HERITAGE COUNCIL OF WESTERN AUSTRALIA

REGISTER OF HERITAGE PLACES - ASSESSMENT DOCUMENTATION

11. ASSESSMENT OF CULTURAL HERITAGE SIGNIFICANCE

The criteria adopted by the Heritage Council in November 1996 have been used to determine the cultural heritage significance of the place.

PRINCIPAL AUSTRALIAN HISTORIC THEME(S)

- 7.7.3 Going to war
- 8.8 Remembering the fallen
- 8.9.1 Remembering disasters

HERITAGE COUNCIL OF WESTERN AUSTRALIA THEME(S)

- 501 World wars and other wars
- 502 Refugees
- 506 Tourism

11. 1 AESTHETIC VALUE

At low tide the wrecks provide a distant landmark, visible across the mudflats, which adds to the rich cultural and natural heritage of Roebuck Bay.(Criteria 1.3)

11. 2. HISTORIC VALUE

The place contains the remains of fifteen flying boats, a type of aircraft commonly used during World War Two for both military and civilian purposes, which has been superseded. (Criterion 2.1)

The place is a physical memorial to those 70 to100 people who lost their lives at Broome in 1942 when Japanese aircraft attacked fifteen moored flying boats carrying refugees from Indonesia. (Criterion 2.2)

The place provided temporary shelter to refugees, and represents the heroism in the face of danger displayed by many in the town who tried to save the refugees trapped in the sinking flying boats. (Criterion 2.2)

The place has national importance as a site encompassing abundant archaeological evidence of an aerial attack on the Australian mainland during World War Two which resulted in a considerable loss of life and aircraft. The site is further associated with the evacuation of approximately 8000 civilians from Java in 1942. (Criterion 2.2)

11. 3. SCIENTIFIC VALUE

Test excavations have shown that each aircraft (including those often accessed by visitors) contains a remarkable range of materials. Much of what remains below the seabed is well preserved in the anaerobic sediments and each

assemblage has the potential to yield information that will contribute to the understanding of technical aspects of the operation and construction of the Flying Boat type. Plans and descriptions of the entire Short Empire class were destroyed, leaving the Broome examples the only remaining evidence. (Criterion 3.1)

11. 4. SOCIAL VALUE

The place is important to Australian community, and in particular national service and ex-service groups, for its cultural and historical associations with the flying boat service, the aerial attack and the consequent loss of life. (Criterion 4.1)

The site(s) have lent a sense of uniqueness with the trauma of the refugee starkly reflected in the remains, and it has also become an element in Broome's tourism industry, all of which contribute to the community's sense of place. (Criterion 4.2)

12. DEGREE OF SIGNIFICANCE

12. 1. RARITY

The place is rare as one of the few sites on mainland Australia (together with the town of Wyndham, the localities of Exmouth Gulf, Port Gregory, and the cities of Sydney and Darwin) attacked during the war. (Criterion 5.1)

It is also considered to be rare in its archaeological potential in respect of the well-preserved remains of a group of aircraft in wartime allied service and materials associated with the evacuation of civilians from Java. (Criterion 5.1).

The place is rare as a collection of war ruins, there being no other ravaged structure or war-torn assemblage left visible as a reminder of attacks during World War Two. (Criterion 5.2)

12. 2 REPRESENTATIVENESS

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12. 3 CONDITION

The current potential of the sites to contain archaeological material is high. Despite the removal of some material that may detract from the archaeological record, the current management strategies are serving to prevent further degradation. There is a high expectation that many disturbed deposits are present within the site.

12. 4 INTEGRITY

In preparation for the evacuation of Java, the place became a Flying Boat facility. As a result of the raid it became a World War Two wreckage site and it remains so. It has a high level of integrity.

12. 5 AUTHENTICITY

As with underwater heritage sites generally, the fabric of each aircraft has been altered from March 1942 only in respect of what has been removed by cultural processes or altered by natural processes such as tidal effect,

corrosion and the like, i.e. the machines and their contents are 'as lost'. As a wreckage site the place has a high level of authenticity.

13. SUPPORTING EVIDENCE

The Documentary and Physical Evidence below has been compiled by Dr M. McCarthy assisted by Ms Corioli Souter and Adjunct Associate Professor Jeremy Green, staff of the Department of Maritime Archaeology at the Western Australian Maritime Museum, and by PhD student, Mr S. Jung, aviation archaeology researcher of the Northern Territory University.

13.1 DOCUMENTARY EVIDENCE

On the morning of 3 March 1942, an armada of fifteen flying boats was at anchor in the waters of Roebuck Bay, not far from the jetty serving the township of Broome on the Kimberley coast.

Bound for Perth with the last of nearly 8000 refugees fleeing the Japanese advance into the Netherlands East Indies (NEI), the aircraft were delayed in their take-off by a combination of low tide and the need to refuel. Caught unprepared, they were subsequently destroyed by Japanese warplanes that arrived overhead at 0930 that day. The pilots apparently had orders to seek out only military targets and this they did to good effect—for all bar one of the flying boats in the harbour were in Service with the Allies.

The Evacuation of Java

The evacuation of the Netherlands East Indies began in February 1942 when all allied citizens were ordered out of the East Indies ahead of an expected Japanese invasion. What has been elsewhere termed an 'air bridge' was set up and over a two week period over 8000 people were evacuated to Perth and Sydney via Broome. Many aircraft were used in the evacuation, including the Flying Boats mentioned here. This was of such a scale that on one particular day in that two week period, 57 aircraft of various nationality and types (including bombers and Flying Boats) passed though Broome.

