AUSTRALIA’S UNDERSEA AERIAL ARMADA:
the aviation archaeology of World War II flying boats lying in Roebuck Bay,
Broome, Western Australia.

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Faculty of Law, Business and Arts
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I hereby declare that the work herein, now submitted as a thesis for the degree of Doctor of Philosophy by research is the result of my own investigations, and all references to ideas and work of other researchers have been specifically acknowledged. I hereby certify that the work embodied in this thesis has not already been accepted in substance for any degree, and is not being currently submitted in candidature of any other degree.

Silvano Jung
DEDICATION

To my parents, Vittorio (1926 - 2005) and Rosina Jung for their loving support
ABSTRACT

In maritime archaeology, the integration of historical and archaeological data generally focused on historic shipwreck sites to enable research into past lifeways (Muckelroy, 1976). The sea, however, holds many aspects of past human behaviour that relate not only to shipwreck sites and the societies that built those ships, but also to aviation. This study shows that the application of a combined study of written and oral historical records, together with archaeological data, can provide insights into the cultural material left in the archaeological record of a recent past event in Australia. The assemblage of 15 flying boat wrecks left on the bottom of Roebuck Bay tells a story of how they were lost and what has happened to them since their sinking.

The aerodrome at the Western Australian town of Broome (Rubibi – the traditional lands of the Yawuru people) was the target of a Japanese air raid on 3 March 1942. The aim of the air raid was to neutralise the aerodrome and to destroy all aircraft in the area in order to close the aerial escape route from Java in the Netherlands East Indies, or NEI, now Indonesia. The rapid Japanese expansion into the NEI forced the evacuation of thousands of Dutch civilians and Allied military personnel by sea and air to Australia. The Java air lift to Broome, however, finished on 27 February 1942. The Japanese invasion of Java on 1 March 1942 forced the remaining naval aviation units of the Marinелuchtvartdienst (MLD), the Royal Air Force (RAF) and the United States Navy (USN) to evacuate to Australia. The destination for these units was also Broome.

Two flying boats of the USN and two Short Empire flying boats (one operated by the Royal Australia Air Force - RAAF and the other by the British Overseas Airways Corporation - BOAC) were already at Broome on the evening of 2 March 1942. 11 Java-based flying boats arrived there early the following morning. The scene in Broome’s Roebuck Bay resembled a floating armada. Within hours all of the flying boats and all of the aircraft at the aerodrome would be destroyed. While nothing remains of the terrestrial sites destroyed at the aerodrome, in the sea the remains of the flying boats endure, as well as another two land based aircraft, American and Japanese that are yet to be found.

This thesis demonstrates that the Broome flying boat wreck sites represent a significant archaeological resource that provides insights into the air raid and nomothetic principles of site formation process of a new class of archaeological site – submerged aircraft. New data are presented to predict wreck site location, as well as the likely condition of the wrecks. This thesis identifies the sites of ten of the 15 recorded flying boats destroyed in the raid, and provides information on the possible location of the remainder. Analysis is undertaken of how the wreck sites have re-entered a living context as important places not only for tourism, but also as a memorial to those that lost their lives. This thesis provides interpretive data that can be used to increase the public awareness of these sites. The processes of formally identifying wrecked aircraft enables links to be re-established between the people associated with the air raid and the cultural material record in Roebuck Bay. The research in this thesis, furthermore, develops our understanding of how humans behave in a time of crisis. The stories recorded are of suffering, hope and survival from this devastating air raid. They are an insight into Australian, Dutch, British, US and Japanese history that was not previously confirmed, a history whose associations with the archaeological record became lost and forgotten on the sea bed of Roebuck bay.
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List of abbreviations

A/C - Aircraft
A/B - Able Seaman (RAN)
AA - Anti Aircraft (gun)
ADF - Australian Defence Force
AFAHM - Royal Australian Air Force Association Aviation Heritage Museum
AIF - Australian Imperial Force
AMM1c - Aviation Machinist Mate 1st Class
AMM2c - Aviation Machinist Mate 2nd Class
AMM3c - Aviation Machinist Mate 3rd Class
AO - Oiler or Fuel oil tanker
ASR - Air Sea Rescue
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVD</td>
<td>Seaplane tender (highspeed)</td>
</tr>
<tr>
<td>AVP</td>
<td>Small seaplane tender</td>
</tr>
<tr>
<td>BAC</td>
<td>Broome Aircraft (WAMM artefact accession code)</td>
</tr>
<tr>
<td>BEM</td>
<td>British Empire Medal</td>
</tr>
<tr>
<td>BHSRM</td>
<td>Broome Historical Society Museum</td>
</tr>
<tr>
<td>BOAC</td>
<td>British Overseas Airways Corporation</td>
</tr>
<tr>
<td>BPM</td>
<td>NV De Bataafsche Petroleum Mpij</td>
</tr>
<tr>
<td>BUAERNO</td>
<td>Bureau of Aeronautics Number or ‘BuAero’</td>
</tr>
<tr>
<td>CAC</td>
<td>Commonwealth Aircraft Corporation</td>
</tr>
<tr>
<td>CDT</td>
<td>Commandant</td>
</tr>
<tr>
<td>CINCAF</td>
<td>Commander In Chief, Asiatic Fleet</td>
</tr>
<tr>
<td>CO</td>
<td>Commanding Officer</td>
</tr>
<tr>
<td>Col</td>
<td>Colonel</td>
</tr>
<tr>
<td>CPO</td>
<td>Chief Petty Officer (RAN)</td>
</tr>
<tr>
<td>Cpt</td>
<td>Captain</td>
</tr>
<tr>
<td>CVA</td>
<td>Civil Aviation Department</td>
</tr>
<tr>
<td>DD</td>
<td>Destroyer</td>
</tr>
<tr>
<td>DFC</td>
<td>Distinguished Flying Cross</td>
</tr>
<tr>
<td>DGPS</td>
<td>Differential Global Positioning System (sub-metre accuracy)</td>
</tr>
<tr>
<td>Do</td>
<td>Dornier</td>
</tr>
<tr>
<td>E/A</td>
<td>Enemy aircraft</td>
</tr>
<tr>
<td>E/F/B</td>
<td>Empire flying boat</td>
</tr>
<tr>
<td>EAMS</td>
<td>Empire Air Mail Scheme</td>
</tr>
<tr>
<td>Ens</td>
<td>Ensign</td>
</tr>
<tr>
<td>ERA</td>
<td>Engine Room Artificer</td>
</tr>
<tr>
<td>F/B</td>
<td>Flying boat</td>
</tr>
<tr>
<td>F/Lt</td>
<td>Flight Lieutenant</td>
</tr>
<tr>
<td>FAB</td>
<td>Flying Air Base</td>
</tr>
<tr>
<td>FTR</td>
<td>Failed to return</td>
</tr>
<tr>
<td>GmbH</td>
<td>Gesellschaft mit beschränketer Haftung (B.V.)</td>
</tr>
<tr>
<td>Gms</td>
<td>Gouvernements motor schip (Government Motor Ship)</td>
</tr>
<tr>
<td>GMT</td>
<td>Greenwich Mean Time</td>
</tr>
<tr>
<td>Gp/Cpt</td>
<td>Group Captain</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>GVT</td>
<td>Groep Vliegtuigen (GVT – aircraft group)</td>
</tr>
<tr>
<td>HAL</td>
<td>Holland America Line</td>
</tr>
<tr>
<td>HMAS</td>
<td>His/Her Majesty’s Australian Ship</td>
</tr>
<tr>
<td>HMS</td>
<td>His/Her Majesty’s Ship</td>
</tr>
<tr>
<td>HOMSD</td>
<td>Staff Officer?</td>
</tr>
<tr>
<td>Hr Ms [Dutch]</td>
<td>Harer Majesteits or Zijner Majesteits (HNLMS [English] His/Her Majesty’s Netherlands Ship)</td>
</tr>
<tr>
<td>HSK</td>
<td>Handelsstörkreuzer (commerce disruption cruiser)</td>
</tr>
<tr>
<td>IAL</td>
<td>Imperial Airways Limited</td>
</tr>
<tr>
<td>IJN</td>
<td>Imperial Japanese Navy</td>
</tr>
<tr>
<td>JAAF</td>
<td>Japanese Army Air Force</td>
</tr>
<tr>
<td>KLM</td>
<td>Koninklijke Luchtvaart Maatschappij</td>
</tr>
<tr>
<td>KM</td>
<td>Koninklijk Marine (Royal Netherlands Navy - RNN)</td>
</tr>
<tr>
<td>KMR</td>
<td>Koninklijk Marine Reserve</td>
</tr>
<tr>
<td>KNIL</td>
<td>Koninklijk Nederlands Indisch Leger (Royal Netherlands East Indies Army)</td>
</tr>
<tr>
<td>KNILM</td>
<td>Koninklijke Nederlandsch-Indische Luchtvaart Maatschappij (Royal Dutch East Indies Airways)</td>
</tr>
<tr>
<td>KPM</td>
<td>Koninklijke Paketvaart Maatschappij (Royal Packet Navigation)</td>
</tr>
</tbody>
</table>
Ku  - Kokutai (Aircraft group – Japanese)
LAC  - Leading Aircraftman
Lb/Lbs - pound/s
Lt - Lieutenant
Lt (jg) - Lieutenant (junior grade)
Lt/Cdr - Lieutenant Commander
Lt Col - Lieutenant Colonel
Ltz 2  - Luitenant ter zee der 2e klasse KMR
Ltz 3  - Luitenant ter zee der 3e klasse KMR
MIA - Missing in action
ML-KNIL  - Militaire Luchtvaart van het Koninklijk Nederlands-Indisch Leger (Royal Netherlands East Indies Army Air Force)
MLD  - Marineluchtvaardienst (Royal Netherlands Naval Air Service - RNNAS)
MTB  - Motor torpedo boat
MV - Motor vessel
MVKM  - Marinevliegkamp (Naval station) Morokrembangan
MVKP - Marine VliegKamp Tandjong Priok
NAA  - National Archives of Australia
NAS  - Naval Air Station (USN)
NASA - National Aeronautics and Space Administration
NB - Naval Base
NCO  - Non Commissioned Officer
NEI - Netherlands East Indies (now Indonesia)
NEIAF - Netherlands East Indies Air Force
NT - Northern Territory
NV - Nederlandse Vliegtuigenfabriek (Netherlands Aircraft manufacturer)
NWA  - North West Area (Australia)
OMSD2 - Marinestoomvaartdienst 2e (Engineer Officer 2nd Class)
OZWNR 3 KMR - Officier Zeewaarnemer 3 Koninklijk Marine Reserve (Naval Observer Officer 3rd Class Royal Naval Reserve)
P/O  - Pilot Officer
PAA - Pan American Airways
Pan Am - Pan American World Airways
PBY - Patrol Bomber Consolidated
POW - Prisoner of war
QANTAS - Queensland and Northern Territory Aerial Service – Q.A.N.T.A.S. (became ‘Qantas’ after 1967?)
QEA  - Q.A.N.T.A.S. Empire Airways
RAAF - Royal Australian Air Force
RAF - Royal Air Force
RAN - Royal Australian Navy
RANR - Royal Australian Navy Reserves
RCAF - Royal Canadian Air Force
RLM - Reichsluftfahrtministerium (The Reich Air Ministry)
RMA - Royal Mail Aircraft
RM2c - Radio Man 2nd Class
RNZAF - Royal New Zealand Air Force
RT - Radio Transmission (logs)
SCUBA - Self Contained Underwater Breathing Apparatus
SSBA - Surface Supplied Breathing Apparatus
Sgt/Sgts - Sergeant/Sergeants
Abeam - At right angles to the keel of the boat, but not on the boat.
Aft - The back part of/or the rear of a boat.
Afterbody - The rear section of a flying boat fuselage from the step to the sternpost.
Aileron - The movable areas of a wingform that control or affect the roll of an aircraft by working opposite one another — up-aileron on the right wing and down-aileron on the left wing.
Amidships - The centre fore and aft line of a boat.
Analogy - A means of reasoning based on the assumption that two things are similar.
Antiquarian - A term used in the eighteenth and nineteenth centuries referring to one who collected antiquities for their intrinsic value.
Bollard - A vertical post, or fitting forming posts, in wood or metal for making fast cable, etc.
Bow - The fore most part of the hull.
Coaming - A padded, protective rim around an open cockpit.
Chine - A line formed where the sides of a boat meet the bottom. Soft chine is when the two sides join at a shallow angle, and hard chine is when they join at a steep angle.
Cruciform - Cross-shaped tail (pertaining to Catalinas).
Elevator - The movable part of a horizontal airfoil which controls the pitch of an aircraft; the fixed part being the stabiliser.
Empennage - An aircraft’s tail group, includes rudder and fin, and stabiliser and elevator.
Ferry Flight - Flight for the purpose of (1) returning an aircraft to base; (2) delivering
an aircraft from one location to another; (3) moving an aircraft to and from a maintenance base.

**Floatplane**
- A water-based aircraft with one or more mounted pontoons, as differentiated from a hulled SEAPLANE or Flying Boat, but sometimes used generically.

**Forebody**
- The forward section of a flying boat from the step to the bow.

**Friendly Fire**
- Accident attacked by units of one’s own forces.

**Fuselage**
- An aircraft’s main body structure housing the flight crew, passengers, and cargo and to which the wings, tail and, in most single-engined airplanes, engine are attached.

**Hind cast**
- Known or closely estimated inputs for past events entered into a model to see how well the output matches the known results.

**Hull**
- The boat as distinct from her superstructure.

**Keel**
- The fore and aft members in a boat to which the frames and garboard strake are fastened, or if diagonal planked boat, where the planks end.

**Lines**
- A general term applied to the drawing or design of a boat as depicted by fore and aft lines and cross sections.

**Loci**
- A place that contains a cluster of wreck sites, lost during either a singular or multiple event.

**Longeron**
- A main longitudinal strength member of a fuselage or nacelle.

**Mainplane**
- General term for the entire wing, which is a throw back to when aircraft had more than one wing, hence, the main wing.

**Mainspar**
- Wing box section to which leading and trailing edges and sailplane sections of the wing are attached. The mainspar usually contains the fuel tanks.

**Mainspar boom**
- Lower and upper girders of the wing box section.

**Metacentre height**
- The point of intersection of a vertical line drawn through the centre of gravity of a line drawn through the centre of buoyancy when she is heeled. To ensure that a ship will come upright when she is heeled the metacentre must be above the centre of gravity.

**Monocoque**
- Type of fuselage design with little or no internal bracing other than bulkheads, where the outer skin bears the main stresses; usually round or oval in cross-section. Additional classifications are (1) Semi-Monocoque, where the skin is reinforced by longerons or bulkheads, but with no diagonal web members, and (2) Reinforced Shell, in which the skin is supported by a complete framework or structural members.

**Nacelle**
- A streamlined enclosure for an aircraft engine.

**Neaps**
- Tidal condition whereby there is little variation between high and low tide.

**Oleo leg**
- Telescopic gas-filled landing gear.

**Pitot-static tube**
- An instrument for measuring air speed – on Catalinas, this is found on the port wing.

**Planing step**
- Section of the fuselage that breaks the surface tension of water once the aircraft has reached flying speed.

**Port**
- The left hand side of the boat looking forward.

**Pusher**
- A propeller mounted in back of its engine, pushing an aircraft through the air, as opposed to a tractor configuration.

**Ribs**
- The frames or timbers of a boat.

**Rudder**
- The movable part of a vertical airfoil, which controls the yaw of an aircraft; the fixed part being the fin.

**Sailplane**
- Outer sections of wing – attached to the mainspar.

**Skin**
- The outside or inside planking of a boat.

**Springs**
- Tidal condition whereby there is great variation between high and low tide.
tide – at Broome this is sometimes in the minus readings (below chart datum) at low tide.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sponson</td>
<td>A protrusion/walkway attached to the fuselage.</td>
</tr>
<tr>
<td>Standard dress</td>
<td>Hardhat (helmet) diving with surface supplied air.</td>
</tr>
<tr>
<td>Starboard</td>
<td>The right hand side of a boat looking forward.</td>
</tr>
<tr>
<td>Stem</td>
<td>The forward vertical continuation of the keel.</td>
</tr>
<tr>
<td>Step</td>
<td>A break in the planing bottom of a flying-boat hull which assists ‘unsticking’ from the water.</td>
</tr>
<tr>
<td>Stern</td>
<td>The rear most part of a hull.</td>
</tr>
<tr>
<td>Sternpost</td>
<td>The vertical member where the planking terminates aft.</td>
</tr>
<tr>
<td>Striken off</td>
<td>Formerly disposed of in records.</td>
</tr>
<tr>
<td>Stringer</td>
<td>Strengthening fore and afters connected to frames or timbers.</td>
</tr>
<tr>
<td>Trailing Edge</td>
<td>The rear most edge of an aerofoil.</td>
</tr>
</tbody>
</table>
CHAPTER 1: INTRODUCTION

1.1 Research aims

Given the vast amount of documentary source material available, from contemporary blueprints, servicing manuals, photographs, film and even sound recordings, it might be expected that early C20th military aircraft represent an extremely well defined and understood phenomenon. As with many other aspects of archaeological or historical study, closer analysis suggests otherwise (Holyoak, 2001:259).

Tuesday 9.30 am, Broome, Western Australia 1942: nine Japanese Zeros rounded Gantheaume Point and discovered 15 flying boats on Roebuck Bay. Within a few minutes, they destroyed all the flying boats and six aircraft at the aerodrome. Now, over 65 years since the air raid, tourists and archaeologists descend on the flying boat wrecks exposed at low tide and puzzle over what they are and how they got there. This thesis argues that the application of an integrated historical and archaeological, or aviation archaeological approach can solve Broome’s flying boat mystery - what happened to this synchronous concentration of flying boats; Australia’s underwater aerial armada. Specific wreck site identification is sought for the located sites and a prediction model is posited for the missing sites, providing not only data for cultural heritage managers, but also closure for the people involved in the air raid. Determining who those people are is a focus in this research, as well as indicating the possible links they may have to the objects they left behind.

Gosden and Marshall (1999:172) argue that objects are recontextualised ‘as objects of scholarly scrutiny’ and viewed as having a biography; a history. In this light, the Broome flying boats are a link with the air war in north Australia in WWII. Understanding the context of the historical and archaeological data of the air raid will, in this thesis, determine where specific wreck sites lie, in effect linking them to the people that were aboard:

At the heart of the notion of biography are questions about the links between people and things; about the ways meanings and values are accumulated and transformed. There are many ways of understanding these links and many ways of conceptualizing the objects which lie at the heart of these links (Gosden and Marshall 172).

Is the fabric of the material culture in Roebuck Bay, therefore, despite the claims of salvage, the years of submersion in sea water and the impacts by souvenir hunters, sufficiently intact to allow archaeologists to re-establish these links? To answer this question, the compilation and analysis of historical data, including the recording of participant accounts, is crucial in determining the nature of what archaeologists expect to find in the archaeological record. On the basis of a sound grounding in the chronology and nomenclature of each aircraft history (the circumstances of their arrival etc.), archaeologists can make valid assumptions about the past.
The flying boat wrecks in Darwin, another flying boat wreck loci, are now utilised as a fishing resource for anglers, and yet little is known about the aircraft’s operational service histories nor the circumstances of their loss (Flynn and Green, n.d.). Similarly, the flying boat wrecks in Broome, are not widely known. Some may even lie in a pristine condition, not visited since the day of their loss. Their hulls and their contents will be remarkably undisturbed (Bass, 1983:98). If Broome’s flying boats are relatively intact, certain patterns should be discernable in their fabric, indicating how they sank.

Determining site formation processes at wreck sites will indicate how aircraft sank and how cultural and environmental impacts have shaped the archaeological fabric at those sites. This shows that mainstream archaeological concepts such as site formation processes and site identification/delineation, are phenomena common to all archaeological sites, whether they be prehistoric or historic (Foard, 2001:101). Understanding the spatial relations of cultural material within and between sites in the landscape is also common to both prehistoric and historic archaeological data sets of which: ‘... the techniques of prehistoric archaeology, especially those relating to the study of landscapes – [are] a category with which the battlefield has close affinities’ (Carman, 1999:242). Study of the Broome flying boat wreck sites offer an opportunity to investigate how aviation archaeology can help to:

... provide insights into the past that are not necessarily available through other means, such as archival sources. At the very least it [aviation archaeology] should act as an independent test of histories created through other sources. It should have its own status as a reconstructive science (Veth and McCarthy, 1999:12).

Six wreck sites are exposed at low tide providing a tantalising glimpse as to what may be found in deep water. Determining patterns in the archaeological record in Broome has significant implications that give rise to theory building in aviation archaeology. In this instance, the accumulation of both historical and archaeological data sets enables the recognition of general laws that govern how flying boats sink, enabling predictions to be made about where and what are Broome’s missing flying boats: ‘predictive statements aim to build upon, and go beyond, the descriptive domains of historical particularism’ (Veth and McCarthy, 1999:12). Wreck site locations and identifications were not recorded in history. The study of aviation history and the concomitant rise of aviation archaeology have been slow to emerge, apparently due to lack of historical particularism by writers in a relatively new field:

Universities in the past have been extremely slow to recognize aviation history as a legitimate field for theses and dissertations, and scholars have not been anxious to enter the field. They have been intimidated by the terminology and the technology (Higham, 1992:92).

In the case of the Broome flying boats, this thesis argues that not all wreck sites have survived in situ. It has been determined that the result of a site formation process (specifically salvage), has left a pattern in the layout of wreck sites that suggests the sites that have been located to date, have survived because they were not salvaged. Those that were salvaged, have been
blown up by explosives; the pieces were removed and dumped elsewhere, leaving behind most
probably only a debris field.

Aviation archaeology, or more broadly ‘aerospace archaeology’, is an emerging branch
of historical archaeology. It is examined in an Australian context in this thesis, to provide
a verifiable account of important events in history and in the archaeological record that
are otherwise not well understood (Capelotti, 1998 and 2003; Gorman, 2005a and 2005b;
O’Leary, 2006). While aerospace archaeology covers the whole gambit of human flight, closer
analysis of Australian WWII aircraft wreck sites in particular, indicates that there are virtually
no archaeological data available. There has been little comprehensive historical research
undertaken on the aircraft wreck sites that archaeologists might expect to find, and like the early
days of maritime archaeology, aviation archaeology has ‘few comparative data with which to
work’ (Bass, 1983:97). At any aircraft wreck site, however, the research objective ‘should be to
determine its type and nationality as well as the circumstances leading to its final destination’
(Legendre, 2001:127). This work, in what was known as the South West Pacific Area (SWPA)
during WWII, with few exceptions, has not been conducted to archaeological standards. The
following defines what is aviation archaeology and the outcomes of that research elsewhere.

1.2 Defining aviation archaeology

A subdiscipline of archaeology...in its infancy worldwide...The field addresses both the
archaeology of single airplane wrecks and the archaeology of the support structures of
aviation, such as airfields and related structures (air operations centres, flight controls
etc.). Research issues focus on the archaeological site formation process of aircraft wrecks
and patterns therein; on the study of modern mass transportation systems, and their social
and political impacts; as well as on the interpretative uses of such sites for educational and
recreational purposes (Spennemann, 2000).

It is necessary to reiterate the definition for aviation archaeology above, as it is still the most
applicable in terms of defining the discipline as an anthropological pursuit. From this overview
of archaeological considerations regarding aircraft wreck sites and despite their relatively
recent antiquity, it is evident that aircraft as a class of archaeological site, ‘have proved
surprisingly complex, in typological terms, in assessing importance and in management needs’
(Holyoak, 2002:663). Understanding aircraft wreck sites as maritime aviation archaeological
sites is, however, a further aim in this research. This thesis will indicate the archaeological
and historical significance of a new class of archaeological site not previously considered in
mainstream archaeological research.

Gould (1983) is the first to use aircraft wrecks in a broad-based study of contextual sites
and their relationship to larger historical and anthropological themes (Capelotti, 1996a:19). Goul’d’s study of the aircraft wrecks from the Battle of Britain demonstrated ‘the need to
examine at least as carefully the behavioural processes that also affect the physical character
and deposition of wrecks’ (Gould, 1983:140). He is referring in this instance to the recycling
behaviour of the British towards crashed German aircraft and how that behaviour can alter interpretations of aircraft crash sites (Gould, 1983:139-140). So many aircraft losses presented the authorities with the problem of what to do with them, which led to many wreck sites being completely recycled for war materials (Fig. 1.1).

Other studies have looked at the value of aircraft wreck sites as rare examples of their type, to be used for reference purposes. Given the problems associated with contemporary documentary material:

… the only means of producing a new part (or aircraft) to the specifications of the original is by employing reverse engineering. In practice this means using surviving components as patterns (Holyoak, 2001:259).

Archaeological or obsolete aircraft, therefore, have the potential to act as source material for otherwise lost details of their construction. This implies that the machines being investigated are rare ie, despite large numbers of a particular aircraft having been manufactured, surviving examples are few. For example, although there were 42 Empire boats made, no operational examples have survived. The only place to observe an Empire boat, is in the archaeological record. For an overview of the three types of flying boats lost in Roebuck Bay, see Appendix 1.1. One type has virtually no technical information. No original line drawings of an Empire have survived, the best being a reconstruction of aircraft line work made for modelling (Appendix 1.2):

For all practical purposes, the drawings and most of the calculations have gone up in smoke and unless someone, somewhere, has a hitherto undiscovered hoard of prints, they too seem to have all disappeared…The fact that an authentic general arrangement drawing of an Empire ‘boat could not be found is a considerable drawback to a book of this kind. None of the existing three-view drawings, and most of them are no more that small scale diagrams, are wholly accurate and some are wildly inaccurate (Cassidy, 1996:iv).

Furthermore, given the wastage associated with war: ‘… as a rule, even where a number of aircraft survive, there are likely to be few examples of the earlier variants and many more of those last on the production line’ (Holyoak, 2001:260). This is true in the case of the Catalina flying boat where there are many later variants still in operational serviceability, but there are no earlier variants surviving, apart from either archaeological examples or highly modified hybrids with little original fabric. Components within the aircraft can also be important:

… For all aircraft, regardless of rarity, crash sites offer primary data on internal fittings and equipment, colour schemes and finishing techniques, field modifications, repairs and adaptations which together demonstrate how they were actually used operationally. Such information offers a useful check and supplement for documentary material but, more than this, provides a precise and unique reference as to the equipment used by a particular unit on a given day in a way that preserved examples, with their long history of repair, modification and restoration, cannot (Holyoak, 2002:662).

Furthermore, the materials used in aircraft are not well understood and neither are their long-term survival prospects good:
... the precise survival and extent of remains can only be established through excavation. In addition, the long-term properties within buried environments of many of the alloys and polymers employed in aircraft construction are not well understood and in this context the fundamental viability of in situ preservation as an effective conservation strategy is difficult to judge (Holyoak, 2002:662).

Holyoak’s 2001 and 2002 published works outlines the stance taken by English Heritage’s Monuments Protection Programme (see also: Holyoak and Schofield, 2002). Statutory protection
is seen as having only a minor role in the conservation of wreck sites. The programme aims at raising: ‘awareness amongst archaeological professionals and the public of the potential of this class of remains’ and ‘to encourage more data on amateur excavations to be entered into mainstream archaeological record systems’ (Holyoak, 2002:662-663). This last point is very important given that ‘many previous excavations have … gone largely unrecorded, the artefacts are unavailable for future study and a mass of material is now unprovenanced’ (Holyoak, 2002:662). It is particularly true in the case of the Broome aircraft wreck sites, which have undergone ‘digs’ that have produced important clues as to how some of the wreck sites can be identified. None of the previously collected artefacts from Broome, however, has been linked to a location, making it difficult to link those artefacts with the wreck sites that they came from (Jung, 2004).

One particular case study of aviation archaeology in the United States has important implications for interpreting aircraft crash sites. A Catalina flying boat wreck site was found in Kaneohe Bay, off the main Island of Oahu in Hawai‘i. The machine was lost during the Pearl Harbor air raid, but the archaeologists investigating this wreck site sought to answer questions relating to human behaviour that would help explain the condition of the wreck site and the circumstances of its loss (Rodgers et al. 1998). These studies are broadly are based on previous notions of antiquarian: salvage of wreck sites and artefacts for their intrinsic value, but they have come a long way in their methods analyses since the time aircraft wrecks were first exploited. The following section outlines the development of aviaiton archaeology and what its study represented.

### 1.2.1 The evolution of aviation archaeology

There is a considerable body of literature with the words ‘aviation archaeology’ somewhere either explicit or implied in their titles, for example: Final Flights: Dramatic wartime incidents revealed by aviation archaeology (McLachlan, 1989), Epics of aviation archaeology (Robertson, 1978); Aviation archaeology: a collector’s guide to aeronautical relics (Robertson, 1977); Hunting Warbirds: the obsessive quest for the lost aircraft of World War II (Hoffman, 2001); Wreck chasing: a guide to finding aircraft crash sites (Veronico, 1992). None of these texts, however, actually discusses archaeology; only recovery and restoration. The study of aircraft wreck sites had been, until relatively recently, the focus of antiquarians who value more the intrinsic value of artefacts rather than the historical context of their finds (Capelotti, 1999; Griffiths, 1996). Excavations at aircraft crash sites were not conducted initially according to archaeological standards. This is not to say that earlier antiquarian investigations of aircraft wreck sites were ‘wrong or immoral’ (Bass, 1983:96), but that antiquarian practices of aircraft recovery should be regarded as a step towards developing the study of aviation archaeology. So where and when did aviation archaeology emerge as a sub-field of historical archaeology?

