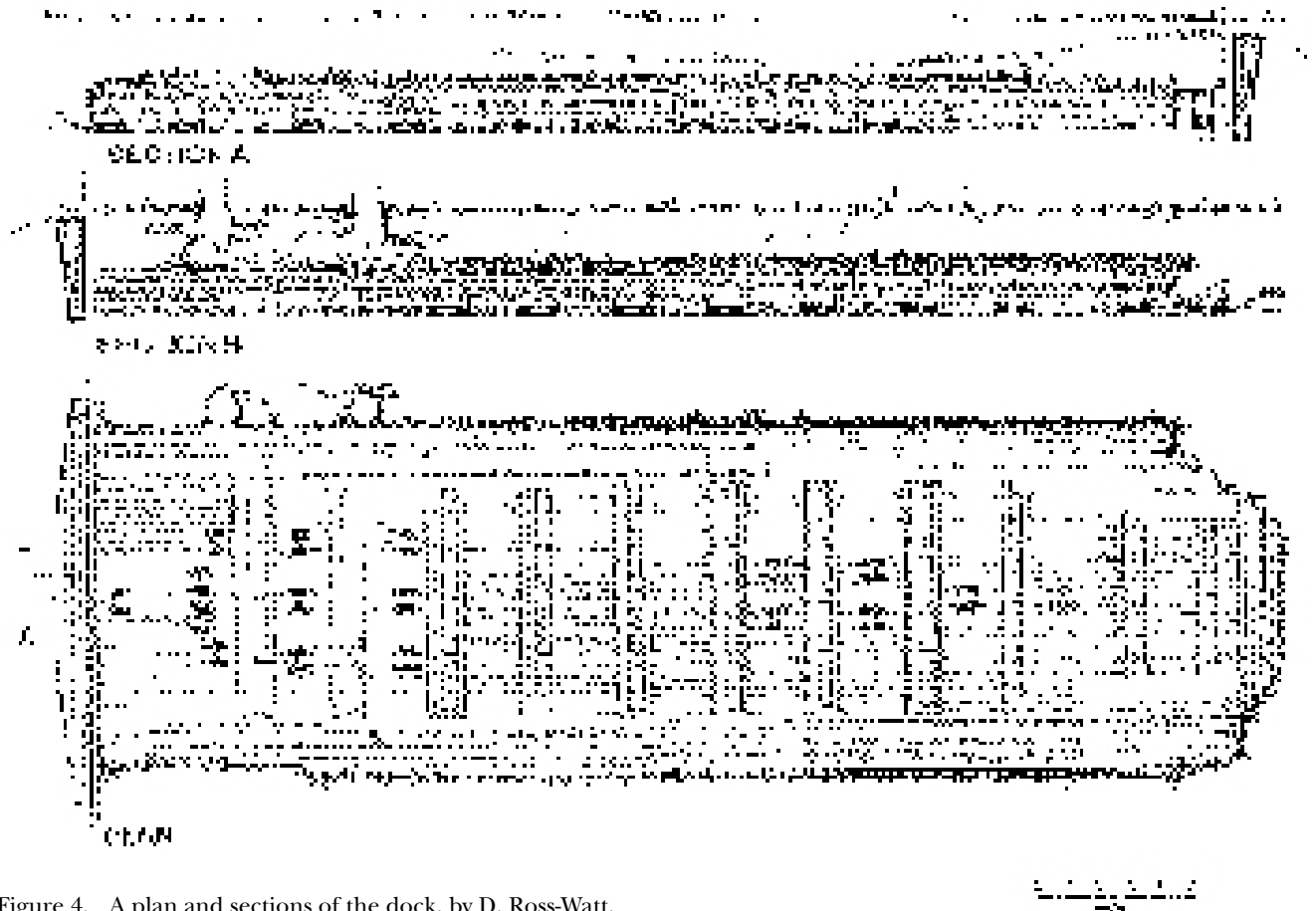


Figure 4. A plan and sections of the dock, by D. Ross-Watt.

- his residence *Bleak House* at the back of the dock, up the hill;
- the beam engine used in pumping out the dock;
- the boiler of the *Mary Ann*;
- the wreck of the *Mary Ann* (so far not located);
- the wharf and wool stores.

#### The PS *Marion*

With the resurgence of interest in our heritage related to the river trade in the 1980s and 1990s a section of the Mannum community decided to restore the PS *Marion* which had been placed in the dry dock in about 1963. Although it was not known how much of the dock remained and what condition it was in. No one had seen the bottom of the dock for some time (c. 30–40 years) and it was only after an earth dam sealed the entrance to the dock that the water and sediment laying there could be removed and expose the well preserved and extensive timber planking, trestles and rollers. It was decided, therefore, by the Mannum community and the District Council of Mannum, in consultation with the State Heritage Branch, to repair the *Marion* in the dry dock (Fig. 2). The dock is a registered place under the *South Australian Heritage Act 1993* and a permit is required to disturb or interfere with it.

The PS *Marion* is reported to be the 'only remaining original wood fired passenger steamer with overnight accommodation in the world' (Williams & Steggall,

1994). The *Marion* was first built as a barge in 1897, and her superstructure was built up over the next fifty years culminating in accommodation, lounges and saloons spread over three decks. Other details of the *Marion* are; length 107.9 ft (32.88 m); breadth 22.6 ft (6.88 m); depth 5.2 ft (1.58 m); 157 gross tons; and 99 net tons (Fig. 3).

During the restoration of the PS *Marion* some facilities were provided to stop the complete drying out of the red gum planking. A water spray system was installed and the work of restoring the *Marion* in the dry dock commenced in 1990 and concluded with the recommissioning of the vessel during celebrations on 24–27 November 1994 (Williams & Steggall 1994).

At the same time as the *Marion* restoration, detailed recording of the dock structure was carried out and a plan and elevations of the dock was produced (see Figure 4). This early recording did not include the gate as it was not visible. However, in 1993, with the removal of the earth dam, the area around the entrance to the dock was excavated and the gate was revealed, raised and recorded (Fig. 5). This additional information has been added to the plan.

#### Further investigations of the dock

With the refloating of the *Marion* out of the dock further work was contemplated for the dock.



Figure 5. A view of the gate as it was found in 1993. (Courtesy: Mannum Dock Museum)

Funding had been obtained by the Mannum Dock Museum from the Murray–Darling Commission to investigate and compile a management plan for the dock. The Museum was keen to see the dock interpreted in addition to making it available for ongoing, light commercial use. The State Heritage Branch also considered that the continued use of the dock was probably the most effective way—provided there were a number of controls in place—in which the dock should be managed, including its interpretation.

To achieve a comprehensive understanding of the dock some archaeological excavation was considered necessary. A 1.5 m section of the northern part of the dock had been covered by land fill and grass and one theory was that this was one of the ballast tanks when it was used as a floating dock. The other area selected for excavation was an area of bare land adjacent to the southern perimeter where timber storage and work sheds stood, but no visible evidence remains of the sheds (Fig. 6).

In December 1994, a group from the Flinders University Archaeology Society and the State Heritage Branch carried out some excavation and further recording of those parts of the dock that had not been previously recorded.

Three trenches were excavated within a 1.6 m longitudinal strip along the dock's northern perimeter in order to reveal the construction of this section. It was only possible to penetrate about 50 cm below the horizontal planking which was thought to form the top of the northern ballast tank and shown on the left-hand side of the dock in Figure 7. Upright posts determine the northern extreme of these sections, hereafter referred to as the 'northern ballast tank' and they are bolted to two vertical planks. Horizontal timber frames or joists are fixed to the upright posts and two remaining horizontal planks are bolted to the frames and determine the top of the 'northern ballast tank'. The frames appear to be a horizontal extension of the angled frames located within the dock. The upright posts are only a little over 1 m in length and a large *c.* 40 cm diameter longitudinal timber

is located under and fixed to the frames. Randomly placed within the 1.6 m strip a number of *c.* 25 cm piles were located which could be part of the '130 piles' driven in when the dock was extensively repaired in 1880.

The information gained from the excavation was useful although no conclusive evidence was found to say that this was the northern ballast tank. It was not possible to excavate down to the bottom of the dock in this 1.6 m strip. If this was a sealed ballast tank it would be expected to find timber on the outside of the dock sealing a cavity down to the bottom of the dock. No such timber was found and, as stated, the upright post and vertical timber appeared to terminate approximately 2.5 m above the bottom of the dock. It could be that significant alterations were made to the sealed ballast tanks either in 1876 or 1880 and it is highly likely that this occurred in order to stop the dock from floating.

The use of ballast tanks or watertight chambers to sink and raise a floating dock is not the only way in which to operate a floating dock. It is probably the most used method. But where there is a good rise and fall in the tide, floating docks can utilise the tide to fill the dock with water and for the vessel to enter, then drain it, when the tide goes out, without using watertight chambers (Marcil, 1995: 448–56). Where the tide, or rise and fall of river levels is non-existent or very spasmodic, as is the case at Milang on Lake Alexandrina—the place where the dock was built—the need for watertight chambers would have been necessary.

There is a small amount of historical evidence that supports the theory that the dock was built with watertight chambers on each side, although no specific reference has ever been found to these chambers (*Advertiser*, 1946). The most significant historical evidence found which alludes to the dock containing watertight chambers on each side was when the dock was repaired in 1880 and it was reported that 'it is intended to remove one side of it, and make it four feet wider' (*SA Register*, 6 April 1880). This dimension is consistent with the dimension of the 'northern ballast tank' and if it is incorporated with the breadth of the remains of the dock today, *i.e.* 36 ft (10.97 m), the overall breadth becomes 40 ft (12.19 m), and consistent with the original specifications of the dock (*Southern Argus*, 19 Sept. 1873).

The excavation carried out to the south of the dock, and in the area of the timber storage and work sheds, consisted of four trenches of various dimensions. The aim in this excavation was to see what evidence could be found of the structure of the sheds and, from the artefacts found there, draw conclusions about the activities carried out within the sheds. The Mannum Council recently acquired this area of land to assist in the interpretation of the dock and the *PS Marion*. The information that could be gleaned from the archaeological work might prove useful in the of the dock and the area in general.

Unfortunately, not a lot can be gained from the excavation of the four trenches. No construction details of the sheds were found. Artefacts that were found could have



Figure 6. The PS *Corowa* in the dry dock in 1880, and showing the storage and work sheds to the south of the dock. (Courtesy: State Library of South Australia)

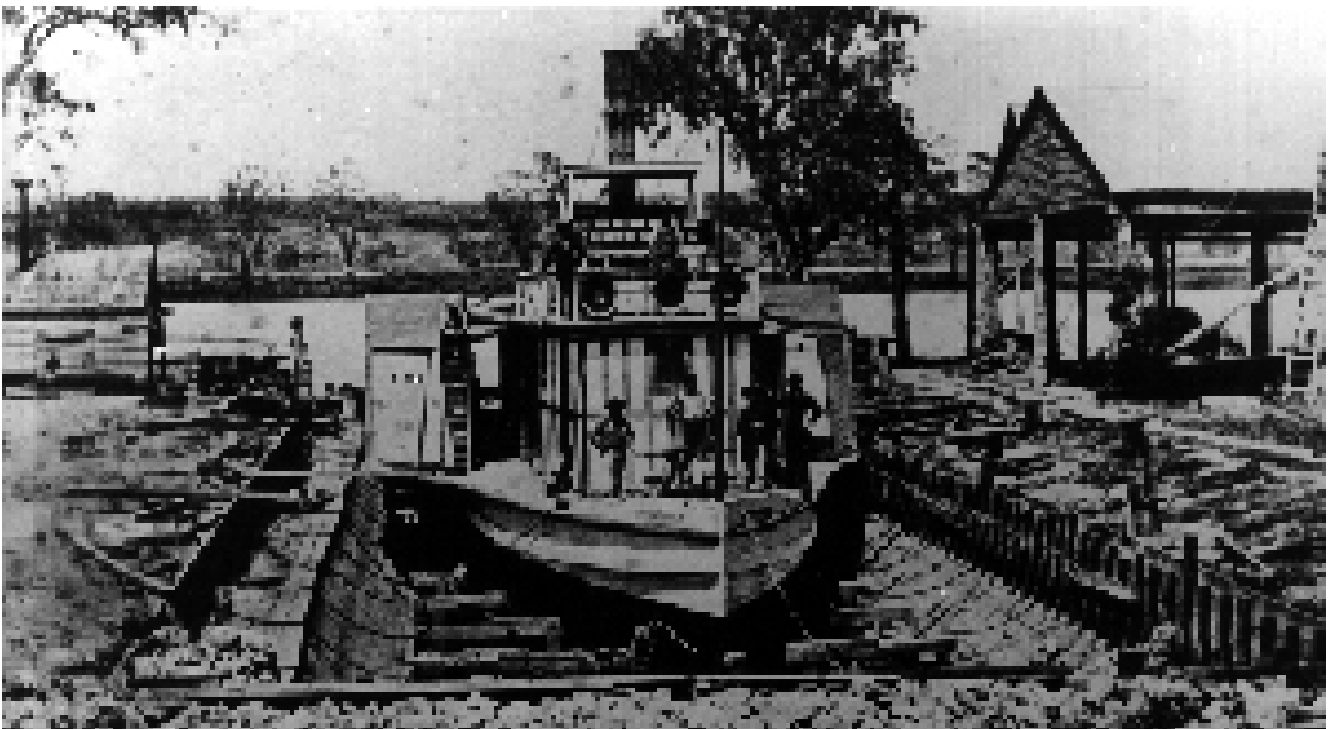


Figure 7. The PS *Cumberoona* in the dry dock in 1881. (Courtesy: State Library of South Australia)

come from the 1870s to the present day. Most are likely to be attributed to rubbish brought in during floods and from the general occupation and use of the area from the 1870s to the present day. There were a number of sterile layers of sediment interspersed with layers containing artefacts which clearly showed that the area was subject to flooding and deposition of silt (Piddock, 1995). Nails and other fastenings were a common artefact type found

throughout the four trenches and support evidence—interpreted from viewing historical photographs—that the sheds were used in the general construction and repair work associated with vessels in the dock. A steam kiln that can be seen in one historical photograph—presumably used in bending timber to be attached to the hulls of paddle steamers and barges—was tentatively verified by the discovery of charcoal.

A small quantity of bluestone was found at the very bottom of one trench 1.5 m below present day ground level. Bluestone is not indigenous to this area and would have to be imported. It is possible that it is part of the bluestone imported when William Randell built his house up the hill in the 1860s which is also built of bluestone. The main wharf at Mannum is located directly in front of this area. The bluestone located in the bottom of this trench, if related to Randell's house, provides a level of the ground within the sheds and around the dock in the 1860s.

No further work could be carried out within the dock as it was not possible to pump the water out of it.

### The management and conservation of the dock

There are some issues related to the conservation of the timber and fittings that need to be investigated, and while a specialist has been arranged to view the dock, nothing can be done until it is drained of all the water.

All the parties associated with the dock agree that the most effective management is if the dock can be utilised commercially in a manner consistent with its past uses, i.e. repairing timber vessels, barges and paddle steamers, not modern iron, steel or fibreglass vessels that could cause irreparable damage. It would not be in the best interests of the dock if major modifications were needed to cater for these vessels, whereas minor maintenance and replacement of the timber and fittings as required would be in keeping with the dock's history.

This type of approach in the management of the Mannum dock is consistent with some views expressed in ICCROM (1995) when considering the management of cultural heritage sites:

A cultural heritage site should retain a high level of authenticity within significant value-defining attribute... Amongst these attributes are 'material/substance, function/use setting/context' which are the most applicable in the case of the dock.

- Material/substance

Evidence for authenticity here lies in the degree to which the existing fabric genuinely represents the significant phases of construction, and the marks given by use and age...

- Function/use

Evidence for authenticity here is found in the degree of continuity of original or significant uses in historic buildings and areas...

- Setting/context

Evidence for authenticity here is found in the integrity of the relationship between the cultural heritage resource and its physical context or surroundings...

Historical and archaeological information gathered on the Mannum dock and briefly presented in this paper provide a case on how it should be managed and presented to the community. It should be done with regard to:

- its association with William Randell, pioneer steam navigator of the River Murray, and other sites, buildings and structures associated with Randell.
- the fact that it was originally built as a floating dock; further

information should be sought from within Australia and Internationally about floating docks, particularly on the claim that it was 'the largest floating dock ever built in the Southern Hemisphere'.

- the adaptation of the floating dock as a dry dock and the use of it in the repair of vessels, i.e. continue to repair timber vessels in it. This is particularly relevant to the function/use attribute in managing cultural heritage sites, as turning the dock into a static museum display would change the function of the dock.
- any other remaining associated objects and sites; and possibly including a further investigation of the area south of the dock where the work sheds were located to reveal additional information on the range of activities carried out there.

Managing and presenting the dock in this manner would not allow this area—still rich with many surviving cultural heritage sites—to duplicate what is occurring in other river towns. These are unique and important features to Mannum. There would not be a better place on Australia's major river to present to future generations the birth of the river paddle steamer and how they were maintained in a unique facility such as the dry dock.

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## The Bird Key Wreck, Dry Tortugas National Park, Florida

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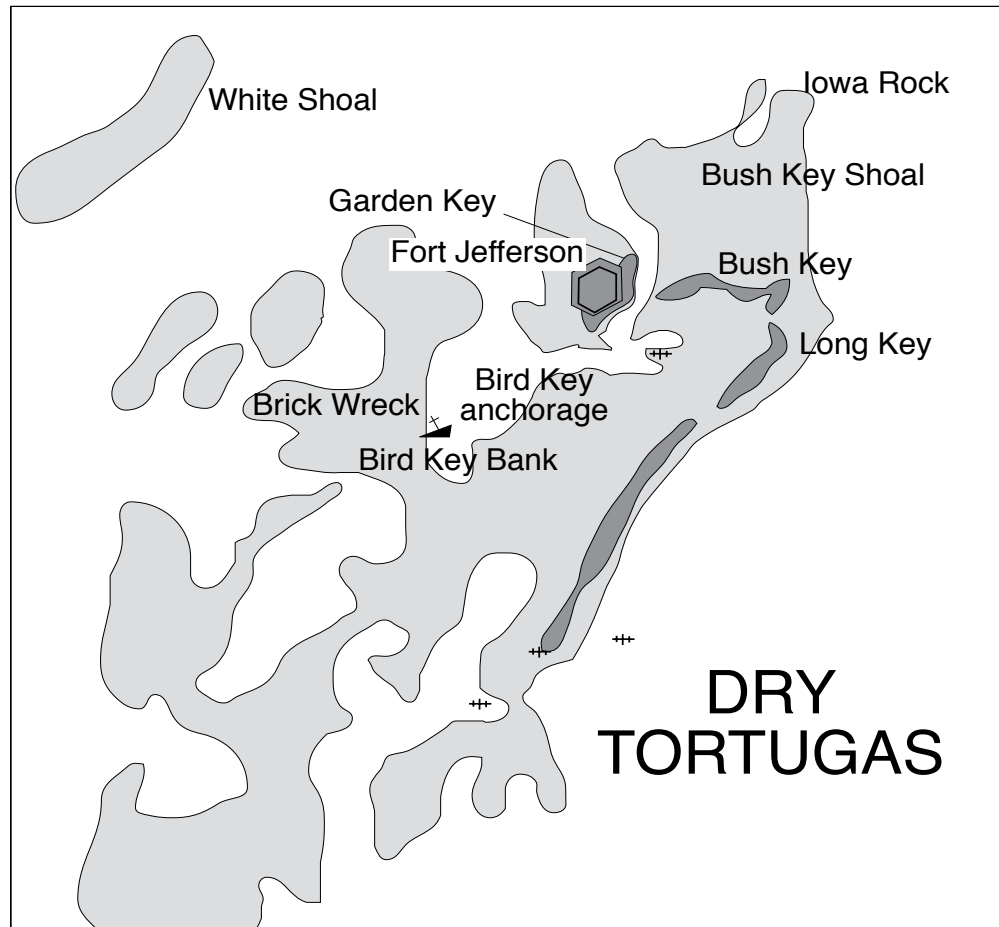


Figure 1. Detail of map, Dry Tortugas, published by National Park Service (1994) showing location of Bird Key Wreck ('Brick Wreck') in relation to Fort Jefferson.

### Introduction

The wreck of this small steamboat has been known for many years to the National Park Service staff and was mapped in a preliminary fashion (Logan, 1976) and studied intermittently by field teams in 1985 (Lenihan, 1985) and 1988 (Murphy, 1993) that made notes on the ship's propeller and portable artefacts. In 1989 a two-day reconnaissance of the site was conducted by Richard Gould, Linda Stoll, and Larry Murphy that included a perimeter survey and collection of a wood sample from the outer hull planking. In 1990, under the sponsorship of the National Park Service (NPS) and with the aid and advice of the Submerged Cultural Resources Unit of the NPS, volunteers and students from Brown University mapped and recorded the wreck in detail. This fieldwork was followed in 1992 by NPS-sponsored research by the author at the US National Archives in Washington, DC (specifically, the archives of the US Army Corps of

Engineers for Fort Jefferson) and in the Historical Archives of the Monroe County Public Library, Key West.