All the flying boats referred to above were at anchor in Roebuck Bay and some were in the process of being refuelled in that section of the bay opposite the town jetty that was given over to flying boat operations during the evacuation of Java ahead of the Japanese advance.

The normally sheltered waters of Roebuck Bay and the facilities at the Port of Broome, including a jetty and refuelling barges, were a welcome stop-over on the 900 km flight. In this instance, pilots, some of whom had gone entirely without rest for days, rested ashore overnight, or took much-needed refreshments, while their aircraft were being refuelled.[1] The civilians, many of them women and children unfortunately remained in a cramped and overcrowded situation on board, there being no accommodation available in town. The numbers on-board are not known, though it has been estimated that while most of the crew were ashore preparing for the flight south up to 50 people were on board each aircraft when the raid began.[2]

The Japanese raid

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1 Prime, M., *WA's Pearl Harbour: The Japanese raid on Broome.* The Royal Australian Airforce Association, Aviation Museum, Bullcreek, Perth, 1985.

2 Souter, C. 2001 *Port of refugees: Archaeology and oral history of WW2 flying boat wrecks in Broome WA*. in prep.

In a surprise raid that commenced at 9.30AM and inadvertently claimed mainly civilian lives, between 70-100 people were killed. The event was such a psychological blow that it has been referred to by some aviation historians as 'Australia's Pearl Harbour'.[3] Only 30 bodies were ever recovered of those lost in the Flying Boats.

A18-10 was the first flying boat to be destroyed. Sergeant Douglas Dick's experience is quoted below:

> We were totally unaware that they were hostile until the leading machine opened fire. A18-10 caught fire immediately; 1400 gallons of petrol provided good fuel. Corporal Andrew Ireland rushed to the flight deck and in the face of enemy fire released the rubber dinghy, the remainder of the crew (except the captain and second pilot who were ashore) dived through the hatches into the sea where Ireland had already inflated the boat. Dutch evacuees and aircrew who had survived the attack were hauled into the dinghy, which although built to hold five persons eventually reached a larger rescue craft with 13 aboard .[4]

Soon all the other aircraft moored nearby suffered a similar fate as they were strafed with small arms and cannon fire. All were holed and started to sink; at the same time they also caught fire. Being aluminium, a known source of fuel in high temperature blazes, it appears that in many cases, the fire spread rapidly progressing downwards to consume much of what remained above the water. The wings invariably broke at their roots and having floats on their ends they inverted as the main hull sank beneath them, often to cross over the centre-line of the aircraft's hull.[5]

Some hulls exploded, others just sank according to the order in which the water entered the hull and floatation systems. In the description of the wrecking of Catalina Y-59, for example, one Dutch aviator, Fritz Van Hulssen, described how the rear of the plane was 'gutted' by fire and sank at anchor.[6]

The Japanese aircraft departed as quickly as they came, leaving fifteen burning flying boat hulks sinking in the waters just off the town jetty and many shattered aircraft on the landing strip closer to town. Other aircraft, including a B52 bomber, were downed as they tried to escape and one unfortunate DC3 type carrying refugees and a parcel of diamonds towards Broome met the departing Japanese flight, and after being extensively damaged was forced to crash-land in the shallows north of the town.

Many Broome residents displayed great heroism in the face of extreme danger in trying to save the refugees trapped in the sinking, burning aircraft. Other townsfolk also rallied around to provide shelter and assistance to the refugees when the raid was over.

After the fires were extinguished by the incoming tides the twisted fuselages were strewn with military materials mixed with personal goods and objects, some preserved from the fires by the ingress of water. Wings and engines lay at odd angles to their original configuration. Tail planes often broke off, also to lie at odd angles nearby. Sometimes substantial pieces floated off in the tide. Many bodies also drifted away, never to be found.

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3 Prime, M., 1985. op. cit.

4 Vincent, D., 1984, op cit. p.74.

5 These site formation processes in aviation archaeology have been elucidated by Silvano Jung in his Masters Thesis. op. cit.

6 F. Van Hulssen to C. Souter August, 2001. In Souter, C., Port of refugees: Archaeology and oral history of WW2 flying boat wrecks in Broome WA in prep.

Broome experiences a tidal range sometimes in excess of 8 metres and when the tide receded one group of 6 aircraft were left visible or part-visible on the drying mud flats (the 'drying wrecks') and another group of 9 were either totally submerged or nearly so. These 'deep-water wrecks' were lying on the side of a sloping mud bank or on the seabed in the shipping channel offshore.

The Aftermath of the Raid

A considerable amount of salvage was conducted at the time. As but one example, a Colonel Gibson, then Commanding Officer of the North West military forces later recalled taking a group out after the raid at low water to 'hacksaw' the guns out of the visible flying boats to be used as anti-aircraft guns to defend Broome against further attack.[7]

In an as yet to be confirmed process, it appears that pearl industry or service divers in 'standard dress' (what is popularly known as the 'hard-hat') also descended to the deep water wrecks to ascertain if any bodies were trapped and to recover what could be re-used. This would have been a difficult and dangerous task, and there is some indication (from archaeological evidence) that explosives may have been used to obtain access to the interior of the hulls then, although this is more likely to have taken place at a later date.