The evolution of aviation archaeology has been compared to other sub-fields of archaeology: ‘The field is enduring the kind of slow particularistic infancy in many ways reminiscent of the maritime and industrial archaeologies of the 1950s and 1960s’ (Capelotti, 1996a:18).
Aircraft wreck sites, especially World War II (WWII) sites, were initially not considered by archaeologists, but by military personnel who made safe the unexploded ordinance and, of course, removed the remains of aircrew missing in action (MIA) (Hoshower-Leppo, 2001; Holland and Mann, 1996).

One of the world’s greatest concentration of aircraft wreck sites is reported to be in the Netherlands: ‘In fact, more [aircraft] came down in the Netherlands than in any other country in Europe, including Germany’ (Zwanenburg, 1978:9). Given the large number of Allied bombers that were lost in the Netherlands (the Germans predominantly lost fighters), the subsequent aircraft recovery focused on recovering unexploded ordinance and, hence, ‘is entirely a government affair, and is done by the Recovery Team of the Royal Netherlands Air Force’ (Zwanenburg, 1978:9). This situation has changed with the formation of the Nederlandse Federatie voor Luchtvaart Archaeologie (NFLA) in 1993, which aims at developing a solid and general structural solution for research and recovery of aircraft wreckage and MIAs of WWII (NFLA, 2001).

Elsewhere aviation archaeology is still seen as the prerogative of the owners of lost aircraft ie, the military. Understandably, the most important aim for post-WWII aircraft wreck searchers is the recovery of MIAs (Eames, 1999). The Australian Defence Force (ADF), for example, ensures that: ‘men and women of today’s Australian Defence Force will go to great lengths to ensure that those who have died in the service of our nation will be buried with honor’ (Callick, 2002:18). Once the human remains were removed, however, the wreck sites themselves were often ignored and left to aircraft salvors who see them as a ready made cache of spare parts for personal collections or for museum restoration projects (Jung, 2001:181).

The United States Navy (USN) has a progressive policy for aircraft wreck sites: ‘The USN maintains an interest in its cultural resources, wherever in the world they may be, in order to preserve its nation’s heritage in naval aviation’ (Jung, 2001:181). The USN, working with archaeologists, has started to look beyond aircraft wreck sites as either than memorials for the dead or a source of spare parts, to their importance as an anthropological resource (Rodgers, Coble and Van Tilburg, 1998).

The aviation archaeology of the Broome wreck sites shows an insight not only into intra, but also inter-site relationships that are characteristic of battlefield studies. Iconic American wreck sites such as USS Arizona at Pearl Harbor (Jasper, Delgado, and Adams, 2001; Linenthal, 1991), the H.L. Hunley and the USS Housatonic conducted by the US National Park Service are all battlefield studies in their own right, ‘as a single “naval engagement site”’ (McCarthy, 2006:363). From an Australian perspective, the recent discovery of HMAS Sydney and HSK Kormoran, once the excitement of their discovery subsides will provide researchers the opportunity to develop insights into the circumstances of the battle that sank both opponents. The Broome battlefield of Roebuck Bay (and its aerodrome – now an international airport site), therefore, exhibits patterning, or regularities in the archaeological record that would
otherwise not be evident had extensive alteration of the fabric at those sites occurred. It is these patterns, such as the extent, condition and spatial orientation of the archaeology that is unique to the study of aviation archaeology. Patterning in Broome is explained by independent tests between the two data sets.

Apart from some world famous wreck loci (see glossary), such as Truk Lagoon, Australia also has a number of aircraft wreck groups or loci that are attributable to combat losses or mishaps during and shortly after WWII (cf. Bailey, 2000). For example, Darwin Harbour (NT), Broome’s Roebuck Bay (WA), Rottnest Island (WA), Fenton airfield (NT) and Truscott air base (WA) are a few (Pearce and Alford, 2006). The war in north Australia was predominantly characterised as an air war, but with a number of sea-to-sea and sea-to-air conflicts (Alford, 1991; Lewis, 1997 and 1999; McCarthy, 1992; Clark and Jung, 2002). The archaeological evidence of that air war, therefore, is the remains of the aircraft and the infrastructure to support them ie, airfields, support bases and so on (Garrett, Stein, Bigourdan and Jeffery, 2006:78).

The archaeological record of that conflict has resulted in numerous airfields, associated cultural material and a significant number of terrestrial aircraft crash sites (Waters, 2003; Ralph, 2004; Lake, 2002). While many Japanese and Allied aircraft are also recorded to have been lost at sea, it is a particular class of aircraft, the flying boat, whose physical structures endure, and yet are so poorly understood (Jung, 1996). To this day, in Australian waters there are more flying boats discovered in the sea than land planes, although the inverse is relative to the actual number of land planes lost in water (Jung, 2000; Jung, 2001; Ford, 2004; Smith, 2004). In the Townsville area, for example, an aircraft wreck database has been compiled, indicating that there may be up to 202 possible wreck sites, both from WWII and post-WWII. None of these have been found (Garrett et al., 2006:78). Elsewhere in Queensland, however, other wreck sites have been found, for example, three Bell P-39 Airacobras off Cape Greenville and a B-17 near Albany Passage (Badger, 2003:35; The Age, 2007). In Victoria in 2005 a virtually intact Commonwealth Aircraft Corporation (CAC) CA-16 Wirraway was found in Lake Corangamite, revealed by receding waters caused by a protracted drought (Anderson, 2005:13). The eastern states have, in general, very few surviving aviation wreck sites on land, while most crashes at sea disappeared without trace. Occasionally, aircraft structures are dragged up in fishing nets that have sailed through known wreck site, revealing some spectacular finds (Smith, 2005:1). In time, more wreck sites will be found as archaeologists actively search for aircraft beneath the sea (Garrett, 2005:1 and 8). Although referring to a WWII Japanese barge that had drifted ashore on Cape York from Papua New Guinea, the following relates equally to the Broome flying boat wrecks: ‘I guess we are lucky that parts of Australia are so remote relics like these still exist’ (Badger, 2003:35).

1.2.2 Aviation archaeology’s overlap with maritime archaeology

Unlike maritime archaeology, which has finally obtained ‘recognition in most academic circles of underwater archaeology as a valid scientific discipline’ (Roper, 1978:7; McCarthy, 1998:34), the study of aircraft wreck sites of the early to mid 20th century is a similarly misunderstood
research subject. Archaeology of the recent past, however, presupposes that an object or a place does not need to have great antiquity to be of archaeological significance:

It should go without saying that archaeological evidence can be of any period before the present...This is a point which has been made many times: O.G.S. Crawford referred to obsolete aircraft as strictly archaeological, while Gordon Childe similarly speculated about the remains of his picnic lunch on Esher Common. We, like our predecessors, are busily creating our own archaeological record. Given time, this may be investigated by future archaeologists who wish to throw light on some aspect of our period which is not revealed by written documents. As a widespread example of the 20th-century archaeological record, one could quote the traces of two world wars which still litter Europe: bunkers, cemeteries, airfields, redeveloped towns and much else (Dymond, 1974:13-14).

Historical events, often, are not recorded or, recorded incomplete, or the records of those events that are made are themselves destroyed by intent or accident. However, an archaeological record requires that the spatial context for sites is understood. For example, Holyoak (2001:260-261) states that the Royal Air Force (RAF) recorded information about the manner of aircraft losses and the circumstances of their crews, and that location information was unnecessary. The locations of aircraft wreck sites, as a result, are not recorded, and in the rare instances where they are, that location is either erroneous or imprecise. This is the situation with the assemblage of flying boats in Broome, Western Australia; their location and identification are not known. It is generally known that the wreck sites occur in Broome’s Roebuck Bay, but where exactly is unknown (see Fig. 2.1). Even the number and the precise location of the exposed wreck sites at low tide, until recently, was not known (Dorny, 2000).

The north Australian region where the majority of operational losses incurred in battle may be found, is virtually an unexplored archaeological landscape. In Broome an air raid occurred that has left a material record on the sea floor, a snap shot of flying boat operations during 1942. Nowhere else in the world can such an archaeological landscape of this kind and magnitude be found, which in itself is testimony to both the success and human suffering of the air raid and yet it is poorly understood. The air raid resulted in the greatest concentration of flying boat wreck sites in Australia, almost akin to a ships’ graveyard, but instead contains rare flying boat types, some of which are extinct. Furthermore, they were lost within moments of each other, rather than being sunk over a period of time during different events.

Given there were flying boats belonging to four nationalities (Dutch, English, Australian and American) lost during the first air raid on Broome, the underwater environment conceals a complex archaeological landscape (Table 1.1 and Table 1.2). One reason why historians have overlooked the Broome aircraft wreck sites in the past is that:

The historiography of the Second World War for instance is conditioned by the politico-military preoccupations of documentary historians, where war as a process is addressed through the psychology of commanders, the industrial economies of nations and the deeds of heroes. The appearance of anything so basic as a distribution map in a conventional volume of Second World War history is a rare event indeed, whilst the typologies of defence sites...are simply not discussed in mainstream histories. Many historians are still reluctant to think in spatial terms, or to bother with fabric (Dobinson, et al., 1997:288-289).
CHAPTER 1: INTRODUCTION

Table 1.1  The archaeological matrix in Roebuck Bay showing the number and diversity of flying boat types together with their nationalities

<table>
<thead>
<tr>
<th>Flying Boat type</th>
<th>NEI</th>
<th>Australian</th>
<th>UK</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBY-4 (28-5) [Catalina]</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>PBY-5 (28-5MNE) [Catalina]</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PBY-5 (Mark I) [Catalina]</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Dornier Do 24K-1 (V-3)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Short S.23 Empire Flying Boat</td>
<td></td>
<td>1*</td>
<td>1*</td>
<td></td>
</tr>
</tbody>
</table>

*Owned by BOAC, but operated by the RAAF
*Owned by BOAC, but operated by QEA

Table 1.2  Historical nomenclature and serial numbers of flying boats lost in Roebuck Bay, listed by type

<table>
<thead>
<tr>
<th>Dornier Do 24K-1 (V-3)</th>
<th>PBY-4 (28-5MNE)</th>
<th>PBY-5 (Mark I)</th>
<th>Short S.23 Empire Flying Boat</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-1</td>
<td>#6</td>
<td>Y-59</td>
<td>A18-10</td>
</tr>
<tr>
<td>X-3</td>
<td>#7</td>
<td>Y-60</td>
<td>Corinna</td>
</tr>
<tr>
<td>X-20</td>
<td></td>
<td>Y-67</td>
<td></td>
</tr>
<tr>
<td>X-23</td>
<td></td>
<td>Y-70</td>
<td></td>
</tr>
<tr>
<td>X-28</td>
<td></td>
<td>FV-W</td>
<td></td>
</tr>
</tbody>
</table>

The air raid at Broome can also be classed as ‘simplified characterization (whereby few if any individuals are named and none considered as complex personalities)’ (Carman, 1999:233). The complexity and scale of modern warfare that was WWII rarely, if at all, documented the participants of small-scale conflicts, particularly during the time of Japanese expansion into southeast Asia, where there was no time to record passenger lists for ships and aircraft fleeing the encroaching threats. In times of crisis, humans become focused on survival rather than documenting how they survived. Reconstructing passenger lists is, therefore, an important focus of research for historians and archaeologists, as all had arrived by slightly different circumstances and luck.

Aviation archaeological research in this thesis, as a result, will be directed at recording and interpreting a synchronous archaeological landscape at the bottom of Roebuck Bay. This will enable an understanding of the events that occurred there, in a systematic and verifiable fashion, as well as to obtain an understanding of the fabric of the existing wreck sites. In this way, wreck site location, aircraft type, nationality, their origins and the circumstances of their loss shall be determined. The consequence of this line of research is that it will set an example as to the potentialities of aviation archaeology and, hence, change previous perceptions as to how aircraft wreck sites are regarded:
The subject [aviation archaeology] will become more important as battlefield tourism grows and the guardians and curators of military sites are faced with the prospect of pilgrims being increasingly replaced by tourists. In the presentation of battlefields of the recent past, the archaeologist is going to play as much an important part as the historian and museum curator. And this is before we consider the significance of tourism and the presentation of sites to a lay audience (Freeman, 2001:7).

1.3 Thesis outline

Chapter 2 provides an historical and environmental background to the material record found in Roebuck Bay. The chapter is divided into two parts based upon the causal effect of the Japanese air raid and the circumstances of the flying boats being in Broome. The Japanese participants are identified and their accounts of the air raid are recorded.

The second part concerns the resultant archaeological assemblage, with specific spacial data on wreck site location. Side-scan sonar data is analysed, enabling predictions to be made about the location of missing wreck sites.

Chapters 3, 4 and 5 outline the aircraft service histories of the flying boats. These chapters analyse and compile the historical data, linking them to significant events in aviation history. Prior to the air raid, for example, the flying boats accomplished amazing rescue missions. Their loss in Broome attests to the dangers of those missions.

Chapter 6 records the accounts of the air raid by its survivors, which graphically describes the wrecking events from different perspectives. These accounts are analysed to determine how the flying boats may have sank and how that data assists in interpreting the archaeology.

Wreck site identifications are made in Chapter 7 on the basis of unprovenanced artefactual evidence, but only after careful assessment with data from an archaeologically excavated assemblage. The assemblage discussed is from the Dutch Catalina -59. Its excavation, by the Western Australian Maritime Museum, was the first of its kind in Australia, and the artefacts that were found reveal insights into that flying boat’s crew and passengers. The artefacts from Broome’s flying boat wrecks indicate what might be found on the missing sites.

Two related chapters (8 and 9) record and analyse the submerged material culture, respectively. An inspection report is presented for the found wreck sites, which illustrates the condition of the surviving fabric at sites. The survey data is used to interpret the site formation processes the wreck sites have undergone at the time of their loss. Determining patterns in the archaeological record enable some inferences to be made about the past, such as reconstructing how the flying boat sank. On the basis of this evidence, in conjunction with Japanese photographic data of the air raid, the number and location of the missing wrecks is predicted.

The identity of all the known flying boat wreck sites, based upon verifiable historical archaeological data, is presented in the conclusions, Chapter 10. Further work is outlined
indicating that at least nine of the 15 machines have been located. The majority of these could only be identified to specific types of flying boats, rather than determining their individual identity, which must wait for further site inspections. This data is essential in wreck site management and for the survivors; providing the tangible evidence of the flying boats that brought them to Australia.
CHAPTER 2: CAUSE AND EFFECT – the air raid and the formation of its archaeological record

2.1.1 Part 1 - Introduction
Part 1 of this chapter outlines the historical background to the Japanese air raid on Broome’s Roebuck Bay and introduces the sequence of events leading up to that raid. The reasons why the flying boats were in Broome is explored. Official histories and contemporary reports of the human and material costs of the air raid, both Japanese and Allied, are analysed. The air raid came as no surprise to many who had survived the retreat from the Philippines, Singapore and the NEI. The Japanese air raids, by that time, could be predicted. Broome, as will be discussed below, was never the safe haven the Allies had assumed it to be. The loss of the flying boats, however, could be attributed to bad luck as much as a lack of defence.

When nine Imperial Japanese Navy Mitsubishi A6M2 Type O ‘Zero’ Model 21 fighters, fitted with long-range fuel tanks, and a naval Mitsubishi C5M.2 ‘Babs’ reconnaissance aircraft entered Roebuck Bay on the morning of 3 March 1942, the pilots were shocked at the sight before them (Horikoshi, 1981; Okumiya, Horikoshi and Caidin, 1957; Nohara, 1983). Fifteen flying boats were on the water with no discernable defence - there were no fighters at the aerodrome to scramble for interception, nor were there any anti-aircraft (AA) guns. Some flying boats had no one on board, while others were too crowded with refugees to bring their guns to bear. The ensuing conflict, however, was not a one-sided affair. Roebuck Bay became a battlefield with machinegun exchanges between the Zeros and some of the flying boats (Hurst, 2001:51). All the attackers, with the exception of one Zero, were damaged in the air raid.

If the Allies were unlucky to have been caught on ‘the ground’, it could equally be said that the Japanese were lucky to have escaped the mission with the few casualties that they sustained. The Battle of Broome was a spontaneous defence to a carefully planned attack; a fast played out encounter that is generally believed to have lasted for only 20 minutes, with both protagonists unaware of the other’s presence and disposition until the moment of contact.

The second part of this chapter outlines and describes the geographical location of the wreck sites. The previous wreck location data and new data acquired by local Broome diver Geoff Parker and the WAMM in 2001, are assessed and plotted onto Admiralty Chart AUS 50 (1973). Additional cultural material discussed in this thesis, is also plotted so as to provide a comprehensive picture of the archaeological material from WWII in Roebuck Bay. This provides a framework for predicting the location of missing wreck sites (see Chapter 8).

2.1.2 Historical background to the air raid
Broome was not the ideal terminus for a major aerial evacuation of Java. The small town had only two moorings (see Chapter 9), which were used by Short Empire flying boats during the evacuation flights of February 1942. Refuelling was limited with only several vessels
available and the big tidal differences made going ashore problematic for flying boats moored or anchored a long way offshore. Accommodation in town was practically non-existent for the thousands who would transit through Broome once the Java refugee shuttle flights began in earnest. With the recent surprise and devastating air raids on Darwin (19 February 1942), Broome would have to make do as the hub for the world’s greatest air lift of people in history up until that time. The MLD military planners were familiar with the town from their earlier visit in May 1941, but most of the pilots and crews had probably not been to Broome before (see Chapter 4).

The ferry flights to bring out people from Java were predominantly done by land planes. After the air raid, the last of the land planes and flying boats from Java continued to arrive in Broome. Some of those flights were recorded, which also provide valuable clues as to what their crews saw first hand, of events that only just happened. In addition to Lockheed Super Electras (not mentioned below) the following describes the other types of machines involved in the ferry flights:

From February 25th, Beechcraft, Lockheed Lodestars, Douglas DC-2s, DC-3s, Consolidated LB-30s, B-24s, and Boeing B-17s were continually arriving at the Broome airport either from Perth or Java, then leaving again as they were loaded and refueled [sic]. On Roebuck Bay, Dutch, Australian, British and American Dorniers, Catalinas, and Empires constantly landed and left (Rorison, 1992:242).

Of all the Broome flying boats wrecks, Corinna was the only machine involved in the shuttle flights to Java. The rest, with the possible exception of one USN Catalina, which ferried an unrecorded number of people to Derby, made their one and only visit to Broome. The MLD’s X-3 may have been one of the three Dorniers to visit Broome in May 1941, but this is yet to be confirmed (see Chapter 4). The Broome – Tjilatjap (Cilacap on the south coast of Java) refugee shuttle had stopped some six days prior to the air raid, with over 8,000 people having been evacuated through Broome (Rorison, 1992:243).

Reconnaissance flights by the Japanese were recorded over Broome at 1500hrs on 2 March 1942 and again at approximately 0400hrs on 3 March 1942 (Gillison, 1962:465; Series number AA1966/5. Control symbol: 146, NAA). Although identified, the senior military officials in control of Broome (ie, the Americans) did not see them as a presage to an imminent attack. However, the pilots in Broome were alarmed by news of the Japanese reconnaissance:

I left within 3 minutes of receiving that advice by voice from the lookout tower above us at 6-55am (+ or – 10 minutes). I was standing on the left running board of a Utility travelling at 55 to 60 miles per hour towards the flying boat anchorage area and my Co-Pilot standing on the ute drivers side running board, when out of the corner of my right eye I saw a tight formation of Japanese fighter aircraft pass us for the attack at just above tree top level. (less than 5 metres above the surface of the road and with their port side wing tips less than 10 metres from our utility). We were about half way around the curve into Roebuck Bay when I told the Driver to stop the ute, and running through the scrub in that high rocky outcrop saw the actual start of the attack, and the first shots fired (Caldwell, 1992b).
The Japanese reconnaissance pilots had most probably seen three flying boats on the water – A18-10, two USN Catalinas plus a number of aircraft on the aerodrome. The reconnaissance of 2 March 1942 found eight large aircraft on the aerodrome at approximately 1500hrs, the day before the air raid. A USN seaplane would have been there too, but the MLD flying boats had not yet arrived. Throughout the night and early morning of 2/3 March 1942, a further 11 flying boats alighted on Roebuck Bay. Now in Australia, the refugees thought they were safe from the Japanese, but they were unaware of the extended range of the Japanese aircraft. The Japanese extended the range of their aircraft by the use of an external fuel tank, which could be jettisoned before combat. Photograph 2.1 depicts Zero fighters with long-range drop tanks, similar to the machines that attacked Broome.

2.1.3  Contemporary and official reports of the air raid on Broome

2.1.3.1  Japanese personnel and their raison d’être for the attack on Broome

The first air raid at Broome was not directed on the town itself. Mervyn Prime’s correspondence with Col Takeo Shibata (IJN), who ordered the air raid, revealed the Japanese intentions for the attack (Photo. 2.2). The attack aimed to neutralise the aerodrome, destroy all aircraft in the Broome district and to effectively cut off the aerial escape route from Java.

The sweep was planned to take 30 minutes. The large number of flying boats encountered upon their arrival over Roebuck Bay, however, meant that they would spend about an hour there, according to some accounts. Shibata (1977a) records that there were nine Zero fighters involved in the attack, which were from the 3rd Naval Air Group (Kokutai) and a single ‘Babs’ reconnaissance aircraft. All the participating pilots, with the exception of Yasuo Matsumoto, were probably later killed during the war (Photo. 2.3). Lt Miyano, the leader of the mission, went missing on 16 June 1943 over Lunga Point, north of Guadalcanal, after a battle between 24 Zeros and approximately 100 Allied fighters (Photo. 2.4 and Photo. 2.5) (Shibata, 1977b; Hata, Izawa and Gorham, 1989:383). PO3c Zempei (Zenpei) Matsumoto was killed on 26 October 1943 at the Battle of Santa Cruz (Hata et al., 1989:53). W/O Júzo Okamotō was pronounced lost while on patrol off Guadalcanal on 11 October 1943 (Photo. 2.6) (Hata et al., 1989:350). W/O Yoshirō Hasiguchi was killed on 25 October 1944 east of the Philippines (Photo. 2.7 and Photo. 2.8) (Hata et al., 1989:335). The fate of the other pilots is not known.

Nine Zeros arrived at Kupang from Ambon on 23 February 1942 with Col Shibata flying the lead aircraft (Photo. 2.9). The following day, 10 Zeros under the command of Lt Miyano arrived at Kupang; the main force of Zeros in the 3rd Kokutai (aircraft group) arrived there on 10 March 1942, under the command of Captain (Cpt) Yoshio Kameis. While Miyano commanded nine Zeros in the attack on Broome, that same day eight Zeros under the command of Sub-Lieutenant Toshitada Kawazoe, left Kupang to attack the town of Wyndham on Australia’s northwest coast. These two flights departed from the 335 Air Base, Penfœi (Penfui) aerodrome near Kupang, at 0705hrs (Shibata, 1977b).
Photograph 2.1  ‘The Zero fighter ... Two Zero Model 11 aircraft of the 12th Air Group flying over the Chinese mainland. LT Minora Suzuki flew the fighter marked with a double stripe on its fuselage’ (Minora Suzuki via Hata et al., 1989:8).

Photograph 2.2  ‘Col. Takeo Shibata. Commander of the Japanese Naval Air Arm in Koepang, Timor and who ordered the raids on Wyndham and Broome’ (M. Prime via Tyler, 1987:101).

Photo 2.3  ‘Yasuo Matsumoto, second row - 6th from left (Hata et al., 1989:199).

Photo 2.4  ‘Miyano’ (Aviation Heritage Museum WA. Photo No. 892513 742/20).
CHAPTER 2: PART 1 — BACKGROUND TO THE AIR RAID

Photo 2.5 ‘CDR Zenjirō Miyano’ (Maru via Hata et al., 1989:272).

Photo 2.6 ‘W/O Jūzō Okamoto’ (Katsutarō Kobayashi via Hata et al., 1989:350).

Photo 2.7 ‘W/O Yoshirō Hashiguchi during his 3rd Air Group days’ (Katsutarō Kobayashi via Hata et al., 1989:335).

Photo 2.8 ‘Hashiguchi’s favorite plane, during his 3rd Air Group days. His kills are marked on the tail’ (Katsutarō Kobayashi via Hata et al., 1989:335). Note: perhaps some of those kills were flying boats at Broome?

Photograph 2.9 ‘Model 21 Zero fighters belonging to the Sōryū at the Kendari Air Base in February 1942. The [nine] Zero fighters to the right and the Type 98 land reconnaissance plane [C5M.2 ‘Babs’] belonging to the 3rd Air Group’ (Kiyoshi Kato via Hata et al., 1989:36).
Shibata (1997b) indicates that the Zeros reached Broome at 0930hrs local time. Upon returning home: ‘the 2nd and 3rd planes [in the first formation] found a DC3 transport plane, and they attacked it and it crash landed and burnt’ (Shibata, 1997b). This was Capt Smirnoff’s DC-3 (later nick-named the ‘diamond plane’ on account of its cargo of diamonds), which was shot down and had crashed in Carnot Bay, north of Broome. The remaining Zeros returned to Kupang by 1305hrs after a flight of over six hours. Lt (jg.) Kudo, who was killed in the raid, was credited with having destroyed two PBYs and one B-24A Liberator. The Liberator, thought to be nicknamed Arabian Nights (serial number 40-2374), had taken off just as the Zeros arrived over Broome (Claringbould, 2002:33). Kudo is believed to have crashed in the sea somewhere near Broome. The aircraft and the body of its pilot have never been discovered (Photo. 2.10 and Photo. 2.11).

Shibata (1977c) wrote to Prime listing the attacking Japanese pilots. Table 2.1 records their details. Few accounts of the air raid were recorded from these pilots. However, damage was recorded to have been inflicted on the surviving Zeros as a result of a battle with the flying boats (Shibata, 1977c. Trans. unknown n.d.).

The ‘Babs’ reconnaissance aircraft ‘Succeeded in taking photos of the several spots of the air-raid results’ (Shibata, 1977c) (Photo. 2.12). One of these photographs has survived (see Photo 6.1). The image provides an insight into what the carnage would have looked like. This photograph is of immense value to archaeologists as it shows the distribution of some seven flying boats. Smoke columns can be seen rising from the aerodrome and from Roebuck Bay, each column marks an aircraft’s funeral pyre. This image is analysed in Chapter 9 for the data it contains on where the flying boats were anchored. Underneath those columns of smoke, people were swimming for their lives, or were dead or dying. As will be discussed in Chapter 6, more is now known of the identity of the flying boats and the people who were on board.

2.1.3.2  Air raid account – the Crommelin and Coster reports

Two significant primary references to the outcome of the air raid are from Dutch sources, one of which was written by a survivor of the air raid himself, Lt R.M. Crommelin (MLD). Crommelin’s report is presented in both the original Dutch and translated form in Appendix 2.1. The other report is from F.W. Coster and is principally concerned with documenting who had departed from Broome on the lugger Nicol Bay; nevertheless it provides significant information on the NEI personnel in Broome. Coster’s report is presented in Appendix 2.2 and in this appendix is also a letter Coster wrote to Helfich (commander, Dutch forces in Australia) detailing the aircraft groups that were in Broome as well as the people who were brought to Broome, including the names of some of the people killed. The Crommelin and Coster data in conjunction with Prime (2004), as well as additional data from the National Australian Archives (NAA), is the basis for much of the data on NEI personnel in Appendix 6.1.

Crommelin’s report accurately lists which machines were on Roebuck Bay and provides a list of crew and passengers who had arrived in Broome on those flying boats. However, which
Photograph 2.10 ‘Pilots of the Kaga Fighter Squadron as of October 1938. Centre row: second from left, LCDR Chujirō Kakano, group leader. The faces of the following aces can also be seen here. Extreme left, Jirō Chōno. Centre row: right end, Osamu Kudō. Back row: right end, Yoshio Fukui; second from right, Chitoshi Isezaki’ (Yasujirō Abe via Hata et al., 1989:28).

Photograph 2.11 ‘Ltjg Osamu Kudō during his days on board the Kaga’ (Minoru Suzuki via Hata et al., 1989:368).

Table 2.1  Imperial Japanese Navy aircraft and aircrew participating in the Broome raid, 3 March 1942 (After Prime, 2003)

<table>
<thead>
<tr>
<th>*</th>
<th>Aircraft</th>
<th>Pilot</th>
<th>#</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Mitsubishi A6M.2 Zero</td>
<td>Lt Zenziro Miyano</td>
<td>6</td>
<td>Commander</td>
</tr>
<tr>
<td></td>
<td>Mitsubishi A6M.2 Zero</td>
<td>W/O Takashi Kurano (Kurauchi)</td>
<td>2</td>
<td>Attacked the Carnot Bay DC-3</td>
</tr>
<tr>
<td></td>
<td>Mitsubishi A6M.2 Zero</td>
<td>1st Air Pvt. Zempei Matsumoto</td>
<td>0</td>
<td>Attacked the Carnot Bay DC-3</td>
</tr>
<tr>
<td>2nd</td>
<td>Mitsubishi A6M.2 Zero</td>
<td>W/O Osamu Kudō†</td>
<td>?</td>
<td>Killed</td>
</tr>
<tr>
<td></td>
<td>Mitsubishi A6M.2 Zero</td>
<td>W/O Masaki Okazaki</td>
<td>2</td>
<td>Pilot wounded</td>
</tr>
<tr>
<td></td>
<td>Mitsubishi A6M.2 Zero</td>
<td>W/O Susuma Matsumoto</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>Mitsubishi A6M.2 Zero</td>
<td>W/O Júzō Okamotō</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mitsubishi A6M.2 Zero</td>
<td>W/O Yoshio (Yoshiro) Hasiguchi</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mitsubishi A6M.2 Zero</td>
<td>1st Air Pvt. Yasuo Matsumoto</td>
<td>?</td>
<td>Ditched, near an island off Rote Is.</td>
</tr>
<tr>
<td></td>
<td>Mitsubishi C5M.2 ‘Babs’</td>
<td>W/O Akira Hayashi</td>
<td>0</td>
<td>Used as ‘mother plane’ for navigation and to photo results</td>
</tr>
<tr>
<td></td>
<td>1st Air Pvt. Shinobu Nagasawa (navigator)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Formation Number  # Number of bullet holes caused by Allied ground fire  † Posthumously awarded the rank of Lt (jg.)
people were on which flying boat is not specifically recorded. The report significantly mentions
the exchange of machinegun fire, although the statement that a Zero was shot down during
these exchanges is erroneous. Only one Zero was lost over Broome and that was shot down by
Lt Gus Winckel (see Chapter 4).