The wreck was located in shallow water ranging from 4 ft to 9 ft (1.2–2.7 m) deep at mean tide on Bird Key Bank inside the west end of Bird Key Harbour, approximately 1 700 yd (1 554 m) south-west of the Fort Jefferson lighthouse (Figs 1 and 2). Initial interest focussed on the remains of the ship's cargo of bricks, found scattered within the hull structure and over a broad area northward from the wreck on Bird Key Bank. These bricks indicated either that the ship's destination was Fort Jefferson or that the ship was engaged in salvaging bricks from the fort (this latter idea was proposed by Lenihan, 1985). Fort Jefferson was the largest of the Third System forts built for coast defence in America following the War of 1812 (Lewis, 1979: 43, 54–55) and was reputed to contain around 14.5 million bricks. A detailed study of the wreck site was intended to examine the relationship of this vessel



Figure 2. Aerial photograph of Bird Key Bank. The wreck is visible in the lower left-hand side, directly on the Bank. View faces north-east from an altitude of 1 500 ft (457.2 m).



Figure 3. Aerial view of Bird Key Wreck from an altitude of 500 ft (152.4 m) facing south.

and its cargo to the construction history of the fort as described by Bearss (1983) and as known from archival sources. Visible features of the wreck also indicated that the ship itself might be of historical interest, especially for what it could tell us about early steamboat design and construction in the south-eastern United States. Initial examination showed that the vessel had a large, four-bladed screw propeller with flared blade tips, quite unlike the Griffiths screw which was initially introduced in England from around 1855 (Yeo, 1894: 182), and closer in appearance to the Loper propeller in use during the 1850s (Ridgley-Nevitt, 1981: 191). So, even allowing for delays in the dissemination of this technology, the propeller on the Bird Key Wreck must date from prior to or around that period.

Examination of the hull remains revealed that the ship was of a type of composite construction that consisted of a wrought iron frame with iron hull plates along the bottom and part way up the sides, and an exterior covering of wood. The sample taken in 1989 from one of these hull planks was identified at the Laboratory of Tree-Ring Research at the University of Arizona as oak (*Quercus* spp.), but no species identification was possible. Composite hull construction was common on commercial ships during the mid-19th century (Thearle, 1910; Paasch, 1890; Doyère, 1895) but was passing out of use by the 1860s (Graham, 1958: 46), so this feature provided another indicator of the ship's general antiquity. Finally, the presence of outer hull sheathing of Muntz metal, a copper-zinc alloy patented in England in 1832 (Flick, 1975: 76) and introduced in England during the 1840s and into the United States during the 1850s as an alternative to higher priced sheathing of pure copper, pointed to a mid-19th century date of origin for this ship. As noted by Lenihan (1985: 7), if this ship was involved in the construction of Fort Jefferson, 'it would be an early propeller and therefore of considerable significance to marine history and architecture'.

### The 1990 field season

Site mapping and recording was carried out over a four-week period in July–August 1990 by a research team recruited under the National Park Service VIP ('Volunteers in Parks') program. A total of 375 person-hours of dive time was spent on-site during the 1990 season, with an additional 63 hours dive time in 1989 and during follow-up visits to the site in 1992 and 1993.

Diving conditions were generally benign, although strong tidal currents sometimes swept across Bird Key Bank. These currents were not a serious safety hazard but made accurate site recording difficult and led to several instances where planned dives were cancelled. Visibility was variable, ranging from 12 ft to 30 ft (18–45 m), according to the strength of tidal currents and surge. The wreck was clearly visible from the air over its entire length, thanks to its shallow depth and the light, sandy substrate (Fig. 3) and was easy to relocate by boat, because it showed up well against Bird Key Bank. Site recording proceeded in three stages. First, a trilateration survey and direct measurements (based on trilaterated points) were carried out on parts of the ship's structure that remained relatively intact or attached to other structural elements. Second, further trilateration and direct measurements were done to measure in and map elements of the ship's structure that were detached from the main parts of the ship. This included the ship's rudder and curved frames later identified as sponsons for the ship's overhanging deck structure. And, third, limited measurement and recording was done for portable artefacts and fragments of ship structure larger than the size of a brick. No attempt was made in the 1990 field season to record the location or recover smaller items, although such items were encountered. The approach used in 1990 was entirely non-destructive. Some larger portable artefacts, such as marked bricks and pieces of the ship's machinery, were brought ashore for superficial cleaning and were drawn and photographed in detail. These items were then returned to their original locations.

	No. of Cases	Mean (ft)	Standard deviation	Standard Error	T-Value
<b>LENGTH</b>					
Wreck Sample	38	0.7322	0.034	0.005	
					1.99
Fort Jefferson Sample	38	0.7453	0.023	0.004	
<b>WIDTH</b>					
Wreck Sample	38	0.3479	0.019	0.003	
					0.42
Fort Jefferson Sample	38	0.3462	0.015	0.002	
<b>THICKNESS</b>					
Wreck Sample	38	0.2097	0.022	0.003	
					6.84
Fort Jefferson Sample	38	0.1831	0.010	0.002	

Table 1. T-Test comparison of Pensacola bricks from Fort Jefferson with unmarked yellow bricks from the Bird Key Wreck.

### The condition of the site in 1990

Bird Key Bank lies in a high energy environment that is subject periodically to intense scouring and movement of silt, especially during storms. By 1862 a wood-frame isolation hospital had been constructed on Bird Key Bank along with its cistern (Bearss, 1983: 225), but all visible traces of these structures have disappeared. The shipwreck has acted as an artificial reef, providing a firm, hard substrate for marine growth and associated fish and crustaceans. The area surrounding the wreck was characterised by loose silt and coral rubble mixed with sand, with patches of turtle grass and some small coral heads in a few of the shallow areas. There was a shallow scour in the sea-bed along the port side of the wreck with a corresponding low rise about 20 ft (6 m) out from and parallel to the ship's hull remains. This scour resulted from the action of strong tidal currents, which we observed in progress several times.

The wreck itself was thickly covered in marine growth, with fire coral and gorgonia especially well represented. The site also abounded with fish and lobsters. A few selected parts of the shipwreck were subjected to superficial cleaning and removal of marine growth to facilitate accurate measurement and photography of structural details. These areas included the propeller, the deadwood structure (including the propeller shaft), a series of frames and stringers along the port side, and some detached pieces of the ship's hull near the bow. In each case, efforts were made to avoid exposing bare metal. Light fanning was used to expose superficial layers of silt when tracing key portions of the ship's structure, such as the bow frames and the propeller shaft. Such fanning rarely penetrated more than 6 in (0.15 m) into the sea-bed, but even such limited efforts revealed small artefacts

such as brass or bronze fasteners, screws, fittings, broken bottles, and bricks resting loose in the silt and around the immediate vicinity of the ship's hull.

These studies revealed a sequence of destruction that included both human and natural factors. The ship was driven onto Bird Key Bank with the engine running, although it is not known whether this was done by accident (an error in navigation?) or intentionally (was the ship already in danger of sinking?). A look at the site map (Fig. 4) shows that the bow struck at more or less a right angle to the sand-bank as the ship proceeded from the inside of Bird Key Harbour and 'accordioned', with the forward part breaking off. The intact part of the hull closest to the bow was also deformed by the shock of the initial collision with Bird Key Bank. The ship stopped and came to rest with its longitudinal axis pointing west in a direction slightly south of Loggerhead Key.

Meanwhile, at the stern, the propeller struck the sea-bed, tearing the deadwood away from the main part of the lower hull. The ship was driven forward while the propeller was turning in a clockwise direction. The deadwood was twisted over onto its starboard side at an angle of 32°, where it presently rests with the propeller shaft running through it, completely intact and attached to the propeller. Forward of the thrust-bearing there is a gap of about 8 ft (2.4 m) where separation from the hull occurred, and the ship's structure in and around this gap was broken up and deformed. The ship's rudder was torn off at this time and came to rest flat on the sea-bed a short distance to starboard of the propeller.

The main part of the lower hull survived the shock of striking the bank relatively intact and came to rest leaning to starboard at an angle of 12° (20° less than the ship's deadwood) and more or less level fore-and-aft. A total of 33 of the ship's frames were found still relatively intact and attached to other elements of the lower hull, although many of these frames were broken and bent. The port side of the lower hull survived better than the starboard side, with more frames, stringers, and sections of hull plating still attached and visible.

Given the shallow depths in this area, it is reasonable to assume that the deck and superstructure above the lower hull were exposed above water after the grounding occurred, allowing ready access for salvage. After settling onto Bird Key Bank, the ship was subjected to salvage operations, perhaps more than once, that led to the removal of the engine and most of the ship's machinery. Shattered iron firebox fragments and boiler components as well as thick frames and other elements show jagged breaks indicative of blast damage. Blasting probably accounted for the initial breakage of the ship's structure, especially when dealing with heavy structural elements. For example, parts of the firebox, including 1.5 in (3.8 cm) thick iron plates and castings and layered brickwork, were found in at least seven different, widely scattered parts of the site. These included one large piece, complete with attached firebricks, thrown over 60 ft (18.3 m) from

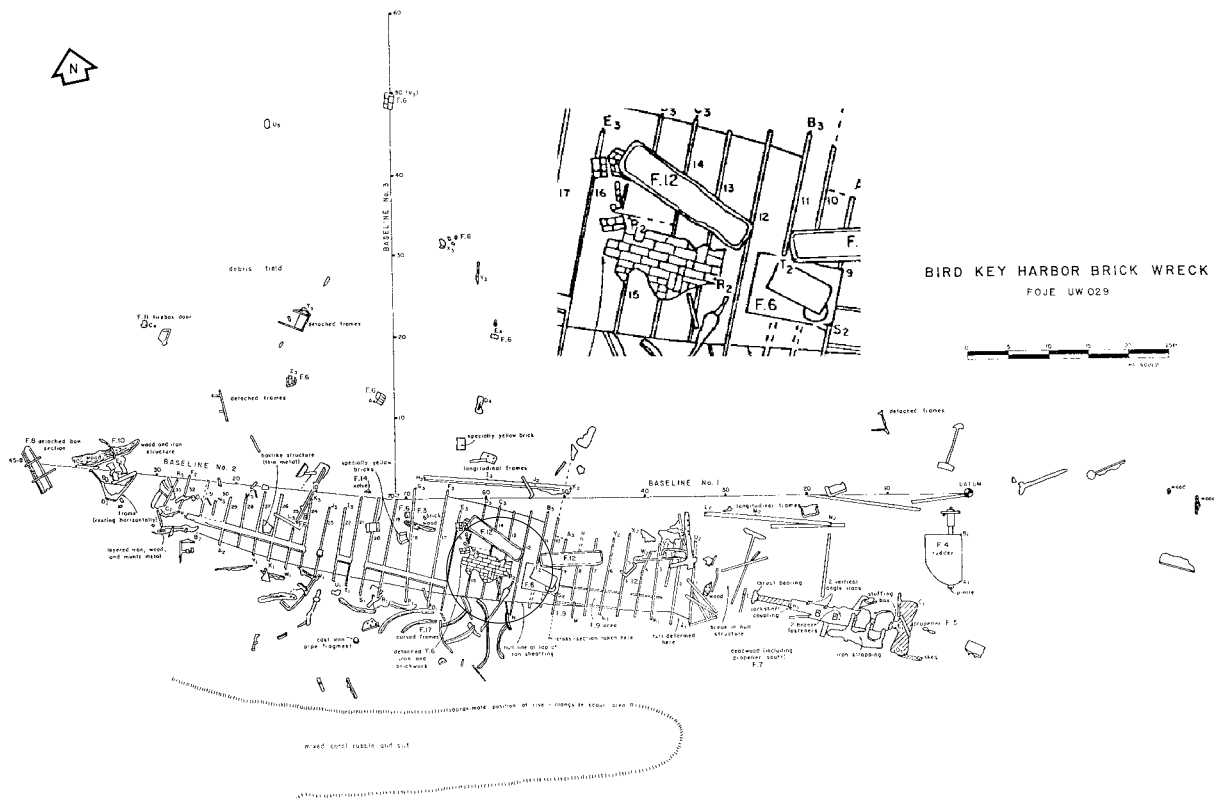


Figure 4. Site plan of Bird Key Wreck.

its original location amidships as well as one of the ship's cast iron firebox doors. Many other elements of the ship's structure were detached due to salvage operations, and these now either rest inside the lower hull or form part of the debris field surrounding the lower hull.

Further scattering of detached structural elements and portable artefacts resulted from storms that swept across Bird Key Bank after the sinking and salvage of the wreck. Such items tended mainly to occur across a debris field that extended to the north of the wreck. Two clusters of iron wreckage from the ship were recorded along with nearby bricks and other, smaller objects. One of these clusters occurred 422 ft (129 m) north of the ship's starboard side, while the other was located 840 ft (256 m) north of the same point. Such a wide distribution of structure and/or machinery was most likely the result of a two-part sequence of events involving initial detachment due to blasting during salvage followed by further dispersal from powerful action by storms, especially hurricanes. It is unlikely that the propeller, shaft, deadwood, and rudder assembly were subjected to dynamiting and other attempts at salvage, since these elements showed none of the fractured or twisted components seen in and around the midships area of the lower hull, nor were they scattered over the sea-bed.

#### Chronology of the ship's loss

Our survey revealed that there were three types of brick present on the shipwreck site. One type consisted of

unmarked yellow bricks similar in size, shape, colour, and texture to those used in the construction of the curtains, bastions, and other major parts of Fort Jefferson (and at Fort Taylor in Key West). Table 1 summarises the results of a T-test comparison of unmarked yellow bricks from the shipwreck site and yellow bricks selected at random from the exterior of Fort Jefferson. The results show low values for T when comparing length and width measurements, indicating that the two samples of bricks belong to similar or identical populations. The higher value for T in relation to maximum thickness reflects a significant difference between these two populations along this dimension. One possible explanation could be weathering, which affected bricks on the fort's exterior surfaces to varying degrees. Differential weathering exposed the bricks by eroding away their cement mortar matrix which enabled us to make thickness measurements (something not possible with bricks fully cemented in place). The dimensions for unmarked yellow bricks from the Bird Key Wreck closely match those for 'Abercrombie Brick' recorded at Fort Jefferson (1857–60) by Lazarus (1965: 75), lending support to the interpretation of these items as bricks from the ship's cargo that were originally intended for use at the fort. A comparison of Lazarus' measurements with ours revealed that it was the bricks from the Fort Jefferson sample, not the wreck sample, that showed reduced mean thickness, supporting the conclusion that attrition due to weathering affected the thickness of the bricks at the fort. The full-sized, unweathered Pensacola bricks found



Figure 5. Yellow firebrick from Bird Key Wreck, showing markings, 'EVENS & HOWARD, ST. LOUIS'.

at the wreck site are most easily explained as the ship's primary surviving cargo, although many more of these bricks may have been present prior to salvage of the ship's contents after wrecking.

Both of the other types of brick present at the wreck site were refractory bricks used to line the ship's firebox. Portions of the firebox were found with bricks laid in courses and mortared in place. Yellow firebricks formed the course facing the fire, while red bricks served as insulation between the layer of yellow firebricks and the iron walls of the firebox. A total of eighteen yellow firebricks with the markings, 'EVENS & HOWARD, ST. LOUIS,' were found at the site (Fig. 5), including two cemented directly into the firebox structure. These bricks were manufactured by the Evens and Howard Firebrick Company from 1857 to 1930 (Gurcke, 1987: 232). Two other yellow firebricks were found at the wreck site with different markings that could not be deciphered or dated. The red insulating bricks were similar in general appearance to red bricks used in parts of the post-1861 construction of Fort Jefferson. Had some of these not been cemented directly into the firebox structure or to each other, we might have assumed the loose red bricks to have been part of the ship's cargo.

The firebricks marked 'EVENS & HOWARD, ST. LOUIS' are securely dated and indicated that the ship could not have sunk before 1857. The yellow bricks used in the construction of Fort Jefferson and present in the ship's cargo were manufactured by the firm of Raiford and Abercrombie from deposits of Escambia clay in and around Pensacola, Florida, based on a contract with the Army dated 24 August 1854 (Bell, 1925; Ellsworth, 1974: 251). Difficulties with production and quality control delayed the delivery of Pensacola bricks in significant quantities to the fort until 1858, following the development of an efficient brick making machine. But from then on, until the start of the Civil War, the firm (reorganized and renamed Bacon and Abercrombie) produced over 16 000 000 bricks for the Federal Government, most of

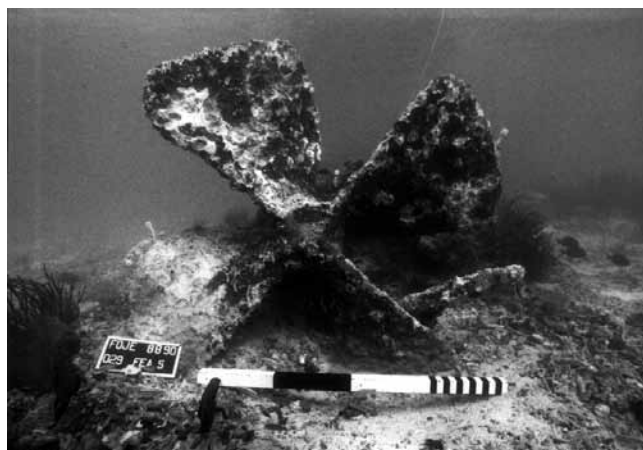


Figure 6. Four-bladed iron propeller, Bird Key Wreck.

which were used in the construction of Fort Jefferson and Fort Taylor. By 1860, this firm had become the largest brick manufacturer in Florida and one of the largest industries in the antebellum South (Ellsworth, 1974: 260). Under secessionist pressure the firm stopped producing bricks for the Federal Government after 26 February 1861. The brickyard was finally burned by Confederate forces in March 1862. So the latest likely date for the cargo of Pensacola yellow bricks associated with the Bird Key Wreck is 1861, and the loss of the ship is presumed to have occurred sometime between 1857 and 1861. While still a logical possibility, Lenihan's suggestion that the ship was scavenging bricks from around Fort Jefferson at a later date is unlikely, given the absence of red construction bricks at the wreck site.

Faced with the problem of shipping large quantities of bricks after 1857, Raiford and Abercrombie, which had previously relied upon two of its own schooners (the *Frederick Sheerer* and *Lucy Whitman*), contracted with the Key West firm of Tift and Company to arrange for shipping bricks (Ellsworth, 1974: 253). This arrangement started in 1858 and continued until brick production stopped in 1861. If one assumes that the Bird Key Wreck was originally one of the vessels contracted by Tift and Company, the date of the ship's loss can be narrowed somewhat to between 1858 and 1861.

#### Engineering and construction

The remains of the Bird Key Wreck indicate that it was a shallow-draft, flat-bottom steamboat with a narrow, hard-chined hull of composite construction and with frames that flared outward on each side near the tops to support a broad main deck. Measurements taken during mapping revealed a minimum length for the lower hull from the bow to the propeller of 108 ft (32.9 m) (103 ft [31.39 m] between perpendiculars). Measured across at the top of the iron sheathing 1 ft (30.4 cm) above the hull bottom, the maximum beam of the lower hull was 12 ft (3.65 m), while the maximum beam at the point below where

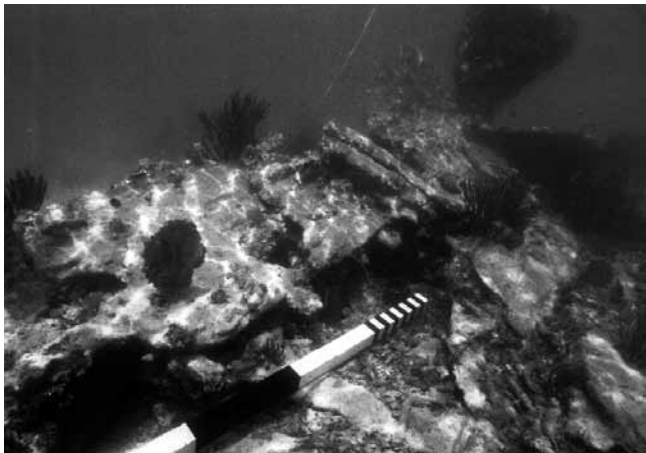


Figure 7. Deadwood assembly with iron strapping enclosing propeller shaft, Bird Key Wreck.

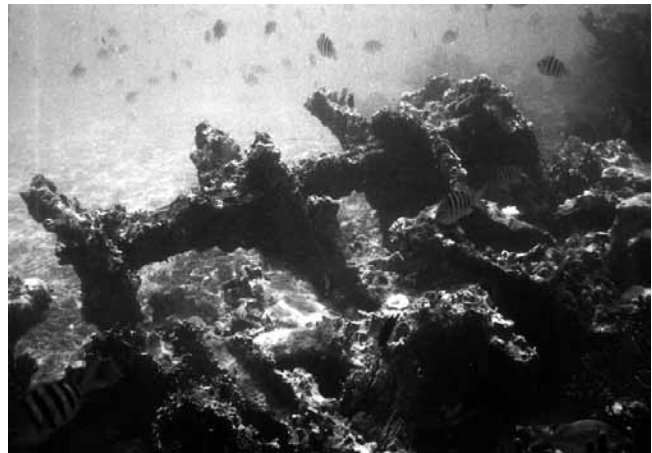


Figure 8. Port side hull detail showing attachment of longitudinal stringers to frames, Bird Key Wreck.

the sponsons flared outward was 14 ft (4.26 m). These measurements indicate that the lower hull was narrow in relation to its length, with a fineness ratio of 1:7.7. The lower hull was hard-chined as well as flat-bottomed and narrow, all of which suggests that the ship was intended for use in shallow water and relatively sheltered waters as opposed to operating in the open sea. No evidence was found for combined sail-and-steam propulsion, such as was common for seagoing steamships of the mid-19th century. The absence of rigging and mast hardware on the wreck site, or of mast steps within the hull area, can be accepted as reasonable, albeit negative, evidence for the exclusive use of steam propulsion. Supporting this interpretation is the fact that the lower hull had neither a keel nor true keelsons, so it would have been difficult to step masts of any kind.