Much of the material remaining inside the wrecks after this activity was quickly covered in deeper layers of mud, both inside and outside the hulls, serving to trap much of it in an anaerobic environment, allowing even quite fragile objects to remain preserved. As time progressed a light layer of a rock-hard substance called concretion covered all bar the stainless steels and toxic substances (e.g., brass) serving to add further to the protective layers.

After the War

While the now-invisible 'deep-water wrecks' quickly slipped from mind, the six that dried at low water became a source of endless fascination for the Broome community and for the occasional visitor. Though effectively stripped in World War Two, the sites were often visited by the curious and by people wishing to recover materials like guns, engines and propellers for exhibitions in town.

Community leaders in Broome took all possible steps to ensure that there was little external interference at the wrecks and that what was raised remained on exhibition in the town or on the shores overlooking the site. They initially succeeded in this aim, partly because Broome was then quite an isolated and small community, accessed only by a long and difficult gravel road, the State Shipping Service and the MMA DC3 & later the Fokker Friendship Service.

The Broome Aircraft wrecks as a reminder of the horrors of war

The Dutch, British and American-built flying boat wrecks perform a symbolic role. The Broome wrecks continue to reflect the effect of war on a civilian population and the pain as war arrived on their 'doorstep'.[8]

They also remain as a timeless reminder of the trauma experienced by the refugee.

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7 CMDR Gibson RAAF, interview with M. Prime 1977. In Souter, C., *Port of refugees: Archaeology and oral history of WW2 flying boat wrecks in Broome WA*. In prep.

8 McCarthy, M., War on the doorstep. In Gregory, J., (Ed.), *On the homefront Western Australia and World War II,* UWA Press, Nedlands, 1996, pp.109-118.

Within Australia, a place little visited by its enemies in two world wars until this time, such a suite of war-related sites is probably unique, there being no other ravaged structure or war-torn assemblage left visible as a reminder of those times.

If one puts aside the loss of HMAS *Sydney II*, the story of the Japanese raid on Broome and the loss of so much life and so many war machines is without par in the history and archaeology of 'Western Australians at war'. To the Dutch people the remains reflect the course of their retreat from the Dutch East Indies in general, which, given the rise to independence of modern day Indonesia in 1947 effectively brought to a close nearly 350 years of Dutch hegemony there. To the services involved, the RAAF, the RNN, USN, Qantas and the RAF, the wrecks are a tangible reminder of their machines, their activities and commitment to the defence of the ABDA (combined Australian/British/Dutch/American) defence region during World War Two. The suite of wrecks drying at low water has long-since been an object of fascination. As the wrecks slowly rise above the receding tide, they are a poignant reminder of the horrors of war, of the panic and fear the raid caused, of individual feats of endurance and heroism in the face of attack and of the cost incurred by civilians in wartime. Further, they serve as a reminder that many civilian residents joined service personnel in the attempts to stem the damage and to save lives.[9]

Management of the wrecks since 1980

Because they were so well-known, outside interest in the wrecks outside of Broome was inevitable and in 1980, the Shire of Broome was led to formally express concerns about the projected salvage of relics by Perth-based, or even by Eastern States aviation history groups.

In casting around in an attempt to forestall the proposal, the Shire and the Broome Historical Society sought the advice of the WA Museum on the best means of protecting the aircraft under its legislation. Reply was received to the effect that no provisions existed under the Museum Act or the 1973 Maritime Archaeology Act. Reference was made to the possibility that the 1976 Commonwealth Historic Shipwrecks Act could be invoked, however, and a request made to the Commonwealth Government along those lines. Reply was received that, though the Government could not apply shipwreck legislation to the submerged aircraft, they were attempting to facilitate their protection through the reciprocal agreements with other countries .[10]

This was required because Allied and Australian warplanes lost in conflict in Australian waters remain under the ownership of their parent Service, unless transferred to the Australian Government, as was the case of the American aircraft lost at Broome. The difference appears to be that Japanese aircraft wrecks lying on Australian territory were forfeited to the Australian Government at the end of the war . i.e. Australia had become the responsible body in all respects concerning the American, Australian and Japanese aircraft lost off Broome in World War Two. This left only the Dutch aircraft still under ownership of their parent government.

The Netherlands Consulate had been approached by the prospective salvors of the Broome aircraft in 1980, for example. In representing the Netherlands

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9 Van Splunter, J., 2000. Dutch share sad chapter of Broome's war history. In *The West Australian*, Wednesday 19 April, pp.18-19.

10 L.W. Claasen, *Vice Consul, Consulaat Der Nederlanden, to M. Prime, 18/9/1980.* File, Aircraft WA Waters, Department of Maritime Archaeology, No13/86. copied to Broome Aircraft Wrecks, Department of Maritime Archaeology, WA Maritime Museum, No. 54/02/1.

Government and the Royal Netherlands Navy (RNN) in whose service the aircraft were lost, the Consulate reasserted ownership of the downed Dutch flying boats and then authorised the salvors to recover materials from some of their aircraft. They required that the salvage be performed only in association with the Shire of Broome, and on condition that the RNN was to have first choice of material raised for exhibition in Holland. In an agreement designed to reflect that established in order to deal with the old Dutch shipwrecks lost off the coast of Western Australia, it was stipulated that up to a maximum of one third of the materials raised were to be repatriated to Holland.[11]

As indicated, the object of interest at this time were the engines and propellers visible on the drying mud flats. Thus the 'drying sites' were substantially altered over time, and there are no obvious artefactual remains left on the mud amongst the much-altered, disjointed structures, though each were identifiable as an aircraft.