The report is mistaken when referring to another Zero having been shot down by *Arabian Nights*,
which had just taken off. *Arabian Nights* was a USAAF Ferry Command LB-30
model. It carried no armaments and was operating an aero-medic flight with some 33 people
on board. *Arabian Nights* was shot down, approximately 10 miles off Broome’s Cable Beach
one of the six survivors made it ashore. They were seen in the water by a KNILM Lockheed
Lodestar that had arrived from Java after the air raid, just missing the Japanese
(Connaughton, 1994:90; Dunn, 2003b and Apeldoorn, 1943:214). Lt (jg.) Kudo is recorded to have shot down
the seaplane, after first having pursued Lt Jack Lamade’s Scout Observation Curtis (SOC-3)
*‘Seagull’ – a seaplane. More on this machine, about the circumstances of its arrival in Broome
and subsequent escape, is recounted in Chapter 6. It was the only aircraft to escape the air
raid.

2.1.3.3 The official records and the NAA source material
The official war historian Douglas Gillison (1962), writing some 20 years after the air raid,
provides a cursory overview of the first attack on Broome. However, temporal distance to the
event prevents Gillison’s account from being anywhere near as accurate as the Crommelin
(1948) report, probably because Gillison was unaware of the written material available at the
time and that he himself was not an active participant. The claim that the Carnot Bay DC-3, for instance, was shot down with no survivors is wrong (Gillison, 1962:467; Wills, 2006). Of the 12 crew and passengers on board, four were killed: two Dutch pilots, a woman and her one year old baby.

The number of aircraft on Roebuck Bay is also recorded incorrectly, although open to semantic interpretations. While Gillison (1962:465 and 467) correctly records that 16 ‘flying boats’ were on the water (actually 15 flying boats and one seaplane) in Roebuck Bay, his recording of the number and types of machines used by different nationalities, lacks detail. This is the only published account of the air raid until Prime’s WA’s Pearl Harbour [sic] (1985). Contemporary WWII records at the NAA indicate why research focused solely on this secondary material is problematic.

The following quote typifies the level of information recorded on the air raid at Broome and on the numbers of aircraft lost. The details of each individual aircraft, however, were never forwarded on, or did not reach the archives:

Aircraft destroyed on aerodrome 2 B12 1 B24 1 N.E.I. Hudson, 1 Dutch D.C.3 1 R.A.A.F. Hudson A16-119. 1 B24 believed shot down just prior to the air raid. On bay 2 empire boats 2 British Catalina, 2 American Catalina 3 Dutch Dornier 1 J2F and 6 other flying boats of which details will be forwarded when available (Series number: A1196. Control symbol: 15/501/247, NAA).

For casualties on Roebuck Bay, the details are sketchy. There is a distinct lack of detail for the RAF and USN machines, although their numbers have been recorded correctly. The MLD machines are also poorly described: their numbers are recorded incorrectly and no details are provided as to which machines were actually lost. Of all the flying boats lost, only A18-10 (ex-Centaurus) is specifically mentioned. Corinna is generally described as the Qantas (QEA) flying boat, but is not named. Neither is its proper association with BOAC instead of Qantas referred to. On 1 April 1940, Imperial Airways Limited (IAL) and British Airways amalgamated into a national corporation, primarily as an exigency of war, resulting in the formation of the British Overseas Airways Corporation (BOAC), – an idea by Lord Reith, the last Chairman of IAL and the first of BOAC, so as to create a suitable instrument for civil aviation communications (Wilson, 2000:106; Pudney, 1959:12; Higham, 1960:289, 303 and 305; Woods, 1997).

From the communications and correspondence on file at the NAA, it would seem a lack of historical detail could be attributed to a greater concern for the evacuation and treatment of wounded than the recording of the particulars of sunken aircraft. Indeed, even after the air raid, no comprehensive list of those who arrived in Broome on the flying boats was created, perhaps an impossible task. Those who perished in the flying boats were left in the charred hulls. Understandably, the population of Broome was anxious over the prospect of a Japanese invasion (Series number: MP742/1/0. Control symbol: 98/1/100, NAA). Recording history
and recovering bodies would have been the furthest things in minds of those who survived. Initial reports of the air raid understated the casualties:

On the morning of the 3rd March, 1942, at 9.50 a.m., Broome was raided by 9 Japanese fighting craft and dive bombers, destroying 14 [sic] flying boats, 2 B-17s, 1 B-24, 1 Dutch Lodestar, 1 Dutch DC-3, 1 Australian Lockheed.

Wounding approximately 40 Dutch nationals who were in a [sic] flying boats on the water at the time of the attack. 15 Casualties were buried in the local cemetery. One survivor died in hospital. I estimate that between 20 and 25 bodies are in the burned hulls of the flying boats – Wing Commander, Director of Intelligence (Series number: AA1966/5. Control symbol: 146, NAA).

They may very well still be there, which adds to the significance of the flying boats as war graves. There was no time to recover and bury them.

This overview of the official history of the Broome air raid indicates that little was recorded about the circumstances of the armada’s arrival in Broome. Historians overlooked the aircraft service histories of the flying boats. Subsequent chapters (Chapters 3, 4 and 5) will show how this deficiency has important ramifications for interpreting the archaeological material in Roebuck Bay. For example, not all the flying boats in Roebuck Bay were carrying refugees; virtually none of them were involved in the February 1942 refugee shuttle flights. Archaeologists will not find the accoutrements of the evacuees at all of the wreck sites. Furthermore, not all of the flying boats had people on board and, therefore, not all of the wreck sites would constitute a war grave. The next part of this chapter discusses the range of wreck sites that have been discovered and provides an overview of archaeology’s current understanding of the number and identification of the 15 flying boats lost in Roebuck Bay. Ten wreck sites have been found, but many of side scan sonar anomalies suggests that more will be found in future expeditions.
2.2.1 Part 2 - Environmental description and wreck site locations

‘Blue water’ navy truism – There are more aeroplanes in the sea than submarines in the sky – from an old carrier sailor (Christian, 2006).

This second part of Chapter 2 describes the physical and cultural environment the flying boat wreck sites lie, as well as detailing where the known wreck sites are located. Many of their locations have become lost from living memory, if they were even known at all. While this part discusses the locations of known sites, it questions what is meant by ‘known’ in terms of flying boat types exposed during spring low water (SLW). For example, even though several wreck sites are exposed at SLW, the types of sites and also the number were not previously understood or recognised.

The flying boat wrecks lie in a complex environment of reefs and of shifting underwater sand dunes that periodically cover and uncover wrecks and debris fields. Roebuck Bay could also contain shipwrecks that are not related to flying boat operations, as well as moorings and channel markers, ‘which rearrange patterns, including later deposition of unrelated material on [sites]’ (Gibbs, 2006:5). There is also the possibility that a Japanese Zero is in Roebuck Bay.

2.2.2 Cultural and environmental description

The town of Broome is situated on Yawuru traditional lands, on the northwest coast of the state of Western Australia (Keeffe, 2003:24). The town is situated on a peninsula of land on the northern shore of Roebuck Bay (Fig. 2.1). The bay is bounded to the north by Gantheaume Point and to the south by Bush Point. It is approximately 20 kilometres wide and has a major waterway called Dampier Creek, which was once used by pearling luggers to careen and lay up.

Broome is at the edge of the Great Sandy Desert. The region is north of the Tropic of Capricorn and experiences a dry and a wet season, although Aboriginal people recognise several additional seasons, depending on the availability of certain flora and fauna. Tropical cyclone activity affects the region during October through to May (wet season), which brings heavy monsoonal rains and strong stream flows that reduce underwater visibility. Underwater visibility is usually less than three metres on a good day.

Pearling was and still is the town’s greatest source of income, despite the collapse of the mother-of-pearl shell industry with the advent of plastic (see Bailey, 2001; Edwards, 1991 and 1983; Burton, 2000; Idriess, 1947 and 1937). Broome is overflowing with tourists during the dry season. Tourism has become the town’s second largest industry. Broome is also an important regional centre and a port for the live cattle industry. With the developments instigated by Lord Alistair McAlpine, mainly at Cable Beach, the town is now a tourist attraction popular in particular to ‘the grey nomads’ (senior travellers) in their caravans and campervans who travel
Figure 2.1 Chart showing the study area’s location (After AUS 50, 1973). See Inset ‘a’ and ‘b’ pages 32 and 33 respectively.
to escape the cold winter months down south. Cable Beach is one of the finest beaches for recreational activities in north Australia, with clear water, surf and white sand.

The waters on the southern side of the Broome peninsula in Roebuck Bay, where the wreck sites are located, conversely are muddy, reasonably well protected from the northwest monsoon, but exposed to the southeast winds of the dry season, which make small boat operations difficult. The harbour substrate is gravelly mud with powder-like sediment that is easily stirred up by divers. Mangrove populations fringe Roebuck Bay, predominantly on its eastern and southern shorelines. Dangerous species that occur in Roebuck Bay include: Salt water crocodiles (*Crocodylus porosus*), Tiger sharks (*Galeocerdo cuvieri*), Box jellyfish (*Chironex fleckeri*) and Ikrakanji jellyfish (*Carukia barnesi*), as well as the scorpion family related Lionfish (*Pterois volitans*) and the northwest stonefish (*Dampierosa daruma*). Green turtles (*Chelonia mydas*) were seen to inhabit the wreck sites as well as Stokes’ Sea snakes (*Disteira stokesii*), which are but one of the species of sea snakes found in Roebuck Bay. These snakes are not dangerous to divers.

Broome is situated in what has been referred to as ‘big tide country’ and experiences semidiurnal astronomical tides ie, two tides in one day (Garrow, 2002:5). Tidal variations are as much as nine metres from high to low during spring tides. Interestingly, the extreme low tides, which go below chart datum, occur only during the early mornings or late afternoons. Broome never experiences a king low tide during the middle of the day ie, the hottest part of the day (Heyward, Revill and Sherwood, 2000:19). These tides, some of the largest in Australia, are attributable to the location of Broome on the edge of the wide, but shallow northwest continental shelf and also due to the ‘shape and depth of the sea floor in the Timor Sea to the north and west of the Kimberley coast’ (Garrow, 2000:11). Historical tidal predictions are not available for WWII, since they only date from 1982, but a hind cast has been sourced (Heyward *et al.*, 2000:19). Table 2.2 is the tidal retrodiction data for Broome, which indicates that there was a spring tide running on the morning of the air raid, with a concomitant fast tidal stream usually between four to five knots. Naval Air Station (NAS) Pearl Harbor produced an emergency anchoring information sheet on Broome for flying boat crews. This sheet outlines the navigational features and environmental conditions in Broome in March 1942 (Fig. 2.2).

Underwater conditions during the spring tides produce turbidity reducing visibility to less than one metre. Most diving, including work dives for the pearling industry, is done during neap tides, when currents are minimal and visibility is improved. The occurrence of deep water in Roebuck Bay runs roughly parallel to the southern shore of the Broome peninsula. A channel (referred to as the ‘inner anchorage’) is delineated by sand bars that rise up from the depths to form what is called ‘Middle Ground’. These occur as three plateaus of sandy mud and are exposed during SLW. Garrow (2000:15) indicates that the massive tidal movements scoured Roebuck Deep, a channel running parallel to Gantheaume and Entrance Points. Roebuck Deep is about 90 metres in depth. The inner anchorage where several flying boat wrecks are located, south of Town Beach, was also probably formed in this way, but is only about 22 metres deep.
As the name suggests, vessels use this channel today for mooring or anchoring as it provides deep water even during the SLW.

Despite the predominantly silty, muddy harbour bottom, some reef systems are exposed, which are visible at low tide, particularly towards Entrance Point and off Simpson Beach (site of the old meat works, now a residential area) in Roebuck Bay. These reefs are most likely to be outcrops of the Broome Sandstone that extends west into Roebuck Bay (Laws, 1991:13).

Broome lies in the Canning Basin, which contains sedimentary rocks of Ordovician to Cainozoic age (Laws, 1991:6). The presence of such sedimentary reefs makes identifying the location of flying boat wrecks more difficult as they skew depth sounder signatures. A blip on the sounder could either be a reef or a flying boat wreck site, or something else altogether, such as an old mooring or even a vessel sunk during a cyclone or was scuttled. Analysis of the side scan sonar data to differentiate between flying boat wreck, reef etc., will be discussed in Chapter 9.

2.2.3 Wreck site locations

2.2.3.1 Exposed wreck sites at SLW

The flying boat wrecks occur within three classificatory groups: Drying, Semi-drying and Submerged. These classifications will be discussed at greater length in Chapter 7, but suffice to state for the moment that Drying sites are exposed during SLW; Semi-drying are also exposed during SLW, but are still awash and Submerged wrecks are always underwater (Photo. 2.13 – Photo. 2.15). All of wrecks within these classificatory groups are poorly understood. However, several have been identified on the basis of artefactual material, but as this material is not provenanced it is open to interpretation.

It is not known which particular aircraft is at which location (apart from those said to have been identified by diagnostic artefacts), but neither are the remains of flying boats themselves properly identified. Figure 2.3 represents the relationship between previously understood data and current data on wreck sites either fully exposed or partially exposed during SLW. The number of wreck sites exposed during SLW is both more and less the same as what has been recorded in this thesis. For instance, there is no wreck site at the X-20 debris field and there are two flying boats at the site marked as ‘4’, but only one was thought to be there, even though both are exposed. The second flying boat wreck site at ‘4’ is badly broken up, which may explain why it was not recorded.
Figure 2.2 USN map of emergency anchorage at Broome 25 March 1942 (BHSM).
The best time to visit the exposed wreck sites is when tidal conditions are less than 0.4m., but it is better if the tide is a minus tide, such as -0.60m or lower. It is best to leave Town Beach one hour before low tide. The walk itself is relatively easy, as the mud in Roebuck Bay is hard underfoot. Several streams are crossed en route, but these are shallow and slow moving. The closest wreck to the beach is of a Catalina. Tides with a minus reading enable time to reach a line of wrecks, south of this first Catalina. Most site visitors either stop at the first Catalina (FV-N), or go to the east, where a Dornier (X-1) wreck site is exposed, rather than moving to the ‘line’ of wrecks further south. Beyond this line of sites, to the west, is a Catalina (referred to in this thesis as Site 10), but only the tips of its propellers and the bow gun turret are visible. It is not possible to walk to this site.
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Photograph 2.13  Oblique view of Roebuck Bay showing location of Drying and Semi-drying wreck sites. Taken at the lowest tide of the year, looking to the west (Photo: Jung 2003).

Photograph 2.14  Oblique view of Roebuck Bay showing location of Drying and Semi-drying wreck sites. Taken at the lowest tide of the year, looking to the northeast (Photo: Jung 2003). Note: pelican flock in the foreground that resembles a wreck site.
2.2.3.2 The WAMM’s side scan survey of 2001

The WAMM’s survey of Roebuck Bay in 2001 focused on an area south of where the exposed wreck sites are located. Exactly which wreck sites were exposed at SLW was not known and as a result, the sonar survey covered some of these sites. Figure 2.2 shows the location of the study area and the region of Roebuck where the flying boat wrecks occur, although there is a debris field that is much larger. Figure 2.4 shows the area covered by the WAMM side scan sonar survey. The survey followed contour lines and focused on an area where the deep water flying boat wrecks were believed to have been lost. Figure 2.5 shows all of the side scan sonar plots. Appendix 2.3 lists the coordinates for these plots.

One hundred and six side scan sonar targets of verified and probable cultural material were located. Of these, twenty-five were clusters ‘with some being either one or multiple events’ (Green, 2002:128) (Fig. 2.6). Some targets that are not exposed at SLW, are known wrecks that have been reported by Broome divers, but others are yet to be inspected and interpreted.

Appendix 2.4 shows the side scan sonar images per target, detailing the sonar track in Figure 2.4. Some of the images show spectacular definition of sites. Several could even be determined to be different flying boat types on account of the clarity of the sonar image. Others, however, only offer tantalising glimpses of possible wreck structure or other cultural material. The titles, or descriptions of the images in Appendix 2.4 are all by the WAMM. Annotations from this research are overlaid on the images. It is difficult to discern cultural features in many of the
Figure 2.4 Area in Roebuck Bay covered by the WAMM side scan sonar survey, 2001.
Figure 2.5 Chart showing side scan sonar survey data 2001 (After AUS 50, 1973). Note: not corrected. Plots as directly placed on the chart sheet.
Figure 2.6 Chart of the location of sonar clusters showing all known flying boat wreck sites in Roebuck Bay and likely locations for undiscovered aircraft (grey filled circles) (corrected, after AUS 50, 1973). Note: not to be used for navigation. Note 2: QEA moorings maybe Target 21 also?
images and it requires some practice to be able to identify them. Wreck site inspection has helped to interpret what the sonar images are actually showing. Generally, cultural features are often delineated by straight edges, such as wings and fuselages.

2.2.4 Nomenclature of sites and methods
The low and relatively uniform profile of Roebuck Bay precludes the use of visual transit marks to record the location of submerged sites. In consequence, accurate locating and recording wreck sites was dependent on Global Positioning System (GPS). However, satellite derived positions cannot be plotted directly onto the Admiralty chart sheet AUS 50. The chart was produced pre-GPS and is related to the Australian Geodetic Datum (AGD 1966) and not the World Geodetic System (WGS84) as used by GPS. To compensate for this discrepancy, all satellite positions are shifted:

0.08 minutes SOUTHWARD and 0.08 minutes WESTWARD to agree with this chart (Australian Hydrographic Service, 2001).

Green (pers. comm., 15 July 2003) has fine-tuned this note and states 0.07 minutes is added to LATITUDE, but that the same is used for Longitude. This method only works for the Broome chart.

The side scan sonar clusters, referred to in this thesis, are numbered in a sequential fashion. Known as Target Numbers, these are trending from west to east. These target numbers are different to the ones used by the WAMM in order to standardise the target values. The Target Numbers used in this thesis are an interpretation of this data that best class known or likely wreck site locations, as opposed to a debris field or something else (non-cultural or deposited at a different time). These interpretations use the side scan sonar images to help determine which are the most likely to be wrecks. The sonar images studied in this thesis are discussed and analysed in Chapter 8.

The DGPS data recorded in the side scan sonar survey are in decimal degrees, but in order to plot these coordinates onto the AUS 50 chart sheet, it is necessary to convert decimal degrees into points of degrees. This is done by multiplying the minutes by sixty. The side scan sonar data in Appendix 2.1 shows both decimal and points (shaded).

2.2.5 Discussion
Determining the location of the Broome flying boat wreck sites from the first Japanese air raid is a complex site-recording problem that has only begun to be understood. The wrecks exposed at SLW are little understood; let alone those in deep water. Six wreck sites are exposed at SLW along with a debris field that possibly relates to a flying boat that may have been there at some stage. Of the six wreck sites exposed at SLW, two are Dorniers and the rest are Catalinas. The two Dorniers, at the moment, are the only located Dornier flying boats in Roebuck Bay. The
debris field (Target 29) possibly relates to a third Dornier, but it is argued in Chapter 8 that it does not.

2.2.6 Conclusions
This chapter has described both the historical and environment backgrounds to the flying boat wreck sites. It also outlines the extent of the known cultural material and indicates where unlocated wreck sites may be found in Roebuck Bay, based on a side scan sonar survey by WAMM in 2001.

Sonar images are in the main, only good for location – some are spectacular and clearly indicate a flying boat, but most require site inspection to verify if they are flying boat wrecks and/or debris. Sonar imagery is, therefore, only a guide to further archaeological research and an indicator of where best to search for the flying boats.

The ability to plot these sites is constrained by limitations in the previously collected data. First none of the wrecks (even those visible at SLW) have been accurately located. The plots for all the sites in this thesis are derived from the WAMM 2001 survey, except those sites added to the list of Targets as a result of fieldwork in 2003 for this thesis (see Appendix 2.2). Secondly, even though DGPS positions have been derived for submerged wreck sites or possible wreck sites, only a few new targets were inspected and verified, there is the potential for completely undisturbed wreck sites to have survived in situ awaiting the archaeologist’s eye.
CHAPTER 3: WINGS OF PEACE –
Broome’s Short Empire flying boats 1937-1942

3.1 Introduction

Those actually engaged in the work of developing transport by air had a different approach - much wider and much more imaginative. They looked at the Merchant Navy, the great overseas transport industry that has played so glorious a role in the building up of the Empire and of the vast export trade by which this country lives, and they saw, taking its place alongside it, a new Merchant Service: the Merchant Service of the Air (Lock and Creasey, 1943:159).

This chapter concerns an often forgotten association between flying boats and Australia’s role in linking the British Empire by an aerial route via an Empire Air Merchant Service. The two Empire flying boats lost at Broome are a part of that history. In what was known as the Empire Air Mail Scheme (EAMS), communications within the British Empire would be revolutionised. Both of the Empire flying boats lost at Broome, *Centaurus* (A18-10 at time of loss) and *Corinna*, are the archaeological remains of this ambitious scheme. This part of their service histories has been overshadowed by their involvement in the air raid at Broome in 1942. The origins and operational service histories up until their loss in Broome are compiled in this chapter, which will point out their historical significance to events beyond the Japanese air raid at Broome. Significantly, this chapter determines how and why these flying boats were in Broome at the time of the air raid.

The implementation of the EAMS required a large flying boat that was capable of carrying the fuel and payload needed for long distance flight. In 1935, the Short Brothers at Rochester in the United Kingdom were designing a four-engine flying boat capable of meeting the needs of IAL, who would conceive and implement the scheme in association with Qantas Empire Airways (QEA) and Tasman Empire Airways Limited (TEAL). Forty-four of Short’s design S.23 Empire flying boats would be built between 1936 and 1940 (Appendix 3.1).

In this thesis, the merchant airmen referred to in the above quote were QEA aircrew, who amongst other duties during WWII were responsible for the evacuation of many hundreds of people from Java during February 1942. QEA was jointly owned by IAL and Qantas. It began an aerial route from Brisbane to Singapore on 10 December 1934 (Lock and Creasey, 1943:165).

Most QEA airmen, like most, never wrote their memoirs, especially those who were associated with the two Empire flying boats lost at Broome (Higham, 1960:319). Those aircraft histories that have survived are often limited in information on QEA flying boat operations prior to WWII. Kelly-Rogers (1980), an Empire flying boat captain, describes in a public lecture how the machines were like to fly from a pilot’s perspective. His account offers a valuable glimpse of life with IAL’s flying boats from England to Singapore, but on QEA little is recorded of the voyage from Singapore to Australia. Another account that has survived, written during WWII,
was restricted for security reasons: ‘I should hate to think of Hitler pouring over these pages in the hope of obtaining a scrap of information!’ (Lock and Creasey, 1943:203). The exploits of QEA pilots, therefore, will need to be reconstructed from other accounts that relate specifically to their achievements.

There has never been a verifiable history of the Japanese air raids at Broome, let alone the individual exploits of the people or civil flying boats that operated there in the early 1940s. For example, 30 years after the event Gillison’s *Royal Australian Air Force 1939-1942* (1962:467), one of the most comprehensive account of events, confuses the actual number and type of flying boats lost. Other accounts, too, differ on the number of machines lost. Bennett-Bremner’s (1944:94) account only gives 14 flying boats lost. Walter Edmonds (1951:437) confuses the types of machines lost, the casualties to the Japanese, as well as the nationalities operating the flying boats themselves.

The two Empire flying boats lost at Broome have a history quite apart from the other flying boats lost there. They were originally civilian transports and operated by IAL before WWII. The other thirteen flying boats, which shall be discussed in the following chapters, were all built for and operated by the military.

The multi-national armada of flying boats at Roebuck Bay have a diversity of historical backgrounds. Some machines were famous for their pioneering flights, while others were the workhorses of their respective (military) units. This chapter specifically explains the Empire flying boats’ part in aviation history and why they were chosen for the journey to Broome; not all machines, for instance, were involved in the evacuation flights from Java, as will be discussed in Chapter 6.

The history of the final evacuation from Java is confused by the hurried nature of the evacuation in the face of the Japanese advance. Official records were not made, or poorly kept, or have not survived, so it is now difficult to piece together the final days of the Allied evacuation. Both of the Empire flying boats where designed for a specific purpose: to carry air mail and passengers and unite the British Empire by air. Stripped of the fittings that made them the most luxurious passenger/mail aircraft the world had seen, they would be sent to the bottom of Broome’s Roebuck Bay while performing a duty their designers would never have envisaged.

### 3.2 Why Broome? – Background to the Java air lift

Cilacap was selected as the evacuation point from Java because Surabaya was exposed to the Japanese threat (Gunn, 1987:54). Why then was Broome chosen as the arrival point in Australia instead of Darwin, which had been a regular stop for QEA prior to WWII? This section explains why they chose Broome, setting the scene for a discussion of Empire flying boat history and its Australian connection.
On 30 January 1942, the Empire flying boat *Corio* (G-AEUH, ex VH-ABD), from QEA’s Australian end of the Horseshoe Route (see *Corinna* history below), flew a special operation from Darwin to Surabaya to evacuate women and children. The aircraft, under the command of Cpt Aubrey Koch was shot down near Kupang by A6M2 fighters of the 3rd Kokutai, Imperial Japanese Navy. This was the first loss of staff, passengers and aircraft by QEA since beginning its overseas service (Fysh, 1968:132; Series number: A11237/1. Control symbol: 928/1/P1, NAA). The repercussions of the aircraft’s loss meant Darwin was no longer considered suitable for civilian flying operations (Pudney, 1959:195; Graham, 2001:5; Gunn, 1987:48). Two more eastbound trips, however, were made before the Japanese closed the route from Darwin on 14 February 1942 (Fysh, 1968:132).

The rapid Japanese advances across southeast Asia beginning 8 December 1941 forced the Allies to retreat progressively from the Philippines to Malaya, Borneo, Ambon, Suluwesi and finally Java, reaching the perimeter of Japan’s planned sphere of Greater East Asian Co-Prosperity (Chihiro, 1997:179). The first Japanese air raids on the Australian mainland at Darwin on 19 February 1942, caused great concern to Allied military planners who had first thought of the town as the most suitable location for the evacuation of Java (Series number: MP115/1. Control symbol: 8/115/186, NAA). The loss of *Corio* and the bombing of Darwin meant an alternative location was sought. Broome was not ideally suited as a main terminus. There were no moorings and extreme differential tidal conditions meant flying boats had to anchor a considerable distance offshore. The biggest problem was the lack of refuelling facilities: few vessels were available to service the large number of flying boats that assembled in Roebuck Bay throughout the night of 2/3 March. This created a bottle neck. Nevertheless, the Java to Broome shuttle service evacuated approximately 8,000 military and civilian personnel between 17 and 28 February 1942 (Gillison, 1962:464; Rorrison, 1992:243). However, the assembly of the aerial armada in Roebuck Bay had, as will be discussed later, nothing to do with these ferry flights to and from Java.

The shuttle service was originally conceived to ferry personnel and equipment into, not out of, Java. Prior to the commencement of regular shuttles on 22 February 1942, six round trips were conducted by the Empire flying boats: *Corinna, Corinthian* (G-AEUF), *Camilla* (G-AEUB), *Coriolanus* (G-AETV) and one, one way trip by *Circe* (G-AETZ) on the last journey out of Tjilatjap on 28 February 1942:

There were ten journeys on which refugees and evacuation loadings (eighty-eight passengers and 7.5 tons of cargo) were carried into Broome. Qantas flying-boats also carried a considerable number of passengers on to Port Hedland and Perth, and others in rescue operations (Fysh, 1968:142; Graham, 2003a; Gunn, 1987:56).

Fysh (1968:141) recounts how QEA was under the orders of the Civil Aviation Department (CVA) in respect of operations and the safety of operations. The CVA’s Director-General, A.B. Corbett, because of the worsening military situation in Java and in response to request by the Americans, had asked QEA if they could supply their flying boats for the evacuation of Java (Series number: A1196/6. Control symbol: 1/501/340, NAA). Broome was chosen because it:
‘was hoped to be out of range of the devastating Japanese aircraft’ (Fysh, 1968:141). Colonel E.S. Perrin of the US Army Air Corps was put in-charge of the evacuation flights. Captain Lester Brain was the QEA authority, but was instructed to ‘co-operate with Colonel Perrin to the fullest extent’ (Fysh, 1968:142). Lt Col R.A. Legge, however, replaced Perrin, of the United States Army Air Force (USAFF) (Rorrison, 1992:242; Bennett-Brenner, 1944:100; Powell, 1992:97). Photographic records of the evacuation flights between Java and Australia are rare, although one image does show Coriolanus being refuelled at Broome, as well as revealing more than one refuelling vessel in Roebuck Bay at the time (Photo. 3.1). Captain Lewis Ambrose, in a letter to Hudson Fysh (Qantas Managing Director), indicated that Broome had been anticipated as an evacuation point shortly after the fall of Singapore on 15 February 1942:

... some months before, I had visited Tjilatjap overland from Batavia in company with the Dutch Deputy-Director of Civil aviation, Van Midde, to survey this lonely port on the southern side of Java as a possible evacuation point. With the capture of Singapore, the Japanese began fanning out to the south, therefore a decision was made that we must also develop Broome as an evacuation base (L. Ambrose quoted in Fysh, 1968:143).