Although the ship's engine and much of the associated machinery was removed during salvage operations, other elements of the ship were left in remarkably good condition. The propeller and propeller shaft assembly were of special interest (Fig. 6). These elements survived the impact of grounding with little visible damage, probably due to their solid wrought iron construction. By comparison, the lower hull and deadwood structures were more lightly constructed. The propeller measured 6 ft (1.8 m) in diameter from tip to tip and had four blades, each flaring in width from the hub to a maximum of 2 ft 10 in (0.86 m). The geometry of the propeller was simple, since the measured distances between blade tips and from tip to hub were also 2 ft 10 in (0.86 m). Viewed from astern, only the lower port side blade showed any damage due to grounding, and this was confined to a small part of the blade tip in contact with the sea-bed. This damage, slight though it was, showed that the propeller was rotating counter-clockwise at the moment it struck the sea-bed—that is, it was being run in reverse as the ship backed down immediately prior to grounding. This evidence supports the idea that the ship grounded accidentally, although the possibility still exists that the

ship was being slowed down just before impact, even if the grounding was intentional. This was not a true screw propeller but more closely resembled a set of four flat paddles, each set into the hub at an angle of 65°. There was little curvature to any of the blades except toward the base where each blade merges with the hub. The hub was square in cross-section, but, even after light cleaning, it was difficult to see the locking pin assembly in detail.

From an engineering standpoint, this propeller represents a combination of good workmanship in wrought iron and poor ship design. The propeller's heavy weight and flat blades probably produced intense vibration and torque, which called for a propeller shaft of equally heavy construction. The propeller and shaft assembly were overbuilt in relation to the rest of the ship's structure, and the vibration transmitted to the hull, especially around the stern, must have been alarming while under power. There is evidence for this in the deadwood assembly surrounding the propeller shaft in the form of heavy iron strapping wrapped around the outer composite covering of the deadwood (Fig. 7). Remnants of three of these straps partially covered the deadwood structure, while openings in the deadwood covering indicated where two additional straps were attached and later torn away, bringing the total number of iron straps to five on each side. These straps enclosed a composite iron-wood-iron laminated sleeve with a V-shaped cross-section fitted over the deadwood keel. This entire structure of iron straps and sleeve was probably added on after the ship was completed and the vibration and torque effects of the

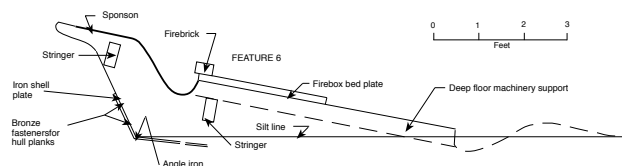


Figure 9. Cross-section of Bird Key Wreck hull (see Fig. 4 site plan for location).



Figure 10. Refractory and insulating firebricks cemented to iron box plating (see trilateration point R.2 on Fig. 4 site plan).

propeller were experienced while steaming.

Jammed into the sea-bed underneath the lower port side blade of the propeller was a portion of what was probably the skag, and about 4 ft (1.2 m) to starboard of the lower starboard propeller blade was the ship's rudder resting flat on the sea-bed. The rudder was fashioned from a solid wrought iron slab 3 in (7.6 cm) thick and was intact. Like the propeller and shaft assembly, the rudder was massively overbuilt, perhaps to withstand turbulence generated by the propeller. The pintle and hinge were still attached to the rudder, almost at the mid-point, indicating a large mass-balance forward of the vertical axis of rotation.

Forward of the thrust-bearing, a single frame aligned with the deadwood structure projected from the sea-bed, marking the forward end of the deadwood where it was detached from the rest of the lower hull. Additional frames associated with the deadwood may have been present below the surface of the sea-bed, but our shallow fanning failed to find any. The 8 ft (2.4 m) forward of this frame represented a break in the hull structure where the deadwood tore away from the rest of the lower hull when the ship struck Bird Key Bank. The sea-bed in and around this gap was covered with twisted frames and stringers,



Figure 11. Ball valve assembly from Bird Key Wreck.

many of them detached and resting loose. At the point where the first of the lower hull frames appeared, there was also twisted lower hull plating along the port side. For purposes of orientation, this frame was designated as Frame 1, with each frame encountered forward of Frame 1 being numbered consecutively and identified on the plan of the wreck site, for a total of 33 visible frames. Any frame attached in some way to the lower hull structure was included in this total. In addition, at least nine detached frame elements were found near the bow and along the sea-bed on the ship's starboard side.

It was possible to trace the iron plating of the lowermost part of the ship's hull along the port side continuously from Frame 1 to Frame 31. The twist in the outer hull plating referred to earlier extended forward only as far as Frame 3. From that point forward the hull plating accurately reflected the curvature of the lower hull along a line parallel to and 1 ft (0.3 m) above the flat hull bottom. Spacing from mid-point to mid-point of each frame was 1.5 ft (18 in; 0.45 m) through the wreck. It was not always possible to trace each frame continuously across the lower hull, owing to debris and marine growth which was especially thick along the ship's centre-line. The plan drawing assumes continuity with frames that were measured in and found to be aligned from the port to the starboard sides of the lower hull. Excavation under debris within the lower hull would be required to establish whether or not these frame ends are connected. The lower hull plating on the starboard side was less well preserved and was traced only from Frame 11 to Frame 17. The curvature here matched that on the port side hull and allowed us to measure across the hull at a point at, or close to, its maximum beam (at Frame 17).

Our best look at the ship's frames came from a section on the port side from Frame 6 to Frame 9. This section was cleared of marine growth and recorded in detail to provide a picture of the attachment of longitudinal stringers to the frames (Fig. 8) and of the relationship of the frame to the ship's firebox, as shown in the Figure 9 cross-section drawing of the hull. While many of the

frames consisted of simple angle irons of L-shaped cross section, the frames here were more complex in shape and served also to support the firebox assembly in the midships area. Unfortunately, the ends of these curved frame elements were all truncated, so we were unable to estimate the amount of overhang represented by these sponsons. One clue to this, however, came from a scatter of eight curved frame elements resting on the sea-bed close along the port side of the lower hull. These may have been supporting elements attached in some way to the hull frames to reinforce the main (cargo) deck at the point of overhang.

The 1.5 in (3.8 cm) thick rectangular iron plate resting upon and attached to Frames 9, 10, and 11 on the port side of the ship's centreline was probably a baseplate for the firebox. There was a round hole 1 ft (0.3 m) in diameter near one corner of the plate along with a red insulating brick cemented to the plate in the same corner. Further forward and resting on Frames 13, 14 and 15, but not attached to these frames, was another iron plate fragment of similar size and thickness with layers of both yellow firebrick and red insulating brick cemented in place (Fig. 10). Additional fragments of thick iron plate with firebricks and/or red insulating bricks still attached occurred nearby, but the exact number and shape of these pieces will be hard to determine without extensive removal of marine growth and overlying debris. These shattered plates with their associated layers of brick represented the heavily blasted components of the original firebox, with additional elements of iron and brickwork widely scattered over the site. Except for the rudder, the iron slabs associated with the firebox were the thickest metal on the ship, with the rim surrounding the base plate hole achieving a thickness of 2.5 in (6.4 cm). Substantial amounts of coal were found resting on the bottom plates of the lower hull near the firebox, mainly on the port side. It is unlikely that coal was actually bunkered in such an inaccessible location. More likely, the bunkers were damaged during salvage, and the residual coal within these bunkers came to rest on the bottom plating of the lower hull.

Resting nearby and partly overlaying the firebox assembly were two rectangular iron pieces and, a few feet astern of these, two more fragments of similar thickness and shape were found. These pieces were 1 in (2.54 cm) thick except at the edges and corners, which were rounded up to 1.5 in (3.8 cm) thick. They appeared to be pieces of an, 'ordinary low pressure American angular flue boiler', (Ward, 1860: 39 and Fig. 1) and also resembled the boiler shell for low pressure boilers of rectangular or box-shaped section described by Yeo (1894: 13). The dimensions of these pieces indicated a rectangular iron shell 8 ft (2.4 m) long, 3 ft (0.9 m) wide, and 2 ft (0.6 m) high, although it is possible that more than one of these may have been present. Such a rectangular firebox-boiler assembly would be consistent with the pre-1857 construction date inferred for this ship.

Extending forward from Frame 16 to Frame 31 along the port side there was a longitudinal frame attached to the hull interior at each vertical frame. It was continuous except for three breaks that arose during the ship's destruction, either when it sank, or, more likely during salvage operations. This was the heaviest structural element found on the wreck, and it was probably matched by an identical element along the starboard side—since torn away by blasting due to salvage. A similar item 18 ft (5.5 m) long was found resting on the sea-bed along the starboard side of the lower hull, and this could be a segment of missing longitudinal frame, now detached from its original position. On the port side, the longitudinal frame terminated in an area of bent and twisted metal between Frames 31 and 32. It is unclear whether it extended beyond Frame 32. If so, it would have intersected the curving hull line within a few feet, meaning that the bow would have been unsupported much beyond Frame 33. This could help account for the extreme damage to the bow during the vessel's grounding on Bird Key Bank.

Forward of Frame 31 there was a jumble of twisted metal and bent frames, with at least two fully detached elements. By tracing these elements by means of fanning the sea-bed and superficial removal of marine growth, we determined that the bow was a lightly constructed combination of iron plates meeting along the bottom and lower sides of the lower hull and joined at the seams by angle iron strips with a single line of rivets along each side of the seam. No keel or keelson elements were present. A large fragment of wood, presumably from the outer hull covering, was found articulated with one of the detached elements of the bow structure. At the sea-bed along the port side near Frame 32 there was a well-preserved segment of the ship's composite hull structure, with a layered sandwich of Muntz metal outer cladding, wood, and inner iron plating, still held together by the original bronze fasteners. These fasteners were small, nail-like items, and other examples were seen at various places attached to the outer plating of the hull deadwood and also found loose in the silt alongside the hull.

#### **Portable artefacts and detached elements**

Items larger than a brick were recorded and mapped. These appear on the site map. In addition, two concentrations of wreckage that appeared to be parts of the ship's machinery were located farther to the north on Bird Key Bank and were drawn and photographed. Another slab-like piece of detached iron wreckage resting 180 ft (54.6 m) north of the wreck was also recorded but could not be identified.

Although the ship was stripped of its engine and machinery during salvage, a well-preserved globe valve assembly was found resting loose on the sea-bed immediately next to the port side of the lower hull between Frames 20 and 21. This item was recovered for light cleaning, drawn and photographed (Fig. 11) before being returned to its original location. A cast iron object

lying farther out in the debris field was identified as a firebox door and was similarly recovered and recorded. Two unusual curved yellow specialty bricks were also found in the debris field about 5 ft (1.5 m) to the north of the lower hull.

Farther out in the debris field were four bottle bottoms of probable mid-19th century origin, which can be compared with contemporary collection from well-documented wrecks such as the steamboat *Bertrand* (Petsche, 1974; Switzer, 1974). During the 1988 survey of the wreck, a field team supervised by Larry Nordby found a single green glass bottle bottom that was determined to have been hand-blown (Murphy, 1993: 325, plate 17.1). It was identified as a mid-19th century demijohn commonly used for spirits and similar to those described from the *Bertrand* as Class III, Type 1 (Switzer, 1974: 22–24).

#### Possible identification of attribution

No firm identification of the Bird Key Wreck is possible at this time. Most of the ship's structure and engineering features suggest that this steamboat was the product of a 'vernacular' shipbuilding tradition in the south-eastern United States embedded within a more broadly-based ironworking industry that addressed a wide range of tasks. The company that built this steamboat probably manufactured bridge and architectural iron, farm equipment, and possibly even railroad rails and equipment as well. This hypothesis is based upon the unspecialised nature of most of the ship's identifiable elements. The lower hull was formed primarily from L-shaped angle irons and flat iron plates, with specially designed frames only in the midships area where support for the firebox-boiler assembly was required. The propeller was especially revealing, since it showed none of the refinements of contemporary screw propeller design already established in other parts of the world where ship construction and design were more advanced.

The quality of construction appears to have been good, with carefully joined and finished frames and plates. The rudder, propeller, and propeller shaft would have represented a major effort at wrought iron technology for that time and place. But, as suggested earlier, the craftsmanship in wrought iron was not matched by the ship's design, which showed clear signs of unseaworthiness and hydrodynamic inefficiency. The paddle-like configuration of the propeller and need for external strapping over the ship's deadwood revealed flaws in the ship's design and pointed to a mismatch between the heavily built propeller and propeller shaft and the lightly constructed lower hull. The rudder required major counterbalancing. The lower hull was flat-bottomed and hard-chined, avoiding curves commonly found in lines of better designed ship's hulls, probably for the sake of ease of manufacture. Reliance upon longitudinal frames and stringers for hull stiffening instead of keel and/or keelsons left the lower hull vulnerable along the bottom and bow to scraping and crushing in the event of grounding. The

ship's almost eggshell-like construction was evident in the bow area, where the force of grounding bent and broke the bow into twisted fragments.

So far, the ship described in archival sources that most clearly approximates this hypothesis during the period of intensive construction at Fort Jefferson from 1857 to 1861 is the *Scottish Chief*, a steamer built in 1855 in Wilmington, North Carolina, and operated by the Tift brothers during this period (Letter Book, 25 February 1860). The ship was described as 126 ft (38.4 m) long, 17 ft (5.1 m) in beam, and with a draft of 4.5 ft (1.37 m). No mention was made as to whether the *Scottish Chief* was a propeller or paddler, but the ship was described as having 'false sides (expanding)', which was almost certainly a reference to the overhanging deck supported by sponsons. The *Scottish Chief* was further described as having two high pressure engines, 16 in (0.40 m) by 5 ft (1.52 m) stroke each, with a single boiler, and a maximum speed of nine knots.

Later correspondence in the Tift Letter Book revealed that the *Scottish Chief* was sold to M.J. Ferris and Son by 19 Sept. 1860, after which the ship was used as a lighter on Tampa Bay. There was no mention of the ship's loss, but it would have been easy for the Tift brothers to arrange for the *Scottish Chief* to transport bricks to Fort Jefferson even after they had sold the ship. The wreck was not mentioned among those listed in the Admiralty Court Records at the Historical Archives in Key West (Bears, 1971), probably because the cargo and ship's components were salvaged locally, at the fort, and never reached Key West. The *Scottish Chief* is an uncertain identification for the Bird Key Wreck and will remain conjectural until a better candidate is found, but it cannot be ruled out.

#### Conclusions

The Bird Key Wreck represents an early propeller-driven steamboat of pre-1857 origin. Its hull was of composite construction, with details indicating that it was the product of a regional ironworking industry that was not specialised in shipbuilding and did not participate in technological developments in ship design and construction seen elsewhere at this time. Its pre-1861 loss, as inferred from dating the bricks associated with the wreck, makes this an important antecedent to consider in relation to steamboats, especially ironclads, used by the Confederate States during the American Civil War. Its technology should be compared with the wrecks of the *Xantho*, a paddle steamer built in 1848 and later converted to screw propulsion and wrecked off the Western Australian coast in 1872 (McCarthy, 1989), and the *Indiana*, a propeller-driven steamship built in 1848 and lost in the American Great Lakes in 1858 (Johnston & Robinson, 1993).

The engineering and construction details of the Bird Key Wreck support views expressed by the Tift brothers in their correspondence (Tift Brother Company Letter Book, Sept. 1859–June 1861) concerning ships contracted for the War Department. Many kinds of vessels of widely

varying condition were pressed into service to deliver bricks to Fort Jefferson and Fort Taylor. In at least one case, the Tift brothers decided to continue operating a ship (the brig, *Wabash*) that had been condemned by a marine surveyor and could no longer be insured (Letter Book, 25 February 1860). During this period it also became more profitable to transport cotton, and we find letters complaining about delays of shipments to be landed at the Dry Tortugas when the ships could have been used for the cotton trade instead (Letter Book, 6 March 1861). The general impression from these Letter Books is one of a shipping firm that operated on the basis of expediency and sought whenever possible to keep costs to a minimum, even if, as in the case of operating uninsured vessels, this meant taking unusual risks. Except for its shallow draft, the Bird Key ship was not well suited for the task of transporting construction materials to Fort Jefferson and appears to have been an expedient vessel contracted for that purpose.

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## More than a shipwreck: the convict ship *Hive*—Aboriginal and European contact site

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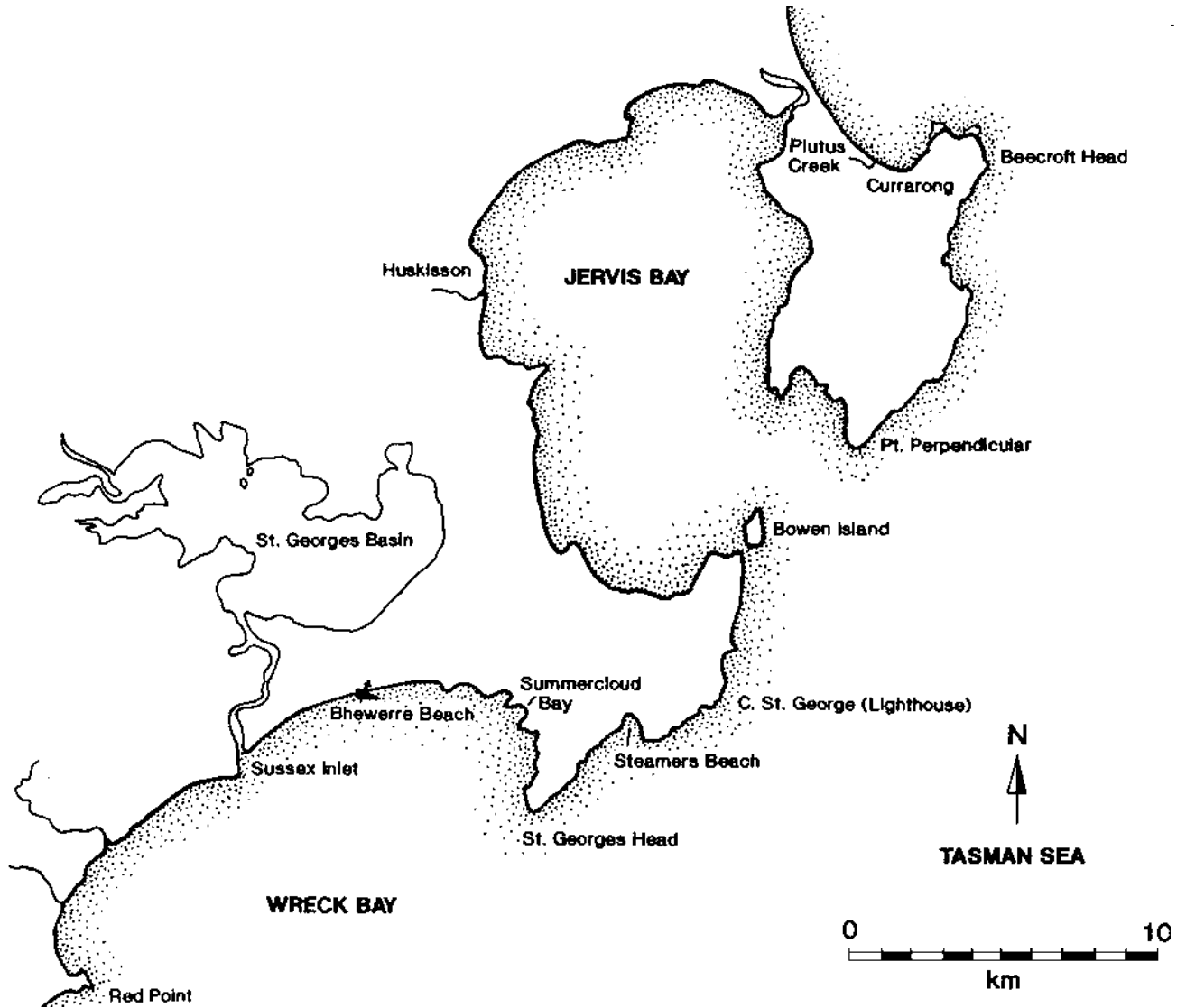


Figure 1. Location Map

### Summary

Aboriginal and European contact in Australia commenced with the arrival of ships on the Australian coast. Subsequently there was frequent maritime interaction between Aborigines and Europeans, as passengers, as fishing hands, as guides and interpreters for coastal navigators. Frequent instances are recorded in shipwreck records but usually there is no physical evidence that has survived. When the convict ship *Hive* was lost on the beach in Wreck Bay in 1835, Aboriginal people from this area assisted in reporting the plight of the survivors to European

authorities. In this instance, the survivors occupied a site adjacent to the wreck for a period of one month.