For a number of reasons there had been few known attempts to conduct an excavation deep within any of the 'drying' hulls. The best known occurred in the late 1970s when noted aviation historian Stan Gadja excavated some internal spaces in a 'drying' Dornier wreck which was identified as the X-1 by tools stamped with this number. [12]

The ingress of water and mud and the threats posed by the incoming tides rendered the excavation of these sites difficult. The Gadja excavation shows that the interior of the buried portions of these aircraft are a rich source of artefacts. Those that were subsequently inspected by the Museum in 1991 as part of the wreck inspection program showed intact structure below the sediments.

At the time, the other aircraft (the deepwater group) lost in the raid on 3 March 1942, had not been re-located, though a select few were aware that they lay somewhere in Roebuck Bay off Broome. Some were favourite fishing spots, jealously guarded by those 'in the know'.

The 'drying wrecks' as aesthetic and tourist assets

Thus the 'drying wrecks ' came to serve as a unique relic from the time when World War Two came to Western Australia. Visible from the shore at low water spring tides, they were also accessible by boat, or by walking from the town past the mangrove swamps and then across the mud flats. These mud flats of their own nature have a special significance to the community of Broome, providing a link with the sea and with early indigenous maritime activity. The mangroves too are part of the town's folklore and attraction, being associated with pearling, the former economic lifeblood of the region. The flats have also become a feature of the town, especially at low water spring tides, full moon and cloudless skies when interest focuses on the 'staircase to the moon' phenomenon, one of the town's prominent natural heritage features. The aircraft exposed on the mud-flats at low water combined with these historic and natural attributes to add to the appeal and mystery of the Broome foreshore. As one would expect, many buildings are

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11 The *Australian Netherlands Committee on Old Dutch Shipwrecks*. Managers of a legal agreement forged between the Netherlands, Australian and Western Australian Governments to manage the Dutch East India wrecks on the coast.

12 Gadja, S., 1980, Air Raid on Broome, *Fly Past*. Vol 28: 44-48.
Gadja, G., 1982 To Identify a Wartime Wreck in *Book of Flying*. Yuff Publication Group;
Gadja, S., 1983, Down under Relics. *Flypast*. May, 1983: 58

set to take advantage of this vista, as has Broome developed to cater for the flood of tourists that came from the 1970s. To look across the mangroves and mud flats to the wrecks and then out to the Bay itself to the pearling vessels anchored offshore, and to ponder the cultural and natural history of it all, is an experience replete with historic, aesthetic and emotive connotations. Over the last decade and as tourist numbers grew, access has also been by the regular hovercraft service across the Bay.

The 'deep water' wrecks relocated in modern times.

Conversely those wrecks lying forgotten on the seabed have been the subject of a relatively small number of visitation or cultural transformation in the form of salvage since World War Two. Some damage has resulted from large vessels dragging anchors through the sites (before the advent of the present 'cyclone mooring systems) and by natural forces (e.g. current, seas and swell).

In August 1990 divers located some of the 'deep water' wrecks and recovered a Browning .303 machine gun and a number of significant, and in some cases poignant artefacts, including a child's doll. The matter was reported to the Historical Society by Mr Bill Carswell, a former Canadian heritage worker living in Broome.

Again the Western Australian Museum was approached and advice was given that the materials raised were considered the 'property' of Broome and that all effort should be made to ensure their return. In the interim the gun disappeared, causing some controversy and precipitating calls for the legal protection of the sites and the recovery of the lost materials. The Broome Historical Society considered the matter of 'grave concern' and stated that the relics were of 'little monetary value, but historically they are priceless'.[13]

Given that existing shipwreck legislation was not considered appropriate and at the time the Western Australian Heritage Act (1990) had not been proclaimed, the newly established Air Force Association Aviation Museum in Perth, the Dutch Government, the Department of Customs, the Department of Transport, local and Federal Police were all contacted by Museum staff in order to ascertain whether the wrecks could not be protected by some other means. Eventually a legislative *pot pourri* was 'concocted' in order to prevent the removal of materials under air navigation and customs regulations. These prohibited the removing of material from wrecked aircraft, or the importation of aircraft parts without a permit. [14]

These regulations and the moral implications of interference with possible 'war graves' were informally conveyed to the divers at the Museum's request by State and Federal Police and by Customs staff and the looting ceased. There was also popular support for this stance, for it was generally recognised throughout the community that the wrecks were a 'grave-site' and they represented the well-preserved remains of a group of aircraft that were a memorial to personnel and townsfolk who distinguished themselves in World War Two.[15]

This management strategy was then effected by the Broome Historical Society, the RAAF Aviation Museum (in Perth, at Bullcreek) and the WA Maritime Museum acting in concert as a tripartite management group. The

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13 Secretary, Broome Historical Society, to M McCarthy, 12/9/1980, File, Broome Aircraft Wrecks, Department of Maritime Archaeology, WA Maritime Museum, No. 54/02/1.