The distance between Broome and Cilacap is approximately 2,100 kms, a 7 to 10 hour flight by flying boat. Only large aircraft with enough fuel capacity could make the distance. For instance, the MLD’s wing of Fokker seaplanes did not have the range to fly to Broome and were subsequently scuttled by their crews in the Kali Brantas. QEA’s Empire flying boats, designed for long distance travel, were next to ideal. The following describes what such flights entailed:

When the position had become critical on 26th February Millar had requested two flying-boats to be sent from Broome to clear QEA staff and stores. This was done, and one of those evacuated was ‘Shinty’ Colville, our long-time Batavia agent, who had done notable service in the Singapore-Broome shuttle period.

On the same day Millar was advised by Java Allied Headquarters that the last service should leave the next day. This information was dispatched to Sydney but never reached its destination. Since our Authority, the Department of Civil Aviation, had not received the vital message, Brian, continuing the shuttle series, had to send two further boats from Broome on 27th February. Brian had arranged with the authorities in Broome that this was to be the last shuttle, but our Civil Aviation Authority still required us to go on, and Captain Denny on 28th February left Broome for Tjilatjap in Coriolanus on what was to be the final trip. However, he was recalled to Broome on word being received from the Civil Aviation Department to cancel the flight.

The last two flying boats that Brain had sent to Tjilatjap – Corinthian in command of Cpt Howard and Circe in command of Cpt Bill Purton – left Tjilatjap within minutes of each other on the morning of 28 February 1942. Howard got through but Purton was never heard of again (Fysh, 1968:145).

Circe became the second Empire flying boat lost to QEA since the start of WWII (Photo. 3.2 and Photo. 3.3). The RAAF meanwhile lost an Empire flying boat leased to them from QEA: A18-12 (ex-Coogee) on 27 February 1942 in Cleveland Bay near Townsville (Series number: A705/15. Control symbol: 163/113/177, NAA; Series number: A11083/1. Control symbol: 906/46/P1, NAA). This incurred to heavy casualties to crew and machines. Searches from
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Photograph 3.1. ‘22 February 1942, Coriolanus on one of the first shuttle flights refuelling at Broome before departure for Tjilatjap in Western Java. The vessel is a pearling lugger with the masts removed and the deck stacked with fuel drums’ (Gunn, 1987:55; see also Bennett-Bremner, 1944: facing pages 88-89). Note the BOAC symbol near the cockpit window. Corinna would have had the same.

Broome for Circe continued until fading light on the evening of 28 February 1942. Ambrose speculates what might have happened to Purton, his crew and passengers:

Neither was I in a position to fight back when some hours after take-off, ahead and above me on a closing course I sighted a large Japanese military flying-boat. I think they called this type a Kawanisi [sic] and it was probably the larger Martin boat built under licence.

I began taking evading action but the Japanese aircraft had speed and height advantage and, as I reported later to the General [Gordon Bennett], we were extremely fortunate to reach nearby cloud cover … when I cleared this some 90 seconds later, the enemy aircraft was no longer in sight. The Japanese were using this aircraft for long-range reconnaissance and probably had fuel reserve restrictions to consider if he was going to complete a search patrol in the vicinity of Tjilatjap. I’d have been a good one for the pot but not if it meant a long chase…

I knew Bill Purton was on his way from Broome and might well strike the same aircraft on its return, therefore, although committed to radio silence, I felt justified in initiating a private agreement that we would briefly transmit each other’s initials once if contact was thought necessary. Purton immediately acknowledged my brief call and by agreed abbreviations I warned him of the enemy aircraft and the position of the sighting (Ambrose quoted in Fysh, 1968:144).

Circe has never been found, hence, it has never been proven that the aircraft was shot down. Shores et al. (1992b:241) appears to solve this mystery where he records years later that Circe was indeed shot down by Zeros (not by the Japanese flying boat that Ambrose had seen), together with a MLD Catalina (the Y-65), severely damaged and later abandoned. The action also resulted in the loss of a Japanese pilot, NAP 1/C Toyo-o Sakai, who failed to return. The uncertainty surrounding Circe’s loss caused QEA and the US authorities to argue as to who would foot the bill during post war compensation claims for losses (Series number: A6079/T1. Control symbol: M0938, NAA). The US Government eventually paid compensation for the aircraft’s loss, but guilt could not so easily be attributed to a single factor:
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Photograph 3.2  Circe. 'Tiberias, Palestine 1940-10. An Imperial Airways Short C class flying boat being tied up to a mooring buoy. The plane was carrying Captain Frank Hurley, an Australian official photographer attached to the Department of Information, and Allied News Correspondents' (Photo: Damien Parer; Australian War Memorial. ID Number: 003151/13).

It was the disadvantage of a mixed control of our operations in the rush of a hot retreat that cost Purton and his companions their lives—but it was something that just happened in wartime (Fysh, 1968:147).

Despite the end of the shuttle service by the Empire flying boats, they still operated into and out of Broome conducting rescue missions and ferrying personnel to capitals down south. The MV *Koolama*, for instance, was attacked near Wyndham *Camilla* was dispatched from Broome to pick up survivors (Loane, 2004). Captain Sims returned with 25 people (Fysh, 1968:147). Searches continued for *Circe*, and *Corinthian* in command of Cpt Denny, was asked by the American command at Broome to look for survivors of a DC-3 which had crashed somewhere on Australia’s north coast. Dunn (2003a) indicates that this was a USAAF C-47 Douglas Dakota (VH-UGY), which went missing near Cape Londonderry, Vansittart Bay, on 26 February 1942. There were survivors, who were in radio communication with Broome and after several unsuccessful trips, Denny rescued them by what has been described as: ‘a thrilling rescue by use of a rudder boat and a long swim out to the flying-boat by some of the rescued’ (Fysh, 1968:147; see also Bennett-Bremner, 1944:105; Graham, 2001; Rorrison, 1992:247).

Land based aircraft were also involved in the shuttle service and these were arriving at Broome from either Perth or Java. Despite the large number of aircraft movements per day (some estimates are put at 57 aircraft on the busiest day), not all the flying boats lost in Roebuck Bay (with the exception of *Corinna*) were involved in the shuttle flights (Fysh, 1968:142). They were some of the last aircraft out of Java before the island was overrun by the Japanese and had made a one-way journey to Australia carrying with them remaining VIP service personnel of the *MLD*, their families as well as the families of the flying boat crews and maintenance personnel.

This section has outlined the nature of the flight operations in and out of Broome at the time of the Java evacuations, how the air lift was carried out and which specific flying boats were involved. The following describes their history from the production line to their destruction in Roebuck Bay.

### 3.3 Centaurus (G-ADUT) and the Empire Air Mail Scheme

Royal Mail Aircraft (RMA) *Centaurus* was instrumental in establishing the EAMS (Photo. 3.4 and Photo. 3.5). Others have called this the Empire Air Mail Programme; ‘it was first called Scheme but the double meaning was soon realised’ (Stroud, 1989:763). In this thesis, however, the word ‘Scheme’ will be used, as it is how the air mail system is referred to in archival sources (Series number: A5954/69. Control symbol: 900/11, NAA; Series number A5954/69. Control symbol: 900/6 and Series number: A467/1, NAA).

*Centaurus* was the third in a batch of 12 Empire flying boats (Cassidy, 1999:1; Barnes, 1967:317). It was ordered on 24 January 1935 from the Short Brothers factory at Rochester and emerged from that factory on 29 October 1936, followed by an exhibition of the machine to the press.
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Photograph 3.4  'Imperial Airways 1939. Short “C” Class Empire flying boat’ (Aviation Heritage Museum WA. Photo No. 005151 742/22). Starboard side view.

Photograph 3.5  ‘Imperial Airways 1939. Short “C” Class Empire flying boat’ (Aviation Heritage Museum WA. Photo No. 005151 742/21). Port side view.
on 11 November 1936 (Barnes, 1967:319; Oliver, 1999:39). Centaurus was registered on 7 October 1936 and given a Certificate of Airworthiness on 28 October 1936. It was delivered to its owners, IAL, on 7 December 1936 at a cost of £36 200 (Present Value £787 000) (Cassidy, 1999:37 and 47). Delays, much to the consternation of Cpt ‘Twizzle’ Egglesfield who would fly the aircraft on its maiden flight, were experienced prior to the flying boat’s launching on 29 October 1936, due mainly to experimentation with different spark plugs (Cassidy, 1999:80-81; Lock and Creasey, 1943:168). This was not the standard Empire flying boat, known as Mark Is, but one of two ‘Bermuda’ boats referred to as Mark IIs, which varied from the Mark Is by the use of medium range fuel systems and the associated increased cargo capacity. Centaurus was initially planned for the New York – Bermuda route in conjunction with aircraft from Pan American World Airways (Pan Am), but was replaced by Cavalier, the next Empire flying boat to be built (Armstrong, 1952:210-211; Cassidy 1999:1, 173 and 176). Centaurus instead:

... began the service from Alexandria through to Southampton [on 12/13 January 1937], with a night-stop at Brindisi, flown by Capt L. A. Egglesfield; he made the first outbound flight on the same schedule on the 16th and 17th, being followed by Capt Powell on Cassiopeia on the 26th to connect with the African mail at Alexandria (Barnes, 1967:319; see also Lock and Creasey, 1943:219).

Prior to the trip to Alexandria, however, Centaurus left Hythe for Egypt on 13 December 1936: ‘with the first of the EAMS bags to earn the £22,500 Egyptian subsidy’ (Higham, 1960:217). The following year. Centaurus left Alexandria on 18 September 1937 for the second survey flight to Karachi and arrived there on 20 September 1937 (Lock and Creasey, 1943:221).

IAL had by this stage an urgent need for aircraft capable of carrying mail and passengers throughout the British Empire, so to increase the ties between those nations (Wilson, 200:95; Harrison, Lockstone and Anderson, 1997:26). Competition was fierce. IAL was years behind companies such as the Dutch Koninklijke Luchtvaart Maatshappij (KLM) and Pan Am (Harrison et al., 1997:22). In order to compete they needed a machine large enough to lift heavy loads of mail long distances. IAL’s existing fleet of biplanes was outdated and not up to the task:

The S23 Empire flying boat came into being as a result of Imperial Airways ordering two aircraft to replace obsolescent “Kent” seaplanes in 1934. Imperial Airways was faced by this time by competition from K.L.M. with its D.C.2’s and from Lufthansa, and needed new equipment. The development of the Empire Air Mail Scheme in 1935 made a much enlarged new fleet necessary (Preston, 1978:36).

Orders for the Short Brother’s new monoplane flying boat were placed in 1935, sight unseen. There were no prototypes, yet 28 machines were ordered off the drawing board by what one author has claimed as: ‘one of the world’s boldest experiments in aviation. There were others, however, who referred to the order as a gamble’ (Norris, 1966:3; see also Kelly-Rogers, 1939:3; Cassidy, 1999:1). Apart from De Havilland, British aircraft manufacturers up until that time had little incentive to build civil aircraft: ‘… when the only buyer was Imperial Airways. It had never ordered more than eight aircraft at a time until the order for the Empire flying-boats
was placed’ (Higham, 1960:247). C.C. Grey states why IAL’s apparent gamble was well worth the risk:

Our Empire Flying Boats are collectively the biggest and boldest experiment, one might almost call it gamble, that has ever been taken in connection with British Civil Aviation. And yet when one has seen the way in which all the Short flying-boats of the past years have come up to calculations, and have generally bettered them, one can hardly regard the ‘boats themselves as an experiment, or call the use of them a gamble (C.C. Grey quoted in Cassidy, 1999:1).

The Short Brothers were not new to building superb flying boats. IAL’s initial order of 28 Empire flying boats was, therefore, hardly a gamble (Norris, 1966:3). Short’s flying boats were some of the best in the world. It is not surprising then that when the ‘prototype’, Canopus (G-ADHL), was eventually launched on the Medway River at Rochester the pilot, John Lankester Parker, who had intended to only do some fast runs on the water, decided to take-off, the aircraft was performing so well and flew Canopus for 14 minutes (Wilson, 2000:95). It was believed at that time that no land plane could be built of the ‘size and weight with acceptable landing and take-off characteristics, a flying boat was hence required’ (Norris, 1966:3; Barrington, 1937). As a result, IAL had a machine built to their own specifications that could implement their desire to carry overseas air mail profitably, at surface rates, without surcharge, at a rate of 1½d. per ½ oz. (Cassidy, 1999:173; Harrison et al., 1997:22; Lock and Creasey, 1943:173). The flat rate for the carriage of mail anywhere throughout the Empire consequently had follow-on effects:

Letters then went to India and Malaya for 1½d., and in the July of the same year (1938) the penny-ha’porth continued as far as Australia and New Zealand; a letter from one London district to another cost the same. An immense increase in mail was expected, new machines, new staff and new methods were introduced. Traffic increased considerably on all routes, for the air mail meant more machines, and more machines meant more passengers and more general freight.

The real effect was not apparent until Christmas, when everybody in England appeared to discover that they had thousands of friends in South Africa who should have Christmas cards. One only cost 1/d. to send! All South Africa was inspired by the same spirit of goodwill, and the crews and staff perspired and cursed beneath the avalanche of mail (Lock and Creasey, 1943:173).

The British Government gave approval for the EAMS on 20 December 1934. The air mail would initially also be flown by Armstrong Whitworth AW.27 ‘E’ class land planes, but in time, the Empire flying boats would end up carrying the bulk of the mail (Cassidy, 1999:173). Provisions were also made to carry a limited number of passengers in levels of comfort and luxury not seen before in air travel (Fig. 3.1; Photo. 3.6 and Photo. 3.7).

The role of Centaurus in the EAMS’s plans was to service the link between England and South Africa, the first stage in the implementation of the Scheme. The second stage was to extend the service to India, Ceylon and Malaya; the third stage onto Australia and finally across the Tasman Sea to New Zealand. A conference was held in Sydney in 1935 between British and New Zealand officials to discuss the viability of New Zealand entering the EAMS, and although the
Australians were concerned about the controlling interests of IAL, ‘New Zealand’s Postmaster General thought that anything which brought the empire together was desirable’ (Harrison et al., 1997:23). IAL’s concerns, however, were not whether the EAMS would extend to New Zealand, but what type of aircraft would be used. There was strong competition between the Martin M130 Clipper and the Sikorsky S42 flying boats. Both these machines, like Short’s Empire flying boats, could carry a considerable amount of mail and passengers (Harrison et al., 1997:23-24). What clinched the deal to get the New Zealanders to buy British-built Empire flying boats over American-made machines was the arrival in New Zealand of aviation’s superstar – Centaurus on its survey flight of the proposed EAMS route in 1937/1938 (Fig. 3.2). Centaurus, however, was not the original Empire flying boat planned for the inaugural flight, but Capricornus (G-ADVA), which tragically crashed over France in March 1937 shortly after its delivery to IAL (Higham, 1960:234; Penrose, 1980:139).
Pan Am was not the only airline surveying routes to New Zealand. The new British Labour Government had endorsed the EAMS Sydney – Auckland route, but progress was suspended while arguments over the Sydney – Singapore route and IAL’s use of Empire flying boats were being sorted. Frank Clune’s *All aboard for Singapore* (1941) relates an excellent description of the flight between Sydney and Singapore. Discussions between the New Zealand, Australian and UK Governments at the 1937 Imperial conference resulted in the decision that the Tasman service would be provided by only one airline company ‘registered in New Zealand and a three member commission would govern its activities’ (Harrison *et al.*, 1937:28). This company would later be known as TEAL. IAL is said to have forced the pace for the opening up of the new route to Auckland from Sydney when on 3 December 1937 it dispatched its newly completed Empire flying boat S.23 *Centaurus* from Southampton, commanded by New Zealand born Cpt John Burgess, on a survey flight along the route from England to Auckland via Australia (Harrison *et al.*, 1997:28; Higham 1960:238; Lock and Creasey, 1943:221). Crew for this flight is listed in Table 3.1.

Thousands of holiday makers welcomed the flying boat to Mechanic’s Bay in Auckland on 27 December 1937. Edwin Musick’s flying boat was also there. He was one of the world’s greatest
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pilots. Musick’s *Samoan Clipper* had arrived back in Auckland to complete a second survey flight. This historic moment is recorded in a rare photograph of the two flying boats, representing the competing ambitions of IAL and Pan Am, together at their moorings in Mechanic’s Bay (Photo. 3.8) (see also Pomeroy, 2000:27). The itinerary for the survey flight of *Centaurus* to Australia and New Zealand is shown in Table 3.2. The itinerary was not strictly adhered to. *Centaurus*, for instance, arrived at Darwin a day earlier than had been intended (Appendix 3.2).

Prior to the survey flight of *Centaurus*, however, this flying boat set several milestones in aviation history. *Centaurus* began the mail and passenger service to Durban (South Africa) from 28 June 1937 (Duval, 1966:191). During the survey flight, *Centaurus* became the first Empire flying boat to come to Australia (Duval, 1966:317). Photographs depict *Centaurus* on Darwin Harbour during this time (Photo. 3.9 and Photo. 3.10). According to one caption, it was the first Empire flying boat to arrive in Darwin, but in 1938. *Centaurus* departed England on ‘3 December on the first commercial flying boat survey to Australia and New Zealand’ (Gunn, 1985:315-316). The aircraft arrived at Darwin on 17 December 1937, so if the 1938 date is correct, then the photograph had to be taken upon the flying boat’s return journey to England, probably around 29 January to 1 February 1938 (Series number: F1/0. Control symbol: 1937/750, NAA).

*Centaurus* flew from Darwin to Gladstone, Brisbane and then to Sydney where it alighted on Rose Bay. Less known is the aircraft’s courtesy call to Hobart, Tasmania and to Adelaide, South Australia (Appendix 3.3). After a return flight to Sydney from Auckland on 10 January 1938, the machine stirred great interest and apparent 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 (Gunn, 1985:318).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captain</td>
<td>Burgess, J.W.</td>
</tr>
<tr>
<td>First Officer</td>
<td>Elder, C.F.</td>
</tr>
<tr>
<td>Flight Engineer</td>
<td>Murray, F.</td>
</tr>
<tr>
<td>Senior Wireless Operator</td>
<td>Low, A.</td>
</tr>
<tr>
<td>Wireless Operator</td>
<td>Dangerfield, H.</td>
</tr>
<tr>
<td>Steward</td>
<td>Bingham, H.J.</td>
</tr>
<tr>
<td>Passenger (joined at Singapore)</td>
<td>Captain Brain</td>
</tr>
<tr>
<td>Passenger (joined at Singapore)</td>
<td>Un-named press representative</td>
</tr>
</tbody>
</table>

Table 3.1 Crew of *Centaurus* on inaugural flight to New Zealand via Australia (Series number: F1/0. Control symbol: 1937/750; Series number: A705/0. Control symbol: 21/1/70, NAA; Northern Standard, 1937)
Despite poor public relations in Sydney, Centaurus gained much publicity while in Australia and one of the reasons IAL sent the machine to New Zealand was to rally them in support of a British over an American airline:

Centaurus was celebrity wherever it flew and crowds gathered around Lyttelton Harbour and Otago Harbour, where Burgess landed on 4 January (Harrison 1997 et al., 1997:28).

Newspapers throughout Australia reported the flying boat’s progress. Unlike the cold reception given to the people of Sydney, Darwin people had a better chance to see the flying boat:

During its stay here the Centaurus was open to inspection by the public and on Sunday [17 December] 240 residents of Darwin availed themselves of the opportunity (Northern Standard, 1937).

Australians and New Zealanders were also suspicious of each other and ‘united only in their opposition to a British monopoly’ (Gunn, 1987:13). The inaugural weekly service between Auckland and Sydney was flown by the Short Empire S.30C flying boat Aotearoa (ZK-AMA)
Table 3.2. Itinerary for the survey flight of *Centaurus* 17 December 1937 – 1 February 1938 (Series number: F1/0. Control symbol: 1937/750, NAA)

<table>
<thead>
<tr>
<th>Day Nos.</th>
<th>Date/Day</th>
<th>Month</th>
<th>Location and destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17</td>
<td>December</td>
<td>Bima-Darwin</td>
</tr>
<tr>
<td>2/3</td>
<td>18-19</td>
<td>December</td>
<td>At Darwin</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>December</td>
<td>Darwin via Groote Eylandt, Karumba, Townsville.</td>
</tr>
<tr>
<td>5</td>
<td>21</td>
<td>December</td>
<td>Townsville, Gladstone, Brisbane</td>
</tr>
<tr>
<td>6/7</td>
<td>22-23</td>
<td>December</td>
<td>Brisbane</td>
</tr>
<tr>
<td>8</td>
<td>24</td>
<td>December</td>
<td>Brisbane-Sydney</td>
</tr>
<tr>
<td>9/10</td>
<td>25-26</td>
<td>December</td>
<td>Sydney</td>
</tr>
<tr>
<td>11</td>
<td>27</td>
<td>December</td>
<td>Sydney-Auckland</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>January</td>
<td>Auckland-Sydney</td>
</tr>
<tr>
<td>13/14/15</td>
<td>11-12-13</td>
<td>January</td>
<td>At Sydney</td>
</tr>
<tr>
<td>16</td>
<td>14</td>
<td>January</td>
<td>Sydney-Melbourne</td>
</tr>
<tr>
<td>17/18</td>
<td>15-16</td>
<td>January</td>
<td>At Melbourne</td>
</tr>
<tr>
<td>19</td>
<td>17</td>
<td>January</td>
<td>Melbourne-Adelaide</td>
</tr>
<tr>
<td>20</td>
<td>18</td>
<td>January</td>
<td>Adelaide-Hobart</td>
</tr>
<tr>
<td>21</td>
<td>19</td>
<td>January</td>
<td>Hobart-Sydney</td>
</tr>
<tr>
<td>22/23/24/25</td>
<td>20-21-22-23</td>
<td>January</td>
<td>Sydney</td>
</tr>
<tr>
<td>26</td>
<td>24</td>
<td>January</td>
<td>Sydney-Brisbane</td>
</tr>
<tr>
<td>27/28</td>
<td>25-26</td>
<td>January</td>
<td>At Brisbane</td>
</tr>
<tr>
<td>29</td>
<td>27</td>
<td>January</td>
<td>Brisbane via Gladstone, Townsville.</td>
</tr>
<tr>
<td>30</td>
<td>28</td>
<td>January</td>
<td>Townsville, Karumba</td>
</tr>
<tr>
<td>31</td>
<td>29</td>
<td>January</td>
<td>Karumba via Groote Eylandt, Darwin</td>
</tr>
<tr>
<td>32/33</td>
<td>30-31</td>
<td>January</td>
<td>Darwin</td>
</tr>
<tr>
<td>34</td>
<td>01</td>
<td>February</td>
<td>Darwin-Bima</td>
</tr>
</tbody>
</table>

*Photograph 3.9. ’The arrival of the first Empire flying boat in Darwin in 1938. The launch in the foreground is the patrol boat Larrakia, based in Darwin in case air sea rescue was needed’ (Photographer unknown via Forrest, 2001:29; Forrest, 2005:27).*
on 30 April 1940, under the command of Cpt J.W. Burgess (Ministry of Information, 1946:40). The flying boat was acquired on 28 August 1939. A second Empire flying boat was acquired by New Zealand on 3 April 1940 and was named Awarua (ZK-AMC) (Walker and Stapleton, 2004).

The only criticism of the trip of the EAMS to Australia was that when regular services commenced, facilities and procedures were still below expectations. The Advertiser (1938) reported that at Darwin during the arrival of the first mail-carrying Empire flying boat, Challenger (G-ADVD) in 1938, passengers were subjected to the vagaries of the customs formalities and of the sea:

‘Didn’t the Federal Government wake up to the fact that it was partaking of an event which is making history?’ a critic asked about the Darwin muddle. It is a question which many are asking after today’s revelations from the special correspondent with the flying boat about the treatment accorded the Challenger … Readers of “The Times” and the “News-Chronicle” were shocked today to learn that when passengers had been cooped up on the Challenger for two hours while formalities were pursued, the cabin became so stuffy with fumes during the vaccination that a customs officer became sick and had to be given brandy (Series number: D959/0. Control symbol: IA1938/405, NAA).

Fysh maintained that the troubles at Darwin were due to the Challenger’s visit being still a part of a running-in service and that requirements were still being sorted out prior to the inauguration of the first regular service later that year (Series number: D959/0. Control symbol: IA1938/405, NAA). Troubles with handling the Empire flying boats were also experienced at Sydney’s Rose Bay, where in April 1938, the land for the main base had only just been transferred by the NSW Government to the Federal Government. In August 1939 it was still not complete, apparently due to the Federal government’s lack of interest in flying boats for the service (Higham, 1960:234 and 236; Brimson, 1984:92; Brimson, 1988:92) (Photo. 3.11 — Photo. 3.13). The return flight to England highlights the rudimentary nature of these pioneering flights in the EAMS:
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Photograph 3.11  ‘Opening day of the Empire Air Mail Scheme’s first service to London on 4 August 1938 at Rose Bay. The government’s lack of enthusiasm for flying boats is evidenced by the slow progress made on the maintenance facilities and hangar at the left of the picture’ (Qantas via Brimson, 1988:92).

Photograph 3.12  ‘First flying boat air mail service to England, official opening’ (V) c. 1938-1940 [view from Camilla] (Series number: C4078/1. Control symbol: N1311E, NAA).
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UT Centaurus was taken off Lake Tiberias by Captain J.W. Burgess with a dead port outer engine, the main engine bearing having seized. The nearest replacement engine was at Alexandria and as he wished to get back to the UK as soon as possible, Captain Burgess decided not to wait for it. There were no passengers on board as the aircraft was returning from the survey flight to New Zealand. The first attempts to take-off with three engines failed, as the starboard outer engine could not be fully opened up. The lake was mirror calm and the dead engines’ windmilling airscrew generated too much drag, so it was unshipped over night and stowed in the passenger accommodation. Captain Burgess tried an operational procedure learnt during his days on the Rangoon ‘boats. He mustered the crew forward on the lower deck with instructions to proceed – run – aft as quickly as possible on the word of command. Alone on the upper deck, he opened the throttles. As the ‘boat came up onto the step, the crew rushed aft at their Captain’s shout of command. ‘UT came off the surface ‘like a bird’ (Cassidy, 1999:140-141).

Engine reliability also troubled the Empire flying boats. They were complicated and intricate, but this was alleviated with a duplication of servicing facilities at Durban and Sydney (Photo. 3.14). When war cut the EAMS in the Mediterranean and later in southeast Asia, the duplication of the engine overhaul services enable the isolated machines to remain in the air (Gunn, 1987:14, 16 and 19).

The flying boat is recorded as inaugurating the accelerated Australian service on 10 April 1938 (3 days to Karachi, 5 days to Singapore and 9 days to Sydney), but no further information about the aircraft’s movements is known until it was impressed into the RAAF upon the declaration of war in Europe. The military history of the Broome Empire flying boats is further discussed below.
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3.4 Corinna (G-AEUC) and the Horseshoe Route

An outline of the history of Corinna is warranted, as this was the second ex-IAL aircraft lost in Roebuck Bay. Corinna was the 22nd Empire flying boat constructed in the second run of 14 machines ordered from Short (Stroud, 1989:766). It was delivered to IAL some 10 months after Centaurus and by that stage, Short Brothers were producing about two flying boats per month. Unlike Centaurus, Corinna’s history is not well known, probably because it lacked the celebrity of the former. C.H. Barnes’s Shorts Aircraft since 1900 (1967) provides an insightful overview of the history of many Empire flying boats, but apart from an excellent picture of Corinna, nothing is mentioned of the aircraft’s history (Photo. 3.15).

One indicator of Corinna’s association with Australia prior to its loss in Broome is the establishment of the first ‘all-air through’ services between England and Australia. Previously, passengers had to change planes, as well as board a train in Paris for Brindisi, but with the introduction of the Empire flying boats, the same machine operated the service from Southampton all the way to Sydney (Lock and Creasey, 1943:168). What changed were the aircrews. IAL pilots flew to Singapore on the Far Eastern leg of the EAMS, where QEA pilots took over for the remainder of the journey (Clune, 1941:129; Ministry of Information, 1946:61; Gunn, 1985:340). These change-overs were both beneficial and problematic for the service: ‘This method of operation put an end to the old idea of “one crew - one aircraft” which is to be very much regretted but, with the discovery that the aircraft could do more than the man, was inevitable’ (Kelly-Rogers, 1939:4). Corinna was caught at the Australian end of the service (known as the ‘Horseshoe Route’) when the Japanese cut the air mail route between England and Australia (Gunn, 1987:20).