In December 1994, a maritime archaeological team from the Department of Urban Affairs and Planning in NSW searched for and located the remains of the shipwreck. It lies under 2–3 m of sand in the surf zone off Bherwerre Beach on the New South Wales south coast. Due to the dynamics of the surf in this area and the depth of the covering sand, the shipwreck is effectively inaccessible to archaeological investigation, unless uncovered by natural processes. However, an inspection of the adjacent sand



Figure 2. TM4 magnetometer located ferrous metal objects under beach sand adjacent to the main wreck site in the surf zone. (Photo: S. Hickey)

dune area revealed artifactual evidence that is likely to be associated with the survivors' camp and there was also evidence of isolated ferrous objects underneath the beach sand, presumed to be debris washed in off the shipwreck.

This paper will look at the evidence that has been found to date in the surf zone, under the beach sand and in the dunal area. It will investigate the possibility that the dunal site represents an Aboriginal and European 'contact' site and will consider the site's potential for further investigation.

In addition, the investigation of the *Hive* remains under the beach sand, involved excavation under conditions that do not appear to have been previously documented, at least in Australia. It was anticipated, prior to additional field-work in April 1995, that there are particular difficulties to be encountered in working in hydrous beach sand. This was subsequently proved correct. The paper is therefore in three parts. The first outlines the environmental and historical context of the shipwreck, the second examines the potential of the 'contact' site and the third looks briefly at the technological approach adopted in the beach excavation, its shortcomings and a solution that is recommended for further such work.

## PART 1

### Background

The NSW Department of Urban Affairs and Planning conducts a program to promote the location, investigation and management of the State's underwater cultural heritage. A central philosophy of this program is (i) the integration of the management of this element of NSW heritage with the general program for heritage management in the State; and (ii) facilitating opportunities for participation of individuals and organisations in the underwater heritage program.

The investigation of the wreck of the convict transport *Hive* is a good example of the program in cross-section. It was conducted in accordance with the State *Heritage Act 1977* as well as the Commonwealth *Historic Shipwrecks Act 1976*. The excavation of remains under the beach sand, which is in State territory, was in compliance with an excavation permit issued by the NSW Heritage Council.

The investigations involved personnel from the Department of Planning's Maritime Archaeological Program, the Department of Public Works, the Wreck Bay Aboriginal Community, private researchers and archaeologists specialising in Aboriginal archaeology, Australian Defence Industries and Jervis Bay National Park.



Figure 3. Vegetation on dunes adjacent to the *Hive* wreck site. (Photo: S. Hickey)

### Investigation of the wreck site

The investigation was conducted over a three-year period. A preliminary visual search, with a towed diver, was conducted in 1993 but indicated no evidence of a shipwreck site.

A second search, using Ferex and TM4 magnetometers was undertaken in December 1994. This remote sensing survey was carried out over a three-day period (12–14 December 1994), was successful with locating a large buried anomaly in the surf zone adjacent to Bherwerre Beach.

Five smaller magnetic anomalies were detected buried within the sands of the adjacent beach. It was anticipated that these might represent portions of the either the *Hive* or the schooner *Blackbird* that was lost near the *Hive* during salvage work in 1836.

During the 1994 survey, an inspection of the sand dunes behind the beach resulted in observation of glass and ceramic fragments as well as numerous pieces of coke. The glass and ceramic were consistent with the period of the *Hive* shipwreck and the coke was consistent with supplies for the ship's fires. The material was all in a fairly discrete area, directly inland from the wreck site and is likely to be the remains of the survivors' camp.

In April 1995, a third investigation, aimed at further identifying the nature and extent of the magnetic anomalies under the beach. The investigation involved excavation of one anomaly under about 2.5 m of sand and

1–2 m below the water table. As there are a number of shipwrecks buried below beach sand on the NSW coast, it also provided an opportunity for developing appropriate techniques for working in this type of setting.

### Environmental context

The substrata of Bherwerre Peninsula consists predominantly of gently folded sandstone (Sullivan, 1977: 3). In the vicinity of the study area, the substrata is completely covered by a mantle of wind blown sand. By the 1970s, these sand deposits had been severely destabilised as a result of grazing activities. A stabilisation program has helped to arrest this damage but has further altered the original appearance of the area. In some sections, Aboriginal midden sites are reported to have been either buried or destroyed by the actions of earthmoving machinery (Sullivan, 1977: 11).

In most of the swales between the sand dunes, pumice stone and pipi (*Plebidonax deltooides*) shells were exposed. Pipi are common to the area and Sullivan (1977: 8) states that these bivalves 'were exploited along the entire 7 km of the beach'. No attempt was made in the current survey to determine whether the shell deposits observed were midden material from this exploitation or whether they and the pumice stone were the result of natural processes.

Vegetation on the restabilised dunal area consists primarily of grasses and low coastal scrub (generally



Figure 4. Vegetation in the vicinity of the 'survivors' camp'. (Photo: T. Smith)

about 1–2 m). Marram grass (*Ammophila arenaria*) is both sand and salt tolerant and has been planted since 1966. It is particularly dominant along the frontal dunes near the high water mark. Behind this, other grasses and herbs include, *Spinifex hirsutus*, *Carpobrotus* sp., *Sonchus megalocarpus*, *Festuca littoralis*, *Senecio lautus*, *Stackhousia spathulata*, *Arctotis* sp. and *Lupinus varius*. There are also examples of *Acacia longifolia* and *Leptospermum laevigatum* (Ingwersen, 1976).

South of the dunes, the siliceous beach sands slope at a gentle 5° to the water's edge. The wreck site believed to be the *Hive* is located in the surf zone and is subjected to extreme wave and surge action. From the undulating sand-banks in the surf zone, there is a very gradual grading of the sea-bed into deeper water of the bay. There are no exposed rocks or visible reef.

David Hanslow of Public Works Department's Coastal Section examined aerial photographs of the area dating from the 1940s up to the present. He concluded that there had been few marked changes apart from a major scouring in 1974. As a result it was concluded that the beach would have retreated or accreted  $\pm 50$  m since the time of the shipwreck event 160 years ago (Hanslow, pers. comm.). The submerged shipwreck remains were located in approximately the same depth of water and distance from shore as reported by contemporary sources. This suggests that actual movement of the line of the beach has been minimal.

### Background research

Prior to the 1994 field-work, the Department prepared a background history of the *Hive*. The historic record consists of contemporary written accounts, such as those of Alexander Berry, contemporary newspaper reports, shipping registers and the records of an inquiry conducted by the Harbour Master.

### Historical context

The convict transport *Hive* represents the only known wreck, on mainland Australia, that was carrying convicts

at the time it was lost. Only two other ships were wrecked

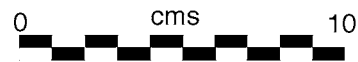


Figure 5. Shako badge from 28th Regiment of Foot headress. (Courtesy: NSW Department of Transport; drawn by Tim Smith)

while carrying convicts, these being the *George III* and *Neva*, lost in Tasmanian waters, all during the year 1835.

The loss of the *Hive* occurred in what was then a largely unsurveyed region of Jervis Bay, New South Wales. The valuable cargo of £10 000 of specie (coin) for the Commissariat was successfully salvaged, (Letter from John Lamb, 14 Dec. 1835), although later work resulted in the further loss of the Government schooner *Blackbird*. Local identities such as Alexander Berry, aided the rescue of some 300 people on board, including passengers, soldiers, crew and 250 convicts (*Sydney Herald* (SH): 14 Dec. 1835). (Note: Alexander Berry wrote that the value of the specie was £40 000. This appears to be error as later official references state the value as £10 000 (Major General Sir R Bourke's letter to Lord Glenelg 20 Dec. 1835; SH: 17 Dec. 1835).

The wreck event contributed to the naming of the bight Wreck Bay, a name that was to become well earned over the following years.

### The early days

Built in the United Kingdom at Deptford, Kent, in 1820 the *Hive* was ship rigged with two decks, a square stern and quarter galleries. The vessel was 120 ft (36.6 m) in length, 480 tons and had a female bust figurehead (*Lloyd's Register* 1835, No. 536; British Register, London, 381 of 1833).

The *Hive's* first voyage to Australia was in 1834. Sailing from Falmouth, United Kingdom, to Port Jackson on 8 February 1834, the *Hive* brought out its first cargo of 250 male prisoners. Suffering extreme conditions and

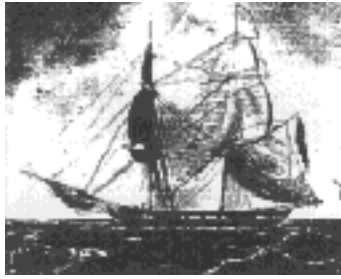


Figure 6. Brig *Zebra* sent to the aid of the *Hive*, 1835.

CONSTRUCTION DETAILS		
	HIYE	BLACKBIRD
Type:	Ship	Schooner (also referred to as a cutter)
Built:	Deptford, Kent, UK, 1820	Moreton Bay Dockyard, 1828
Lost:	10 December, 1835	16 January, 1836
Master:	Capt. John Nutting	Mr Crook
Owner:	J. James, J. Luscombe	W.H. Chapman, Sydney
Tonnage:	480	67
Length:	120 feet, 2 decks	56 feet, 2 masts, 1 deck

Table 1. Construction details of the *Hive* and *Blackbird*.

a protracted 123-day voyage, the prison temperature reached an alarming 100° F. Surgeon George Fairfowl, in a humanitarian gesture, allowed 60 prisoners to sleep on deck, changing shifts every four hours (Surgeon Fairfowl’s Journal, 1833).

**Tragic adventures**

On 24 August 1835, the *Hive* again departed on a second and fateful voyage. Picking up convicts at Dublin and then Cork in Ireland, the *Hive* made the passage with the death of only one prisoner. However, when turning up the east coast of Australia, events took a dramatic turn for the worse. Having not touched land the entire voyage, the transport crawled up the coast towards final disembarkation at Sydney. The *Hive* sailed on during the night of Thursday, 10 December 1835 but soon found itself driven ashore a total wreck at ‘Wreck Bay’ (SH 17 Dec. 1835).

On board was Captain John Nutting in command of 250 Irish male prisoners, Chief Officer Edward Kenny, Ensign Kelly of the 17th Regiment, Surgeon Superintendent John Donohoe Esq, RN, Lieutenant Lugard of the 31st Regiment, Henry Lugard, Royal Engineers and 29 rank and file soldiers of the 28th Regiment. In addition, there were eight women and eleven children (SH 17 Dec. 1835).



Figure 7. One of the glass fragments found in the ‘survivor’s camp’ area. (Photo: S. Humphries)

About midday on 10 December, the *Hive* had sighted land in the vicinity of Montague Island. The chief officer, Edward Kenny thought the vessel to be only 8–9 miles (13–14 km) off the coast. Informing the captain, his concern was not shared and Captain Nutting continued a course bringing the vessel closer to shore. Kenny attempted to have the course altered again, but to no avail. Captain Nutting advised him to mind his own business and that ‘one person is sufficient to navigate the ship’! It was also to prove that it took only one person to wreck the ship.

Cautious of danger, Kenny decided not to sleep after the change of the night watch. The *Hive* continued under full sail following the captain’s instructions. At about 9.30 that evening, Kenny again tried to convince third mate Thomas Morgan, then on watch, to reduce sail. Not wishing, or daring, to disobey his captain, the vessel plied on into the dark and cloudy night (Governor’s Despatches, 1836–37: 1649, 1651).

Two look-outs were stationed in the forecabin and one on the lee gangway watching for any sight of land. Some time before 10.00 p.m. a prisoner who had been a Master of an American vessel reported to Ensign Kelly that he had seen land on the starboard bow (Governor’s Despatches, 1836–37: 1652). Morgan and the other Officer of the Watch assured Kelly that it was cloud that could be seen as they had been observing it rising for some time. At 10.00 p.m. Morgan came below decks to break some fearful news to Chief Officer Kenny that there was something white on the port bow that looked like breakers! Kenny rushed on deck and ordered the wheel to be turned hard-a-port. However, the *Hive* began running through the sand on a gently shelving beach (Governor’s Despatches, 1836–37: 1655–56). Luckily for those on board, the vessel did not strike any rocks and there was no violent impact.

Contemporary documents placed the wreck in the breakers and ‘within her own length of the shore’ (Letter from Alexander Berry, 14 Dec. 1835), ‘in a deep bight south of Jarvis Bay, between St Georges Head and Sussex Haven [Inlet]’ (Letter from Alexander Berry, 11 Dec. 1835). Alexander Berry placed the location as 4–5



Figure 8. A compressed air probe accurately placed the corners of the caisson in relation to the iron object. (Photo: S. Humphries)

miles (6–8 km) from the southern part of Jervis Bay. The only significant sandy shore that fits these descriptions is Bherwerre Beach extending for some 6 km along the northern portion of Wreck Bay.

Kenny ordered the yards to be thrown back. Captain Nutting then staggered on deck with a countermand for them to be braced and the studding sails taken in (Governor's Despatches, 1836–37: 1649). There was considerable confusion and, according to witnesses, the captain appeared incapable of taking effective command. Kenny ordered the longboat to be launched. Nutting interjected and had the smaller, weather quarter boat launched. Kenny objected and, realising that boat would be swamped, decided to form part of the crew himself to save another's life. The boat capsized and was smashed against the ship as soon as it touched water. Kenny and Ensign Kelly just managed to catch the ship's forechains and Kelly was hauled aboard (Governor's Despatches, 1836–37: 1653).

A third seaman clung to the upturned boat and was driven through the surf to safety. Chief Officer Kenny then swam ashore with a hawser. By this stage, Captain Nutting is said to have 'lost all presence of mind'. Surgeon Donohoe, with the support of the Commander of the Guard, Lt Lugard, temporarily deposed him of command and gave organisational control to Kenny (Governor's Despatches, 1836–37: 1653–54).

### Rescue

After Kenny swam ashore to secure a hawser, Captain Nutting finally agreed to lower the longboat and with the aid of lines, had the women and children taken to the beach (Governor's Despatches, 1836–37: 1653). The guard and prisoners were then ferried across in shifts. Once ashore, they were employed removing provisions from the wrecked vessel, dismantling the top yards and establishing a camp in the adjacent sand-hills. During this process the Boatswain was tragically drowned while trying to save a young crew member. The young man, who



Figure 9. After the first metre, hydrated sand flowed into the hole. (Photo: S. Humphries)

had got into difficulties in the surf, was washed ashore uninjured (SH 17 Dec. 1835).

Ensign Kelly proceeded across land to gain help, carrying a letter about the wreck from Surgeon Donohoe. With the aid of Aboriginal people from Wreck Bay, he found the farm of John Lamb on Friday morning, then proceeded to the farm of Alexander Berry in the Shoalhaven. A message was dispatched to Wollongong and from there to Port Jackson (SH 17 Dec. 1835) and help was soon on its way. The wreck

...was the means of producing much excitement in Sydney [and] great numbers of the town's people were observed flooding to the Dock Yard and other places where information might be obtained relative to the accident (SH 17 Dec. 1835).

The shipwreck victims on Bherwerre Beach were not altogether isolated. The Aboriginal community continued to provide a communication link between Surgeon Donohoe and Alexander Berry (Letter from Alexander Berry, 17 Dec. 1835).

Alexander Berry, at his own expense, sent his schooner *Edward* to the scene of the disaster (SH 17 Dec. 1835). In a letter to authorities in Sydney, Berry believed that the *Hive* 'might again be got afloat if under the direction



Figure 10. Extraction of sand caused subsidence in the area surrounding the caisson. (Photo: S. Humphries)

of an Able commander'! (Letter from Alexander Berry to Alexander Macleay, 14 Dec. 1835). Nutting however refused all aid until permission arrived from Sydney. By Sunday, the Government revenue cutter *Prince George* was dispatched to the wreck with the brig-of-war HMS *Zebra* under command of Captain McRae and the steam packet *Tamar* with a detachment of the 17th Regiment.

On Tuesday, 15 December, the bower anchor was carried out into 22 ft (6.7 m) of water. Another anchor was carried out on Thursday, 17 December but a southerly arrived that evening and both anchors 'came home'. By Sunday, 20 December, the Captain considered that any further attempts to keep the ship intact were hopeless (Governor's Despatches, 1836–37: 1647–48).

The *Tamar* returned to Sydney on 16 December with the *Hive's* surgeon, Donohoe, Lt Lugard, part of the guard and 106 convicts. HMS *Zebra* returned with the specie, the mails, stores, 94 prisoners and ten soldiers from the 28th Regiment before returning to the wreck to pick up the remainder (SH 11 Jan. 1836).

In early January, the schooner *Edward* brought up part of the crew and some of the *Hive's* stores. By this time, *Hive* was reported to be lying on the beach with its back (keel) broken and water flowing over the orlop (lowest) deck (SH 7 Jan. 1836).

#### Salvage brings further disaster

The former Government schooner *Blackbird* (67 tons) had returned from New Zealand on 4 January with a cargo of timber, potatoes and yams (SH 11 Jan. 1836). Having discharged its cargo the schooner was then engaged to salvage the vessel's stores left onshore, departing Sydney on 11 January 1836 (SH 25 Jan. 1836). The *Blackbird*, a colonial vessel, was built in 1828 at the Government dockyard at Moreton Bay (British Register, Sydney 25/1833).

A serious accident befell the small vessel while engaged on the first day of salvage work on 15 January. Having anchored 2 miles (3 km) out into the bay, the vessel's



Figure 11. The iron artefact could not be uncovered and could only be reached by loosening the sand with the air probe and reaching down by hand. (Photo: S. Humphries)

'whaleboats' were used to ferry the bulk of the salvaged goods in 22 trips. Returning to the laden schooner at nightfall, a sudden gale greeted the crew about 9.00 p.m. Unable to stop the anchor dragging, the crew attempted to hoist sail and get the *Blackbird* underway. Time was running out and anchors were dropped as the vessel drew nearer the beach. After holding the schooner for half an hour, the first anchor cable parted then the other (SH 25 Jan. 1836).

With howling winds, rain and lightning, the little vessel was thrown towards the broken water on the beach. Salvaged cargo was jettisoned to lighten the load. A decision was made to raise all sail and run the vessel onto the beach. Striking the sand several times, at 2.30 a.m. on the morning of 16 January, the *Blackbird* was carried 'high onto the beach' to join the *Hive* as a spectacle of disaster.

Captain Nutting, who had been aboard the *Blackbird*, had now been wrecked twice in the same location. He and the owner, Mr Chapman, decided to walk back to Sydney for help. The captain and crew of the *Blackbird* were left at the scene to guard both wrecks. No further salvage appears to have been carried out (SH 25 Jan. 1836). The total cost of the salvage operations amounted to £435 10s. This sum was deducted by the British Government from the *Hive's* owners freight claim for the voyage (Lord Glenelg's letter to Governor Bourke, 30 Nov. 1836).

In Sydney, an inquiry into the *Hive* incident was convened by the Harbour-Master's Office and a report was delivered on 11 February 1836. The report concluded that the course steered by *Hive* would have taken it clear of Cape St George, had it not been for a strong inshore current of which Captain Nutting was apparently unaware. Nutting was censured for his inefficient handling of his vessel after leaving Montague Island, especially for retiring to bed after Kenny had raised concerns about the vessel's course (NSW Governor's Despatches, 1836–37, No. 39 of 18.3.36).

The Captain, who Alexander Berry claimed had lost two previous ships, (Letter from Alexander Berry to Alexander Macleay, 14 Dec. 1835), left for England on Sunday, 3 April 1836, aboard the *Avon*—but as a passenger, not as the ship's master (Lugard: 1947: 3).

## PART 2

### Potential of the survivors' camp as a contact site

An area in the dunes behind the wreck site had been inspected during the December 1994 survey. This area was found to contain coke, glass and ceramic fragments as well as stone flakes of Aboriginal origin. These were located in an area of approximately 18 m radius.

Numerous areas of shell and pumice stone were visible in the swales between the sand dunes. However, in one discrete area, about 50 m behind the frontal dunes and nearly directly inland from the shipwreck remains, two fragments of glass and a small shard of blue and white ceramic were found. One of the pieces of glass was a badly broken base of a bottle. Aboriginal Park Worker, Eric Ardler, later advised that his community used to find a number of old, intact bottles in this area (Ardler, pers. comm.). Photographs of the glass and have been dated to fifteen years either side of 1835 (Johnson, W., pers. comm.). This provides additional weight to the possibility that this, and other material in this area, relates to the *Hive*.

Associated with the glass and ceramic, were numerous pieces of coke. Coke is a product of burning coal and these examples could have originated from the coke burning fires on board the *Hive*. Samples of the coke were submitted to petrological investigation to provide an indication of their origin. Details of the outcome are provided in Appendix (1). In summary, the coke was found to be manufactured, as opposed to naturally occurring, and an origin from Wales was considered to be the most probable (Cook, June 1995: 9).

It is difficult to imagine circumstances other than a shipwreck, that would account for the arrival of the coke in this area. Marjory Sullivan (Sullivan 1977: appendix 1, number 12) recorded an Aboriginal camp site in approximately the same location. The site was reported to contain 'in-situ hearth material'. While it is not certain that the two sites are the same, it is possible that the hearth material to which Sullivan referred was coke. The site recorded by Sullivan also contained silcrete flakes. While the focus of the investigations in 1994 and 1995 were on the shipwreck remains in the surf and under the beach sands, a small amorphous piece of silcrete and a silcrete flake were observed within the same area as the glass, ceramic and coke artefacts.