14 WA Maritime Museum, Maritime Archaeology Advisory Committee Minutes. December , 1990

15 Secretary, Broome Historical Society to M. McCarthy, 22/11/1990. Broome Aircraft Wrecks File, Department of Maritime Archaeology, op. cit.

strategy included long-term plans for the location, survey, inspection, interpretation and marking of all sites in a wreck trail *milieu* that was to be managed locally by the Broome Historical Society on behalf of all stakeholders including the burgeoning tourist industry.[16] Funds were not available however, and sponsorship was sought. In the interim visitation was monitored by the Broome Historical Society and by sympathetic dive shop operators. While to date the loose mix of legislative strictures that has been applied has proved effective, it became apparent that with the advent of GPS the situation could readily change as the desire to access those lying in deeper water grew, leaving the sites and the relics within them in a protective vacuum where goodwill and an extent of 'bluff' would no longer suffice.

In March 1991 Woodside Petroleum and Associated Survey International joined with the Museum in deploying a side scan sonar, expert staff and a large workboat. Though this survey produced a number of targets, it proved incomplete due to equipment failure.[17] Soon after being incorporated into the Dutch multi national Fugro Survey, the ASI team under Mr Ted Graham completed another leg of the work, identifying further sites and setting the scene for the completion of the search and an inspection visit by a Museum team as soon as funds could be found.[18] At all times these two sponsors considered the safety of the sites more important than their corporate needs for public acknowledgement of their generosity, given their considerable outlay in assisting the work and acted accordingly in keeping the confidences requested of them. For a while the issue lapsed, though a keen eye was maintained with a view to locating appropriate funding sources.

In 1998, the Curator responsible for the sites was approached by a well-known aviation photographer and film maker, Mr Jon Davison who was interested in producing a documentary with the ABC on the four RAAF PBY Catalina's (the 'Black Cat's) that were scuttled as part of the 'Lend Lease agreements' in the Rottnest Island Graveyard after World War Two.[19] Having concluded that this was not feasible due to location and conservation problems it was suggested that the focus of any application for funds using the ABC as a source would become the history, archaeology and protection of the Broome flying boat sites, thereby enabling the money to be applied to the completion of the search and analysis program. A component for the presentation and marking of the sites in accordance with modern site management strategies was also fundamental to the application. As agreed earlier these initiatives were to be developed by the Department of Maritime Archaeology, in consort with the Broome Historical Society and RAAF Aviation Museum. While the danger that enhanced publicity could result in unwarranted diver interest in the sites, it was agreed by the chief stakeholders that this funding mechanism was the only visible alternative.

With the backing of the Department, Davison subsequently produced a proposal for an historical and archaeologically-based documentary entitled

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16 The Hon. Kay Hallahan, MLC., Minister For The Arts, to Mr G. Campbell, MHR, 18/12/1990. Broome Aircraft Wrecks File, Department of Maritime Archaeology, op. cit.

17 Associated Survey International, 1991, *Wreck Search Roebuck Bay*, West Perth, Assoc. Surveys Intl.

18 Fugro Survey Pty Ltd/WA Maritime Museum, 1996, *Roebuck Bay aircraft wreck search*: survey report. West Perth, WA: Fugro Survey Pty Ltd

19 McCarthy, M., 1997. *The 'Black Cats'. Report into the feasibility of locating, raising and conserving one of the four Catalina Flying Boats scuttled off Rottnest Island in the years 1945–1946.* Report – Department of Maritime Archaeology, Western Australian Maritime Museum, No. 125.

'*Australia's Pearl Harbour: The Japanese raid on Broome, March 3 1942*'. The National Broadcaster was unable to proceed, partly due to internal restructures and the matter was put 'on hold' until another backer, or alternative funding source, could be found.

In the interim, Broome resident Mr Geoff Parker became involved with the wrecks. An avid diver with a keen eye for history, he had dived on some of the 'deepwater sites' after comparing notes with fishing friends and in returning to them with the aid of GPS and traditional transit marks he began to develop site plans and an interest in the preservation of the sites. He had also scoured plans of the aircraft and in one instance predicted where the navigator's desk at one of the 'drying sites' would have been located. He then visited the site, on low water spring tides, located the remains of a table, reached beneath it through the mud to find a sextant in its storage case. This was immediately reported to the Museum and to the Historical Society and the sextant is presently being conserved at Fremantle, ready for return to Broome when the process is complete. Around the same time, Geoff Kimpton, the Museum's chief diver, who was then on leave in Broome, joined Mr Parker in recording the two sites and both fixed their position with a GPS and produced a 3D plan.

With other divers gaining access to GPS systems and with interest in the 'deepwater' wrecks clearly increasing in Broome, it was evident that the Museum had to act quickly in the inspection of the 'deep water sites' and fortuitously another reliable funding source appeared.

After completing a very well received film on the SS *Xantho* program, in late 2000, former professional diver, qualified maritime archaeologist and noted film-maker Ed Punchard began developing a '*Shipwrecks Detective*' series. This was to be produced in association with the Department of Maritime Archaeology and three projects, *Batavia* excavations, the Rottnest Graveyard and Broome Aircraft Wrecks programs were considered suitable subject matter. With the backing of Museum staff, Mr Davison presented his 1998 proposal to Prospero and it was accepted as a viable proposition, adding another dimension to the saga while at the same time providing the funds needed in order to complete the search and inspection regime.

The Museum's archaeological investigations.