The Horseshoe Route refers to the EAMS service from Durban in South Africa to Sydney via Karachi. The service began on 19 June 1939 (Lock and Creasey, 1943:224) and looked like an inverted horseshoe when plotted on a chart (Fig. 3.3). The use of Empire flying boats on the Horseshoe Route was reciprocal; QEA aircraft would alight on the Solent and IAL aircraft would alight on Rose Bay. That Corinna was on the eastern leg of the route is verified by Hudson Fysh while describing the character of Cpt Purton:
I would like to add, if I may, that it was a pleasure to number myself among Captain Purton’s crew. His never-failing good humour and wit were a big help when the going was difficult. His handling of Corinna during the most incredible violent storm I had ever seen was, in my opinion, a masterpiece of flying. We ran into it near Benkulen in Sumatra [Bengkulu Province, Sumatra, Indonesia] and it was a disturbance known as a Sumatran - a small concentrated cyclone notorious for its violence (Fysh, 1968:146).

In the advent of war, however, it was determined that the Empire flying boats: ‘West of Darwin will be recalled to Darwin and those between Darwin and Sydney will be recalled to Sydney’ (Corbett quoted in Gunn, 1987:38). Corbett’s statement was further qualified on 15 August 1941; communications with Singapore should continue as long as possible until the Japanese cut the route. This shows how Corinna ended up in Australia during WWII:

The Chief of Air Staff has informed me … that flying boats actually at Singapore on the outbreak of hostilities with Japan should continue their journeys eastward or westward as long as the routes remain open, but if the westward route is closed from Sydney, flying boats at Singapore should be instructed to return to Australia. The only circumstances under which flying boats could come under the orders of the Commander-in-Chief Far East would be when no possible return route to Australia remains available (Corbett quoted in Gunn, 1987:38-39).

The route west of Sydney to Singapore was not cut until Singapore fell to the Japanese. A detailed history of Corinna continues after WWII started and the following discusses the roles of both Centaurus and Corinna just prior to their loss.

3.5 Short Empire flying boats at war
At the outbreak of hostilities with Germany on 3 September 1939, the RAAF had no suitable long-range aircraft. However, QEA had Empire flying boats that could be impressed (Vincent, 1982:72; Fysh, 1968:99). Two Empire flying boats were at the Australian end of the London to
Figure 3.3  Map showing Horseshoe route (After Ministry of Information, 1946:46 and 47).

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Sydney route when war was declared (Vincent, 1982:72). One of them was Centaurus, which was impressed by the Commonwealth Government; the other was Calypso (which became A18-11, ex-G-AEUA). Corinna, also placed on Government charter around this time (1939), was reported to have been operating ‘reconnaissance flights around New Guinea, the Solomon Islands and the New Hebrides’ (Wilson, 2000:106. See also: Cassidy, 1999:188).

The Mediterranean route of the EAMS was temporarily cut on 10 June 1940 when Italy declared war (Ministry of Information, 1946:44). To avoid Italian and later French-controlled airspace (after France capitulated). From 1940 to 1942 flying boats going to England had to make a vast detour to West Africa by flying virtually due south into Africa from Cairo, then headed west and once at the coast, fly north. An overland route across the Sahara Desert, operated by land-planes, maintained the link until it was broken by the German advance across the Western Desert (Ministry of information, 1946:96). This land-plane link was itself eventually stopped after a ban was placed on flying over French colonial territory on 28 June 1940 (Ministry of Information, 1946:48). However, 16 countries between Durban and Sydney continued to be linked by the Empire flying boats plying the Horseshoe Route after 19 June 1940 (Ministry of Information, 1946:45). QEA aircraft were also caught on the other side of the cut in England. Fysh (1968) summarises the history of Empire flying boats in the QEA fleet, together with the inclusion of aircraft from IAL. Note there is no mention of Corinna (Table 3.3).

When it had been judged that Italy and Japan would not immediately join the war in 1939, QEA’s peacetime operations to Singapore and Karachi continued, but only two instead of the regular three services were run until Japan entered the war and these were operated by land-planes between Egypt and Britain (Graham, 2001; Ministry of Information, 1946:41). The peacetime QEA service was only to Singapore, but during the early Pacific war, QEA aircrew assisted BOAC by continuing on to Karachi (Gunn, 1997:42). This burden was almost entirely carried by Australian merchant airmen: ‘It is to their credit, therefore, that the life-line between Britain and Australia over this critical area remained open for as long as it did’ (Pudney, 1959:193). Table 3.4 lists the commanders operating the route.

There were 16 flying boats east or south of Alexandria at this time (Gunn, 1987:19; Ministry of Information, 1946:45). Corinna must still have been operating on the Horseshoe Route and is recorded to have been the last Empire flying boat out of Singapore on 4 February, after its arrival from Batavia (Jakarta) on 3 February (Graham, 2001:5; Shores, Cull and Izawa, 1992a:364). The following describes the last flight:

… the flying-boats continued to operate until February 3 [?], when Captain W. H. Crowther took the last craft into Singapore, bringing out forty passengers in bright moonlight. After this the BOAC launch continued rescue work ferrying evacuees out to shipping in the roads, before itself escaping to Java (Pudney, 1959:195).

Further mention is made of this incident in an interview with Crowther by the following author, but the aircraft is not identified. Corinna departed Singapore under trying conditions:

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Table 3.3  Short S.23 Empire flying boats owned or operated by QEA 1934-45 (After Fysh, 1968:224-225; Wilson, 2000:117; Kelly, 2003:193-195)

<table>
<thead>
<tr>
<th>No.</th>
<th>Registration</th>
<th>Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>VH-ABA – Carpentaria</td>
<td>Transferred to BOAC in exchange for G-AEUB Camilla – Broken up 1947</td>
</tr>
<tr>
<td>2.</td>
<td>VH-ABB – Coolangatta</td>
<td>Impressed by Commonwealth Govt. as A18-13 – Crashed Rose Bay 1944</td>
</tr>
<tr>
<td>3.</td>
<td>VH-ABC – Coogee</td>
<td>Impressed by Commonwealth Govt. as RAAF A18-12 [G-AEUG] – Crashed Townsville 1942</td>
</tr>
<tr>
<td>4.</td>
<td>VH-ABD – Corio</td>
<td>Transferred to BOAC in exchange for Centaurus. As G-AEUH – Shot down by enemy action near Koepang 1942</td>
</tr>
<tr>
<td>5.</td>
<td>VH-ABE – Coorong</td>
<td>Transferred to BOAC in exchange for Calypso G-AEUA – Broken up 1947</td>
</tr>
<tr>
<td>6.</td>
<td>VH-ABF – Cooee</td>
<td>Transferred to BOAC in exchange for Coriolanus G-AETV – Broken up 1947</td>
</tr>
<tr>
<td>7.</td>
<td>VH-ABG – Coriolanus</td>
<td>Sold 1948. Note: ex-G-AETV</td>
</tr>
<tr>
<td>9.</td>
<td>G-AEU A – Calypso</td>
<td>Impressed by Commonwealth Govt. as A18-11 – Crashed near New Guinea 1942</td>
</tr>
<tr>
<td>10.</td>
<td>VH-ADU – Camilla</td>
<td>Formerly G-AEUB – Crashed in sea off Port Morby 1943</td>
</tr>
<tr>
<td>11.</td>
<td>VH-ACD – Clifton</td>
<td>Impressed by Commonwealth Govt. as A18-14 – Crashed Sydney 1944 [note: S.33 flying boat]</td>
</tr>
</tbody>
</table>

Table 3.4  Commanders operating the Kangaroo route between Karachi and Sydney

<table>
<thead>
<tr>
<th>R.S. Adair</th>
<th>L.R. Ambrose</th>
<th>L. J. Brain</th>
<th>W.H. Crowther</th>
<th>O.D. Denny</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.K. Howard</td>
<td>C.R. Gurney*</td>
<td>H.B. Hussey</td>
<td>A.A. Koch</td>
<td>W.B. Purton</td>
</tr>
</tbody>
</table>

**40---1426 returning from a raid on Rabaul was forced down in the vicinity of the Trobriand Islands. Catalina A24-18 of the RAAF 20th Squadron with Sq/L R.A. Atkinson, captain, and P/O T.L. Duigan, co-pilot, searched the Trobriands and located the missing Marauder in a clearing on the south end of Kiriwini Island. The survivors were picked up at Sinakeat, and they reported that the Marauder captain, 2nd Lt C. I. Herron, and his co-pilot Sq/L Gurney, had both been killed instantly when the aircraft overturned after a short run on soft ground. The bodies were buried beside the crash and were not recovered (Duigan, via Cardell 1991:66). *Sq/L Gurney was a Catalina captain, but flying as a co-pilot on the American Marauder. He had come to the RAAF from Qantas, and had been one of the “early birds”, using Empire Flying boats until the “Cats” arrived (Cavanagh via Cardell, 1991:66).
On 3 February 1942, Captain Crowther left Batavia for the last shuttle flight to Singapore, timing his departure to arrive in late afternoon when all Japanese aircraft were likely to have returned to base. They flew low over the Sumatran jungle, below the level of the hills when possible, to avoid being sighted and were about half way long the route when a radio message from Singapore said there could be no guarantee of any facilities for their arrival. Crowther decided to proceed, then thought he should let his crew express their feelings. There would have been no difficulty in turning back at that moment, but all agreed to continue and their arrival at Singapore was uneventful. In the early hours of the following morning, Crowther was taken out onto the crowded harbour by the director of civil aviation to decide a take-off path that would avoid the minefields, the many ships, and the fish traps. There was just enough moonlight filtering through the clouds to provide sufficient visibility as Crowther opened the throttles and, heavy with refugees, the aircraft lifted from the water on the last flying boat service to leave Singapore (Gunn, 1987:49).

Some accounts name the aircraft *Camilla* (Wilson 2000:110; Cassidy 1999:193). While others do not mention the aircraft involved, they all state that Capt Crowther operated the last Empire flying boat out of Singapore, the news of which was broadcasted by Tokyo Radio that afternoon (see also Sims, 2000:214; Fysh, 1968:125).

The regular arrival of Japanese bombers made the congestion worse, and it continued for some days after what was to be the last flying boat to call at Singapore had left. This boat flew into Singapore on the evening of 3 February and, under the command of Captain W. H. Crowther, left again at 2.30 a.m. on the following morning from the Inner Roads (Bennett-Bremner, 1944:47).

Although there appears to be some discrepancy between which machine operated the last flight, it is maintained here that it was *Corinna* not *Camilla*. Further verification is a report on the shuttle services between Batavia and Singapore:

A total of 14 shuttles was carried out each way between Batavia and Singapore until 4 February, when Captain Crowther in *Corinna* evacuated 40 civilian men, women and children, totalling $2\ 1/2$ tons together with a quarter of a ton of mail and a quarter of a ton of equipment to Batavia (Bennett-Bremner, 1944:175).

*Corinna* was also the first Empire flying boat to commence the shuttle flights between Batavia (Jakarta), Tjilatjap and Broome on 8 February 1942 (Graham, 2001:5; Gunn, 1987:49). *Corinna* probably made the last-through service from Karachi to Sydney via Singapore. Although no mention is made of the aircraft’s identity, it is determined here on the basis of corresponding dates and destinations that the following refers to *Corinna* at the far western end of the Southampton to Karachi service:

In the hazardous conditions, on 8 February, Capt. Russell Tapp set off from Karachi for Batavia on the last through service of the Empire flying boat route … Tapp’s route took him to Calcutta, Akyab, and on to the Port Blair [South Andaman Island] and here, where there were visits by Japanese aircraft almost daily (Gunn, 1987:49).

Departure from Batavia was scheduled for midnight, with an anticipated arrival at Sibolga (Sumatra) at 6.30 am. An engine failure caused delays at Port Blair, but the aircraft eventually departed at 9 am for Sibolga via the Little Andaman Islands and Nancowry (Gunn, 1987:50).
On 9 February 1942, *Corinna* alighted at Batavia. The aircraft was then handed over by Tapp to an unknown pilot who took the machine on to Sydney. Tapp was to await another aircraft to return to Karachi, but before he could get away. Singapore had fallen, ‘making it impossible to carry out the return flight’ (Tapp quoted in Gunn, 1987:51). Tapp’s inability to return to Karachi fits in with the documented last shuttle flight of *Corinna* between Singapore and Batavia:

On 19 February 1942 Capt. L. Ambrose flew the last (flying boat) service out of Batavia for Australia via Tjilatjap and the following day QEA’s headquarters were transferred to Tjilatjap from Batavia (Gunn, 1987:51).

*Corinna* broke from the shuttle service on occasions to fly onwards to Sydney. The machine is recorded to have returned to Broome ex-Sydney via Darwin on 1 March 1942. Under the command of Cpts O.F.Y. Thomas and L.R. Ambrose, *Corinna* departed Broome on 2 March on a 10-hour search for *Circe* and its crew, but failed to find any trace of their destruction (Graham, 2001:8; Gunn, 1987:56) (Photo. 3.16 and Photo. 3.17).

With the declaration of war by Great Britain and her Allies, a regulation of the Australian Civil Aviation Department meant civilian pilots would be called upon as members of the RAAF reserve. War also meant the suspension of the EAMS (Wilson, 2000:105). As a result, IAL pilots and some aircraft, were taken over by the RAAF. *Centaurus* and *Calypso* were taken over on 20 September 1939, although some sources say 21 or 25 September (Gunn, 1985:355-356; see also Wilson, 2000:106 and Kelly, 2003:194 respectively). Most IAL aircraft were modified for military service, although this may have been different for *Corinna*. The RAAF chartered the BOAC Empire flying boats caught at the Australian end of the Horseshoe route, including *Corinna*. Therefore, while *Corinna* was not officially a RAAF machine and was flown by QEA aircrews, it was under RAAF control.

QEA as a member of the Commonwealth, may have come under the auspices of BOAC, but it did maintain its national identity and its part of what was known as ‘The Kangaroo Route’ from London to Sydney (Pudney, 1959:31; Gunn, 1987:15-16; Hooper, 1985). *Corinna*, because of the amalgamation, was given over to BOAC after 1 April 1940 (Higham, 1960:333). Table 3.5 shows the exchange of IAL and QEA aircraft during WWII and explains why some machines such as *Centaurus* were taken over by the RAAF while others, such as *Corinna*, were not militarised (Photo. 3.18 and Photo. 3.19). *Corinna*’s absence from Table 3.5 is conspicuous. The machine was not militarised because it still belonged to BOAC up until its loss at Broome, but was worked by QEA. Another BOAC machine, *Corinthian*, was also in Australia and was not militarised. Possibly they were both retained by BOAC to keep the aerial link to Britain open, until it was closed with the fall of Singapore?

QEA pilots flew *Corinna* at the time of its loss, because it had been at the Australian end of the EAMS service when Japan cut the Horseshoe Route in late February 1942. It should be remembered that QEA pilots took over EAMS aircraft from London at Singapore to fly them on to Sydney. This explains why there has been some confusion over whether *Corinna* was a ‘Qantas’ aircraft.
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Table 3.5 Aircraft changes between IAL, QEA and RAAF (After Graham, 2001)

<table>
<thead>
<tr>
<th>Name &amp; Serial No.</th>
<th>Organisation</th>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First changes – first two swaps</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Centaurus G-ADUT</strong></td>
<td>to RAAF as A18-10</td>
<td>09 1939</td>
<td>At Australian end of service</td>
</tr>
<tr>
<td><strong>Calypso G-AEUA</strong></td>
<td>to RAAF as A18-11</td>
<td>09 1939</td>
<td>At Australian end of service</td>
</tr>
<tr>
<td><strong>Corio VH-ABD</strong></td>
<td>to IAL as G-AEUH</td>
<td>09 1939</td>
<td>In England at start of war?</td>
</tr>
<tr>
<td><strong>Coorong VH-ABE</strong></td>
<td>to IAL as G-AEU</td>
<td>09 1939</td>
<td>Repaired in UK after storm damage in Darwin – and eventually scrapped</td>
</tr>
<tr>
<td><strong>Second changes – no swaps necessary as these were QEA aircraft</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Coogee VH-ABC</strong></td>
<td>To RAAF as A18-12</td>
<td>06 1940</td>
<td></td>
</tr>
<tr>
<td><strong>Coolangatta VH-ABB</strong></td>
<td>To RAAF as A18-13</td>
<td>06 1940</td>
<td>Returned to QEA on 29/07/43</td>
</tr>
<tr>
<td><strong>Third changes – second two swaps</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Carpentaria VH-ABA</strong></td>
<td>to BOAC as G-AFGJ</td>
<td>08 1942</td>
<td>Isolated at African end of service</td>
</tr>
<tr>
<td><strong>Cooee VH-ABF</strong></td>
<td>to BOAC as G-AFBL</td>
<td>08 1942</td>
<td>Isolated at African end of service</td>
</tr>
<tr>
<td><strong>Camilla G-AEUB</strong></td>
<td>to QEA as VH-ADU</td>
<td>08 1942</td>
<td>Isolated at Australian end of service</td>
</tr>
<tr>
<td><strong>Coriolanus G-AETV</strong></td>
<td>to QEA as VH-ABG</td>
<td>08 1942</td>
<td>Isolated at Australian end of service</td>
</tr>
<tr>
<td><strong>Clifton G-AFPZ</strong></td>
<td>To RAAF as A18-14</td>
<td>03 1942</td>
<td>Isolated at Australian end of service</td>
</tr>
</tbody>
</table>
Photograph 3.18  1940-02-17. Port Moresby - Squadron Leader A.M. Murdoch, RAAF fires a burst from Lewis gun in port vent of A18-10 using shadow of flying boat as morning target on the sea. 3626a - Port Moresby - an Australian air-gunner preparing to “cover the target” with port side Lewis gun on flying boat. RAAF survey flight. (N. Tracy via AWM. Negative Number: 003626).

Photograph 3.19  ‘Townsville, May 1942 - Short Empire Flying Boat A18-14 - In the early stages of using the Short Empire Flying Boats Doug Dick (now Dickson) shown here, had this open gun turret - later a cover was fitted’ (Photo: courtesy Doug Dickson via Bob Cleworth).
Aircraft History Cards (Fig. 3.4) indicate that *Centaurus* was received by the RAAF on 21 September 1939 (Series number: A10297/1. Control symbol: Block 104, NAA). *Centaurus* was allocated to No. 11 Squadron (Sqn) at Richmond, NSW but was soon moved to the squadron’s new operations centre in Port Moresby, New Guinea on 25 September 1939 (Vincent, 1982:72). Figure 3.5 shows the range of flying boat operations conducted by the RAAF throughout the war. The motley arrangement of aircraft and personal created a somewhat unusual unit:

In September, an RAAF Flying Boat Squadron, No 11, was formed and hastily equipped with two of the Qantas Empire boats, and two Seagull Mark V amphibians. The squadron was under the command of Flight-Lieutenant Jim Alexander. Fifteen Qantas captains, first officers, radio officers, engineers and ground staff joined the squadron, which also contained sixteen permanent Air Force members … This squadron, so curiously equipped with the only machines then available, its personnel from such differing walks of life, quickly became known as ‘Alexander’s Ragtime Band’ (Sinclair, 1986:2).

*A18-10* was used for transport duties at this time, including the transport of the dead. On 28 February 1940, *A18-10* is shown in Photograph 3.20 transporting the body of Sir Hubert Murray (Lieutenant-Governor of New Guinea) to Fairfax Harbour, Port Moresby, which had been brought back from Samarai (Narin and Serle, 1986:645-648; Haddon and Williams, 1940). That same day, two years later, *A18-10*, under the command of F/Lt Keith Caldwell, flew to Broome and then on to Tjilatjap, Java, where it was to assist in the evacuation flights (Vincent, 1982:74). This, however, was not the case. *A18-10* had not gone to Broome to help with the evacuations from Java as the shuttle service had already ceased by 28 February 1942. It was there for another reason, a secret mission to Timor to evacuate RAAF personnel.

Operating out of Port Moresby, the aircraft was used for aerial reconnaissance as far as the Solomon Islands, including flights over Rabaul, Tulagi and Vila (Photo. 3.21 – Photo. 3.23). The aircraft’s operations were later ordered to include ‘operations in the defence of trade’ (Vincent, 1982:73; Gunn, 1997:22). Reconnaissance patrols were aimed at locating German surface raiders, but by 18 November 1941 *A18-10* had been allocated to No. 20 Sqn where it stayed until February 1942 (Vincent, 1982:73; Series number: A10297/1. Control symbol: Block 104, NAA). Additional information on the aircraft’s movements is provided by ‘The gateway to Victory’ plaque on Bretts Wharf, Hamilton, Brisbane, dedicated in 1997:

-On 24 December 1941 QEA, the RAAF and the USAF completed their first joint operation when *A18-10* [ex G-ADUT] alighted on the Hamilton Reach of the Brisbane River with 22 pilots from the US 27th Bomber Group and 5 pilots of the 24th Pursuit Group who were withdrawn from the Philippines. These US pilots, together with RAAF personnel, organised and trained the first squadrons that were to become the US Fifth Air Force (Wilson, 2000:106; see also Graham 2001:5).

After Japan’s entry into WWII, *Centaurus* would be used for its originally intended role as a passenger carrier and later on as a carrier of evacuees from Port Moresby and nearby islands (Vincent, 1982:73; see also Sinclair, 1978). Forty-two adults and nine children were crammed into one flight on 26 December 1941, with take-off weight far exceeding their design limits (Vincent, 1982:73). These mercy flights were a beacon during the dark days of Japanese expansion into New Guinea:

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**CHAPTER 3: WINGS OF PEACE**
Figure 3.4  Aircraft Status Cards A18-10 to A18-14 (Series accession number: A10297/1. Control symbol: Block 104, NAA).

Figure 3.5  ‘Area of wartime operations Empire Flying Boats 1939-1945’ (After Wilson, 2000:109).
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Photograph 3.20 ‘1940-02-28. Port Moresby - A18-10 about to alight in harbour bearing Sir Hubert Murray's remains brought back from Samarai. RAAF survey flight’ (Negative by N. Tracy via AWM Negative Number: 003633).

But perhaps the finest achievement of the pilots, engineers, aeroplanes and administrators of that vanished [flying boat] era – was the evacuation of the white women and children of PNG before the Japanese menace and the later evacuation of most of the civilian population at the last possible hour, a task carried out with the magnificent aid of Qantas Empire Airways, Australian National Airways, and the Royal Australian Air Force (Sinclair, 1986:2).

Corinna was also in New Guinea too (the reference to government charter perhaps refers to RAAF):

G-AEUC Corinna was also placed on Government charter. The aircraft’s main duties at this stage became reconnaissance flights around New Guinea, the Solomon Islands and the New Hebrides (Wilson, 2000:106).

With the introduction of Catalinas and their subsequent use as offensive aircraft, the Empire boats in the RAAF were allotted to transport units, where they were badly needed (Vincent, 1982:73). On 12 February 1942, the RAAF’s Empire flying boats were allocated to No. 33 Sqn based at Townsville, Queensland (Vincent, 1982:73; Balfe, 1985; Series number: A10297/1, NAA). Graham (2001:3) and Kelly (2003:235) indicates that 33 Sqn was formed on 16 February 1942 and that the squadron was divided into ‘A’ and ‘B’ flights; flying boats and land planes respectively. It was the first ‘of the R.A.A.F. Transport Squadrons activated during the war’ (Cardell, 1991:87). A local boy offers his impression of the squadron:

The squadron acquired two Empire Flying Boats from No. 11 and 20 Squadrons, and operated these from the bay [Cleveland Bay] between Townsville and Magnetic Island. One of the prettiest sights I ever witnessed was when I lived on the Strand myself in about 1939/1940, and watched civil versions of these beautiful big silver boats approaching majestically from...
CHAPTER 3: WINGS OF PEACE

Photograph 3.21 ‘Short Empire flying boat A18-10 (on lease from Qantas [sic])’ (Broome Historical Society Museum). [Unidentified Short Empire flying boat in background, at an unrecorded location].


over Castle Hill way, to alight out in the bay. One of the 33rd Squadron’s ‘boats’ crashed on take off from the bay on 27 February 1942, with much loss of life (Cardell, 1991:88).

All of the Empire flying boats in RAAF service were transferred to No. 33 Sqn. A18-10 and A18-11 from No. 11 Sqn and A18-12 and A18-13 from No. 20 Sqn, however, on 20 February 1942, A18-10 was the only one in operational serviceability. A18-11 was undergoing repairs and engine changes at Sydney’s Rose Bay – estimated to take four weeks; A18-12 was undergoing repairs to its hull; A18-13 was also having its engines changed at Rose Bay, which was estimated to take two weeks (Kelly, 2003:237). Hull repairs must have been completed to A18-12 shortly after 20 February as the machine was destroyed at Townsville on 27 February while alighting.

The Japanese advance quickly overran Timor. RAAF personnel from No. 2 Bomber and Reconnaissance Squadron and a small number of AIF volunteers (C company of the 2/40 Battalion) were at Penfoei (Wray, 1987:33). Their task was to maintain radio communication as long as possible, refuel transiting aircraft and to destroy the airstrip there to deny it to the Japanese once its capture became inevitable (Humphris, 1990:8). RAAF Hudson aircraft were meant to take them out upon completion of their duties on 20 February, but they never arrived because the Japanese had bombed Darwin the day before (Humphris, 1990:13). The Australians were trapped. On 23 February 1942 the survivors were informed by radio from Darwin that a flying boat would be dispatched to pick them up on 1 March 1942 – later this was revised to 2 March 1942 (Humphris, 1990:25 and 27). In Collin Humphris’ book, *Trapped on Timor* (1990), no mention is made of which flying boat that was meant to pick them up, but that machine was A18-10.

By late afternoon on 28 February 1942, the RAAF party was only about a mile from the mouth of the Kapsali River, their proposed rendezvous point with A18-10 (Humphris, 1990:26). On 2 March, the party moved camp to within 50 yards of the beach and after an unsuccessful attempt to build rafts to enable the non-swimmers to reach the flying boat, they waited for their rescuers (Photo. 3.24) (Humphris, 1990:30). A18-10 was delayed and the rescue was rescheduled for 3 March 1942, but by 1600hrs on that day, Darwin radioed the message: ‘Broome raided unlikely rescue attempt tonight’ (Humphris, 1990:30). Sgt Andrew Ireland, crewmember on A18-10, recounts the final days of his flying boat in a letter to Mervyn Prime, dated 3 August 1992 (Photo. 3.25 and Photo. 3.26). Kelly (2003:238) correctly assumed that A18-10 was the unnamed Empire flying boat that on 27 February left Townsville for Darwin via Groote Eylandt. Parts in Ireland’s letter are transcribed below:

**February 27th 1942** – Flew Townsville to Port Moresby and then across to Groote Eylandt (12 1/2 hrs. flying).

**February 28th 1942** – Flew Groote [Eylandt] to Darwin for instructions re rendezvous and rescue mission. Overnight Darwin (3 1/2 hrs. flying).

March 1st 1942 – Flew Darwin to Broome (6hrs. flying) – we were supposed to refuel on the afternoon of the 1st ready to fly to Timor the following day. Qantas civilian flying boats received priority much to the displeasure of our skipper Keith Caldwell.

March 2nd 1942 – Received fuel during the morning of this day and attempted take off during the afternoon. Take-off aborted due to the instability of the six 44 gallon drums stowed in the cabin section.

March 3rd 1942 – Re-arranged the drums ready for noon take-off, caught napping by the Zekes at about 9.30am.

These particulars have been taken directly from my Flying Log and I am at a loss to know what happened to Saturday 29th February [note: 1942 was not a leap year, hence there would not have been such a date]. Keith Caldwell may be able to fill in this gap when he answers your letter. What puzzles me a little is that Colin Humphris, the author of “Trapped on Timor”, and who was one of the party to be rescued by us, refers in his book, to February 28th being a big day for them since the rendezvous with their rescuers was planned for the next evening at the mouth of the Kapsali River. This would have been, of course, the 29th, although he does not refer to it being the 29th. He does, however, mention in a paragraph later and quoting from a recording in a diary, that the rendezvous with the rescue aircraft, a 4 engine Empire Flying Boat, near the mouth of the Kapsali River, had been arranged for dusk on Sunday March 1st (Ireland, 1992).

Douglas Dick (later Dickson, changed by Deed Poll in 1966) elaborates on the events of 2 March 1942 in a letter to Rae Howard (the then President of the Broome Historical Society) dated 24 February 1992:

... our Skipper F/LT Caldwell attempted to become airborne, it was choppy sea and we had a full compliment of petrol in wing tanks and six (6) – 44 gallon drums roped together at the rear of A18-10 (Centaurus), which started to move when bouncing on the waves and
Andrew Ireland had his arms and body trying to steady them, however, the Skipper in his wisdom decided against taking off. Just as well as our assignment was to fly to Timor to rescue some Commando’s [sic], with the Japanese so close we would have been shot down (Dickson, 1992).

A complete crew list for the flying boat at time of loss is presented in Chapter 6, despite suggestions that none was available (Kelly, 2003:262). Photograph 3.27 shows Ross Jones, one of the eight-crewmembers onboard the flying boat at time of loss. No photograph has yet been sourced for Clarrie Masters. F/Lt Keith Caldwell of A18-10 (Photo. 3.28) gives his version of the days leading up to the flying boat’s loss at Broome in a letter to Mervyn Prime dated 26 April 1992:

My flying boat A18-10 was only in Broome on a 45 minute refuelling stop, en route to Timor to rescue some 80+, sick & injured Army personnel from the Western end & Northern shore of Timor near Koepang (a regular Qantas Stop on the old Sydney/UK route). Although the fuel required for this Broome/Timor leg had been confirmed available/held for us. It was stolen by Lester Brian for Qantas requirements without advice to us, or anyone else before we arrived. That was a costly loss for Australia and its people (Caldwell, 1992a).