This site, tentatively designated, the 'survivors' camp' was discussed with archaeologists Kelvin Officer and Kerry Navin, both specialising in Aboriginal archaeology. In their view, archaeological sites that relate to the early period of contact between Aboriginal and European people

are a rare site type in Australia. They hold the potential rewards of recording many aspects of the foundation and poorly understood social and technological dynamics that mediated initial 'Black' and 'White' interrelation. This lost record has relevance to many aspects of Australia's contemporary society and cultural mediation.

Unfortunately contact sites can be hard to identify and frequently require the coming together of both documentary and archaeological interpretation before ephemeral material associations on the ground can be recognised.

The survivors' camp associated with the wreck of the *Hive* is one such site. The simple proximity of shell midden, stone flakes and European artefacts merely represents a location, the referral to an historical event, and only the potential of a revealing archaeological deposit.

However, the identification is significant for the potential survival of this type of site within the rapidly developing coastline of southern NSW. It also anticipates a fruitful arena of research in association with other types of historic Aboriginal sites known to occur in the Jervis Bay region. The challenge will be for the formulation of appropriate research designs that will determine the association, if any, between the Aboriginal artefacts and the European artefacts in the dunal area behind the *Hive* shipwreck.

## PART 3

### Excavation

The April 1995 survey was conducted over a five-day period and was limited to excavation of one of the anomalies under the beach sand. This is an area that required the development of specialised techniques to cope with the combination of relatively dry surface sand overlaying extremely hydrated sand below the tidal water table. Although numerous enquiries were made in preparation for the work, no comparative excavation in these conditions was obtained.

A 4 m compressed air probe was used to accurately place the corners of the caisson in relation to the iron object under the sand. The anomaly was located and accurately positioned using a theodolite and differential Global Positioning System (GPS). The overburden was quickly removed by the back hoe to a depth of about 1 m. At about 2 m the water table was refilling the hole with sand at about the same rate as it could be removed. The iron artefact remained about 0.5 m under the sand with another 0.5 m of water sitting above the level of the sand. The sand around and above the iron object was entirely devoid of any traces of artefactual material.

The iron object could be reached through the sand and water with finger tips. It was rod like and about 1 m in length, running diagonally across the trench. At one end it broadened to about 30–40 cm and felt a little like corroded chain. The other end was deeper and could not

be reached except with the air probe. A firm identification could not be made.

It became clear that no further advance could be made and the hole was filled in after removal of the sheet piles and framing.

### The Solution

The field-work provided valuable information on the difficulties of working on a beach site. The drier sand posed few problems for the sheet pile method. However, the hydrated sand below the water table could not be effectively precluded. To achieve this, a dewatering system should be used to lower the water table in the vicinity of the caisson. With this technique, spear points, (vertical pipes with filters attached), would be placed adjacent to the trench. These would be connected to a vacuum pump and would operate continuously while the excavation was in progress. This would keep the trench and immediate surrounding area dry and prevent the ingress of mobilised sand.

### Future of the site

As a result of the investigations that have been conducted to date:

- a description of the nature and extent of the site has been obtained;
- identification of a direction for further research has been made;
- information has been compiled to assist Jervis Bay National Parks to interpret the site;
- author/historian Allen Mawer has been inspired to undertake research for a book on the three convict ships lost in Australian waters in 1835; and
- a technique for controlled archaeological excavation in below-water-table situations has been identified. It now awaits an opportunity to put it into practice.

In relation to the 'survivors' camp', there is opportunity and potential for further archaeological investigation. It is clear that any such investigation must draw upon the information that may be contained within the physical limits of the site, the information contained in the historic record and the nearby Wreck Bay Aboriginal community, whose members have a significant living memory of other bottles and remains that have been seen and recovered from this 'survivors' camp' location.

## APPENDIX 1

**Petrological examination of coke**—extracts from a report by Alan Cook of Keiraville Konsultants, June, 1995.

A small sample of the cokes was submitted for petrological examination to determine their probable source. The examination was conducted by Alan Cook of Kieraville Konsultants. The results of this examination follow and the full report is attached at Appendix 1.

The pieces of cokes and related materials were photographed prior to being cut for examination with

a petrological microscope. Small sections of the pieces were then mounted and polished using normal polishing techniques for cokes.

Six of the pieces are cokes and two (F and H) are vesicular ash that could have been derived from the combustion of coke or coal. Of the cokes, five are very similar and represent cokes produced from low rank coals that are rich in vitrinite. They are similar to the cokes used in the town gas industry although the temperatures of carbonisation appear to have been higher than those commonly used in the manufacture of town gas. Coke D was produced from a high rank coal (vitrinite reflectance in the range 1.55% to 1.8%). Such a coal would only have been used to manufacture coke for metallurgical purposes. It is probable that all of the cokes were sourced from metallurgical coke manufacture.

Inerts other than minerals comprise about 10% to 20% of the cokes. Small amounts of inertodentrinite-derived coal are present but most of the inerts are lenticular masses derived from semifusinite or fusinite. The general form of the inertinite is similar to the fusain bands found in Carboniferous coals from the Northern Hemisphere but generally absent from the Permian of Australia or South Africa. Mineral matter contents are generally high, probably due to a lack of coal washing procedures rather than hand picking.

The cokes were presumably used as a fuel in the ship with the primary use being for cooking. Cokes A, B, C, E and F would have relatively easy ignition characteristics and high reactivity provided the initial lump size was below about 6 cm. Coke D would be more difficult to ignite and would burn more slowly. It appears to have been only a minor portion of the fuel.

Low rank coals such as those used to produce the majority of the cokes are found in a wide range of locations. It is possible that some Australian coals from the Hunter Valley could have been used. However, the coals near Newcastle would yield a fine mosaic and the coals from the Cessnock District would yield cokes with a higher content of inertinite. It is more probable that these cokes were made from Carboniferous coals from Europe or Great Britain. A number of coalfields in Great Britain would be possible sources, with the East Wales, Radstock and some of the Midlands coalfields being the most likely sources. Coke D has properties that indicate a source from the Western part of the South Wales coalfield. An origin from Wales for all the cokes is, therefore, the most probable. Coke D may have been a minor contaminant of the normal product.

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## The nineteenth century Pacific guano trade

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By the beginning of the 1840s, guano enjoyed a worldwide reputation as agricultural fertiliser, the only commercially known sources of which were the Chincha Islands—rocky, uninhabited islands off the coast

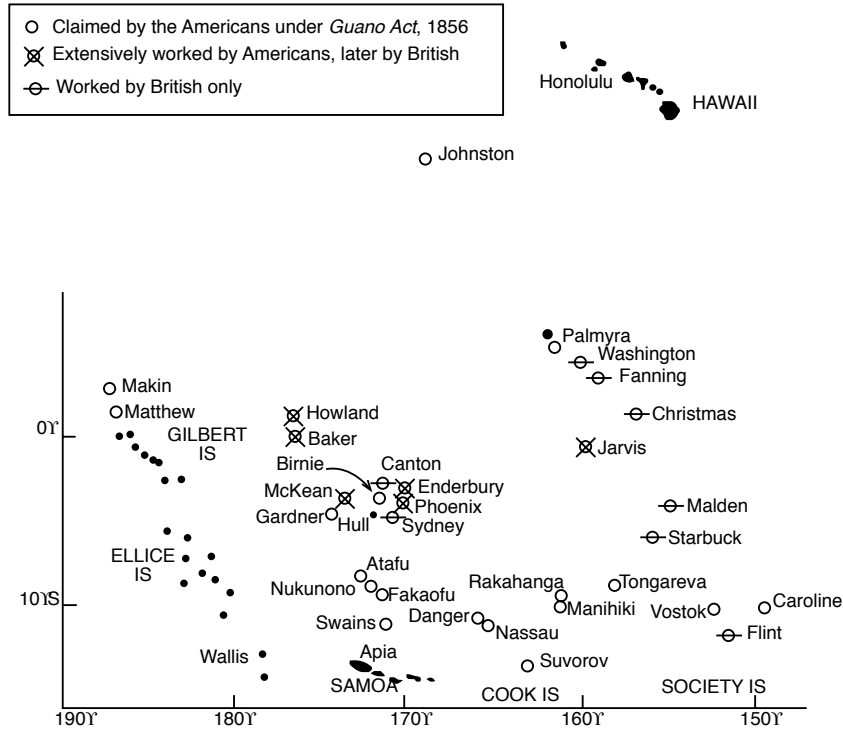


Figure 1. Map from E.H. Bryan, *American Polynesia: coral islands of the central Pacific* (1941: 32)

of Peru but owned by that small Latin-American Republic. For centuries, Peruvians had visited the islands, availing themselves of the natural phosphate-resource deposited by sea-birds in centuries of droppings. As with oil in the twentieth century, the Powers evinced a mighty interest in a resource which appeared to have the capacity to make bountiful even the most exhausted of agricultural lands. England, France and the United States were the keenest purchasers during the 1840s, but by the early 1850s, Peru was also selling its guano, in foreign bottoms, to other European nations (including Spain), to China, India, and even Mauritius, Costa Rica and Australia. In 1841, 6 500 tons were exported to England, another 126 000 tons following between 1842 and 1846. In 1847, some 47 000 tons were exported to England, France and the United States, the figures indicating the size and importance of an industry which helped to keep afloat debt-torn Peru. Between 1850 and 1857, almost half a million tons were carried to the United States in vessels owned by the Barrera Company, while between 1852 and 1856, A. Gibbs and Sons carried 1 172 000 tons to England, Europe and Australia (Gates, 1960: 312–28). Both the monopoly—Peru was the world’s only supplier—and the price—approximately \$50 per ton delivered to the end-user—came to a head in 1852 when an even richer supply was discovered on Peru’s

Lobos Islands. United States Secretary of State Webster actually ordered a warship of the US Pacific Squadron to head for the Lobos Islands to ensure American rights to the guano. Remarkably, little international attention was paid at the time to horrific human rights offences which ought to have caused outrage amongst civilised men.

The Peruvian trade itself was a blot on human history, being based on cruel exploitation of the weak and powerless. Literally thousands of Chinese coolies—the exact number defies calculation—had been recruited, largely by English vessels, to labour on the Chincha Islands, not only constructing the wooden rail-tracks but maintaining and loading the huge wooden chutes atop the cliffs of the Chinchas. This infrastructure was specifically designed to load the hundreds of vessels below, the number we can but guess at on the evidence of the massive tonnage exported in the 1840s and early 1850s. The tonnage itself is accurately quantified since every vessel was required to register at Callao prior to visiting the islands and then re-visit Callao prior to departure for overseas destinations. Up to a thousand coolies at a time, all doomed from the time they were shanghaied from their homeland—the ominous origin of the term comes strikingly home to us in this context—laboured in what was described by G.W. Peck (1854: 204) in 1853 as ‘a kind

From New York Times, 20 Aug. 1852

Letter from Daniel Webster to the Boston Shipping firm, Magoun and Son who inquired about safety for American guano vessels plying to the Lobos Islands:

"I have to inform you that the Navy Department have ordered a vessel of war to those islands for the purpose of protecting such vessels of the United States as may wish to load with Guano there."

The same edition carried a supportive letter from Secretary of the Navy, William A. Graham:

"You are informed that instructions will be sent to Commodore McCauley, Commanding the United States Squadron in the Pacific Ocean, by the first steamer, to afford protection to our citizens resorting to those to procure Guano."

of human abattoir, or slaughter-house of men'. Working alongside them were other unfortunates—convicts and Polynesians—but the fate of all had been sealed from the commencement of their work in the guano trade which was described by John Moresby (1913: 96–98)—whose name is perpetuated in Port Moresby—as 'a system scarcely to be paralleled for cold-blooded cruelty'.

In the case of the Chinese, a five-year contract provided a veneer of legality to the evil employment practices, but there can be little doubt that the system was unmitigated slavery. In a book published the year after his visit, Peck (1854: 207) wrote that all were:

...condemned to be diggers of guano; their labours much more severe and injurious than railroad digging; they have no liberty days, no protecting laws, no power to obtain even the pittance said to be paid to them, no proper seasons of rest. Most of them go nearly naked; none have more than enough clothing just to cover themselves; they live and work like dogs; they are constantly within reach of the thongs of hideous black drivers—the link between men and devils; there are no women among them, nothing to mitigate their hopeless toil.

In the words of Dr John Bach (1967: 49) of Newcastle University: 'Within two years over sixty of these men sought release in death by leaping from the edge of the sheer cliffs'. Suicide was a more attractive option than merciless and incessant toil.

In the United States by 1850, the huge cost of the guano was beginning to attract political intervention. Secretary of State Cayton suggested to the Peruvian Minister in Washington that a drop in price from \$50 to \$10 per ton would result in mutual advantages: increased demand from the United States; increased export income to Peru. Clayton's successor, the hard-headed Daniel Webster, was not so certain, noting that American freighters demanded at least \$15 per ton just to ship the product via Cape Horn. Peru actually had very little room to manoeuvre since her horrendous debt to British capitalists (\$20 million,

formalised by treaty), and to Venezuela and Ecuador (another \$30 million ensuing from debilitating internal revolutions) all had to be serviced from Chinchu guano sales. Some hope for Peru came in 1852 with the opening of yet more fabulously-rich discoveries of guano on the Lobos Islands, but this was short-lived with the release of a letter from Secretary of State Webster to the master of an American merchantman, James C. Jewett, that the State Department was 'not aware that the Lobos Islands were either discovered or occupied by Peru or that the guano on them has ever been used as manure on the adjacent coast or elsewhere' (O'Donnell, 1993: 38). The guano lobby had done its work well as is evidenced by the publication of Webster's opinion that American farmers could obtain guano for half the price they were paying but for the excessive charges imposed by the Peruvian Government. He did not mince words. "Under these circumstances," he told Jewett: "it may be considered the duty of this Government to protect citizens of the United States who may visit the Lobos Islands for the purpose of obtaining guano."

With such blessing from on high, an American flotilla of guano hunters set sail from eastern ports within days in quest of their own share of the spoils. What could they lose? They had the backing of the awesome American Pacific Squadron, comparable to the Pacific naval stations of both France and Britain, the only other Powers of note in the Pacific at the time, and the only Powers perceived by the United States as potential rivals for their own growing commercial empire stretching from the western seaboard to China and Japan. Webster endowed his actions with legitimacy by instructing the Secretary of the Navy to dispatch a warship to the Lobos Islands 'for the purpose of protecting such vessels of the United States as may wish to load guano there'. It was a short-lived but one-sided affair, with the United States bowing to domestic and international pressures, including British, and Peru happily making concessions to placate its powerful northern neighbour, but it almost ruptured relations between the United States and Peru, and on both sides there were grave fears of war.

By the end of 1852, it was over. Face was saved: American vessels which undertook the voyage were permitted to load with guano at much reduced rates and Peru won international recognition to sovereignty over its offshore islands. In the meantime, the United States vigorously sought other supplies. It was this chapter of the guano story with most relevance to Pacific maritime archaeology (O'Donnell, March 1993: 43–66).

In the fall of 1855, President Pierce received a report from the American Guano Company of a deserted Pacific island identified as Baker Island (also known as Nantucket Island) supposedly rich in guano. With it was a request that the island should be annexed. Within weeks, on 25 October 1855, the United States Pacific Squadron was ordered to conduct an examination of this island, the actual sailing orders carrying references to the 'heavy tax'



Figure 2. The South American Guano Islands.

of Peruvian guano to American farmers to press home to the Squadron Commander the importance such a find would be to the American economy. The New England press manifested keen interest in the prospects of an American-owned supply of the fertiliser to reduce the huge costs of Peruvian guano and the vexatious delays associated with toing-and-froing at Callao.

By 15 November 1855, Boston's *Daily Evening Standard* was informing its readers of this 'newly-discovered island' which was believed to 'contain an immense quantity of guano'. On 5 March 1856, the *Daily Mercury* described the 'vast deposits' as 'equal to the best ammoniated Peruvian Guano', underscoring the importance of such a find with reference to the fact that a warship of the Pacific Squadron had been ordered to examine and survey the island 'and protect the owners in their territorial rights'. Also in the article were details of the American Guano Company, the first of four companies which sprang up to make the ventures commercially viable. Floated in New York, it had a capitalisation of \$10 million consisting of 100 000 shares at \$100 par value. The prospectus envisaged that even half a million tons the first year would yield a handsome profit, but with the plant in full production, some 2 million tons per year, huge profits were to be made, even with a selling price of \$35—a huge reduction of Peruvian guano.

On 26 May 1856, the question of Pacific guano islands was referred to the Senate Foreign Relations Committee,

and on 18 August 1856, Congress enacted the *US Guano Act* which empowered American citizens to take peaceable possession of and occupy any guano island, rock or key not within the lawful jurisdiction of any other government. Three other clauses are worthy of note. First, citizens of the United States could themselves 'take peaceable possession' of any unoccupied guano island, and the President had the discretion to consider each island 'as appertaining to the United States' if he so chose. Second, the United States was not obliged to retain possession of the islands after the guano was extracted. Third, the President was authorised to 'employ the land and naval forces of the United States to protect the rights' of the discoverer. All three were of enormous significance in re-evaluating the so-called 'consensus theory' which has postulated that only in 1898–99 did the United States acquire possession of any territory that was not contiguous and on the North American mainland. Neither Alaska (1867) nor Midway (1867) qualified, yet there is still residual support for the thesis even today.

Within three years of the passage of the Act, some fifty Pacific Islands were absorbed into the Union, and even in 1867, Midway (or Brooks Island) was appropriated under its terms though its important as a strategic stepping-stone on the important China route was clearly perceived at the time. In total, over 100 Pacific and Caribbean islands were absorbed.

On 1 May 1857, the first batch of guano from Baker

Island and the nearby Jarvis Island arrived in Boston. On board also was a sample from Howland Island, just north of Baker. 'The supply is reported as being almost inexhaustible, and of a quality not inferior to that of the Chinchas', the Boston *Daily Advertiser* proclaimed. The *Baltimore American* was even more fulsome on 9 May, asserting that the islands were as important as 'a new El Dorado', and although they were not literally covered with gold dust, they were indeed covered in material 'which will cover our wasted fields with golden grain'. By April 1859, forty-eight islands had been appropriated, including Jarvis, Baker, Howland, Christmas, Malden and the Phoenix Islands, plus Johnston (south-west of Honolulu), French Frigate Shoals (north-west of Honolulu), and Elide Island (nominally owned by the Mexican Government but recognised by 1859 as effectively owned by a company of American citizens).

Contemporary American attitude to the Pacific policies of rival European Powers can be glimpsed in public comments about the tiny island of Clipperton, one thousand miles west of Mexico. This rocky outcrop, surrounded by treacherous shoals, posed a navigational hazard for vessels plying between California and Peru, and had been viewed as a potential prize since the *Guano Act* of 1856. When in 1859 France proclaimed to the world its ownership, there was angry denunciation of the government for allowing the prize to be grabbed by a foreign Power. "Why don't our Government announce their sovereignty over those guano islands which our citizens have discovered?" the Massachusetts *Daily Evening Standard* demanded to know on 18 February 1859:

By and by we may find ourselves not only dependant upon Peru, but France and England also, for guano. It would look well by and by to have the farmers of the United States pay \$20 to \$30 a ton royalty for that might have been had for nothing.

By 1859, there were four guano companies operating in the Pacific: the American Guano Company, the US Guano Company (with headquarters in New York), the Phoenix Guano Company (based in Honolulu), and the Pacific Guano Company (operating out of San Francisco). The US Guano Company had begun operations only in 1858 with the appropriation of its four main islands: Malden, Christmas, Howland and Arthur. Christmas Island (some forty miles long by fifteen wide, was reputedly covered in guano from one to ten feet deep). Its annexation was immediate cause for exultation not only for the fabulous wealth perceived in guano but for the land-locked harbour in a lagoon where hundreds of ships could lie at anchor and thousands of boats work at once in loading them. Christmas Island failed utterly to live up to expectations and with the Civil War interest in working the island lapsed, and ultimately it was claimed by British interests. Fanning, in the same group, had been claimed by Britain in 1857.

Malden Island was also claimed by the US Guano Company in 1859 but worked only intermittently. Known also as Independence Island, it appeared to hold much

promise initially, an advertisement in New England just three months after the Fort Sumter incident offered unlimited supplies of Malden guano but either its supplies were rapidly exhausted or the strictures of war caused the company to abandon ownership. On 10 October 1861, the *Boston Evening Transcript* reported discovery of the 'remnant of a small town' on Malden, supposedly 'a stopping place for the buccaneers three centuries ago'.

The Phoenix Guano Company was the smallest, its name reflecting ownership of the Phoenix Group—McKean, Phoenix itself, Enderbury, Canton Hull, Sydney and Gardner Islands, all just north of the Samoas—and Starbruck (also known as Starve or Barren). Enderbury was the most lucrative, with some twenty-five labourers equipped with huts, water and food supplies working there by May 1859. Two months later, there were twenty-nine. McKean, too, was profitable, its first shipment of 1200 tons reaching New England at the end of 1860, and evoking the observation that the Phoenix Islands were 'a mine of wealth to the lucky owner'. Already, a wooden railroad had been constructed on McKean, the guano being conveyed from the digging in cars drawn by horses or mules. The Boston *Daily Evening Standard* proclaimed on 13 February 1860 that McKean was a desert island 'with a soil so rich that a small portion of it stimulates to the highest fertility the land on which it is sprinkled'. Enderbury, with a permanent colony, was worked by the company until its abandonment in 1878.