Over the course of two field seasons between 3-25 May 2001 & 10-20 August 2001 the Museum team (including, Kimpton, Baker, Davison, Jung, Parker and John Lashmar, with logistical and other assistance provided by Prospero Productions) commenced further work at the sites. The remote sensing phase led by Jeremy Green resulted in the location of all the submerged sites, some producing remarkable side scan sonar images. A comprehensive oral history program was conducted by Corioli Souter resulting in interviews with some of the World War Two aviators mentioned above flown in by Prospero Productions. Finally, a site inspection and test excavation regime was commenced under McCarthy's leadership.

As a result of this work it has become apparent that these sites are rich repositories indeed, rivalling many shipwrecks in the wealth of materials contained within them. In addition to an assessment of the fabric of each aircraft, and the technical information that could be obtained, the question put by the archaeological director in the latter instance was: 'what, would a person or a child keep if ordered to board an aircraft and to jettison all personal effects in order to save space and weight in order to carry more

refugees?' The material evidence has indicated that it things that were held most dear and that were small and portable.

One survivor recalled that each person brought on board only 'a little bit of hand luggage and they placed it anywhere there was room' and this is an indication that personal possessions may be found throughout each aircraft not just in one compartment. Further these personal items reveal more about the age, gender, social status and nationality of the refugees than any of the histories or recollections of the servicemen who met up with the Museum's team. This was not surprising when one considers that a Catalina site excavated during this season was identified as the Royal Netherlands Navy Air Force PBY Catalina Y59, by cutlery found on site bearing this number. Fortuitously Mr Fritz Van Hulssen, the radio operator/navigator on-board Y59 on the occasion of the raid was present in Broome during the excavation. He and a number of other survivors joined in a number of commemorative activities and in the preparation of an oral history record.[20]

The program has resulted in a detailed archaeological report being prepared, a web site created (with assistance from Mr Jon Davison), a range of artifacts recovered and conserved (by Jon Carpenter), a film produced (by Prospero Productions), an extensive management plan developed, and an approach being made to the Heritage Council to consider the places for entry into the State Register. This latter move has widespread support. For the first time these initiatives are now based on a full knowledge of the place and extent of the remains and the materials contained within.

Being the first such sites subject to protection strategies and assessment within the full range of regional maritime sites generally and then having been the first subjected to an archaeological testing regime, *Flying Boats Wreckage Site, Broome* is a benchmark for similar remains in the waters of other Australian States.

The Aircraft[21]

The lost aircraft were:

RAAF	1 x Short Empire	A 18-10 On lease from Qantas Empire Airways
RAF	2 x PBY-5 Catalina	W8423 & W8433
MLD[22] (RNN-AS)	5 x Dornier 24K 4 x PBY-5 Catalina	X1, X3, X20, X23 & X28 Y 59, Y60, Y67 & Y70
USN	2 x PBY-4Catalina	Patrol Wing 10
Qantas Empire Airways & Imperial Airways	1 x Short Empire	G-AEUC '*Corinna*'

i) The Short S.23 'C' Class Empire Flying Boat

This aircraft was designed by leading British aircraft manufacturers, Short Brothers, in a successful attempt to surpass all other aircraft of its time in

20 Souter, C., Port of refugees: Archaeology and oral history of WW2 flying boat wrecks in Broome WA in prep.

21 A précis of detailed research notes kindly provided by Ph.d Candidate Silvano Jung, a member of the Museum's excavation team. (Thesis in prep).

22 MLD: Marine Luchtvaart Dienst. The Royal Netherlands Naval Air Service.

terms of luxury and comfort. They also represented a major step forward in flying boat design and, as a result, Imperial Airways (later British Overseas Airways Corporation) purchased twenty-eight of these machines, sight unseen.

They are described thus:

> The tapered cantilever wing carried monocoque mountings for the four 920 h.p. Bristol Pegasus XC radial engines, which drove three-bladed de Havilland variable-pitch propellers, the fuel tanks being situated within the wing structure. The deep hull contained two decks, the upper having the flight deck at its forward end, with seating for captain, first officer, and radio operator. Aft of the flight deck, a longitudinal partition formed the ship's clerk's office to starboard and a 3,000-pound capacity mail and freight hold to port. At the forward end of the lower deck lay the mooring compartment, and aft of this the forward cabin, the galley, midship cabin, promenade cabin, after cabin, and a further mail, freight, and baggage hold in the stern. Toilet facilities were provided amidships. The S.23 was fitted out for twenty-four day or sixteen night passengers.[23]

In 1937 an air route between England and Australia was opened by Imperial Airways (later BOAC) in conjunction with Qantas Empire Airways (QEA). One of the machines that pioneered the mail route on this run was the Short S.23 'C' Class Empire flying boat *Centaurus*, registration number G-ADUT. In commencing a regular mail run RMA *Centaurus* flew from Darwin to Brisbane and then to Sydney Harbour. After a return flight back to Sydney from Auckland in January 1938, the aircraft stirred great interest and some disappointment:

> Some fifty thousand people turned out to see it. No one was allowed on board and the visit, like all other matters connected with flying boats as 1937 ended, left a sour taste. There was still to be a considerable wait before flying boats, on a regular basis, were to bring grace and spectacle to Sydney Harbour.[24]

At the outbreak of the war with Germany, the RAAF cast around for suitable long-range aircraft and *Centaurus* was leased into service together with the QEA Empire flying boat *Corinna*, registration number G-AEUC. While *Corinna* was earmarked for a transport role and maintained its original QEA designation, *Centaurus* was modified for action and was given the RAAF designation A18-10.[25] Under-wing bomb racks, capable of carrying 500 lb bombs, were installed together with two former World War One Lewis guns mounted each side of the rear freight compartment, and a machine gun mounted on top of the hull.