It is not known why Caldwell did not have the fuel waiting for him in Broome. Brain perhaps allocated it to Corinna and as stated by Ireland above, QEA flying boats had priority. The second Empire flying boat under Brain’s jurisdiction, Camilla, was waiting at Wyndham so as not to arrive at Broome while Corinna was still there. Brain’s foresight saved Camilla and true to his orders, did not have two Empire boats at Broome at any one time (Gunn, 1987:58). The arrival of A18-10 in Broome on its special mission must have thrown Brian’s plans into chaos. In a previous letter to J. Caldwell dated 29 March 1992, Keith Caldwell elaborates on A18-10’s service history:

During World War II, I transferred complete with a Qantas “C” class flying boat to 11 Squadron RAAF Port Moresby based. We operated in an area very roughly described as from Sydney to the North East, to or near the Fiji Islands, then to near Kiribati around North Borneo and down to Singapore and say back to Broome and Sydney or in a more open expression generally within those boundaries. Basically we lived on board the flying boats and serviced them for about a month at a time before returning to our Port Moresby Base.

I was captain in command of A18-10 and the crew was usually about 12 to 14. We lived on board most of the time when away from base and 3 radio operators maintained 24 hours per day radio contact for orders and instructions.

On 28th February 1942 we arrived in Darwin and Group Captain Sherger asked me was I willing to go to near the North Western tip of Timor (to a position quite close to our old Qantas routine Koepang stop) but in open waters on that North Western coastline. He asked me which route?, Start from Broome or Darwin. I chose departure from Broome because I believed we would use less fuel on that leg under present conditions. Sherger signalled [sic] Broome to have the fuel loaded immediately we arrived, and as I did not have a gun, he gave me his own revolver on the spot. Broome then confirmed fuel ready and available on your arrival 1st March…

Actually we were 4 minutes late on touch down and Lester Brain of Qantas had already stolen the fuel reserved and promised for us upon arrival. That fuel was certainly not stolen.
in 4 minutes and now there was no fuel left for us. We did not get our fuel until late P.M. on 2nd March, whereas we should have been refueled [sic] and airborne enroute for Timor before 10-45 am on 1st March 1942 (Caldwell, 1992b).

Caldwell’s earlier concerns for the reliability of Broome’s refuelling services proved justified. Ironically, it was the fuel left in its tanks, that once hit by incendiary cannon fire would destroy his aircraft in minutes, ending its operational history.

3.6 Results

There is a plethora of secondary material relating to the Broome’s lost Empire flying boats and their role in the EAMS, yet reconstructing the specific aircraft histories of Centaurus and Corinna is problematic, as much of the source material is questionable. Therefore, both secondary and primary sources have been examined to provide the most likely account of the service histories. While Centaurus, presented little problem due to its celebrity status as a pioneering aircraft in the air mail link to Australia and New Zealand, other machines that routinely plied along the Horseshoe route are less known; such is the case of Corinna.

Details of the individual service histories of Centaurus and Corinna reveal gaps and inconsistencies in determining the various locations of each flying boat in the past and the people associated with each machine. This is acutely evident during the early stages of WWII.

Photograph 3.27  Ross Jones of A18-10 (Unknown photographer, n.d. BHSM).

Photograph 3.28  F/Lt K.G. Caldwell. Commander of A18-10 at time of loss (Bennet-Bremner 1944: facing page 168).
in the southwest Pacific area. After Centaurus was impressed into the RAAF as A18-10, the machine’s service history was recorded on its status cards. No such document was created or has survived for machines such as Corinna, which were not militarised. No pilot or BOAC log that relates to Corinna have survived either. This account of its operational life, therefore, drew on the potted history recorded by its pilots. Similarly, aircrew accounts of the final days of A18-10 provide details otherwise not recorded on its status cards.

A further outcome of the research in this chapter is the dermination of the ownership details of the lost Empire flying boats. If WWII had not occurred, both of these BOAC aircraft would have continued to fly QEA aircrew between Singapore and Sydney. WWII, however, had a drastic impact on how these two particular machines would be used. Centaurus was used as a stopgap in aerial reconnaissance and transport until additional aircraft (such as Catalinas and later, Liberators etc.) became available (Leebold, 1995), while flying boats like Corinna kept the aerial link between England and Australia open in the bleak days of Japanese expansion.

The use of civilian aircraft for military purposes invariably involved a transformation in their structures and fittings. This provides vital data for what archaeologists may expect to find at their wreck sites. More specifically, the militarisation of Centaurus into A18-10 resulted in the arming of the machine. Corinna, in contrast, looked different because it was not armed.

Photographic material of the two flying boats has been sourced for this chapter, some of which has not been published before. Typically, there are many images of Centaurus in its IAL days and listings of all images sourced to date are in Appendix 3.4. Conversely, Corinna has few photographs because it lacked the celebrity of Centaurus. In time, more photographic evidence may emerge, as private collections are published. Geoff Reichelt’s excellent website on flying boats includes rare photographic material contributed by visitors to the site. Information sites like these provide a conduit for the dissemination of private collections. A recent discovery includes previously unknown colour photographs and footage of Centaurus in Jeremy Linton-Mann’s documentary entitled From sea to sky – the story of the flying boats (2005) (Appendix 3.5).

3.7 Conclusions

This chapter has detailed the operational service lives of the two Empire flying boats lost at Broome. These two machines A18-10 (ex-Centaurus) and Corinna are historically significant not only because of their involvement in the Japanese air raid at Broome, but also by their association with the first air mail service to Australia and New Zealand (Higham, 1960:314; Shanahan, n.d.). The EAMS was formed to bring people together. The Empire flying boat was the means by which this was done. The EAMS was a brilliant success and its demise when the Japanese invasion of Java effectively cut the Imperial air routes, was unforeseen.

Developing a history of the Empire flying boats lost at Broome helps predict the archaeological record. The wreck of Corinna is the only archaeological manifestation of the Java – Broome
shuttle flights in Australia; with the possible exception of *Circe* and *Corio*, which are probably in Indonesian or international waters.

This chapter provides a history of the Short Empire machines lost at Broome and insight into the aircrew that operated them. Many (or as many that could be spared) QEA aircrews became RAAF members during WWII, but while QEA was focused on maintaining the air link between Australia and England, RAAF personnel and their aircraft were engaged in different tasks. The meeting of these two services, QEA and RAAF at Broome was a mistake on the part of military planners that had unforeseen consequences. The pilot and aircrew accounts, albeit incomplete, have been incorporated into this chapter. With the passing of the Empire flying boat veterans, historians will no longer be able to create an oral record, but must instead rely solely on the written and photographic data. This chapter has in part, been a contribution to understanding what these merchant airmen accomplished:

Some day the full story of the achievements of civil aviation “down under” will be told, and when that time comes it will be found that Australia’s Air Merchant Service did a grand job of work (Narracott, 1942:56).
CHAPTER 4: The MLD - Broome aircraft histories 1937-1942

4.1 Introduction
This chapter reconstructs the operations service histories of the Marineluchtvaartdienst (MLD) Dornier and Catalina flying boats up until the time of their loss in Broome. They were used as bombers, but primarily as long-range reconnaissance aircraft. The MLD flying boats lost at Broome, however, were involved in many instances of humanitarian work, performing famous air-sea rescue situations.

To understand the role each aircraft it is important to be familiar with the nomenclature of the time that was used to record their operational histories is reconstructed. In Broome these roles vary between the different services, navy and air force, as well as between the services within different nationalities. In order to reconstruct the service histories of MLD flying boats, aircraft are identified by their Groep Vliegtuigen (GVT – aircraft group). If the serial number of each flying boat can be determined to have been associated with a particular GVT, then tracing that GVT’s movements will enable a chronology to be developed in each aircraft’s operational service history. Pilot log books are the ideal source of data, but without these, the GVT system is the best alternative. Combat losses and the exchange of aircraft between groups must be controlled if using the GVT system to reconstruct a day-to-day history for each machine.

4.2 Marineluchtvaartdienst – initial use of Dornier Do 24K flying boats
When IAL were ordering Short Empire flying boats specifically for the EAMS, a civilian role, the Koninklijke Marine (KM) were looking for a large long-range flying boat for reconnaissance. The MLD were more than familiar with Dr. Claude Dornier’s flying boats, such as the Do 15 J Wal (Whale), which they had been using since 1924. These machines, 12 years on, needed replacing. The Dornier Do 24K flying boat was the answer and it was made specifically for operations in the NEI (Shores, et al., 1992a:17-18; Air Enthusiast, 1983).

The KM needed flying boats to patrol their vast domains in the NEI. They required an aircraft that: ‘had to be bigger, equipped with three engines, none of these to use pusher propellers, a maximum speed of 315 km/h, be of an all-metal construction and comfortable enough for long distances’ (de Zwart, 2002). Dornier began what was known as the P.14 project as early as 1935, which aimed at meeting the requirements of both the KM and The Reich Air Ministry (Reichsluftfahrtministerium - RLM) (van Wijngaarden and Staal, 1992:16; Wachtel, 1989:262).

Four prototypes were produced and these were given Versuchs (attempt) numbers, one to four. The first two, Do 24 V1 and Do 24 V2, were for the RLM. The Do 24 V3 and Do 24 V4 were for the KM and were the first of six aircraft to be delivered to them (van Wijngaarden and Staal, 1992:17). The production model is known as the Do 24K-1. The RLM was not impressed by the performance of the diesel powered Dorniers V1 and V2 and had opted
instead to purchase the Blohm und Voss Bv-138 (the earlier Hamburg Ha-138) flying boats. The German invasion of Norway, however, pointed out a shortage of suitable supply aircraft. Consequently, Germany’s military association with the Do 24K began when they used the V1 for the Norwegian campaign. Once the Aviolanda factory in Holland was captured, the Germans would build more Do 24s than had been constructed for the MLD in what has been described as one of history’s paradoxes:

The annals of the air war of 1939-45 are rich in paradoxes, few more curious than the fact that one of the most proliferous of Germany’s wartime flying boats and perhaps the best remembered today was scarcely built in Germany! Indeed, the company whose name it bore retained scant responsibility for it once prototypes had been tested and two dozen built, and little interest was evinced in this flying boat by the Luftwaffe. Yet that Service was destined to be its principal operator, albeit for a mission somewhat removed from that for which this flying boat was conceived; a mission in which it was to gain the reputation of possessing perhaps the most outstanding rough water capabilities of any waterborne aircraft manufactured in quantity (Air Enthusiast, 1983:9).

The Netherlands Government perceived that the Japanese would threaten their interests in the east and had ordered from the German manufacturer Dornier-Metallbauten (G.m.b.H), a machine capable of long-range reconnaissance (van Wijngaarden and Staal, 1992:22). The X-1, accordingly, was built in 1937 at Friedrichshafen on the German side of Bodensee (Boden Lake). The factory by this time had changed its name to Dornier-Werke G.m.b.H. The remainder of the first six MLD orders were built at Altenrhein (including X-3) in Switzerland, near the three-country corner of Germany, Austria and Switzerland (Fig. 4.1). Parts, however, were manufactured in Germany at Rickenbach (tail), Friedrichshafen-Löwenthal (wings and engine gondolas) and at Ravensburg (Stummels/sponsons or Flossenstummeln/finstubs) (van Wijngaarden and Staal, 1992:22; Hooftman, 1964:152).

The X-1 and X-3 were transported directly to the NEI, while X-20, X-23 and X-28 were flown to the Maatschappij voor Vliegtuigbouw (Society for Plane Construction) at NV ‘Aviolanda’ in Papendrecht, Holland, to be equipped as per MLD requirements (Wesselink and Postma, 1985:43). Data on the MLD Dornier shipment of all Dornier Do 24Ks is presented in Appendix 4.1. These requirements included the addition of gun turrets and the application of MLD insignia. For their flight to Holland, all of the Do 24s were painted with the temporary German registration D-AYWI, with water-based paints for easy removal. Armament of the first 12 Dorniers consisted of three Alkan gun turrets each equipped with a Colt-Browning 7.9 mm machinegun. Subsequent aircraft were fitted with a 20 mm Hispano-Suiza type 404 cannon in the middle turret (de Zwart, 2002). The Dorniers lost at Broome, however, were all fitted with the 7.9 mm machineguns.

The first prototype (later known as the X-1) was delivered in 1937. Thirty-seven flying boats followed, out of a total order of 48, before production centres in Holland were overrun by the Germans in May 1940. The short-fall in their order for reconnaissance aircraft meant that the MLD had to look for other types of aircraft that could meet their requirements, but this time instead of Germany, they looked towards America that at the time was producing
an outstanding flying boat of their own that was already in USN, RAF, RNZAF and RAAF service (Geldhof, 1989:7 and 9). The MLD purchased the new PBY-5 Catalina flying boats and together with the older Dornier Do 24s, provided the eyes for the KM in the NEI during the opening stages of the Pacific war.

The distribution of the Dorniers amongst the various GVTs operating in the NEI is shown in Appendix 4.2 and Appendix 4.3. The individual fates of all MLD Dorniers are presented in Appendix 4.4. The locations for the GVTs would change (including the number of aircraft they contained) as the Japanese advance forced the Allies progressively back towards Australia. GVT-1 through to GVT-8 were equipped with three Dornier Do 24s each. These are presented in Table 4.1, which gives the overall dispositions of the MLD GVTs equipped with Dornier Do 24Ks prior to 7 December 1941. GVT-16 and GVT-17 were later equipped with PBY-5 28-MNE Catalina flying boats, although the Dornier-equipped GVTs would also be allocated Catalinas to make up for losses as the war progressed. Shores et al. (1992a:60) indicates that the first Dorniers received by the MLD were, at the commencement of WWII, old and only used for training. The exigencies of war, however, meant that these early Dornier built Do 24s, would be tasked with front line operations. Batavia’s ‘Big Sticks’ policy, which envisaged that any naval invasion force would be bombed out of existence before they could land troops, was seriously flawed. The unescorted Glen Martin bombers would be easily shot down by carrier aircraft or destroyed on the ground. Without effective fighter and bomber support, it would be up to the MLD to carry on the aerial war in the NEI (Casius, 1983).
Frank Clune’s book *All aboard for Singapore* (1941), describes the scene at the main MLD flying boat base at Morokrembangan, in Surabaya Harbour, known officially as the *Marinevliegkamp Morokrembangan* (*MVKM*) in Surabaya Harbour. His pre-war account presents a scene at the *MVKM*, depicting the MLD poised and ready for any eventualities. When the Japanese did come, the MLD, with few exceptions, would become the front line of defence:

Now the Dutch Dorniers ceaselessly patrol the Indies, ranging far to the north, ever on guard against the possibility of an attempted invasion. They are the eyes of the fleet, and their perennial patrol takes them at dusk each day two hundred miles beyond the northernmost limit of the isles. If the sea is clear of an invasion fleet at nightfall, the Dutch can sleep peacefully until the Dornier dawn patrol makes a new survey of the ocean’s broad bosom. By their enormous range, these triple-motored Goliaths can keep close watch on he narrow waters to the south of the Philippines and Carolines, guarding the narrow straits between Borneo, Celebes, the Moluccas and New Guinea (Clune, 1941:218).

Clune (1941) was unaware of the Japanese military’s ability to destroy flying boats with fighter aircraft, such as the then advanced *Zero-sen*, otherwise known to the Allies as the Zero. The Allies themselves in the NEI could not foresee the modern war that was to befall them; a war in which air power would dominate the theatre and render the flying boats of the MLD obsolete.

### Table 4.1 MLD GVT locations and Operational Bases (After Casius and Postma, 1986:55; Geldhof, 1987:59)

<table>
<thead>
<tr>
<th>GVT</th>
<th>Location</th>
<th>Operational Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>GVT-1</td>
<td>Tandjong Pandan</td>
<td>tender <em>Sirius</em>, later with the tender <em>Poolster</em></td>
</tr>
<tr>
<td>GVT-2</td>
<td>Soerabaja</td>
<td>in maintenance at MVK Morokrembangan</td>
</tr>
<tr>
<td>GVT-3</td>
<td>Ambon</td>
<td>Soerabaja, left 11 May 1940 to Ambon (Maluku). With the <em>Reiger</em></td>
</tr>
<tr>
<td>GVT-4</td>
<td>Ambon</td>
<td>tender <em>Reiger/Arend</em></td>
</tr>
<tr>
<td>GVT-5</td>
<td>Tandjong Priok</td>
<td>Tandjong Priok</td>
</tr>
<tr>
<td>GVT-6</td>
<td>Natonena</td>
<td>tender <em>Fazant</em></td>
</tr>
<tr>
<td>GVT-7</td>
<td>Soerabaja</td>
<td>Soerabaja, MVK Morokrembangan, 30 May left for Tandjong Priok</td>
</tr>
<tr>
<td>GVT-8</td>
<td>Soerabaja</td>
<td>MVK Morokrembangan</td>
</tr>
</tbody>
</table>

4.3 The ‘X’ boats – MLD Dorniers Do 24K-1 and the role of *Gouvernementsmarine* (G.m/s) seaplane tenders in the initial operational phases of the Pacific war

The following details the operational service histories of the few Dornier and Catalina flying boats that made it to Broome when they were pushed out of the NEI and into Australia. The Dornier Do 24K-1s delivered to the MLD were given the designation X-1 through to X-37. These machines, hence, became known as the ‘X’ boats. The Broome X boats are discussed in alpha-numerical order, roughly in the same order as they came off the production line. An historical break down of the five Dorniers lost in Broome is presented in point form in Appendix 4.5. Once in the NEI, each machine was given its MLD registration number and assigned to
a particular GVT, which operated from dispersed bases across the Indonesian archipelago. The MLD had established over 110 secondary support points throughout the archipelago. These were, however, no more than caches of fuel and moorings for the flying boats. There were probably even more caches of aviation fuel and oil secreted around the archipelago. Gouvernementsmarine (G.m/s) seaplane tenders, like the USN seaplane tenders, enabled the aircraft groups to operate in remote locations and to move rapidly (Fig. 4.2). The tenders also provided essential maintenance facilities, including spare engines. As these vessels were an essential component of flying boat operations, a brief history of their operational lives is discussed.

The G.m/s patrol vessels were specifically modified to incorporate workshop facilities to service the flying boats. The loss of their flying boats due to accidents and action against the Japanese, resulted in many of these ships withdrawing to Java only to be scuttled by their crews or sunk by the Japanese en route. More details on these ships are provided in Appendix 4.6. When discussing the operational histories of the GVTs based at remote locations such as at Ambon, Tandjungpandan or Sedanau, it should be remembered that those GVTs (including those latter equipped with Catalinas) were not operating from a shore base, but were highly mobile and operating from their respective tenders. Two photographs have been sourced showing these tenders working with Do 24s. These are reproduced in Photograph 4.1 and Photograph 4.2.

Photographs of flying boat operations in remote locations in the NEI are rare, especially during the early stages of the Pacific war. Group Captain Charles Eaton (RAAF) took one such image when he visited the NEI in early March 1941, ostensibly to take stock of the military capacity of the region. The reconnaissance ‘helped influence Allied strategic policies in the event of war and it also initiated contacts between the Australians and the NEI’s military aviators’ (Eaton, in prep.). Photograph 4.3 shows two unidentified Dorniers at Ambon. Three of these machines were regularly stationed there, but when Eaton visited in 1941 there were six flying boats. Halong, the main MLD flying boat base on Ambon was situated, could accommodate nine flying boats and their crews. Eaton later took one of these Dorniers to Saumlaki in the Maluku Islands (RAAF Historical Section, 1941).

The work production order for the MLD’s Dorniers, described in Table 4.2, shows Dornier’s third and fourth prototypes were included in the MLD’s initial order of flying boats. These prototypes were the first to fly; the diesel powered V1 and V2 were not test flown until 1938. The V1 and V2 were fitted with Junkers Juno 205C diesel engines that proved underpowered (de Zwart, 2002). The first six flying boats for the MLD order had instead of diesels:

... three Wright Cyclone GR-1820-F52 radial engines. The choice for these engines was made because the Fokker T.IV and the large order for the Glenn Martin 139 bomber for the Dutch East Indies were equipped with this engine. The engine was 15% lighter and gave 50% more power than the Junkers diesels (de Zwart, 2002).
Figure 4.2 Map showing MLD and RAF flying boat bases and operational centres, including seaplane tender locations (After Geldhof, 1987). Note: place names in italics in the key represent seaplane tender stations.
CHAPTER 4: MILITARY AIRCRAFT SERVICE HISTORIES: MLD


Photograph 4.1 ‘The heavies of the MLD the Dornier Do-24K from G.m/s ‘Merel’ (Courtesy Dick Schouten, n.d.). Note orange triangle markings.

Photograph 4.2 ‘Hr. Ms. Poolster in Sedanau Bay (Groote Natoena Island). To the far right lies the eyes of the fleet’ (Photo: GM Collection, Backer-Dirks via Backer-Dirks, 1986:159).
Photograph 4.3  Dorniers at Ambon, photographed by Charles (Moth) Eaton. He took 130 photographs during this trip, of which Charles Eaton (jr) has only 12 (Charles Eaton pers. comm., 2 November 2002) (Charles Eaton Collection. Aviation Heritage Museum WA. Photograph Number: 920629 742/18).

Table 4.2  MLD order from Dornier and Aviolanda production list including prototypes (After de Zwart, 2002). Note Broome losses indicated by shading

<table>
<thead>
<tr>
<th>Factory</th>
<th>Model</th>
<th>Werknummern (Work number) and remarks</th>
<th>MLD Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dornier</td>
<td>V1</td>
<td>760</td>
<td>Kept by the RLM. First flight on 10 January 1938</td>
</tr>
<tr>
<td></td>
<td>V2</td>
<td>782</td>
<td>Kept by the RLM. Serial number: D-AIBE</td>
</tr>
<tr>
<td></td>
<td>V3</td>
<td>761</td>
<td>Later 1st of the K-1s</td>
</tr>
<tr>
<td></td>
<td>V4</td>
<td>X-1</td>
<td>April 24th 1941 crashed during take-off at Morokrengbanan</td>
</tr>
<tr>
<td></td>
<td>V4</td>
<td>762</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V4</td>
<td>X-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V4</td>
<td>763</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V4</td>
<td>X-3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V4</td>
<td>764</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V4</td>
<td>X-4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V4</td>
<td>765</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V4</td>
<td>X-5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V4</td>
<td>766</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V4</td>
<td>X-6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V4</td>
<td>767</td>
<td></td>
</tr>
<tr>
<td></td>
<td>768</td>
<td>X-8</td>
<td>769</td>
</tr>
<tr>
<td></td>
<td>778</td>
<td>X-18</td>
<td>779</td>
</tr>
<tr>
<td>K-2</td>
<td>700</td>
<td>X-37</td>
<td>First and only K-2. Destroyed at Morokrengbanan during air raid on 3 February 1942</td>
</tr>
<tr>
<td>Aviolanda</td>
<td>K-1</td>
<td>67</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>K-2</td>
<td>67</td>
<td>68</td>
</tr>
</tbody>
</table>
4.3.1 Dornier X-1

The X-1 (Dornier Work Number 761) was first test flown by Erich Gundermann on 2 July 1937 (Photo. 4.4 and Photo. 4.5). The following day the aircraft was offered to the KM (van Wijngaarden and Staal, 1992:18). Trials were conducted on the North Sea with the support vessel Greif from 6 to 9 September 1937 after the flying boat was transferred to Weser Flugzeugwerke [Weser River Aircraft Plant] at Einswarden (Eidewarden) (Appendix 4.7 and Appendix 4.8). The sea trials demonstrated Dornier’s ability to build flying boats capable of alighting and taking off from rough seas, which greatly impressed onlookers:

The seaworthiness of the Do-24 V3 amazed the spectators, there were times when the cockpit of the aircraft was completely submerged. The trials lasted till the end of October and were concluded to full satisfaction (de Zwart, 2002).

On 10 November 1937 the Do 24 V3 was shipped from Hamburg to Morokrembangan on board the Kota Nopan with its MLD registration number X-1 (Photo. 4.6 and Photo. 4.7). In 1938 the X-1 was allocated to the reconnaissance flying school at Morokrembangan (van Wijngaarden and Staal, 1992:18).

There is a four year gap in this aircraft’s service history from when it joined the reconnaissance school until 7 February 1942, when the flying boat joined GVT-7 at Lake Grati, 15 kilometres east of Pasoeroean (Pasuruan) on Java, as a replacement for other Dornier Do 24s destroyed on Rote by Japanese fighters that same day. Training operations are recorded as well as people associated with the machine at that time in 1941 (see Appendix 4.5).

The reconnaissance school evacuated to Australia from Morokrembangan on 17 February 1942 on board the Tjinegara. Five Dornier Do 24s from the school and one Catalina later evacuated to Australia. These were the Dorniers X-5, X-7, X-8, X-9, X-10 and the Catalina Y-49. They had departed from Surabaya on 19 February 1942 and arrived at RAAF Rathmines at Sydney on 24 February 1942 via Broome, Karumba, Townsville, Gladstone and Brisbane (van Wijngaarden and Staal, 1992:37; Shores et al., 1992b:212). The Dorniers would later join the RAAF (Serial Nos. A49-1 through to A49-6 respectively) together with one other that left Surabaya on 2 March 1942; the X-24. Running low on fuel, this flying boat made a forced landing at a sheep station near Wallal (WA), but later refuelled and travelled on to Perth (Shores et al., 1992b:312; de Zwart, 2002; Verenigde Vleugels, 1999). The aircraft is erroneously referred to have left Java on 8 March 1942 (Air Enthusiast, 1983:12).

At midday on 1 March 1942 the MLD’s roll call at Morokrembangan announced that all personnel not part of the demolition team were to go to Cilacap to be evacuated by train. However, ‘a small group of officers and other personnel [sic] received an order to go to the hiding place of a aircraft group to be evacuated by plane’ (de Zwart, 2002). That group was GVT-6, which included the X-3. The X-1, together with other aircraft in GVT-7 at Lake Grati, including X-20, departed for Lengkong near Modjokerto (a small town approximately 60 kilometres south of Surabaya) on the morning of 2 March 1942. They then proceeded to Broome, under
the cover of darkness and arrived there at approximately 8.30 am the following morning (de Zwart, 2002).

4.3.2 Dornier X-3

The service history of this aircraft has been reported incorrectly. Andre de Zwart’s (2002) website chronicles the life of machine X-3 (*Werk* No. 763) as that of X-4 (*Werk* No. 764). The mix-up occurred with the *Werk* Nos., but the historical information written on the X-3 nonetheless correlates with other published sources. There are few Photographs of this flying boat. Two have been located (see Photograph 4.8 and Photograph 4.9).

Other images supposedly of the X-3 might not be specifically of this aircraft, but it is possible that moving images of the machine have been captured while in flight. Fleet Day in 1938 saw a formation flight of Dorniers over the fleet. This was captured on film footage and still Photographs (Photo. 4.10 and Photo. 4.11). The Dorniers with the serial numbers X-1 – X-16 were all recorded as having entered service before 6 September 1938 (although the delivery dates for the X-14, X-15 and X-16 are not specifically known). There are nine Dorniers shown...

Photograph 4.8  X-3 'Its painted in Hollandisch Graw, it means Dutch Grey. This flying boat was build [sic] at Aerometal LAG Zurich, Alternhein. In january [sic] 1938 it was transported by boat from Hamburg to the Dutch Indies. Assembled at MVKM and put in service. At the fins you can see the R-W-B flag. That's [sic] means that this picture was taken before 05 december 1938, because from that date all flags had to be removed on the tailsection. The place is MVKM and I think that the plane was just assembled just before or after his first flight. The boat travel is about 8 to 10 weeks, assembling ±4 weeks so the rough date could be April/May 1938' (Broome Historical Society Museum, n.d., comments by Prudent Staal 2003 pers. comm., 9 July 2003).

Photograph 4.9  X-3 'This pic is taken at MVKM. At the background you see a GVT of Fokker T. IV's. Also is seen the old colour scheme. (Large roundels and large numbers). The date isn’t sure but must be in the early/mid 1941. Mr. G. H. Komst went to Rathmines, Australia as an instructor pilot and did many flights over there. I have his logbook copied, and also of J van der Tol, also an instructor’ (G.H. Komst via Prudent Staal, ca. 1941; copy in author’s collection).
Photograph 4.10  ‘Fleet review at Soerabaja, 6 September 1938. The photograph has been taken from a destroyer of the Admiralen-Class. Furthermore one sees from left to right a minesweeper of the Van Amstel-Class, Mr. Ms. De Ruyter, Mr. Ms. Java and minelayer of the Prince of Oranje-Class (Bosscher, 1984:122).

Photograph 4.11  ‘For the film Sal waerachtig [1940], flew an impressive show of power of nine-X flying boats, six-T planes and five-W patrol planes in neat formation over the Netherlands East Indies fleet squadron’ (Photograph: AMH-48499 via Geldhof, 1987:48).
in the Photographs and it is possible that the X-1 and X-3 were included in the shots. The other Dorniers lost at Broome, the X-20, X-23 and X-28 were delivered after September 1938 (see appendix 4.4) and, therefore, could not have been in the fly over.