The Pacific Guano Company entered the field in March 1859 with formal claim to Johnston Island. Chartered in California to supply directly the west coast, this company almost immediately involved the United States in brief conflict with the fledgling government of the Kingdom of Hawaii. Standing alone one thousand miles south-west of Honolulu, Johnston was visited three months later by a vessel bearing the flag of Hawaii. The American flags and crosses, symbolic of American ownership, were torn down and the land re-claimed in the name of King Kamehameha IV, and Hawaiian sovereignty re-asserted. It was but a trifling footnote to history, the parlous state of Hawaii's own independence in the late 1850s rendering futile such a gesture, and the Pacific Guano Company proceeded without interruption to market the guano. On 15 May 1859, Boston's *Daily Mercury* lauded the acquisition of Johnston Island, emphasising how, 'singularly fortunate' the nation was to have 'obtained the lion's share of these valuable islands'. Before the year was out, huge improvements had been effected on Johnston—now shown to be really two islands, one about fifty acres in size, and the other about thirty. Guano was estimated to be about three to four feet deep on the larger island on which a wharf, some five hundred feet long, had been built, along with a railroad track to the diggings. The conflict over ownership was speedily resolved when the company was able to prove to the United States Attorney-General that its ownership had been 'actual, continuous, exclusive' from the time of its discovery.

By far the most important of all guano annexations was Brooks Island (or Midway), actually two large islands about four or five miles long by two wide. Discovered in 1859 by Captain V.C. Brooks on a routine sealing voyage, the islands were claimed not only for the guano but also for their superior advantages as a coaling port on the line from California to China. It was just another routine guano acquisition until May 1867 when Secretary of the Navy Welles instructed his North Pacific Squadron Commander to take formal possession.

The exhausting of guano on the islands did not end the guano story. The question of sovereignty continued well into the twentieth century. When the ownership of Clipperton was contested by Mexico in 1935, the principles of discovery and symbolic annexation were enunciated in favour of France, the award relying not on French discovery of Clipperton in 1857 but on the symbolic act of annexation in 1858. Kingman Reef and Johnston Island were placed under the direction of the United States Secretary of the Navy by executive order on 29 December 1934. The justification was the *Guano Act* of 1856. On 13 May 1936, Jarvis, Howland and Baker Islands were placed under the jurisdiction of the Secretary of the Interior, again by Presidential order, also by virtue of the Act. Canton and Enderbury were similarly entrusted to that jurisdiction by executive order on 3 March 1938. All of these were ratified by Congress on 25 June 1938. Added legitimacy (if it were needed) was furnished by deliberate colonisation of these deserted islands then beginning to assume strategic interest. On Howland, Baker and Jarvis, four men were landed by the US Coast Guard to serve as 'permanent population', and buildings (including a lighthouse on Baker) were erected as evidence of permanent occupancy. On Canton, an airstrip was constructed since Canton was assuming special significance as a mid-Pacific landing and fuelling depot for Pan-American Airways, and Hawaiians were landed as 'permanent residents'. Howland, too, received an airstrip, its fleeting moment of glory occurring in 1937 with the planned but never achieved stopover of renowned aviators Amelia Earhart and Fred J Noonan during their doomed round-the-world flight. Johnston Island was occupied in 1934 for defensive purposes, with a seaplane base built soon after. Today, the island enjoys a dubious distinction as repository for chemical munitions and poisonous gases.

### Conclusion

The story of the Pacific guano trade merits study in its own right as a unique chapter in both maritime and agricultural history but it is also important for the perspective it provides into the relationships of the players involved in bringing the vast expanse of the Pacific Ocean into world affairs. Accordingly, it brings fresh evidence to test fundamental hypotheses of modern historiography. Since its first enunciation in 1936, the Bemis thesis of a 'great aberration of 1898' exerted a dominant influence on American diplomatic history, the thesis concerning

the end-of-century events being developed into a virtual dogma that the year 1898 marked a stark rupture with American tradition and practice, with the events themselves being aberrant and un-American. Indeed, even today, its residual impact is still discernible, the proposition being advanced in 1984 that never before 1898 had territory beyond the continent been annexed (Carroll & Herring, 1984: ix). The authors clearly adhere to the basic Bemis doctrine that 'while a policy of aggressive expansionism was not new for Americans', what was new was that 'the territories were non-contiguous lands abroad'. Alaska was not contiguous, nor was Midway, nor Baker, Jarvis, Howland, Canton, Enderbury or Johnston Islands—all of which were confirmed as under the sovereignty of the United States in the twentieth century. The guano trade appears to demonstrate conclusively that the roots of American empire can be traced back to 1856, forty-two years before 1898.

### Appendix 1

#### Pacific Guano Islands annexed by the US between 1855 and 1859 (from *Alta California*, 20 April 1859)

	<i>Latitude</i>	<i>Longitude</i>
Bakers	0° 15' W.	176° 21' W.
Jarvis	0° 21' S.	159° 52' W.
Howland	0° 50' N.	176° 52' W.
Maldens	4° 15' S.	155° 00' W.
Authurs	3° 32' S.	176° 05' W.
Christmas	1° 58' N.	157° 32' W.
Caroline	9° 54' S.	150° 07' W.
Anne	9° 49' S.	151° 15' W.
Stovers	10° 05' S.	152° 16' W.
Flints	11° 26' S.	151° 48' W.
Baumans	11° 48' S.	154° 10' W.
Rogweins	11° 00' S.	156° 07' W.
Gronique	10° 00' S.	158° 44' W.
Frienhaven	10° 00' S.	156° 59' W.
Qurios	10° 32' S.	170° 12' W.
Low	9° 33' S.	170° 38' W.
Clarance	9° 07' S.	171° 40' W.
Favorites	2° 50' S.	176° 40' W.
Duke of York	8° 30' S.	172° 10' W.
Farmers	3° 9' S.	170° 50' W.
Birnicks	3° 35' S.	171° 39' W.
Phenix	3° 40' S.	170° 52' W.
Marys	2° 53' S.	172° 00' W.
Enderbergs	3° 08' S.	174° 14' W.
Sydney	4° 20' S.	171° 00' W.
Penhryne	8° 55' S.	155° 07' W.
Pescado	10° 58' S.	159° 20' W.
Ganges	10° 59' S.	160° 55' W.
Riersons	10° 10' S.	160° 53' W.
Siderons	11° 05' S.	161° 50' W.
Humphreys	10° 40' S.	160° 52' W.

Frances	9° 58' S.	161° 40' W.
Flint	10° 32' S.	162° 05' W.
Nassau	11° 32' S.	165° 30' W.
Danger	10° 00' S.	165° 56' W.
Mary Letitias	4° 40' S.	173° 20' W.
Kemins	4° 41' S.	173° 44' W.
Walkers	3° 58' N.	149° 10' W.
Sarah Anne	4° 00' N.	154° 22' W.
America	3° 40' N.	159° 28' W.
Prospect	4° 42' N.	161° 38' W.
Samarang	5° 10' N.	162° 20' W.
Danger	6° 30' N.	162° 32' W.
Makin	3° 02' N.	172° 46' W.
Mathews	2° 03' N.	173° 26' W.
Dauids	9° 40' N.	170° 10' W.
Barbers	8° 37' N.	178° 00' W.
Palmyros	5° 48' N.	168° 20' W.

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**Author's note:** A more detailed examination of the issues is in O'Donnell, D. (1980), 'United States Pacific Policy, 1840-1870', a Master's thesis at the University of Queensland.

## Management of maritime archaeology under Australian legislation

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### Introduction

Operating under a federal form of government Australia has two sets of legislation (Federal and State) relating to maritime archaeology. The Federal legislation is the *Historic Shipwrecks Act 1976*, under which maritime archaeological shipwreck sites are protected. In addition all seven States have their own State legislation protecting maritime archaeological sites that lie in State waters. In all States, except Queensland, the authority delegated with responsibility for the State and Federal Acts is the same. The lack of conformity and the confusion which exists between the various forms of legislation is, however, symptomatic of a country that once had five different railway gauges—even today the railway track outside my office has three rails! It is the purpose of this paper to discuss the management issues relating to maritime archaeological sites, the legislation, the departments that administer underwater cultural heritage sites and the issues that relate to them. The discussion will also compare the legislation in Britain and the United States of America, and then examine the general situation in Australia and the particular case of Western Australia.

### The historical background

Australia, over the past three decades, has developed a sophisticated programme in the field of maritime archaeology and, on an international scale, is regarded as an innovator in the development of cultural heritage management and maritime archaeology. This is surprising, when other countries, with arguably far more significant heritage and greater experience in heritage management, have patently failed to address these issues. Australia's achievements in this field can be put down to a number of complex and inter-related developments. The primary factor has been the implementation of legislation. The first legislation relating to maritime archaeology was the *Western Australian Museum Act 1963*. This legislation was introduced before many States had any form of heritage legislation or, on a global scale, before many other of the world's nations had any comparable underwater cultural heritage legislation. However, it must be remembered that this legislation was brought about, not through the foresight of a regulating authority, legislators or academics, but by public pressure and the efforts of a few public-minded citizens who believed that underwater archaeological sites merited protection.

Prior to discussing the Australian situation in detail it is worth noting how other countries have dealt with this type of legislation and management in order to put the Australian situation in some form of international context.

Britain, parts of Europe and the United States

of America, offer striking illustrations of the varying approaches to cultural heritage management of shipwrecks. In some countries it seems that maritime heritage has become the preserve of the looter and treasure hunter rather than the archaeologist. The situation in Britain, for example, clearly underlines the problems of implementing underwater cultural heritage management in a situation where the government and the statutory authorities have conflicting interests. Britain, which has an enormous maritime heritage, still has inadequate protective legislation for underwater sites. This was outlined recently by The Joint Nautical Archaeology Policy Committee (1989), where British maritime archaeologists highlighted a number of discrepancies in the administration of maritime archaeological sites in the United Kingdom. Firstly, the existing legislation protects only a handful of sites. Secondly, the legislation unintentionally encourages the dispersal of historic artefacts from underwater sites. Archaeologists in Britain argue that underwater archaeological sites of national importance should receive no less protection than those on land. The *Protection of Wrecks Act 1973* is hampered by the lack of a system for the identification, definition and charting of historic wreck sites of national importance; and a lack of a method of securing their preservation; nor does the legislation include underwater archaeological sites other than shipwrecks. In 1986 an Archaeological Diving Unit was created, on a contractual basis, to advise the Department of Transport, but its terms of reference were severely limited and it consisted, in 1991, of just one full-time individual and two seasonal staff (Dean, 1988; Oxley, 1991). Resources and the means for effecting the physical protection of sites, other than some buoying of designated wreck sites, do not exist.

In a positive move in 1990 the Department of the Environment, the body in the United Kingdom responsible for heritage issues on land, assumed responsibility of historic wrecks from the Department of Transport. However, it should be noted that by 1991, only thirty-three historic wreck sites had been designated for protection in the United Kingdom and by 1994, this number had only risen to forty (Allen, 1994). Information about wreck sites designated under the *Protection of Wrecks Act 1973* has recently been published and is now available on the World Wide Web (<http://www.cru.uea.ac.uk/ukdiving/misc/deswreck.htm>). There is still no mechanism for gathering information about newly found sites or to alert the Secretary of State to them quickly, nor is there any method of assessing their importance and fixing their positions so that designation can be made. While the regulatory authority has been transferred to a more

appropriate department, the legislation is unchanged. Thus it remains true that all undesignated sites are at risk from interference. The law requires of salvors only that they report the artefacts they find to the Receiver of Wreck and it is quite likely that the salvor will not apply for the site to be covered under the *Protection of Wrecks Act 1973*. It is therefore legal for salvors to destroy a wreck or other underwater site by any method, including using mechanical excavators or explosives.

The situation is quite different from that operating on land. The legislation which exists for the protection of sites—the *Protection of Wrecks Act 1973*—is distinct from the legislation which deals with the recovery and disposal of the artefacts from these sites. The latter derives from the *Merchant Shipping Act 1894*. Part IX of the 1894 Act is essentially directed to regulating salvage and can militate against the retention of the complete archaeological archive. Designation of a site under the *Protection of Wrecks Act 1973*:

...can be made immediately if the Secretary of State is satisfied that it is or may prove to be the site of a vessel lying wrecked...and on account of the historical, archaeological or artistic importance of the vessel, or of any objects contained or formerly contained in it which may be lying on the sea bed...the site ought to be protected from unauthorised interference (The Joint Nautical Archaeology Policy Committee, 1989).

This could be overridden, however, by Part IX of the *Merchant Shipping Act 1894* which applies to all wrecks, including those sites and their associated artefacts 'protected' under the *Protection of Wrecks Act 1973*. This part of the 1894 Act was intended to control the salvage of wrecks (particularly because of the potential for conflict between rival salvors) and to provide a method of determining ownership of wreck and regulate its disposal. In theory once wreck material is recovered by a salvor, it is handed to the Receiver of Wreck, the Crown then retains possession for a year. If it is unclaimed after this period, ownership transfers to the Crown. Normally the artefact is sold to recoup the Receiver's expenses and the salvor receives a salvage award. Such a system encourages the sale of artefacts; almost, in practice, makes it a necessity, as the salvors—be they treasure hunters, archaeologists or museum staff—may have no other way of paying the Crown's fee of 7.5% of the value of the artefact or, in the case of precious metals, the Crown's retention of 25% of the value, plus VAT.

It is extremely difficult, given the legislation relating to salvage, to avoid a market in artefacts which in turn prevents the retention of the total archive. This is contrary to the practice on land where there is no obligation to dispose of archaeological finds by sale.

The need to pay the fees required by the legislation usually makes it difficult if not impossible for museums to acquire an artefact or collection. Under present law the Crown insists that museums that have recovered material from a wreck must still make payment. In 1988

the Secretary of State stated that:

To waive the charges when antiquities are to go to museums would amount to a hidden subsidy from the tax payer to add to the grants already made to museums by Government and I do not believe that would be acceptable (The Joint Nautical Archaeology Policy Committee, 1989).

Museums are deterred from collecting material from underwater sites or in engaging in underwater archaeological projects because of the uncertainty about ownership. Since ownership can only be confirmed after a year has elapsed, the expense of collection, conservation and storage of finds from underwater, particularly where it may be necessary for the items to remain in the possession of the Receiver of Wreck, is an administrative nightmare.

The outcome is that many museums do not even consider this class of material when formulating their collections policies. Museums should be enabled to give objects from underwater the same priority as those from land sites; particularly because they can provide a new dimension in the display and public presentation of the heritage that has not previously been undertaken.

In 1992, Frith and Ferrari (1992) discussed a new development in the United Kingdom, where Marine Protected Areas, under the *Wildlife and Countryside Act 1981*, were suggested as an alternative method of protecting archaeological wreck sites. The objective of this proposal, which required an amendment to the Act to include archaeological sites, was to include the management of underwater archaeological sites within the marine parks programme. The Act thus deals with access to sites and does not, of course, deal with the ownership issue. Marsden (1994) commented that:

...a stock-taking of the state of underwater archaeology in British waters after twenty years of the *Protection of Wrecks Act 1973*...is a disappointing record on the whole...As the objectives of any excavation work are to interpret and publish a site, wherever it is situated, it is through its publication that the quality of site work and its management can be judged. On this basis it would seem that the government's care of many of the 41 protected sites in Britain is in a sorry state. Judging from the cited publications many of the sites have resulted in little or no significant archaeological publication...there are [some] where excavation was licenced more than fifteen years ago and there is still no adequate publication...One must ask what has been the value of protecting wreck-sites? Indeed, what has been the contribution in some cases of the 'archaeological advisors.'

Referring to the issue of the control of the disposal by the *Merchant Shipping Act of 1894* Marsden questions why 'licences to excavate have been granted when the permanent safety of the antiquities...has not been assured before excavation?'

We may conclude from the above that the situation in the United Kingdom is the result of conflicting legislation and, until very recently, an inappropriate government authority controlling the heritage management issues. The law appears to be in conflict: on one hand suggesting

sites should be protected and on the other suggesting that the objects from these sites have a financial value and that the government would benefit from the taxes collected.

In the United States, the framework governing maritime heritage has also undergone change over the past decade. However, under a federal system of government, the problems between archaeologists, treasure hunters, State authorities, Federal authority and even the original owner is complex and confusing. The United States only recently enacted Federal legislation—*Abandoned Shipwreck Act 1987*—relating to maritime heritage sites, which essentially made the management of sites a State responsibility (Aubry, 1992; Johnston, 1992i & ii; Arnold, 1985).

The passage of the *Abandoned Shipwreck Act 1987* removed historic shipwrecks on State land from the jurisdiction of the Federal Admiralty Courts, which have traditionally treated shipwreck salvage as an economic, not an archaeological issue. The States now have the problem of managing the underwater cultural heritage. Croome (1992) discusses the implementation of the *Abandoned Shipwreck Act 1987* and refers to the *Final Guidelines* circulated in 1991 (United States Department of the Interior, 1990). The guidelines include advice on establishing State and Federal shipwreck management programmes, funding, survey and identification, documentation and evaluation, provision of public and private sector recovery of shipwrecks, public access, interpretation, volunteer programmes and creating and operating underwater parks and preserves. It is not clear, at present, what will be the impact of the *Abandoned Shipwreck Act 1987* on the management of cultural resources in the United States. Clearly the legislation has the potential for the States to manage their underwater heritage, but the question as to what extent they will exert their power is yet to be seen (for a review of the latest situation see: Arnold and McLaughlin-Neyland, 1992). Johnston (1995) recently reviewed the current situation, noting a series of prosecutions under the Act but lamenting the problems occurring in the museum field in relation to shipwreck material.

The situation is further confused by the divergent philosophical viewpoints towards treasure hunters and their proceeds held by archaeologists, museums and State regulatory authorities. Johnston (1992ii) and Elia (1992) discussed the conflict within the profession regarding the archaeological ethics of working with treasure hunters. Both authors referred to the *Charter for the Protection and Management of the Archaeological Heritage* (ICOMOS 1990) and the International Congress of Maritime Museums (ICMM) resolutions regarding shipwreck material (ICMM, 1991; Henderson *et al.*, 1993). While most treasure hunting operations are involved in the sale of artefacts, e.g. the *Atocha* (Mathewson, 1986), there are a number of situations where the issues are complex. For example, Johnson (1992i) and Elia (1992) argue that

artefacts were sold from the wreck site of the ex-slave ship *Wydah*. However, Thayer (1993) claims that the excavation of the site was conducted within generally accepted archaeological principles, that the work was endorsed by certain professional archaeological organisations and the State (Massachusetts) regulatory authority and that no artefacts have been sold.

### **Western Australia and the implementation of legislation**

Maritime archaeology in Australia started with the discovery of two important Dutch East India Company (VOC) shipwrecks: the *Batavia* (1629) and the *Vergulde Draeck* (1656). These sites, discovered in the early 1960s, were the genesis of a series of developments of national and international significance. Two key factors enabled this to happen: the implementation of legislation and a healthy economic climate. The legislation provided an institutional basis for the management of all underwater cultural heritage which in turn was adopted by the Federal Government. This led to a series of interrelated developments resulting in the establishment of a national programme in maritime archaeology.

The discovery of the Dutch shipwrecks in Western Australia occurred at a time when there was no legislation to deal with archaeological sites. As a result the wrecks were the subject of looting and treasure hunting. There was considerable public concern at the time that these sites should be protected and the matter was widely reported in the press. This resulted in some of the finders handing their rights over to the State government to precipitate the protection of the sites. In 1963, the State Government proclaimed the *Museum Act 1963* that included protection of all maritime archaeological shipwreck sites before 1900. The Act was subsequently redrafted in 1969 to correct a number of weaknesses and later was again redrafted and retitled the *Maritime Archaeology Act 1973*. The 1973 Act also acknowledged another and unique piece of legislation: the Australian Netherlands Committee on Old Dutch Shipwrecks (ANCODS) Agreement, whereby the Netherlands Government transferred what rights they held as heirs of the VOC to the Australian Government (Bolton, 1977).

In 1977 there was a challenge to the Western Australian legislation in the High Court of Australia. In the case *Robinson v the Western Australian Museum* (1977), a decision was handed down ruling that the State Government did not have the jurisdiction to legislate in this area as it was the prerogative of the Commonwealth, thus making the *Maritime Archaeology Act 1973* invalid in any waters other than State Waters. Immediately following the ruling, the Commonwealth *Historic Shipwrecks Act 1976* was proclaimed in Western Australia (O'Keefe, 1978). This decision set the scene in Australia for a bipartite form of legislation. In areas that are legally defined as Commonwealth Waters, the *Historic Shipwrecks Act 1976* operates; in State Waters

the State Act operates, which in Western Australia is still the *Maritime Archaeology Act 1973*. Recently, in Western Australia, another piece of legislation, the *Heritage Act 1991* has been declared which also encompasses maritime archaeological sites, although the exact relationship between this and the *Maritime Archaeology Act 1973* is at present uncertain. While suggestions have been made to amend the State Act so that some of the discrepancies between the Commonwealth and State Acts could be resolved, as yet no changes have been initiated.

Recent rulings and written opinions by the Attorney-General's Department (Federal) and the Crown Law Department (State) have now accepted that the *Historic Shipwrecks Act 1976* applies to all water in Western Australia, up to the low-water mark, but excluding inland waterways and enclosed bays. These recent decisions have changed the nature of the management of underwater cultural heritage, since originally the Museum operated under the understanding that the limits of Western Australian 'State Waters' were defined by the territorial sea baselines as proclaimed in 1983 under the *Seas and Submerged Lands Act 1973*. However, according to the Attorney-General's Department the territorial sea baselines determine the limits of Australia's maritime zones for the purposes of international law. The limits of the States are defined by reference to the Letters Patent applicable to each State as at Federation.