A18-10 was allocated to No. 11 Squadron at Richmond, N.S.W., and then moved to New Guinea in September 1939. Operating from Port Moresby, it was employed in reconnaissance patrols in the region that were aimed at locating German surface raiders. As the Catalina type came to prove its worth as an attack aircraft, the more cumbersome A 18-10 came to be used more as a passenger carrier and in that role it assisted in the evacuation of nearby islands and Port Moresby. As some indicator of events that were to follow, on one flight conducted in December 1941, forty-two adults and nine children

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23 Duval, G. 1966. *British flying-boats and amphibians 1909-1952*. Putnam, London, pp. 190-191.

24 Gunn, J. 1985. *The defeat of distance: Qantas 1919-1939*. University of Queensland Press, St. Lucia, p.318.

25 Vincent, D. 1984. 'The RAAF's Empires'. *Aviation Heritage: the Journal of the Aviation Historical Society of Australia*. Vol. 21, No. 4, pp.72-75.

were crammed into the hull producing a take-off weight far exceeding the aircraft design limits. [26]

In February 1942, the RAAF's Empire flying boats were allocated to No. 33 Squadron based at Townsville and duties there also involved the transport of the dead. Under the command of Flight Lieutenant Keith Caldwell, A18-10 flew to Broome and then on to Tjilatjap, Java, where it was to assist in the evacuation flights.[27] Upon the aircraft's return to Broome sometime during 2/3 March 1942, A18-10 was the first flying boat to be destroyed as a result of Japanese air raid.

ii) The Dornier Type

In 1934 the Dutch Navy was seeking to purchase advanced new flying boats to patrol their vast domain in the Dutch East Indies. The specifications for the new craft required that they be all metal construction, comfortable over long distances, have three engines, a maximum speed of around 300 km/h. [28]

The German manufacturer Claude Dornier produced a design which aimed at meeting the requirements of both the Dutch and the German military. Four prototypes were manufactured by his company, later known as Dornier-Werke GmbH. The first two were for German use and the last two variants Do-24V3 and Do-24V4 were for the Dutch Marine Luchtvaart Dienst (MLD). The production model came to be known as the Do.24K-1.[29]

The MLD lost five Dornier flying boats in Roebuck Bay as a result of the air raid. These were the prototype, Dornier Do.24V3: X-1 and the Dornier Do.24K-1 type : X-3, X-20, X-23 and X-28.

X-1 was assembled in 1937 at Friedrichshafen in Germany from parts that were manufactured at Rickenbach (tail), Lowenthal (wings and engine gondolas) and at Ravensburg (engine stubs). On 2 July 1937 it was test flown and on the following day, the aircraft was offered to the Dutch Navy for sea trials. On acceptance it was transported by ship from Hamburg to Surabaya Harbour, Java, where it was allocated to the reconnaissance flying school. In February 1942 the aircraft joined *Groep Vliegtuigen* 7 (*GVT7*) at Lake Grati, in Java and on the night of 2 March 1942 it proceeded to Broome, arriving at approximately 8.30am the following morning.

X-3 was built at Altenrhein near the German, Swiss, Austrian boarder late in 1937 and transported from Hamburg to the NEI in January 1938. In February 1942, X-3 flew from Koepang to Surabaya and on 1 March 1942, the aircraft flew to Broome via Lengkong, arriving on the morning of 3 March 1942.

X-20 was flown from Friedrichshafen to Papendrecht in Holland on 14 February 1939 and entered service after the application of Dutch insignia. A week later the aircraft was shipped to the NEI where it sank a Japanese schooner and was involved in an aerial battle with Japanese fighters in December 1941. The aircraft was then transferred to Lake Grati for special operations over the Savoe Sea and on 2 March 1942 is was sent to Broome, arriving there on 3 March. [30]

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26 Vincent, D. 1984. 'The RAAF's Empires'. *Aviation Heritage: the Journal of the Aviation Historical Society of Australia*. Vol. 21, No. 4, pp.72-3).

27 Ibid., p.74.

28 de Zwart, A. 2002. 'Dornier Do.24' (http://masterdrew.topcities.com/). Accessed 18 March 2002.

29 Ibid.

30 Ibid.

X-23 was flown from Germany to Papandrecht and entered service on 21 April 1939. In that same year, it was shipped to the NEI. In March 1942, X-23 was transferred to Lengkong and evacuated to Australia on 2 March, arriving at Broome on 3 March 1942.

X-28 was flown from Germany to Papandrecht and entered service in August 1939. By December 1941, it was stationed at Surabaya and while shadowing a Japanese transport fleet Makassar Strait in January 1942, it sustained damage by gunfire. A few days later it destroyed supplies and installations at Pontianak and in the next month it was involved in a rescue of survivors from two Dutch ships. It was then ordered to Lengkong Lake on 1 March 1942 and left there the following day to arrive at Broome on the morning of 3 March 1942.

iii) PBY-4 Catalinas

The PBY Flying Boat was developed by Consolidated Aircraft Corporation in San Diego, California.[31] The United States Navy (USN) originally ordered thirty-three PBY-4 Flying Boats, the first being accepted into service in May 1938. A later variant, the PBY-5 type, are mainly distinguished from earlier types by a 'blister' observation hatch and by their engines. The English, who also purchased a large number, referred to as Model 28-5, coined the name 'Catalina' for these aircraft following a suggestion from the owner of Consolidated Aircraft Corporation to Winston Churchill.