The X-3’s association with Australia and in particular Broome, began in May 1941, when it was involved in the first MLD visit to Australia. Eaton had invited the MLD and the Militaire Luchtvaart van het Koninklijk Nederlands-Indisch Leger (ML-KNIL) to Darwin to help build communications between Australians and the NEI. The flying boats stopped in Broome en route to Darwin to refuel. Photographs 4.12 and 4.13 show two of three Dorniers visiting Broome in mid May 1941. The caption for Photograph 4.12 indicates that these machines were of the first batch of 12 Dornier Do 24Ks to be delivered to the MLD and that they are photographed in mid-May 1941 in Broome (Geldhof, 1979:facing page 70). The Operations Record Book (ORB) of RAAF Station Darwin has an entry on 16 May 1941 recording the arrival of three Dorniers of the MLD. Table 4.3 lists those on board (Doorman, 2005). The crew and passenger list is useful and despite discrepancies with spellings, is also reliable as to whom in the MLD participated in the visit.

The flying boats went on to Darwin after Broome quite likely on the same day. A closer view of one of the Dorniers in Broome, dated 16 May 1941, is shown in Appendix 4.9. Photograph 4.13 at the Royal Australian Air Force Association Aviation Heritage Museum (AFAHM), Bull Creek is, is by comparison with Photograph 12, of the same two machines, but at a different angle. The photograph’s caption is incorrect; no photographs of any of the flying boats on Roebuck Bay on 3 March 1942 are known to exist and, therefore, it is unlikely that the caption for Photograph 4.13 is plausible. The flying boats returned to Kupang after a three-day stay in Darwin (Eaton, in prep.). Additional photographs of the three Dorniers in Broome and Darwin are reproduced in Appendix 4.9.

The X-3 was built at Altenrhein sometime in late 1937. The aircraft was shipped to the NEI in January 1938 (van Wijngaarden and Staal, 1992:90; de Zwart, 2002). Here, earlier published historical records stop until early 1942, but additional research by Staal (pers. comm., 11 July 2003) provides personnel arrival details between mid 1938 and early January 1942 (see Appendix 4.5). On 3 February 1942, X-3 replaced X-31 in GVT-6. With a crew from GVT-7, X-3 flew from Kupang to Morokrembangan on 7 February 1942:

During the group’s stay at Morokrembangan, where they had arrived on the 30th of January, they lost the X-31 as a result of a Japanese air raid on the 3rd of February. The X-31 was replaced by the X-3. Because the X-29 was not all that reliable, the X-23 was added to the group. On 7 February, the X-3 and X-23 flew to Koepang to relieve GVT-7, but when they arrived they found that the group had been set alight [because of a Japanese air raid]. The planes then returned to Soerabaja with the crew of GVT-7 (Geldhof, 1987:69. Trans. Heijm, 2005).

On 1 March 1942 the X-3 flew from Morokrembangan to Lengkong on the Brantas River, hence onto Broome on 2 March 1942. It too arrived early on the morning of 3 March 1942 (van
Photograph 4.12 ‘In May 1941 three Dornier Do 24K flying boats of the batch - serial (X-1 to X-12) during a group visit to the west coast of Australia - Broome’ (Photograph: BMH-51059 via Geldhof, 1979: facing page 70).

Photograph 4.13 ‘Dutch flying boats in Roebuck Bay, Broome, 30 minutes prior to the raid’ (AFAHM). Note similarity between this image and that of Photograph 4.12.
Wijngaarden and Staal, 1992:90; de Zwart, 2002). Prior to the flight to Broome GVT-6 was joined at Lengkong, by GVT-2, while other aircraft groups were dispersed elsewhere:

GVT-7 at that time was probably already based on Lake Grati, also at Modjokerto; GVT-17 had already attempted for some time to routinely operate from Toeloeng Agoeng at Kendiri.

GVT-6, consisting of the Dornier Do 24K flying boat X-3, X-23 and X-28 received on 1 March the order to deviate to Australia. They took off after midnight on 2 March. On the morning of the same day, two of the three flying machines landed at Broome, the third [X-23], which had wandered off course, first landed at Port Hedland, further to the southwest, but subsequently on the orders of the group commander, flew to Broome (Bosscher, 1986:343-344. Trans. Heijm 2005).

### 4.3.3 Dornier X-20

The manufacturing plant, *Maatschappij voor Vliegtuigbouw NV ‘Aviolanda*’, in Papendrecht, was unable to keep up with the demand for flying boats from the KM and subsequently was also geared up for the production of the Dornier Do 24K-1. The long production time for these machines (about four months per unit) and the small number of skilled workers available, resulted in a between order being place with Aero-Metall L.A.G. to produce the next 12 Dorniers. A further order was placed with them for another six machines (X-19 up to X-24) on 30 May 1938.

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**Table 4.3 Flight crew data for the first MLD visit to Australia, 16 May 1941 (Series number: AWM64. Control Symbol: 22/2, NAA)**

<table>
<thead>
<tr>
<th>Serial #</th>
<th>Rank</th>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-2</td>
<td>Officier-Vlieger I KI.</td>
<td>MEESTER K.</td>
<td>Passenger</td>
</tr>
<tr>
<td></td>
<td>Luitenant Terzee I KI.</td>
<td>WANINGH C.J. van</td>
<td>Passenger</td>
</tr>
<tr>
<td></td>
<td>Luitenant Terzee II KI.</td>
<td>Baron von [sic] LAWICK</td>
<td>Captain of Flying Boats</td>
</tr>
<tr>
<td></td>
<td>Luitenant Terzee II KI. (RNR)</td>
<td>DITMAR W.</td>
<td>Boat Captain</td>
</tr>
<tr>
<td></td>
<td>Sergeant Vlieger</td>
<td>VANDYK C.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sergeant Vlieger</td>
<td>EVERS G.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vliegtuigmaker</td>
<td>DUYTS S.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vliegtuigmaker Korporaal</td>
<td>VOLKERS F.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Korporaal Telegrafist</td>
<td>HAMSTRA R</td>
<td></td>
</tr>
<tr>
<td>X-3</td>
<td>Ingenieur (Civil Eng.)</td>
<td>OVERBEEK P. van</td>
<td>Passenger</td>
</tr>
<tr>
<td></td>
<td>Officier-Vlieger II KI.</td>
<td>LIBOUREL J.</td>
<td>Boat Captain</td>
</tr>
<tr>
<td></td>
<td>Sergeant Vlieger</td>
<td>NOÈ O.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sergeant Vliegtuigmaker</td>
<td>ES H. van</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vliegtuigmaker</td>
<td>BECKERS J.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seinersmaat</td>
<td>VEUGER H.</td>
<td></td>
</tr>
<tr>
<td>X-8</td>
<td>Officier-Vlieger II KI.</td>
<td>ZEEVEN H.</td>
<td>Passenger</td>
</tr>
<tr>
<td></td>
<td>Luitenant Terzee II (RNR)</td>
<td>WOLFF C. De</td>
<td>Boat Captain</td>
</tr>
<tr>
<td></td>
<td>Officier-Vlieger II KI.</td>
<td>SCHUILLING R.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sergeant Vlieger</td>
<td>SIEZEN R.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sergeant Vliegtuigmaker</td>
<td>VISSE S.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vliegtuigmaker</td>
<td>HOEKWARDER J.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Telegrafist</td>
<td>POLDERMAN F.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Matroos I KI.</td>
<td>ZANTEN P. van</td>
<td></td>
</tr>
</tbody>
</table>
Dornier Do 24K-1 Werk No. 780 was flown from Friedrichshafen to Papendrecht on 14 February 1939 and entered service with the MLD as the X-20. On 20 February 1939 the aircraft was shipped to the NEI on board the Kota Nopan. It was then transferred to GVT-4 in January 1940. The X-20 was to serve with GVT-4, which also included the X-22 and X-19, until 10 December 1941 when it was transferred from Morokrembangan to GVT-3, stationed at Sambo (Pulau Samboe) across from Singapore, for surveillance over the South China Sea (de Zwart, 2002). On 31 December 1941, after having survived several air battles with the Japanese, GVT-3 returned to Morokrembangan for overhaul and maintenance of its Dorniers and received three Catalinas: Y-42, Y-49 and the Y-61. Operations were then carried out from Morokrembangan (Geldhof, 1987:68; Shores et al., 1992a:210).

Staal (pers. comm., 11 July 2003) adds no further information for this period apart from stating that Cdt LTZV 2 G.F. Rijnders flew with the aircraft at this time. On 12 December 1941, X-20 flew from Singapore Island to Tandjong Pinang (Tanjungpinang – Bintan, Riau Islands). X-20 is then reported to have sunk an unknown Japanese schooner near the Tambelan Islands (Kepulauan Tambelan, South China Sea) on 17 December 1941 and to have been involved in an aerial battle with Japanese fighters on 23 December 1941 (van Wijngaarden and Staal, 1992:95; de Zwart, 2002; Hooftman, 1964:166).

The X-20, on 30 January 1942, joined X-1, X-24 and X-36 in GVT-7 at Lake Grati (Shores et al., 1992b:166). The aircraft was at this time tasked ‘for special operations over the Savoe Sea’ (van Wijngaarden and Staal, 1992:95; de Zwart, 2002). However, the flying boat is recorded as having operated with GVT-7 at Tarakan since 3 January 1942 (Staal, P. pers. comm., 11 July 2003). Additionally, Staal indicates the arrival of two other crewmembers for the X-20 on 16 January 1942; MLD members Zwiers and Gobe. Some data has been found on the aircraft’s movements for February 1942, which indicate a re-organisation of GVT-7 as a result of combat losses since the group’s brief move to Kupang.

The Japanese air raids on Surabaya on 5 February 1942 had significant consequences for GVT-7. The Japanese had underestimated the success of their attacks there. They had sunk at their moorings the following aircraft: X-22, X-31 (of GVT-6), X-31 (of GVT-7), Y-43 and Y-50 (of GVT-3), one USN Catalina (unknown serial number) and another unspecified Catalina in a hanger – seven flying boats (Shores et al., 1992b:163). In consequence of this raid, Surabaya was no longer suitable for flying operations. The remaining flying boats subsequently operated from hidden make-shift bases on flooded rice paddies, which from the air were indiscernible as flying boat bases:

Friday, 6 February [1942].... Following the recent heavy losses of flyingboats, GVT-17 moved inland to operate from such a field at Teloengagoeng, near Kediri, from where it was to carry out mining sorties. Dutch naval aircraft were out again, bombing Japanese shipping near Tandjoeng Datoek in southern Borneo, where new landings were taking place. Samarinda airfield was now occupied as a result of these landings, providing yet another base within range of Java.
Saturday, 7 February [1942]. The reaction to the raids on Tandjoeng Datoek was swift in coming. Nine Tainan Ku A6Ms strafed the Sourabaya flyingboat base in the early afternoon, claiming two aircraft shot-up on the water. On Timor GVT-7 at its auxiliary base at Rotti [sic], suffered a bombing attack at a most inopportune moment. Do 24 X-35 had been pulled up on the beach for repairs, whilst X-13 had just landed. Both these aircraft, together with X-32, which was moored inshore, were destroyed. On this very date GVT-6 arrived at Koepang with two Do 24s to relieve GVT-7 but when the crews of the latter unit arrived from Rotti [sic] by ship, they took over these aircraft, all the personnel of both units flying back to Sourabaya. Here GVT-7 was later reformed with X-1, X-20, X-24 and X-36 (Shores et al., 1992b:165-166).

It is presumed that X-20 departed from Lake Grati on 2 March 1942 and flew to Broome, arriving there during the early hours of the morning of 3 March 1942 (Bosscher, 1986:344). There are no known photographs of this flying boat, although Geneste (2002:16) purports to show a photograph of the machine, the image is in fact of the X-24, either on the Swan River, Perth or on Rose Bay, Sydney (Staal, P., pers. comm., 11 July 2003). Despite their being no photographs of the aircraft, there is a black and white film showing the flying boat during 1938. Photograph 4.14 shows a still taken from the film. This is the only known image of the aircraft.

4.3.4 Dornier X-23
Like the X-20, Aero-Metall L.A.G. Zurich in Altenrhein built Werk No. 784 sometime in early 1939. The aircraft was flown from Germany to Papendrecht and entered service with the MLD as X-23 on 21 April 1939. On 24 April 1939 X-23 was shipped to the NEI on board the Bantam. Staal’s (pers. comm., 11 July 2003) additional research provides information on the people associated with the machine between 19 November 1941 and 15 December 1941 (see Appendix 4.5).

The X-23 was originally assigned to GVT-4 at the beginning of the Pacific war. Losses, however, during the opening stages of the conflict, lead to the group’s dismemberment and the subsequent transfer of X-23 to GVT-6, where it would stay until its demise in Broome:

GVT-4 began the war in Sambas (Pulau Samboe off Sumatra), but on 12 December flew to Morokrembangan for maintenance and on 2 January was based at Tarakan. This group was also used for offensive action against the Japanese base at Jolo where a number of Zero fighters were stationed. Naturally, the group also made a number of patrol flights. On 10 January the X-23 of GVT-4 discovered the Japanese landing fleet on its way to Tarakan (Casius and Postma, 1986:70. Trans. Heijm 2005).

On 29 January 1942, X-23 was transferred to GVT-6 as a replacement for the X-29. Flying with X-3 on 7 February 1942, X-23 was transferred to Kupang to pick up crew of GVT-7 and fly them to Morokrembangan (van Wijngaarden and Staal, 1992:97; de Zwart, 2002). On 1 March, X-23 together with X-3 and X-28, were transferred to Lengkong and evacuated to Australia on 2 March, arriving at Broome on the morning of 3 March:
Evacuation to Australia – The Japanese bombing attacks steadily increased after February 1942. More territory had to be conceded. Already many flying boats had been destroyed by bombardment. More and more often flying bases and support bases had become unsafe for crews and aircraft and one had to withdraw to the hiding places sometimes three times per day. On 1 March the Japanese invaded Java. Before the signal for total evacuation was given they destroyed those aircraft that were not to be evacuated, most of them on the Brantas River. Only the Dornier 24s and PBY Catalinas had the capacity to fly to Australia or alternatively to Ceylon (Y-55, Y-56, Y-57 and the Y-64). On the evening of 2 March 1942 the aircraft departed in the direction of Broome. The X-1, X-20, X-24 and X-36 flew from Lake Grati and the X-3, X-23 and X-28 from Lengkong. Together with the Catalinas they flew for more than seven hours completely unladen (van Wijngaarden and Staal, 1992:45. Trans. Heijm 2005).

It is important to note that not all of the MLD flying boats were carrying refugees. The last three machines, in the above quote, only carried their crews. This will be discussed at greater length in Chapter 6. The following provides additional details on the Dornier and Catalina movements prior to their evacuation to Australia:

At Soerabaja GVT-17 still had four Cats Y-9 [sic], Y-60, Y-67 and Y-70. GVT-3 did not have a single airworthy Cat left ... GVT-6 departed from Soerabaja with the X-3 and X-23 to Lengkong. GVT-7 with the X-1, X-20, X-24 and X-36 flew to Lake Grati. GVT-17 with the Y-59, Y-60, Y-67 and Y-70 flew to Toeloeng Agoeng at Kediri, where they set down on the Rawah Bening irrigation reservoir (Hooftman, 1965:32. Trans. Heijm 2005).

Previously mentioned was a flying boat in GVT-6 that had flown off course and alighted at Port Hedland. The machine was X-23. Hence, Port Hedland was the X-23’s first Australian landfall, but after refuelling there, was ordered to Broome.

4.3.5 Dornier X-28

Another order was placed with Aero-Metall L.A.G. to produce five more Dornier Do 24K-1s on 13 January 1939, which included the X-28, Werk No. 698. The aircraft entered service with the MLD as the X-28 on 23 August 1939. By 8 December 1941, X-28 was stationed at Morokrembangan with GVT-6 and on 28 December 1941 was ‘transferred to Tajan to relieve GVT-1’ (Wesselink and Postma, 1985:48; de Zwart, 2002).
At the outbreak of war, *GVT*-6 (X-31, X-29, X-28) was stationed at the Naval Air Base Morokrembangan and for the first weeks carried out surveillance flights over Java and provided convoy protection. On 28 December 1941, after *GVT*-1’s group commander’s aircraft went missing, this group [*GVT*-6] took over the task of *GVT*-1 and used Tajan, upstream of Pontianak, as an assembly point. The flying boats were spread out as far as possible and on the rivers were hidden amongst trees along the shore. Overnight locations of crews and aircraft were also routinely spread out (Tajan, Pontianak, Sambas or Sedanau on Natoena Island (Riau, Natuna Besar, Indonesia) (Geldhof, 1987:69. Trans. Heijm 2005).

The aircraft was next reported to have gone on a reconnaissance mission in Macassar Straits to shadow a Japanese transport fleet on 26 January 1942. Between Api and Kuching the fleet opened fire on the X-28 and damaged it. The aircraft, however, was back in the air by 28 January 1942 when it went on, together with X-29 and X-30, to destroy supplies and installations at Pontianak. After this mission, these three aircraft are reported to have flown (from Tajan) to Morokrembangan on 30 January 1941 (Staal, P. pers. comm., 11 July 2003; de Zwart, 2002). Additional information for 12 January is presented in Appendix 4.5, which indicates that *GVT*-6 aircraft were requested by its commander to bomb the port and airfield at Kuching (Sarawak, Malaysia) as the Japanese had occupied the area by this time. It is not certain whether this operation took place, or if the X-28 was directly involved. Additional data is provided for 19 February 1942 on the following encounter with the Dutch ships discussed below.

The X-28 had previously discovered the Japanese invasion fleet in Macassar Straits heading for Java on 26 January 1942 (Geldhof, 1987:69). Departing From Morokrembangan on 19 February 1942 on a reconnaissance mission, X-28 found survivors from the KPM’s *Sloet van de Beele* and the KM’s Her Majesty’s Netherlands Ship (HNLMS) *Van Nes*. The aircraft subsequently alighted and rescued a number of them (Bosscher, 1986:248).

Prior to this, the X-28 was recorded to have been shot down near Lombok on 25 February 1942 (Hooftman, 1964:170 and 177). Given that the machine is generally believed to have been lost at Broome, there is a problem accepting this report. Hooftman’s (1964:170-171) account of the first air raid at Broome is also questionable. He does not place X-28 there, presumably because he believed the machine to have been lost in late February elsewhere:

> On 25 February, the **X-28** was sent on a reconnaissance of Bali Strait and Lombok Strait during which magnetic mines were to be dropped. The **X-28** did not return and thus the last of the three *GVT* 6 Dorniers was lost (Hooftman, 1964:170. Trans. Heijm 2005).


Furthermore he confuses RAF Catalinas for RAAF Catalinas and QEA flying boats as Qantas:

> On 3 March, the four Dorniers X-3, X-23, X-1 and X-20 lay in the bay of Broome, the last two full of people. Four Catalinas lay there also: the Y-59, Y-60, Y-67 and Y-70. There were further two American and two Australian Catalinas and two Qantas flying boats. Suddenly eight Japanese Navy O-fighters appeared. They emptied their machine-guns at
the defenceless flying boats. All of them burst into flames! One of the Japanese fighters
was shot down by the machine gunners on a Dutch flying boat. On a nearby airfield, a
M.L. Lodestar and a KNILM aircraft, as well as a Liberator and two B-17s, were strafed
into flames. The Liberator shot down a second Japanese. Of the 140 people aboard the
Dutch flying boats, 48 were killed and 32 were wounded. 3 March 1942, the day of the
calamity of Broome, was the darkest in the history of our M.L.D. (Hooftman, 1964:170-

There were no RAAF Catalinas lost at Broome during this time. Hooftman, however, makes
some important comments on the nature of the evacuation to Australia. For example, he states
the Dorniers X-1 and X-20 were full of people, whereas the X-3 and X-23 only contained their
crews. This is verifiable and discussed at greater length in Chapter 6. The credit for the shoot
down most likely goes to Lt ‘Gus’ Winckel, who was on the aerodrome at the time. No one,
however, saw the Zero crash to verify the kill. It could not possibly have been the Liberator,
because the aircraft was not armed. This account of the air raid typifies how errors emerged in
the re-telling of the event, which have become perpetuated in subsequent accounts.

The X-28 was ordered to Lengkong Lake on 1 March 1942 and left there the following day (2
March) to arrive at Broome on 3 March 1942 (van Wijngaarden and Staal, 1992:98; de Zwart,
2002). Other sources put the arrival of X-28 at Lengkong on Saturday 28 February 1942:

As a result of the worsening situation, Do 24s X-23 and X-28 of GVT-6 were flown from
Tanjong Priok to a hiding place at Lengkang [sic] on the Brantas River near Modjokarta,
in the Sourabaya area, leaving there next night for Broome (29th), while the surviving
aircraft of GVT-11 and GVT-12 also departed for Broome during the day (Shores et al.,

On 1 March the X-3, X-23 and the X-28 departed their flying base for shelter at Lengkong
and the following night deviated to Broome where they were strafed and caught fire

No aircraft from either GVT-11 or GVT-12 reached Broome, but some personnel from these
aircraft groups are reported to have been evacuated to Australia. These two GVTs were
equipped with Fokker TI.Va floatplanes and their own crews prior to the evacuation scuttled
them all in the Kali Brantas River, as they did not have the range to reach Broome (Geldhof,
1987:70; see Womack, 2001a).

4.4 The Y ‘boats - MLD Catalinas
The MLD Catalinas lost at Broome (Y-59, Y-60, Y-67 and Y-70) were all built by the
Consolidated Aircraft Corporation in San Diego, California, between November and December
1941. Table 4.4 lists the production orders for the MLD Catalinas that were lost at Broome.
Pilots from Consolidated ferried these MLD Catalinas to Manila (Philippines) in November
1941, where MLD pilots flew them on to Surabaya (Messimer, 1985:24). Construction details,
delivery schedules and aircraft fates for Catalinas delivery to the MLD in the first order from
Consolidated, are presented in Appendix 4.10.
The Dutch had to compete with the RAF and RAAF (and other services) for Catalinas and the USN themselves were busy filling their own orders. On 14 June 1940, an order for 36 Catalinas was eventually placed with Consolidated, with the serial numbers Y-38 through to Y-73 following on from the last Dornier serial number, X-37 (Geldhof, 1987:60). The 36 Catalinas delivered to the MLD were given the designation PBY-5 28MNE, and met certain Dutch requirements (Geldhof, 1989:9). For example, the instruments and gauges were to be labelled in Dutch and not in English as in other Allied Catalinas. Likewise the altimeters and air speed indicators were metric (Crocker, 1987:169).

Construction and deliveries of the first MLD Catalinas were brought forward and began in August/September 1941. The first two machines departed on 25 August 1941 from San Diego and the transfer took place took place on 3 September at Manila. The flying boats arrived at Surabaya on 5 September 1941 (Geldhof, 1987:60-61). Once there, the Catalinas were assigned to a GVT. Remarkably colour film footage was taken and has survived, of the departure from San Diego of the first two Catalinas to be delivered to the MLD, the Y-38 and Y-39 (see Appendix 4.8 – film three). A photograph, of the Y-70 shows the early triangular markings carried, while on its delivery flight (Photo. 4.15). Their markings were changed in late February 1942 and these are the markings the Broome MLD Catalinas would have carried at the time of their loss:

The Dutch now overpainted the orange triangle markings of their aircraft with a red, white and blue square [on 23 February 1942] to avoid any possible confusion with the red Hinomaru on Japanese aircraft (Shores et al., 1992b:221).

The MLD Catalinas lost at Broome were delivered without any problems, except for the last machine in the sequence. The delivery of the Y-70 was interrupted by the attack on Pearl Harbor; caught mid-flight from Honolulu to Wake Island, the aircraft was ordered to turn back to Pearl Harbor. It eventually reached Australia, probably from Pearl Harbor via Sydney (Geldhof, 1987:61).
On its ferry flight to Surabaya, the Y-70 was carrying Lt General Ludolph van Ooyen, who had hired an American crew for the flight (Womack, 2005a; Womack, 2006:52). The Catalina is then reported to have flown back to Pearl Harbor via Sydney-Suva-Canton-Palmyra-Pearl carrying another VIP, Dr. van Mook in January 1942. The aircraft stayed at Pearl Harbor between 10 – 24 January 1942 and then at San Diego, returning briefly through Pearl Harbor on 11 February 1942 and then south to Java (Dorny, 2001a and 2001b). The Y-70 is also reported to have made a Pacific crossing from Australia to America after its arrival in Surabaya. The return journey over the Pacific is described below, which indicates that the Y-70 was engaged in ferrying VIPs for most of its operational service. It was only during its final flight that it carried refugees from Java:

Y-70 crossed the Pacific to Australia on that return flight, and on to Java – 06 January 1942. Y-70 (pilot Lt A D De Bruyn) arrived Sydney via Darwin and Townsville, having left Java on 04Jan42. Passenger was Dr H Van Mok [sic], Lieutenant Governor General of NEI. Departed Sydney 08Jan42 arriving Pearl Harbor 10Jan42.

On the return flight, De Bruyn flew Suva to Townsville (about mid Feb42), then to Sydney because of lack of routing instructions. At Sydney 18Feb42, Y-70 De Bruyn then flew to Broome 19Feb42, then to Tjilitjap [sic] where Dr Van Mok debarked. De Bruyn then flew Y-70 on to Soerabaya (Graham, 2005a; see also Graham, 2005b).

The attack on Pearl Harbor and the subsequent rapid expansion of the Japanese through the Philippines cut the usual western ferry route over the Pacific. An alternative route to Surabaya for the delivery of MLD aircraft went via Africa and India known as the Atlantic ferry route:

The Y-69, which had been diverted from Midway to Hawaii, and was immediately confiscated by the Americans, whereas the Y-70 had to turn back to Pearl Harbor after arriving at Midway and finally reached Soerabaja via Australia. As a result of the war situation in the Pacific, the yet to be delivered Y-50, Y-71 through to Y-73, were flown via

After arriving in Surabaya a number of the Catalinas were used for training. Originally the Catalinas were regarded as a reserve for the Dornier flying boats, but Dornier losses soon brought Catalinas into the front line (Geldhof, 1989:10). The operational histories of the Broome MLD Catalinas after their arrival in the NEI, are discussed in the following section. Tasked with front line duties, the machines were lucky to survive the Japanese onslaught and reach Australia.

The four MLD Catalinas at the time of their loss at Broome were all from GVT-17, but aircraft in this group were interchanged prior to the group’s evacuation to Australia. The group was probably stationed at Tandjong Priok with GVT-16 at the beginning of the Pacific war. They moved to Ambon on 2 December 1941 and remained there until late January 1942 ie, for nearly two months (see Appendix 4.2):

Catalina group GVT-16 provided daily surveillance above the Karimata and the Gaspar Straits from the naval flying base at Tg. Priok. Herewith on 21.01.42 the Y-51 was lost. GVT-17 received the task to guard the ‘Great East’ from the main base at Ambon, together with Dornier Groups GVT-2 and GVT-5, as well as the nearby U.S. Navy Patrol Wing Ten. The group operated in this immensely large sea area until 31.01.42. Its most important offensive operation was the bombing of the Japanese landing fleet at Kema on 11.01.42, during which the Y-58 was reported as missing (Geldhof, 1989:10. Trans. Heijm 2005).

GVT-17, however, in another source is recorded to have initially contained different aircraft while at Ambon and that it was not until the group moved to Surabaya for maintenance in early January it was assigned two of the machines lost at Broome, the Y-59 and Y-60. The Y-67 and Y-70 were probably among the 30 assigned to the reserve aircraft groups that had yet to be established, as none of the secondary historical sources mention these aircraft (see Appendix 4.2):

On 2 December 1941 GVT-17 (Y-45, Y-47, Y-48) departed to the naval flying base at Ambon. Many reconnaissance flights were flown to the north from this base. Many aerial photographs were made of Tobi (Philippines), which were used to carry out attacks by Lockheed Hudson bombers of the Royal Australian Air Force stationed at Ambon. When Japanese flights from the south were reduced, reconnaissance flights were carried out over the sea between Davao and Menado, while on 23 December the Y-47 took part in the evacuation of the personnel at the Tondano naval flying base ... Beginning January 1942 the group [GVT-17] went to Soerabaja for aircraft maintenance and afterwards returned with different machines (Y-58, Y-59, Y-60) (Geldhof, 1987:71. Trans. Heijm 2005).

The first reference to the Y-67 having joined a GVT is when GVT-5 was equipped with Catalinas at Surabaya after the group had lost two of its Dorniers on 23 and 26 December 1941. Operations carried out by the aircraft including a collision, are mentioned below:

The X-30 was further used to return the crew that had not been wounded to Soerabaja, where the aircraft was transferred to the flying base [at Surabaja] and the group [GVT-5] was now further equipped with Catalinas (Y-65, Y-66, Y-67). The crews were supplemented
with newly trained personnel and the group was sent to Tjilatjap for convoy escort and reconnaissance over the ocean to which end each aircraft was equipped with four depth charges. As a result of a collision, Y-65 and Y-67 were damaged and the last mentioned aircraft returned to Morokrembangan for repairs (Geldhof, 1987:68. Trans Heijm 2005).

By mid January 1942, the Catalinas Y-59 and Y-60 (in GVT-17) were back in Ambon. The Y-60 was extensively damaged during the Japanese landings at Kema (Celebes/Sulawesi on 11 January). The Y-67, after repairs, is reported to have left GVT-5 and joined GVT-17 on 11 January 1942 in Ambon, as a replacement for the Y-58:

On 11 January, in association with American Catalinas, the group [GVT-17] attacked the landing fleet at Kema. After the bombardment there was a dogfight with the lead Japanese aircraft, whereby one crewmember died on board the heavily damaged Y-60, while the Y-58 went missing. The machine [Y-58] was then replaced by the Y-67 (Geldhof, 1987:71. Trans. Heijm 2005; see also Shores et al., 1992a:213).