One of the most interesting aspects of the implementation of State and Federal cultural heritage management is the differing perception held by State and Federal agencies respectively in exercising their roles. Firstly, the Federal *Historic Shipwrecks Act 1976* defines the cultural resource as a historic shipwreck or a historic relic and for the purposes of the Act, the remains of a ship or relic from a ship that are in the sea or have been removed from the sea. No specification of the definition of historic is made. Until recently, the protection came into effect only after the Minister declared the shipwreck protected. This was recently amended to allow for 'blanket protection' (see below). The State *Maritime Archaeology Act 1973*, on the other hand, deals with maritime archaeological sites that include: remains of a ship, a relic, or a structure, either in the water, on land, or both. Sites are automatically protected, that is they are protected from the moment of discovery.

Under the State *Maritime Archaeology Act 1973*, all finders of shipwreck sites that date before 1900 are entitled to a reward for reporting the site. The spirit of this reward was intended to recompense the finders, firstly for reporting the site and secondly to compensate, in a moderate way, the loss of salvage dues that they would have been entitled to under the *Merchant Shipping Act 1894*.

*Historic Shipwrecks Act 1976*

II (18) The Minister may... pay a reward not exceeding the prescribed amount to the person who first notifies the Minister.

*Maritime Archaeology Act 1973*

18 (1) Subject to the approval of the Minister and to the provisions of section 20, the Trustees have the power to reward the person who first notifies the Director of the position of a ship that was, or appears likely to have been, lost before the year nineteen hundred...

18 (8) Subject to subsection (10) of this section, unless the Minister otherwise directs the aggregate of the moneys paid ... by way of reward... shall not exceed five thousand dollars.

18 (10) ... where the Judge is satisfied that ... the value of the metal content of any relics... the claimant be paid an amount not exceeding one-half of the market value of the metal content of those relics.

Such provisions have been frowned upon in some States where the delegated authority has argued that rewards are inappropriate and that people should not be rewarded for obeying the law. In Western Australia, where legislation has not proscribed the payment of rewards, it has been a policy that persons reporting wreck sites should be encouraged and monetary rewards should be made in recognition of this action.

Both Acts have clauses relating to rewards. The Federal Government was, however, uncomfortable from the very beginning with the issue of rewards whereas in Western Australia it was regarded as an important, if contentious, aspect of the *Maritime Archaeology Act 1973*. Ryan (1977) indicated the Federal position inasmuch that:

The provision for rewards was inserted as an incentive for a person to come forward with details of wrecks...he is quite entitled to claim a reward and his application will be given prompt, serious and fair consideration.

However, what the *Historic Shipwrecks Act 1976* did not describe was what that reward would be. It merely stated a reward 'not exceeding the prescribed amount' that was to be decided by the Minister, but was set in Statutory Rules 1980 No. 391 at a maximum of \$50 000. In the amending Act of 1985, the reference to monetary rewards was deleted and provided for other forms of reward (historic relic, plaque, model, medallion, replica, etc.) The Delegates, at their 1992 meeting, recommended to the Minister that rewards should no longer be seen as a reimbursement or compensation relating to the cost of discovery, or the pecuniary value of a wreck, but as a recognition of public spirited efforts in locating wrecks and notifying authorities. Further they recommended that monetary rewards should be at the discretion of the Minister and should be only given to the finders of wrecks of exceptional significance, suggesting a maximum reward of \$5 000.

On the other hand the *Maritime Archaeology Act 1973* specifies the exact conditions and extent of the reward that a finder can expect. The Act specifies that where a claimant is entitled to a reward, the Judge may award the claimant what is deemed just, however, the Judge may

State	Delegated Authority	State Act	Proc.
WA	Western Australian Maritime Museum	Maritime Archaeology Act 1973 (1963)	1977
SA	State Heritage Branch, Dept. of Environment and Natural Resources	Historic Shipwrecks Act 1981	1980
VIC	Maritime and Historical Archaeology Unit	Historic Shipwrecks Act 1981	1981
TAS	Parks and Wild Life Service	Historic Cultural Heritage Act 1993	1982
NSW	Heritage Branch, Dept. of Urban Affairs and Planning	Heritage Act 1977	1983
QLD	Queensland Museum	Cultural Heritage Act 1991	1977
NT	NT Museum of Arts and Science	Heritage and Conservation Act 1991	1976
COM	National Maritime Museum	Historic Shipwrecks Act 1976	1977

Table 1. Australian State delegation and legislation and date of proclamation of *Historic Shipwrecks Act*.

also order payment not exceeding one half of the market value of the metal content of the relics. The legislation therefore perceives that there are two aspects; firstly, and in a simplified form, a reward for finding, and, secondly, a reward for the metal, and here the Act assumed monetary value of the coins (Crawford, 1977).

One of the most contentious issues relating to the implementation of the *Museum Act 1963* was that the Government chose not to reward the finders of sites that were discovered before the legislation. Thus the finders of the *Batavia*, *Vergulde Draeck*, *Zeewijk* and *Zuytdorp* and those individuals that had given the material they had recovered to the Western Australian Government were not rewarded. This resulted in a longstanding perception by the general public and the diving community that the Government had disadvantaged or badly treated these individuals.

Recently these issues have been re-examined. A Western Australian Government Select Committee was established in 1992 to investigate the question of rewards. In the Foreword to the Report (Select Committee on Ancient Shipwrecks, 1994iii) the Chairman, the Hon. P.G. Pental, MLA, stated:

...two fundamental issues are addressed in this Report: firstly, whether a person should be rewarded for doing the 'right thing' by society; and secondly, if they *should* be rewarded, how much is a fair thing?

The first Report (Select Committee on Ancient Shipwrecks, 1994i) recommended that four of the finders of the *Batavia* should be paid an *ex-gratia* payment of \$25 000 each, which has recently been paid. The second

Report, tabled before the House in August 1994, made recommendations for the rewards to finders of other sites and to 'secondary' finders (individuals who although not finding the site, were instrumental in its discovery). The report also suggested honours for other individuals (Select Committee, 1994ii). The final Report recommended that all primary discoverers of ancient shipwrecks should receive *ex-gratia* payments of up to \$25 000 and secondary finders up to \$5 000. Thus the Parliamentary Select Committee clearly and firmly believes in the notion of financial rewards for finding or discovering wreck sites of historic significance and is thus at odds with the Federal perceptions.

#### Legislation in other states and the impact of the *Historic Shipwrecks Act 1976*

The *Historic Shipwrecks Act 1976* requires the Act to be proclaimed in each State before it can become law and further requires that each State nominates a delegated authority to administer the Act. Thus, when the Act was proclaimed in a particular State (and not all States chose to proclaim the Act at the same time) the delegation was usually to the State authority that was considered responsible for maritime archaeological sites. Thus for example, in South Australia in 1977, the State Heritage Branch was responsible for the *Aboriginal and Historic Relics Preservation Act 1975* under which the State Government dealt with maritime archaeological sites. Following the High Court ruling, the Federal *Historic Shipwrecks Act* was proclaimed in South Australia in 1980. In 1981 the South Australian Government proclaimed a State Act, the *Historic Shipwrecks Act 1981* that mirrored the Commonwealth legislation. An exceptional case is Queensland where the delegated authority for the *Historic Shipwrecks Act 1976* is the Queensland Museum. However, the State Government enacted the *Queensland Heritage Act 1992* that included shipwrecks in State Waters and this Act is administered by the Heritage Branch of the Queensland Department of Environment and Heritage. Compounding the bureaucratic confusion, the Federal Department responsible for the *Historic Shipwrecks Act 1976* has changed on a number of occasions. Initially it was the Department of Transport, followed by the Department of the Arts, Sport, the Environment, Tourism and Territories (DASETT), the Department of the Arts, Sport, the Environment, Tourism (DASET), the Department of Arts and Administrative Services (DAS), the Australian Cultural Development Office (ACDO) and it is now the responsibility of the Heritage Branch, Department of Communications and the Arts (DCA). While the basic departmental structure has remained the same during these changes, the staff responsible for administering the Act have changed frequently. This has caused problems, because the new overseeing staff member usually has no experience of the area and is unfamiliar with the sensitivities of the issues.

Thus, while all States now have both State and Federal legislation, the proclamation of the Act occurred at

different times and there is no uniformity in the State Acts. Table 1 gives the States, the delegated authority and the State Acts under which maritime archaeological sites are administered.

The Federal Government delegated the Act to different types of authorities in different States. This has naturally lead to different philosophical approaches to maritime archaeology and heritage. As Table 1 above shows, three are museum organisations, four are heritage management authorities and one a wildlife authority (encompassing natural and cultural heritage), and they fall within two broad schools of thought. The museum-related authorities are naturally based on collections through excavation, research, conservation and a public interface through displays, while being less concerned with site management issues. The heritage authorities are primarily concerned with preservation and conservation of sites and material culture and issues related to public access. Such organisations promote excavation, research, conservation and public displays through museums and other options, but usually have no resources to house collections or provide a public interface through the organization. Without wishing to be outrageously biased, one could argue that heritage management examines issues in relation to 'preservation' and that process can be at odds with archaeological excavation. Originally, I thought that the reasons that there has been little excavation work carried out by heritage units was because of this. However, it was recently pointed out by David Nutley (pers. comm.) that heritage units have worked on the *Zanoni* in South Australia, *Loch Ard* and *Clarence* in Victoria and the *Sydney Cove* in Tasmania; while in comparison, in the Northern Territory, Queensland and Western Australia there have been excavations on *Pandora*, *Zuytdorp*, *Belinda* and *Gudrun*. It may, therefore, be a reflection of the economic climate that has produced this impression.

For example, in Western Australia, the initial emphasis—underlined by the name of the Act—was on archaeology. At the time, maritime archaeology was not considered a respectable academic discipline and much of the early work was pioneering and experimental. Following the implementation of the *Historic Shipwrecks Act 1976* the role of the Museum changed to take on issues related to management of sites. With the onset of the recession, the ability to mount large-scale archaeological excavations diminished. At the same time, the Western Australian Museum perceived maritime archaeology to be an over resourced field causing a financial burden on the main organization. As a result the operational budget of the Department has gradually diminished over the last ten to fifteen years, while at the same time the responsibility in the cultural resource management required under the Federal legislation increased. This caused a gradual reduction in the amount of archaeological field-work that could be carried out within the operational budget. At the same time the climate became more questioning of excavation without appropriate goals and objectives.

Professional debates discussed the issues of the ethics of excavation and various approaches to archaeological theory (see Gould, 1990; Shanks, 1992 for a discussion of some of these issues).

#### **Administrative problems**

The States, in implementing the *Historic Shipwrecks Act 1976* make recommendations, through their delegated authority, to the Federal minister, through the Heritage Branch, Department of Communications and the Arts (DCA). DCA has produced a number of publications that help administrators of the Act, as well as the public, to interpret the operation of the Act (DASETT 1990; Kendall 1990, AIMA/ACDO 1994). Of particular interest are the criteria for protection of sites which at the time the *Historic Shipwrecks Act 1976* was implemented included shipwrecks of significance in the following categories: discovery; development; a person or event; source of relics; representative of design or development; and/or naval ships (Ryan, 1977). Later, recreational significance was added. It has been argued by Nutley (1990), that these criteria lack relevance to the resource or to current heritage management issues, although it is acknowledged that the criteria were developed in the mid 1970s when the implementation of legislation was in its formative stage. New criteria have been developed by heritage managers as part of a programme initiated by DCA (see below).

The implementation of the *Historic Shipwrecks Act 1976* cleared the way for States to protect shipwreck sites that were considered to be of heritage significance. However, the operation of the Act raised some interesting administrative problems. One such problem was in determining the question: at what particular moment does a site receive protection? In the case of the Western Australian *Maritime Archaeology Act 1973*, sites are automatically protected at the moment they are 'discovered'; in other words they are protected by definition. In the case of the Federal legislation, originally, sites were defined as unprotected until the Minister had decided that they should be declared protected. This created a difficult situation for heritage management, since it is not possible to control what happens on a site until it is protected and this can be a lengthy process, both to assess the significance of the site and then to implement the declaration. Where a site was known from historical records, it was possible to use the legislation to protect it before it was discovered, but this was rarely used except for special circumstances. A good example was the case of the *Koombana*, a passenger vessel lost in a cyclone in 1912 and of great significance to Western Australia. Arising from the fact that a number of organisations had been searching for the vessel, the Western Australian Maritime Museum decided to seek protection of the vessel even though its position had not been discovered. The Federal Government was asked to proclaim provisional declaration in order that if it was found the management of the subsequent investigation could be immediately controlled. As a result of these

sorts of problems, the Act was amended in April 1993 and 'blanket legislation' was implemented; i.e. sites known from historical records to be older than 75 years, or sites of particular significance outside that time limit, are automatically protected (Cassidy 1991).

The implementation of 'blanket legislation' posed another administrative problem. Since all sites known from historical records to be over 75 years old were to be declared, it was possible that a person might unwittingly hold material from an unreported wreck site. This situation creates a loophole in the legislation, because there is no way of verifying when wreck site material was recovered. An unscrupulous person could, therefore, recover material today from a wreck site, report it to the authorities claiming it was obtained before the 'blanket legislation' and therefore legally claim ownership. To resolve this situation the Federal Government declared an Amnesty that ran from 1 May 1993 for one year, to allow for all material held by private persons to be recorded. In this way, all wreck site material that is held privately is registered. At the end of the Amnesty any unregistered material held privately is assumed to have been recovered after the Amnesty and is thus held illegally.

The Amnesty has had quite varying impact in the different States. For example, in Western Australia during the early stages of the Amnesty there were few declarations, towards the end, large numbers of people declared material. The notifications to date (May 1996) resulted in the registration about 2390 individual coins (which make up the bulk of the declarations) and 891 individual artefacts, plus Amnesty donations. At present there are a few objects pending certification, which are mainly in country areas, and thus difficult, time consuming and expensive to process. Table 2 gives the registrations for the various States.

Another problem which emerged from the operation of the Act was the definition of terms. For example, were flying boats covered under the terms of reference? It was finally decided that they did not come under the Act, and that they were aircraft, rather than boats that could fly! The question of deliberate scuttling, the sinking of aircraft and other objects on barges, objects that come from stranding sites where the vessel is shipwrecked but then refloated all raise interesting and complex legal questions, some of which are still not resolved.

#### **The unifying threads: education and AIMA**

Two issues have helped to promote a sense of cohesiveness in maritime archaeology in Australia. Firstly, in 1981, the Western Australian Institute of Technology (now Curtin University of Technology), together with the University of Western Australia, Murdoch University and the Western Australian Maritime Museum initiated a graduate diploma course in maritime archaeology (Penrose, 1983). The course was unique for a number of reasons: it was not run concurrently each year, there has been a total of four courses run in the last ten years (the fifth started in July

1995); it involved input from all the tertiary institutions in Western Australia; and it taught maritime archaeology to a wide range of graduates from both Arts and Science backgrounds. The four graduation years have seen almost 75% of all the graduates obtain employment in areas related to maritime archaeology. At present, graduates are employed in every State in Australia in institutions involved in maritime cultural heritage management. It has been commented that, in spite of the potential for personality and institutional conflict, maritime archaeologists in Australia have become an élite group with a strong sense of cohesiveness. However, responsive to changing needs, there has been a growing concern that the original course structure, which was aimed at teaching technical and practical aspects of maritime archaeology, is now inappropriate for the needs of many of the heritage management organisations that are likely to employ these graduates (Staniforth, 1993). The 1995 course will see these issues addressed, and components of the course will be taught by the newly formed Centre for Cultural Heritage Studies within the School of Social Sciences and Asian Languages at Curtin University.

Another unifying feature of maritime archaeology in Australia is the Australian Institute for Maritime Archaeology (AIMA). This organisation grew out of a combination of the institutional State agencies and the State maritime archaeological associations that developed in the mid 1970s. AIMA was created as a forum to bring together the disparate interests of State and Federal issues related to maritime archaeological sites. Publication was an important aspect of the organisation which produces a quarterly newsletter, a biannual *Bulletin* and occasional special publications. To date (1995), AIMA, through the generous support of ACDO, is publishing Volume 19 of the *Bulletin* and has produced seven special publications. DCA, being the Federal department responsible for the administration of the *Historic Shipwrecks Act 1976* has an important relationship with AIMA. The department has sponsored two major projects with AIMA, firstly the formulation of guidelines for the use of a wide range of individuals and organisations. These guidelines were formulated by the practitioners in each State and as a result, express a group, or national consensus on the management of maritime archaeology. It represents an important document for the development of archaeological standards in maritime archaeology (AIMA/ACDO, 1992, see also Department of Planning, 1994). In addition DCA, according to the *Historic Shipwrecks Act 1976*, is required under the Act to maintain a register of historic shipwrecks. DCA has contracted AIMA to develop a national database of all known historic shipwrecks that can be incorporated into a historic shipwreck register and will be available for researchers, historians and archaeologists (Lorimer, 1988; Green and Vosmer, 1993).

Finally, AIMA has initiated a national shipwreck programme as a result of an initiative of Jeffery (1993). Jeffery suggested that there was a need for a more

coordinated effort by the States to carry out more systematic research. The aims of the project should be to provide the community with a better understanding of the significance of shipwrecks and the role these ships played in Australia's history. In 1994 a contract was issued for a group of consultants to examine this question and make recommendations to AIMA and DCA.

In spite of these achievements it was argued by Staniforth (1994) that maritime archaeology is still a marginalised subject.

While I would suggest that the comment made by Margaret Anderson that 'the Shipwreck! exhibition was severely constrained by its exhibition brief, which aimed, at least in part, to further deify the activities of Australian maritime archaeologists' (Anderson 1990: 4) was hardly 'fair' such a view could be said to exemplify the opinions of a significant part of the Australian museum community's view of the Shipwreck! exhibition in particular and of maritime archaeology in general.

Parts of the archaeological and museological professions have little respect for maritime archaeology (although not so within heritage management); however, these limited perceptions belong largely to the past. Much of the research basis of maritime archaeology involves examining the theoretical issues relating to the archaeological record. Arguably, maritime archaeology in Australia has begun to achieve a balance between the theoretical and the practical—the public and the professional. Such developments within this profession have to be judged in the context of the recent achievements of other related fields within the humanities.

In Australia there have been a number of unique developments that all originate from the implementation of heritage legislation. From legislation came the development of institutional organisations to manage this legislation, and thus educational programmes to train cultural heritage managers. Finally, in the on-going process came the development of a professional association. The States are currently developing new and interesting research and management programmes, which suggest that there is a developing theoretical framework to the study of sites and their management (see for example, Strachan, 1988; Jeffery, 1989; Clark, 1990; Coroneos, 1991).

### **The maritime archaeological cultural heritage programme in Western Australia**

The administration of the Department of Maritime Archaeology is a complex operation. At present there are a number of facets to its operation which represent management, research, curating and site survey and excavation. The management issues relate to the operation of the legislation, i.e. matters relating directly to the various Acts; usually these concern the notification of the discovery of a wreck or issues relating to a particular site.

Research covers a wide area within the operation of the Department: it can relate to sites that are known from the

records but have not been discovered or reported; sites that have been reported but have not been identified; sites that have been reported, identified and excavated; artefact collections and issues related to maritime archaeology (site environments, survey procedures, etc.) In most cases the research involves archival and historical research.

The curation of material recovered from sites involves documentation, cataloguing, identification (which may also involve research), the administration of material in relation to conservation and the conservation process, storage of material and administration of material that is used or incorporated in displays. Some of this latter work would overlap with research, particularly where additional information is required for material that involves thematic displays. Finally, there is the overall publication of research which may be of field-work or of a collection. This requires lengthy and painstaking research and generally is an on-going process, since it often leads to new questions being raised.

Within the management programme there is the question of the justification for conducting an excavation. The decision to excavate a site is usually based on one of two criteria, either the site is threatened or its excavation is part of a research programme that has clearly defined objectives. As mentioned above, there is disagreement on the merits of excavation. The 'preservationists' argue that the only way to preserve a site is to leave it alone and not excavate it, where others would argue that the only way to find out what one is preserving is to excavate. There are extremes between total excavation and total preservation; however, it is clear that excavation does change sites and any excavation has to be justified and conducted with the best possible scientific methods. Given the number of sites that exist within Western Australia the archaeological study of this resource is a long-term and complex issue that must have clear methods and objectives.

In terms of management, the most important aspect of the work of the Department of Maritime Archaeology is the Wreck Inspection Programme. This programme forms part of the public interface, particularly where it relates to the legislation. In simple terms, both Acts imply that sites of historic or archaeological potential may be protected and, if they are, certain procedures must be followed. If a member of the public reports the discovery of a wreck to the Museum, then this report is recorded. A decision is then made regarding its likely name and date of the site and thus its potential significance. These considerations will have to be weighed against the danger of the site being interfered with and the difficulty of getting to the site with the finders. Unless there is a serious danger of the site being looted, the inspection of a remote or logistically difficult site is deferred until it can be included in a carefully planned survey of a number of sites in the region. It must be remembered that the coast-line of Western Australia is about 6000 km long and many areas are extremely remote and difficult to reach. However, the majority of wrecks reported by the public

State	Notifications	No. Items
New South Wales	70	~6000—10000
Victoria	126	>8000
Tasmania	40	250
South Australia	10–15	~1200
Western Australia	405	891 (~2391 coins)
Northern Territory	Nil	
Queensland	30	1000 (+3000 coins)

Table 2. Amnesty notifications.

are usually easily accessible.