Four Catalinas, Y 59, Y60, Y67 & Y70 belonged to the MLD (the air wing of the Royal Netherlands Navy). The Dutch used metric measurements and this type of machine is otherwise identical to the PBY-5 Catalina, except that metric calibrated gauges were fitted instead of US Imperial gauges. PBY-5 Catalinas also had the more powerful Pratt and Whitney R-1830-82 engines.

As with the Short empire types, more archival research is required before the individual service history of the various Catalinas lost in Roebuck Bay can be considered complete. It is known, however, that pilots from Consolidated flew the MLD PBY-5 Catalinas to Manila (Philippines) in November 1941, and that Dutch pilots flew them on to Surabaya where they entered service with the MLD.[32]

The two RAF machines lost in Roebuck Bay were both from 205 Squadron. Catalina FV-N was a Model 28-5, which was purchased directly from Consolidated in America. Flight Lieutenant Tamblyn operated the aircraft at time of loss.[33] Catalina FV-W (ex-MLD Y-54) is a PBY-5 and was operated by Flight Lieutenant Lowe. Both aircraft had arrived from Tjilatjap, Java, on the morning of 3 March 1942.[34]

The two USN aircraft lost were PBY-4 types, from Patrol Wing Ten and were veterans of the Philippines conflict. It is believed by researcher Silvan Jung that they had Bureau of Aeronautics Numbers [BUAERNO] 1227, flown by Lieutenant (jg), Ira W. Brown, and BUAERNO 1237 flown by Lieutenant (jg),

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31 PBY: P=Patrol; B=Bomber; Y= Consolidated. Jung pers. com. 16/09/2002.

32 Messimer, D. 1985. *In the hands of fate – the story of Patrol Wing Ten. 8 December 1941 to 11 May 1942*. Naval Institute Press. Annapolis, Maryland:24.

33 Dorny, L. 2002. 'Not Nearly Enough'. http://groups.yahoo.com/group/PBY/message/7190). In prep. Accessed 19 March 2002.

34 Ibid.

Leroy C. Deede, USN..[35] Aircraft Status Cards, one of the primary references for obtaining information on US military aircraft, are presently being investigated.[36].

Further archival research, in conjunction with analysis of secondary reference material will reveal detailed information on the operational service lives of all of these aircraft.

13. 2 PHYSICAL EVIDENCE

Flying Boat Wreckage Site consists of two groups of fifteen World War Two Flying Boat wrecks lying on the mudflats and in the waters of Roebuck Bay, Broome at around 17°59'S., 122° 15'E.

These appear as a group of 'drying wrecks' in which there are 6 aircraft and a group of 'deep water wrecks' in which there are 9.

The drying wrecks lie in a group one nautical mile (c. 1.8km) from the town and these dry only at low water spring tides and are readily accessible over the tide.

The 'deep water wrecks' lie only slightly further offshore, but in lying on the side of a sloping mud bank or on the seabed in deeper water, are submerged at all times.

The aircraft lie in a variety of configurations on the seabed, that indicates that they all burnt close to the waterline before they sank, with wings, tail-planes and engines collapsing around the hulls as they descended the short distance to the seabed.[37] Despite this, today they all each remain effectively as a 'cup' all containing an assemblage reflecting the materials carried by civilian men, women and children in a hurried and enforced evacuation situation—the social implications of the remains are rich indeed. The technical data and information contained in the wrecks of these three types of allied flying boats relates to their construction, mode of operation and in their being relatively unexcavated examples of each type.

Much of the materials from the wrecks was quickly covered in deeper layers of mud, both inside and outside the hulls, serving to trap it in an anaerobic environment allowing even quite fragile objects to remain preserved. As time progressed a light layer of a rock-hard substance called concretion covered all bar the toxic substances (e.g., brass) serving to add further to the protective layers.

As comparatively well-preserved sites, each aircraft (where the deposit was tested) surprised even some of the most experienced archaeologists in the team due to the wide range of materials found.

13. 3 COMPARATIVE INFORMATION

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13. 4 KEY REFERENCES

Prime, M. *WA's Pearl Harbour: The Japanese raid on Broome* The Royal Australian Air Force Association, Aviation Museum, Bull Creek, Perth, 1985.

35 Ibid.

36 Jung, in prep.

37 Jung, S., 2001. *Wings beneath the sea.* Unpublished Master's Thesis. Northern Territory University. Darwin.

Davison, Jon and McCarthy, M., Western Australian Maritime Museum, Website
http://www.mm.wa.gov.au/Museum/march/treasures/treasures.html

13. 5 FURTHER RESEARCH

The Department of Maritime Archaeology at the Western Australian Maritime Museum will continue to use its expertise in monitoring the sites and will seek to assist other stakeholders, e.g. the Broome Historical Society and the RAAF Aviation Museum in the provision of interpretive material and data.

The Department will also act in accord with the stakeholders in responding to perceived, or actual, threats to the fabric of the wrecks and the materials contained within.

The Department is presently assisting Mr Silvano Jung in the preparation and presentation of a PhD thesis focussing on the Broome Aircraft. In that comprehensive study provision will be made for further minimal-disturbance fieldwork at the sites.