Once the situation has been assessed, a decision to inspect the site may be made. This will invariably require the finders to accompany the Museum staff to the site as guides. The objective of the exercise is to get to the site quickly and to confirm that what is being inspected is the site that was reported. The archaeological inspection has a number of complex objectives. Firstly, to accurately position the site. This is usually done with a GPS (Global Positioning System) which provides a positional accuracy between  $\pm 10$  m to  $\pm 100$  m, depending on how the satellites have been configured or using a differential system now available in Australia called Omistar which gives  $>3$  m in real-time.

The next phase of the operation is to produce a plan of the site. This is essentially a pre-disturbance survey, giving the basic dimensions of the site and the site information. In addition, a photographic and video coverage of the site is usually recorded together with a collection of artefacts that may help in identifying the site.

A third objective is to attempt to identify the site. In most cases, before wreck inspection takes place, there will be a fairly good idea of the identity of the site. The Department has an extensive database which records all known wrecks prior to 1900 and the majority of known sites after this date. The information provided by the finders is generally enough to provide a clear idea of the range of possible identifications. Thus it is likely that an iron ship, say about 40 m long, in a particular geographical location, would have more than one possible identification. The building of iron ships would give an approximate date. It is also likely that the loss of such a large vessel would have been recorded in the newspapers of the time. However, with smaller vessels, particularly in remote areas, it is possible that the loss would not have been recorded. Similarly, very early vessels before or during the very early period of settlement, may not be recorded in the Colonial archives. A good example of this is the *Rapid*, an American China trader, which was lost near Point Cloates on the north-western coast of Western Australia en route to Canton from Boston in 1811. This was prior to European settlement in Western

Australia and the survivors made their way to Batavia (now modern Jakarta) where the loss was first recorded. When this vessel was first reported it was thought to date from around 1809 since this was the terminal date of the Mexican silver dollars, found in large numbers on the site and that it was possibly American from the barrels marked 'MESS BEEF BOSTON MASS'. Archival research in America finally identified the vessel as the *Rapid*.

Following the site inspection, recommendations are made through the Maritime Archaeology Advisory Committee (which advises the Museum on matters relating to maritime archaeology), that the site should be protected under the *Historic Shipwrecks Act 1976* and that a reward should be paid to the finders. The reward issue, which was discussed above, is a complex matter which the Committee has to decide. The policy of the Advisory Committee has been to follow the guide-lines of the *Maritime Archaeology Act 1973*. It has, in my opinion, created a positive image for the Museum, both with the public and with the divers. This perception and the policy has recently been confirmed by the findings of the Select Joint Committee 1994iii). There is no doubt that a few people are withholding information on wreck sites, but this is a small minority of individuals. On average the department receives between five and eight reports each year and has, since 1970, recommended 83 wrecks for protection under one of the two Acts.

### The public interface

Maritime archaeology is a subject that captures the imagination of the public. One of the advantages of locating a cultural heritage management organization within a museum environment is that it can reach a wide range of the public through a display programme. A museum can operate as a repository for material excavated from underwater archaeological sites, a venue to display this material in exhibitions and a source for public information. Within the museum there is an opportunity to educate and inform the public of the objectives and purpose of maritime archaeology which in turn is an important part of the process of management of underwater cultural heritage. It is through imaginative and informative displays that one may reach a wide range of the public, particularly school children, thus providing an opportunity to change some of the misconceptions that exist in relationship to shipwreck sites and underwater cultural heritage. Twenty years ago skin-diving magazines heroized the pastime of spear fishing. The magazines showed endless photographs of very large dead fish held up by the intrepid 'hunters'; today this has changed, conservation has had a great impact on the diving public. Today, one is more likely to see a fish caught on film than on a spear. So too the habits and attitudes of the wreck divers have changed. Most divers are aware of the significance of shipwreck sites; more importantly, the dive tour operators are increasingly aware of the need to protect and preserve sites, since it is a lucrative part

of their business.

Associated with the public interface is the issue of 'cultural tourism'. Here again we may take the example of the underwater wreck trail developed as part of heritage management programmes in a number of States (McCarthy, 1981; Jeffery, 1987). The programme provides information, both on land and underwater, for the public to interpret and understand maritime sites. In many cases these programmes have involved the local government authorities, including Shires, Parks and Wildlife, Fisheries, and conservation groups. The general thrust of the management programmes is to encourage the public to enjoy and preserve our underwater heritage.

In the future, unless there is a change in direction of the legislation, Australia will be well served in the area of underwater heritage protection and management. However, it is likely that there will be considerable problems in countries bordering Australia, where there is either no, or inadequate protective legislation (see for example Abinon, 1989; Taha, 1989; Ronquillo, 1990, 1992; Dizon, 1992; Khan, 1992; Regis and Koon, 1992). This lack of international agreement over underwater heritage legislation may have unforeseen effects on the situation in Australia. It may, for example, draw the Australian treasure divers to these countries where they can exercise their abilities either legally or illegally in the recovery of cultural heritage for profit. This in turn may put more pressure on Australian sites from this same group.

Most countries have differing attitudes towards the management and protection of underwater cultural heritage and only recently some attempts have been made to provide a form of consensus regarding international legislation (Roper, 1978; Prott and O'Keefe, 1984). In the Indo-Pacific region there are widely varying attitudes to underwater cultural heritage. Some countries have strong underwater heritage legislation, others have none. Some countries wish to protect this heritage, but lack resources. The now famous *Geldermalsen* case (Jörg, 1986) is a classic example of the problem. In this case a treasure hunter recovered most of the porcelain cargo of a Dutch East India Company ship in the Exclusive Economic Zone of Indonesia and then sold the collection at Christie's in Amsterdam. The sale realised a total of £10 000 000! This started a flood of operators searching for porcelain cargoes. Where once the treasure hunter searched for gold and silver, the search was now on for the humble porcelain—in vast quantities. As a result, over the last ten years we have seen a growth in the treasure-hunting industry. The business is slowly evolving, companies that were once called Davy Jones Treasure now call themselves Davy Jones Archaeology; they have beautifully presented proposals and employ so-called 'archaeologists' as part of the operation. To date they have proposed to recover the 'heritage' and sell a proportion of the collection to finance the operation. This has caused international organizations such as the International Congress of

Maritime Museums (ICMM, 1991; Henderson *et al.*, 1993) and the International Commission of Monuments and Sites (ICOMOS, 1990) to lobby actively that museums should not purchase material recovered under such circumstances (Johnston, 1992i and ii; 1993). However, the situation is becoming complex, for example, the *Nuestra Señora de la Concepción*, wrecked in the Northern Mariana Islands was recently excavated by Pacific Sea Resources with a license issued by the Mariana Government. This group has fully conserved and documented the collection and, according to unconfirmed reports, has now sold the whole artefact collection, to a private Japanese company that intends to exhibit it in the Marianas under proper museum conditions. In addition, a detailed excavation report of 535 pages has been published (Mathers *et al.*, 1990).

Archaeologists are actively encouraging countries to develop their own cultural heritage management programmes and a number of training programmes have been conducted in the region (Burns and Green, 1989; Green, 1990). It is worrying that recently in Australia a treasure hunter, who had previously operated in Southeast Asia, was able to work on a site that the delegated authority had recommended be given interim protection; however, the Federal government chose to reject this recommendation. It is quite clear that the situation with underwater heritage management in Australia is not without its problems, and we should be aware that these problems are partially related to what is happening outside Australia.

On a final point, on 18 October 1994 the Prime Minister announced the Government's cultural statement *Creative Nation*. In this statement, the following reference was made to maritime archaeology:

#### **Our maritime heritage**

The Australian National Maritime Museum is an important cultural institution which reflects Australia's maritime heritage and relationship with the sea. The Commonwealth's Historic Shipwrecks Program, including the recent Shipwreck Amnesty, has been extremely successful in developing working partnerships between the Commonwealth and the States to preserve, document and interpret our maritime heritage.

The Western Australian Maritime Museum has international standing in the area of marine archaeology, particularly through its work on pre-colonial and colonial wrecks in the waters adjacent to Western Australia, as well as the assistance it has provided to conservation of the *Pandora* and the *Sirius*. It also plays a significant role in the management and excavation of shipwrecks in South-East Asia, encouraging other national training and conservation programs.

The Government will assist the WA Maritime Museum to continue work on these projects of national significance, including collaborating with Queensland on the *Pandora* project, and will investigate the establishment of the Museum as a national centre of excellence in marine archaeology.

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## Windows into the past: Maritime Archaeology Workshops at the Australian National Maritime Museum

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If archaeologists are serious about raising a greater public understanding of their discipline and the importance of archaeological sites in today's society, they must endeavour to become more involved with the teaching of archaeology and its associated disciplines of history and anthropology at the secondary school level.

Ruth Selig in her paper 'Teacher training programs in anthropology', published by the United States Department of the Interior in 1991, wrote about a process called the 'multiplier effects in the classroom' in which teachers, once convinced about the relevancy of archaeology in present day life, could influence the development of suitable syllabuses and, therefore, pass onto their students the importance of archaeology and heritage management (Selig, 1991: 3–5).

Selig goes on to state that every teacher convinced of the relevancy of teaching archaeology could pass on that message to 50–60 students per year or 1 500–1 800 students per teaching lifetime.

In New South Wales, for example, by convincing ancient history teachers to teach the importance of archaeology to their students it is possible to reach 25 000 Year Ten, 8 000 Year Eleven and 5 000 Year Twelve students per year (NSW Board of Studies, 1994: 14–15).

In the past, and despite the availability of some very good archaeological education kits such as those produced by the Queensland Museum and the National Maritime Museum at Greenwich (Lincoln, 1993; Museum of Tropical Queensland, 1990), archaeologists wishing to present archaeology to Year Eleven and Twelve students were hampered by the way in which archaeology was treated in the various educational syllabuses and by the perceptions of a large number of ancient history teachers that archaeology, and in particular Australian archaeology, had nothing to offer them, nor was it capable of providing any relevant information to their courses.

However, towards the end of 1994, the Ancient History Course syllabus in New South Wales underwent a number of significant changes. These included the development of a preliminary course in ancient history which looked at methods of teaching history through the application of archaeological techniques and written evidence. Students in the new course are now being actively encouraged, by drawing on a range of archaeological and written evidence, to examine the methods used by historians and archaeologists in their investigation of the past (NSW Board of Studies, 1993: 11–35).

Now, ancient history teachers in New South Wales are obliged to take into account the role of archaeology and archaeological research and its relevancy to the discipline

of history.

One area of study featured in the new preliminary course in ancient history titled 'History, archaeology and science: Investigating the past' is Marine (or maritime) Archaeology (NSW Board of Studies, 1994: 57–64).

In early 1995, the Australian National Maritime Museum (ANMM), with its small but active maritime archaeology program, implemented a 'hands-on' maritime archaeology workshop compatible with the new syllabus.

The workshops have been designed to achieve a number of the objectives and outcomes required under 'The preliminary course in ancient history' and are, therefore, more attractive to and fulfil many of the requirements of teachers and students. Objectives include such areas as:

- methods of investigating the past, the nature of sources and evidence in history and archaeology;
- terms and concepts;
- reconstructing the past;
- current concerns relating to the ethics of the discipline;
- the role of science in unlocking the past; and
- the development of investigative, research, analytical and interpretive techniques.

These can all be achieved by the careful selection of case studies which allow the students to use archaeological and written evidence to investigate and interpret the past (NSW, Board of Studies, 1993: 31–35).

The workshops were written and designed in consultation with Jeannie Douglass, Senior Schools Program Co-ordinator at ANMM and were heavily influenced by an existing workshop in 'Applied History' designed by Jackie Lyons, Head of History at Canterbury Girls' High School and Kevin Sumption, a former curator at ANMM (Sumption & Douglass, 1994: 33–35).

The workshops were pilot tested in March 1995 by students from Corpus Christie College and Engadine Senior High School and reviewed by Garriock Duncan, Senior History Teacher at Engadine. After a number of minor changes to make the workshops comply more closely to the New South Wales syllabus it was released for general consumption in April 1995 (Duncan, 1995: 80–81).

One point must be kept in mind that the new curriculum is in ancient history and not archaeology or science and, therefore, it is important to always take into consideration how these two disciplines have contributed to, allowed or affected historians' reconstruction of the past.

The workshops at the Museum are conducted in two

stages—contact is made with the teacher and a pre visit activity pack is sent out to the school. The teacher can then look at the pack and ask for additional information or different subject material to be used. For example if a teacher prefers information on the current work being carried out on the *Pandora* wreck site, then that can be provided.

The second stage is when the students and teacher(s) arrive at the Museum for the workshop. It is conducted in the education classroom at the Museum and is divided into three separate sections consisting of an introductory talk, a tour of the museum accompanied by worksheets and the 90-minute ‘hands-on’ workshop.

The first session comprises two, 20-minute introductory lectures on maritime archaeology and material conservation conducted by Kieran Hosty, ANMM Curator of Maritime Archaeology, and one of the Museum’s conservation staff, either Barbara Reeve or Antonia Syme. The two illustrated talks complement each other by examining the methods and practises of each discipline. The students are introduced to various case studies, including the archaeological work carried out on the wrecks of the *Batavia* (1629), *Sirius* (1790), *Pandora* (1791) and *Sydney Cove* (1797) and the effect the marine environment has had on these sites and the conservation techniques used to stabilise and protect material once it has been raised.

These particular Australian shipwreck sites have been selected because they are good examples of how the two disciplines of history and archaeology use written and material remains to investigate the past. These sites can also illustrate how the use of both disciplines can answer specific research questions and test the reliability of archaeological and written sources.

The questions of professional ethics are also discussed through the excavation versus non-disturbance, museum versus *in situ* cultural resource management.

Following on from the introductory session, the students are then taken on a guided tour of the Museum with particular attention being given to the archaeological material which is currently on display. During this tour the students are confronted with skeletal material excavated from the survivors’ camp associated with the wreck of the *Batavia*. The students are then given the opportunity to discuss the reasons for and against this type of excavation; who owns the past? why excavate skeletal remains? and, what can be learnt from the scientific investigation of such material?

The question of how archaeology can add directly to the historical record is examined by looking at material recovered from the wreck of the *Sirius* (1790) off Norfolk Island.

The reason behind the European occupation of Australia has been one of constant conjecture amongst historians. Many have argued in favour of the ‘Temporary Expedient’ or ‘Convict Dumping Theory’ using the journals of Philip Gidley King to illustrate the lack of

preparation taken by the Pitt administration in the fitting out, provisioning and selection of vessels for the First Fleet ( Gillen, 1982; Henderson & Stanbury, 1988: 28 ff.; Frost, 1994: 1–8, 98–110). King wrote disparagingly about the vessels and the flagship HMS *Sirius* on which he was the second lieutenant. In his journal, King wrote of the armed tender *Supply*:

...formerly a Navy Transport—her size is much too small for so long a voyage which added to her not being able to carry any quantity of Provisions & her sailing very ill renders her a very improper Vessell [sic] for this service.

and of the *Sirius*:

She was built in 178- in the River & intended for an East country man but in loading she took fire & was burnt to her wales, Government being in want of a burthensome ship to send Stores abroad in, the Navy board purchased the bottom of this Ship, she was taken into dock & ran up with the refuse of the Yard,...Such is the Ship in which is embarked an Officer, whose reputation as well as that of the Nations, is concerned in the present arduous undertaking... (King, quoted in Henderson & Stanbury, 1988: 38–39).

Using King’s remarks, the historians have argued that the attention paid in the selection and setting up of the First Fleet is indicative of a government establishing a temporary rather than a permanent settlement.

Historians lead by Alan Frost and assisted by archaeologists such as Graeme Henderson and Myra Stanbury are now putting forward alternative arguments based on information gained from the archaeological investigation of the *Sirius* wreck site (Henderson & Stanbury, 1988: 30–31, 110–112; Frost, 1994: 82, 113).

The students are provided with extracts from King’s journal regarding the construction of the *Sirius* along with information from the archaeological reports and then discuss and draw their own conclusions regarding the appropriateness of the vessel as Flagship to the First Fleet.

Following a short break the students participate in the most interesting part of the workshop, the ‘hands-on’ component.

This ‘hands-on’ section is split into three separate parts, which are individually aimed at outcomes included in the ‘Preliminary course in ancient history syllabus’. Simply called ‘Artefact, Conservation and Interpretation’, each session examines a different aspect of maritime archaeology as practised at ANMM, with the students moving from one session to the next every 30 minutes and therefore gaining the widest possible experience from their visit. For the same reason student numbers are kept to between 20 to 30 students per workshop.

The session on the ‘Artefact’ has the students examining material which was recovered from a wreck site off the coast of New South Wales in the early 1960s. Having no real archaeological context, except for its link with this particular site, for the course of the exercise the material has been given a fake archaeological context (in reality the objects are ‘artifakes’ rather than artefacts).

The students are provided with information on the wreck site from where the material was recovered including site plans, a site inspection report and artefact registration cards along with a list of four vessels known to have been wrecked in the area. By examining the 'artefakes', looking at the site information and reading the historical and technical information on the four reported shipwrecks, the students attempt to identify the material, its use, the date of manufacture and eventually the identity of the vessel from which the material was recovered.

During this session the type of material culture found on shipwreck sites, the technology used to manufacture the material, function, spatial analysis, gender in the archaeological record, archaeological context, stratigraphy and the fundamental difference between archaeology and treasure hunting are discussed.

The session on 'Conservation' looks at artefact material from the Museum's collection through the eyes of a museum conservator. Many of the objects recovered from underwater archaeological sites cannot be displayed without extensive conservation, due to the effect the marine environment has on the material that makes up the artefact. During the session the students examine wood, ceramic, stone, metal and paper based objects, discuss their condition, examine different ways of treatment, storage and display and look at the ethical considerations of the conservator regarding the integrity of the artefact and methods of conservation and preservation. The role of the conservator in the scientific analysis of the material recovered from archaeological sites is also discussed.

The final session—'Interpretation'—presents one of the most difficult, and often the most underrated part of a museum curator's job—the research into and interpretation of archaeological material in a museum context. The students are provided with a collection of primary and secondary source material, along with artefact material associated with the wreck of the *Dunbar*, wrecked off the entrance to Port Jackson in August 1857. The students then use this material to prepare a suitable label, working within the museum guideline for label writing, for a general display on the wreck and its archaeological significance.

During this session the students often provide an interesting critique of how the Australian National Maritime Museum, Hyde Park Barracks, the Museum of Sydney and the Nicholson Museum at the University of Sydney present archaeological material in their collections.

The success of the workshops in fulfilling the requirements of ancient history teachers in relation to the new syllabus is indicated by the number of schools that have already participated in the program.

Since April 1995, over 480 Year Ten, Eleven and Twelve students from 23 schools have participated in the three and a half hour workshops at the Museum. An additional twelve schools, three of which participated in the 1995 program, have made bookings for March, April and May

1996. A number of schools from outside the metropolitan area have also requested access to the workshops and plans are currently underway to take the workshops 'on-the-road' to regional centres in New South Wales, commencing with Newcastle in late May 1996.

The maritime archaeology workshops at the ANMM are providing a valuable alternative to students and teachers involved in the 'Preliminary course in ancient history'. Although demanding a considerable amount of input from curators and conservators, especially during the design stage, the workshops now pay for themselves with the students paying \$9.00 for each three and a half hour session.

There are many ways in which archaeologists, museum curators and other cultural resource managers can sell the importance of archaeology and preservation of the archaeological record to the general public. The recent changes in the New South Wales 'Preliminary course in ancient history' has given heritage professionals a golden opportunity to influence the attitude of young people. In the words of Carol Ellick (United States Department of the Interior) 'Educating children [for children read young adult/adults] about the past saves sites for the future' (Ellick, 1991). Hopefully educational authorities in the other Australian states will take the lead from New South Wales and encourage the teaching of archaeology—even if it is in the guise of ancient history—to assist in the preservation and conservation of the resource.

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All authors are required to present completed manuscripts, together with illustrations. The manuscripts should follow the style of this edition. Original illustrations should accompany the manuscripts together with a caption list. The manuscripts must be typewritten, properly titled and referenced. Essentially, the *Bulletin* follows the style of the *International Journal of Nautical Archaeology*. Where there are discrepancies or ambiguities, authors are referred to Commonwealth of Australia, 1988, *Style manual for authors editors and printers* (Fourth edition) Australian Government Publishing Service, Canberra. Spelling is to conform with the *Shorter Oxford Dictionary*, and where there is an alternative, the first (preferred) spelling will be adopted. Additional guidance may be obtained from Oxford English Dictionary Department, 1981, *The Oxford dictionary for writers and editors*. Clarendon Press, Oxford. All foreign words are to be italicised, together with titles of publications. Where authors do not have access to an italicised typewriter font, italicised words should be underlined.

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References should use the author-date system and in the text can either appear as: 'Jones (1986) discovered water at...' or 'water was discovered at Cambden (Jones, 1986)'. Authors can refer to specific pages; thus (Jones, 1986: 223) or Jones (1986: 44). The list of references should be listed at the end on a separate sheet of paper and must conform to the following format:

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