However, both the Y-59 and Y-60 are recorded to have been in GVT-16 before their transfer to GVT-17. De Zwart (2002) puts the Y-67 with GVT-5 when its Dorniers were replaced by the Catalinas Y-65, Y-66, Y-67 and Y-71 (see Appendix 4.3). These same flying boats were previously assigned to GVT-2 on 26 December 1941, after it had lost all of its aircraft (Shores et al., 1992a:205). However, elsewhere GVT-2 is recorded to have been assigned the Catalinas Y-62, Y-63 and Y-64 instead, on an unspecified date (Appendix 4.3). The Y-62 and Y-64 escaped to Ceylon and the Y-63 was shot down on 27 February 1942. Perhaps the group was disbanded and its remaining aircraft were transferred to GVT-16. Another explanation is that Shores et al. (1992) were wrong; the Y-65, Y-66, Y-67 and Y-71 were never assigned to GVT-2. There is also an inconsistency with putting the Y-59 and Y-60 into GVT-16:

With their patrol areas reduced and many of their bases threatened the Dutch seized this opportunity to re-organise the dispositions and equipment of their flyingboat flights. GVT-1, GVT-3 and GVT-6 all returned to Sourabaya, where GVT-1 was disbanded; GVT-3 exchanged Do 24s X-19, X-20 and X-22 for three Catalinas (Y-42, Y-49 and Y-61), and then began operating from the port’s own flyingboat base at Morokrembangan. The crews of GVT-16 were given a short rest before returning to operations with three replacement Catalinas (Y-58, Y-59 and Y-60) (Shores et al., 1992a:210).

GVT-16’s Catalinas, the Y-55, Y-56 and Y-57 all managed to escape to Ceylon (Shores et al., 1992b:312). They had no need for replacements. It is, therefore, more plausible that the Y-59 and Y-60 were in GVT-17 rather than in GVT-16, since it was that group [GVT-17] that had been sustaining losses and hence, needed replacements. The group had lost two of its original Catalinas: the Y-47 and Y-48 (see Appendix 4.8).

Another version of this episode claims the attack by the Catalinas on the Japanese fleet heading towards Menado had failed to score any hits. No reference here, however, is made of the dogfight mentioned above. This does not imply that the action did not happen, but that versions of events are different, depending on the source of historical material being investigated:

On 11 January GVT-17 consisting of Y-58, Y-59 and Y-60 from Ambon, attacked the Japanese fleet, apparently en route to Menado, which had been discovered by American
Catalinas the day before. No hits were booked up. The Y-60 was heavily damaged; the Y-58 was lost and its entire crew was killed (Bosscher, 1986:174. Trans. Heijm 2005).

The Y-70 is still not mentioned during this period as belonging to any GVTs, probably because the machine was engaged elsewhere. As mentioned above, the Y-70 was busy ferrying VIPs in January and February 1942. The machine was in Australia for most of February and probably did not join a GVT until its arrival in Surabaya at the end of February 1942.

Since its deployment to Ambon, little is recorded of the operational service history of the Y-59. The machine, however, is recorded to have been involved in escorting a badly damaged KM submarine and was attacked itself while on this operation:

On 26 January the Y-59 had to protect the submarine K XVIII, because this submarine had been so heavily damaged during the attack on the transport fleet at Balikpapan that sailing underwater was impossible. Thereby two hostile aircraft attacked the aircraft, but these were shaken off (Geldhof, 1987:71. Trans. Heijm 2005).

After January 1942, GVT-17 retreated from Ambon to Surabaya where its aircraft were involved in patrols and convoy protection. There are no other details are provided for the group’s operations for February 1942, there is an amusing account of MLD innovation amidst dwindling resources:

On 31 January the group [GVT-17] was transferred from Ambon to Soerabaja, from where reconnaissance flights were made and convoy protection was provided. During one of these last mentioned flights a loaf of bread was used, in the absence of a message cylinder, to contact a ship being escorted (Geldhof, 1987:71).

In February 1942 when the Y-67 was reported to have been attacked by Japanese aircraft. Kossen (2001), responding to an inquiry about how to interpret a message sent from the aircraft on 26 February 1942: ‘2 Catapult planes S 06.05 E 113.15 S 06.05 E 113.15 T[GMT] 0930’ (Womack, 2001b), interprets the radio message as indicating that it was attacked twice and that it could not complete its mission because of these attacks:

I am not absolutely sure but I don’t think the Japanese floatplanes attacked the Dutch PBY simultaneously. I think the first one attacked the Y-67 on position S 06.05 E 113.15 and the second position S 05.40 E 113.05. A report that Y-67 could not carry out her mission because of these attacks, was send [sic] at 09:30 hours. Again, I’m not absolutely sure but this is my interpretation of this rather strange message…(Kossen, 2001).

The date for the last MLD flights from Ambon, however, is reported elsewhere as being 30 January 1942. The evacuation must have been desperate, with as many as possible crammed into the flying boats:

The end for the Australian and Dutch forces at Ambon occurred on the 30th. Most Hudsons had already left for Timor by midnight on the 29th/30th, with only two of 13 RAAF Squadron’s aircraft remaining to fly out the last members of the unit. These were followed by the flyingboats of GVT-17, which went to Sourabaya. 11 RAAF Squadron’s Empire ‘boat A18-13 departed with a further load of evacuees, Flt Lt Hampshire’s third
such flight from Ambon in the past seven days; on one of these flights he managed to crowd no less than 60 persons on board, a record for an Empire ‘boat (Shores et al., 1992a:230).

Morokrembangan soon experienced air raids itself, making it unsuitable for regular operations. GVT-17’s final days and operations on Java are described in the following quote, but specific aircraft are not mentioned:

In connection with the many air attacks on Morokrembangan the group stayed during the last days at the hiding place at Toeloengagoeng [Tulungagung] at Kediri, where flooded rice fields – the depth of the water being increased by irrigation works – offered a departure point. From here, some mine laying operations were carried out in the Moeisi River and in the Banka Strait, during which stops were made at Tandjong Priok (Geldhof, 1987:71. Trans Heijm 2005).

The group was eventually ordered to evacuate to Australia on 2 March 1942, but interestingly, only three aircraft are mentioned. The Y-70 is still not referred to as belonging to GVT-17 (Geldhof, 1987:71). What happened to the Y-70 during its last days on Java? The machine had not returned there until late February as it was recorded to have been in Australia up until that time. What then was the machine and its crew doing during the few days before flying to Australia? Hooffman (1965:32), as mentioned previously, indicates that the Y-70 was assigned to GVT-17 and that, therefore, it was probably attached to that group at the time of its loss in Broome. The machine was one of four operational Catalinas left on Java; the Y-45 and Y-62 at Tjileuntje, the Y-66 and Y-70 at Cilacap (Hooffman, 1965:32; see Appendix 4.11). By the time the MLD was ordered to evacuate, they had only 11 Catalinas left. Figure 4.3 shows a detail map of Java indicating the location of the secret bases from which both Dorniers and Catalinas had departed for Broome. Figure 4.4 shows the routes taken to reach Australia by all the flying boats that reached Broome by 3 March 1942. Following the destruction of the five MLD Catalinas at Broome, only nine of the original 36 machines were left to carry on operations against the Japanese with 321 (‘Dutch’) Squadron RAF from Koggala and later China Bay in Ceylon, covering the expanses of the Indian Ocean (Geldhof, 1989:11; Jackson, 1975).

4.5 Conclusions
This chapter reviews the historical data relating to the MLD flying boats lost at Broome; provide their background history and the military contexts in which the machines operated. This chapter also establishes which aircraft were lost in Broome. This is a prerequisite for conducting fieldwork. It is essential that research in the field commence only after researchers understand the nature of the material resources that may be extant in Roebuck Bay.

A review of secondary sources shows conflicting accounts of which aircraft were actually lost at Broome. These sources, therefore, had to be corroborated and inconsistencies identified, in order to establish a verifiable list of aircraft types and specific identities. A chronology for each MLD aircraft lost in Roebuck could then be established. The historical record, however, can
not be expected to be specific. Such details can only be interpolated from the dispositions and movements of the units to which those machines were assigned.

English translations of historical manuscripts on MLD operations during the early stages of the Pacific war are almost non-existent. Those that have written about the MLD and of the air raid at Broome, focus more on the air raid itself than the specific aircraft histories. The focus here has been not so much a history of the MLD in general, but the history of the nine MLD flying boats in Roebuck Bay. In the process of reconstructing their service histories, a range of maritime-related sites has been highlighted, namely, the major and minor flying boat bases, which the MLD operated from and the extensive support facilities provided to the flying boats by tenders, much like the USN had with their Catalinas. Unfortunately, a survey of the information available on these tenders has not revealed additional historical data on the movements of the machines they were supporting, either because they were not kept or had been destroyed when the vessels themselves were scuttled to prevent capture by the Japanese.

This chapter has identified the GVTs to which the Broome MLD flying boats were attached at the time of their loss. Thereby, aircraft movements, in the absence of flight logs or aircraft history cards, could validly be inferred. The MLD flying boats were fortunate to even reach Broome, given the front line duties of these aircraft. Flying any aircraft in the NEI from December 1941 to March 1942 would have been dangerous given the Japanese air superiority throughout this period. Because Allied military planners had not foreseen this nor the loss of ML-KNIL fighter and bomber aircraft, the only type available for the defence of the NEI were
the flying boats, a role for which they were not intended. This resulted in a high toll in both machines and aircrews. The MLD machines, which made it to Broome, however, had one more battle to fight.

Figure 4.4 Map showing Japanese invasion routes into the NEI and flying boat escape routes (After Shores et al., 1992b:473).
CHAPTER 5: LOST CATALINAS – Royal Air Force and United States Navy 1938-1942

5.1 Introduction

Yet it was not entirely American industrial superiority that underlay the dangerous manpower situation of the Japanese in late 1943. For one thing, the Japanese navy took very poor care of its pilots ... ‘Any man who was shot down and managed to survive by inflating his life raft realized that his chance for continued survival lay entirely within his own hands’. In contrast, ‘the Americans sent out flying boats to the areas in which their planes had fought, searching for and rescuing air crews ... Our pilots could not fail to be impressed with these daring search missions’ (Spector, 2001:278).

The remaining flying boats reported lost in Broome were two RAF and two USN Catalinas. The operational service histories of these three aircraft are compiled in this chapter, with a research focus on identifying the actual machines. The serial numbers of the four Catalinas in this group have not previously been verified. As a result, they have been erroneously reported and the wrong machines recorded lost. New data on the USN Catalinas indicates one of them was an experimental type, resulting in technological innovations in the Catalina flying boat, which all subsequent Catalinas were to adopt. Given the nature of the hurried retreat from the Philippines and Singapore and that many historical records were destroyed during the war, the operational service histories of the RAF and USN machines in Broome can only be made by inferring the machines identity, from the fragmented records that have survived.

The USN Catalinas in Broome fought a beleaguered retreated from the Philippines and had detachments throughout the Far East, and left wrecked Catalinas and dead men all along their route they took to come to Australia. By the end of December 1941, the two Broome RAF Catalinas were both stationed in Singapore. Historical research of these machines provides an insight into the air war until their arrival in Java and ultimately Broome.

The USN Catalinas underwent several numbering system changes throughout their operational service histories. It is crucial to understand these changes if particular aircraft histories are to be traced. Both the USN Catalinas lost in Broome were part of a detachment from Patrol Wing Ten (Patwing-10). The wing developed what has been referred to as the simple numbering system in January 1942, after it amalgamated the remnants of its two squadrons into one, called Patrol Squadron 101 or VP-101 (Graham, 1999a and 1999b). This was used to trace the background history of the USN Catalinas that were lost in Darwin (Jung, 2001:60). Given that the USN Catalinas lost in Broome were also from Patwing-10, but of a different detachment, the simple numbering system will be used also to trace their operational service histories through primary documentary material such as the Patrol Wing Ten War Diary.

Unlike the MLD numbering systems, the RAF system was not unique to particular aircraft. Combat and accidents contributed to great aircraft losses throughout the early stages of the Pacific war and the aircraft used to replace them were given the same serial numbers as those
that they were replacing. For historians and archaeologists then, it is necessary to examine the origins of the replacements in order to determine the entire background history behind each aircraft serial number or code letters.

5.2 RAF Catalinas FV-N (ex-AJ154) and FV-W (ex-Y-54) - origins

The MLD in December 1941 handed over several Catalinas to the RAF. A number were also handed over to Patwing-10. One of the Catalinas received by the RAF was given its new squadron code FV-W, a code that would become infamous at the outbreak of hostilities in the Pacific. This machine is reported to have had the contract number W8423 or W8433 (Prime, 2003:34). Table 5.1 and Table 5.2 show the various Catalina types received by the RAF, showing how the ‘W’ serial numbers were assigned. It is argued in this chapter that such data is irrelevant when referring to the Broome FV-W, since that aircraft was not initially operated by the RAF, but by the MLD and hence, has a different contract numbering system. The second RAF Catalina lost in Roebuck Bay, FV-N (ex-AJ154) again, has a history apart from the other Catalinas that were operated by the RAF’s 205 Sqn and as a result, should not be confused with the ‘W’ serial system.

There are no known photographs of either of the two RAF machines. Photograph 5.1, however, shows similar aircraft with 205 Sqn markings ie, aircraft prefix serial number ‘FV’. A colour scheme for these machines is suggested in Photograph 5.2. Although the photograph shows an RAAF machine, the RAF Catalinas would have had a similar colour scheme by the end of December 1941 (see Table 5.4).

The aircraft history of No. 205 Sqn Catalinas during WWII began ominously with the destruction of Catalina FV-W (Serial No. W8417) hours before the attack on Pearl Harbor by five Type 97 Kakajima Ki-27b ‘Nate’ fighters from the Japanese Army Air Force (JAAF) 1st Sentai (Wing); the kill credit going to Lt Toshiru Kubotani (Shores et al., 1992b:197). The loss of this aircraft entailed several historic milestones. It was arguably the first attack on a Commonwealth military asset in the east. It was also the first Allied aircraft to be shot down in the Pacific theatre and it resulted in the deaths of all eight of its crew, including an Australian, Sgt Colin Burns (Ike) Treloar, RAAF (Vale, 2001; Hackett, Kingssepp and Alseben, 2004; CWGC, 2005). Treloar was, hence, not only the first Australian to die in the Pacific Theatre, but also the RAAF’s first casualty in the Pacific (see Vincent, 1999:64). This section tracks the re-use of this infamous serial number, FV-W, for a different aircraft (ex-Y-54 [c/n 330]) that would eventually be destroyed in Roebuck Bay (Geldhof, 1987:192; Geldhof, 1989:25). The service histories of both FV-N and FV-W are compiled and critically evaluated to provide a chronology of their movements, and to discover possible clues to the location of the wrecks in Roebuck Bay.

Both the Broome RAF Catalinas previously operated with different squadrons and in the case of FV-W, a different nation, prior to their deployment with 205 Sqn (Lake, 1999). Their previous serial numbers must, therefore, be understood if their identity at Broome is to be
Table 5.1  RAF Catalina deliveries (Hendrie, 1988:195)

<table>
<thead>
<tr>
<th>Mark</th>
<th>Type:</th>
<th>Quantity</th>
<th>Serial#</th>
<th>Received</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PBY-5</td>
<td></td>
<td>W8405-W8434</td>
<td>March 41- July 41</td>
</tr>
</tbody>
</table>

Table 5.2  RAF Catalinas – individual aircraft (Hendrie, 1988:196-197,201,203). Serial #s in bold represent aircraft reported lost in Broome

<table>
<thead>
<tr>
<th>Serial</th>
<th>Units</th>
<th>Remarks</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH540</td>
<td>205</td>
<td>FTR 30.12.41</td>
<td></td>
</tr>
<tr>
<td>AJ154</td>
<td>202-205</td>
<td>Lost in far east 2.42 [sic] [FV-N]</td>
<td>Ex-Gibraltar</td>
</tr>
<tr>
<td>W8409</td>
<td>202-205</td>
<td>FTR 12.01.42</td>
<td></td>
</tr>
<tr>
<td>W8413</td>
<td>205</td>
<td>Caught fire 09.12.41 Seletar</td>
<td></td>
</tr>
<tr>
<td>W8417</td>
<td>205</td>
<td>FTR 07.12.41</td>
<td></td>
</tr>
<tr>
<td>W8423</td>
<td>205</td>
<td>FTR 07.12.41 (see Barnes bio)</td>
<td></td>
</tr>
<tr>
<td>W8426</td>
<td>205</td>
<td>Crashed 23.07.41 NE of Port Victoria</td>
<td></td>
</tr>
<tr>
<td>W8429</td>
<td>205</td>
<td>Damaged in action 17.01.42</td>
<td></td>
</tr>
<tr>
<td>W8433</td>
<td>205</td>
<td>Lost in evacuation 2.42 [sic] [FV-W {2}]</td>
<td></td>
</tr>
</tbody>
</table>

Note: FTR = Failed to Return; SOC = Struck of Charge; number under ‘units’ are of squadrons unless stated otherwise.

determined. 205 Sqn was established in 1918. It was disbande] following World War I, but reformed, again as 205 Sqn and was the first permanent RAF squadron in the Far East thereby earning its motto of Pertama di-Malaya [First in Malaya] (Halley, 1988:265). This squadron’s history is compiled from when the two RAF Broome Catalinas joined the squadron in 1941 at Singapore, up until their loss in Broome. For a comprehensive account of the squadron’s history, see Lewis (1959 and 1968); Philpott (1979); Halley (1988); Jefford (1988); McNeill (1999) and Taylor (2002:203).

Like the MLD service histories, the operational histories of the two RAF machines are also sketchy. An explanation for this is that the ship carrying the squadron ORB’s, including personal belongings, flying log books etc., was sunk as it was leaving Singapore on 6 February 1942 (Castle, 2001:118; Jardine, A., pers. comm., 29 January 2005). Clues regarding their service histories, however, can be found in secondary sources that refer to these aircraft and in the recollection of events by veterans, only recently published.

A remarkable record of 205 Sqn’s history during late 1941 to early 1942 survives at The National Archives (TNA – formerly the Public Records Office [PRO] in Kew, England). Of most relevance to this thesis is item AIR27/1215, Sections A, B and C. Section A presents a day-to-day account of the squadron’s operations in December 1941, written and preserved in manuscript form by Operations Officer P/O Keon-Cohen ‘in accordance with standing orders’ (AIR27/1215, TNA). Section B records a minute-by-minute history of squadron aircraft operations ‘as recorded by the Operations Room Staff from New Year’s Day 1942 till the three
CHAPTER 5: LOST CATALINAS – RAF AND USN


Photograph 5.2 ‘R.A.A.F. Catalina A24-7 at Rose Bay [Sydney] in July 1941 after its ferry flight from Honolulu by a Qantas crew. It was brought on charge at Rathmines on the 21st. Together with two other Qantas ferried Cats, A24-6 & A24-3. it was destroyed during a Japanese attack on Port Moresby 28 February 1942. The Qantas Indian Ocean Catalinas were painted in the same camouflage: Extra Dark Sea Green and Dark Slate Grey with Sky under surfaces. This dufacolour positive has never previously been published (Pattison and Goodall, 1979: Facing page 40; see also Table 5.3).’

Photograph 5.1 ‘A pair of Catalina flyingboats of 205 Squadron in flight near Seletar. It will be noted that the FV code and individual aircraft letter are all carried on the tail fins of these flyingboats’ (IWM via Shores, et al., 1992a:148). Note: Catalina in foreground is possibly FV-R.
aircraft remaining at Seletar (the RAF’s flying boat base in Singapore) left for Batavia at the end of January 1942’ (AIR27/1215, TNA). Section C was written by P/O Keon-Cohen some 25 years (1966) after the events, and in the words of the author, are limited in both accuracy and content:

The accompanying document has been prepared to provide a background to the operations diary entries of the period 1941-42 which are already in the possession of 205 G.R. Squadron. It is compiled from material carried in the mind of the author and represents his recollection of scattered events of interest which occurred some 25 years ago. It is unfortunate that the author was, at the time, the most junior Officer of the Squadron and that the events recorded are seen, as it were, from the bottom up rather than from the top down (AIR27/1215, TNA).

P/O Colin Keon-Cohen (AIR27/1215, TNA) verified the accuracy of his Section C accounts by showing the manuscript to W/C Burgess and W/C Councell of 205 Sqn, who found no errors. W/C Burgess, however, indicated that the first FV-W was lost on 7 December 1941. Interestingly, this is the only reference in AIR27/1215 to the first Allied aircraft shot down in the Pacific Theatre having the serial FV-W. It is recorded (in Section A) that that aircraft was instead FV-Y. Despite the claims that Section C is free of errors, this thesis critically evaluates AIR27/1215 by incorporating more recent secondary sources that are argued to have corrected many of the errors in AIR27/1215. Keon-Cohen (AIR27/1215, TNA) himself admits the document lacks an understanding of aspects of operations only senior officers would have understood and feels his prominence in the narrative is unwarranted. History has lost out in this respect; while it may be possible to reconstruct the operational lives of individual aircraft, it is not possible to discern what the decision makers were thinking when they dispatched aircrews, on what ultimately would be futile missions. Flying the PBY in wartime was an unknown quantity and the Allies were learning the hard way how best to deploy them.

Following the destruction of FV-W in December 1941, the second FV-W joined 205 Sqn after an urgent request by the RAF to the MLD for three Catalinas. These were the ex-MLD Y-52, Y-53 and Y-54 and are believed to have joined the squadron on different dates between December 1941 and February 1942 (Geldhof, 1989:10; Campbell and Lovell, 2000:137). While Campbell and Lovell (2000:137) claim these aircraft were first logged at Seletar on different days, other sources indicate the RAF received them on the same day, 12 December 1941, and that they were ferried from Surabaya to Seletar by RAF crews (Taylor, 2002:89). Hendrie (1988:71) records that the Y-52 and Y-53 had arrived at Seletar by 12 December 1941, but does not mention the arrival of the Y-54. Shores et al. (1992a:149) details the Y-52’s arrival at Seletar on 11 December 1941, under the command of F/Lt S.G. Stilling and the Y-53’s arrival the next day, under the command of F/Lt Atkinson. No mention, again, is made of the Y-54. In another version of the story, flight crew details for the Y-52 and Y-53 ferry flight are different, or simply mention different members. On 10 December Sjt J.E. Cason (566911) and several other personnel flew to Surabaya from Seletar, picked-up the Y-52 and returned on 12 December 1941. The other members of the party ferried back the other two machines, Y-53 and Y-54; also arriving on 12 December 1941. P/O Sid Scales piloted the Y-54, his first
Catalina command and recalls negotiating the treacherous sea lanes into Surabaya (Campbell and Lovell, 2000:39-40). The ferrying flights of these three machines are described in the book *Lucky Alex* (Castle, 2001), which list the names of some of the ferry crews. Reference to Lake Serati below, is possibly in error. The reference instead, may relate to Lake Grati:

Dec 10 1941 three skeleton crews flew to Bandoeng to pick up three Catalinas from Sourabaja. They were to be captained by F/Lt Stilling, F/Lt Atkinson and P/O Scales. From Bandoeng we travelled by train to Sourabaja and during the journey the news came that the *Prince of Wales* and the *Repulse* had been sunk by Japanese aircraft. On the train we Air Force men suffered some abuse from the Dutch for the RAF not downing the Jap [sic] aircraft. They were very panicky about it all. At Sourabaja, while we were familiarising ourselves with our new aircraft, the Dutch had a report of a Jap [sic] aircraft-carrier in the Java Sea. They immediately began to disperse their aircraft away from the moorings at Sourabaja. With Dutch pilots we flew our new machines to a Lake Serati (about three quarters of an hour away), where they were moored, nose to shore under overhanging foliage and the tails draped with branches and palms – very effective camouflage (Castle, 2001:130).

Only two machines are referred to in the day-to-day account of the squadron’s operational history. The *MLD* Catalinas Y-52 and Y-53 are recorded to have left Surabaya for Serati (Grati?) on 11 December 1941. Onboard Y-52 were the following flight crew: F/Lt Stilling (Captain of aircraft), P/O Garnett as 2nd Pilot, Sgts. Cason, Forrest and LAC Culpin. The aircraft alighted at Serati 0830hrs after an hour’s flight from Surabaya (times in G.M.T.). That afternoon, Y-52 left for Seletar at 2200hrs and arrived there at 0650hrs on 12 December. The Y-53 left Surabaya on 12 December at 0105hrs for Seletar via Batavia and Tanjong Pinang where several *MLD* passengers were landed. The flight crew for Y-53 was F/Lt Atkinson (Captain of the aircraft), P/O Scott as 2nd Pilot and Sgts Edwards, Alsopp and LAC Drake. The aircraft arrived at Seletar at 1023hrs (AIR27/1215, TNA). However there is no mention of the departure or arrival of the Y-54 at Seletar in this document.

Clark (2001) provides a list of the three *MLD* machines handed over to the RAF as well as their new designations in 205 Sqn. The second FV-W, therefore, is believed to be the ex-Y-54:

- Y-52 became FV-Y (replacing FV-Y lost 20 Sep)
- Y-53 became FV-U (replacing FV-U lost 23 Jul)
- Y-54 became FV-W (replacing FV-W lost 7 Dec) (Clark, 2001).

An alternative origin for the second FV-W is that it may have been the ex-Y-52. Appendix 5.1 lists all the Catalinas received by 205 Sqn and their fates. It should be noted that in this list the second FV-W is recorded to have been the ex-Y-52 and that the Y-54 was destroyed by the *MLD* in Java prior to the evacuation. There are no primary references relating to the transfer of the *MLD* machines to the RAF, because it is unknown what aircraft code letters they took. Consequently, the former identity of the second FV-W is not positively known and hence, should be referred to as being either the ex-Y-52 or the ex-Y-54.
However, the second FV-W was most likely the ex-Y-54. This can be interpreted by understanding the 205 Sqn numbering system. The squadron’s six earlier Short Singapore IIIs flying boats were numbered A through to F and when nine Catalinas were incorporated, they were given the first letters ‘from the reverse end of the alphabet’ (AIR27/1215, TNA). Therefore, the squadron’s first nine Catalinas had the following serial numbers: FV-Z/Y/X/W/V/U/T/S/R (in this order) and that, theoretically, the replacement aircraft would have been given the subsequent number (tail code letter). A sequence for the origin of the second FV-W as the ex-Y-54 is presented in Table 5.3. The results of Table 5.3 are used in this thesis to validly infer that the second FV-W was the ex-Y54. Without a primary source, this is the only logical deduction. Table 5.4 corroborates this hypothesis. It should be noted that the first FV-W was the third of the squadron’s losses before the start of the Pacific war and that, therefore, the third (MLD) Catalina replacement in an alpha-numerical system, would have been the last in the sequence to be replaced.

5.2.1 FV-N and FV-W operational histories

The lack of historical data relating to the ex-MLD machines is highlighted in a letter to aviation historian Mervyn Prime by V. Shrubsall (Air Historical Branch [RAF]) dated 9 June 1977: ‘Unfortunately the 205 Squadron Forms 540 (Operations Record Book) and S41 (Daily Record of Operational Sorties) for the period December 1941 to June 1942 are missing, presumably lost during the campaign’ (Shrubsall, 1977). Little historical data has survived for the squadron from December 1942, but Shrubsall (1977) does indicate in her letter that 205 Sqn’s Catalinas were engaged in patrols over the sites where HMS Repulse and HMS Prince of Wales were sunk, so as to prevent Japanese divers going down to the wrecks in search of technical information (Cooper, 2002). Given that FV-N had arrived from Gibraltar by this time, it is quite likely it too would have been involved in this operation.

The first mention of the second FV-W in AIR27/1215 is on 19 December 1941, when the machine went on patrol for Japanese shipping with the following crew:

F/Lt Stilling – Captain
Sgt Thompson
P/O McHardy – 2nd Pilot
Sgt Wiseman
P/O Babineau – Navigator
LAC Hollis
Sgt Kennihan – Observer
LAC Wilday
Sgt Holder
LAC Barker (AIR27/1215, TNA).

Given the date, the Y-54 must have arrived after Y-52 and Y-53 had joined the squadron. FV-W is then recorded to have gone looking for Japanese ships with FV-Z on 23 December 1941. Significantly, the squadron’s new Commanding Officer, W/C Councell, arrived on this date too, from his posting at Station Kuantan (Pahang, Malaysia). For the mission with FV-Z, FV-W had the following crew:
Table 5.3 Hypothetical progression of the serialisation of Catalinas into 205 Squadron incorporating the three MLD replacement aircraft (After Campbell and Lovell, 2000:137)

<table>
<thead>
<tr>
<th>Aircraft letters</th>
<th>Replacement MLD aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>FV-Z (Still operational 12/12/41)</td>
<td></td>
</tr>
<tr>
<td>FV-Y (lost 20/09/41)</td>
<td>Y-52</td>
</tr>
<tr>
<td>FV-X (Still operational 12/12/41)</td>
<td></td>
</tr>
<tr>
<td>FV-W (lost 07/12/41)</td>
<td>Y-54</td>
</tr>
<tr>
<td>FV-V (Still operational 12/12/41)</td>
<td></td>
</tr>
<tr>
<td>FV-U (lost 23/07/41)</td>
<td>Y-53</td>
</tr>
</tbody>
</table>

F/Lt Stilling – Captain
Sgt Holder
P/O Scott – 2nd Pilot
LAC Hollis
Sgt Kennihan – Navigator
LAC Wilday
Sgt Thompson
LAC Barker
Sgt Wiseman (AIR27/1215, TNA).

An incident is recorded on 24 December 1941 involving FV-W. Captained by F/Lt Stilling, FV-W went in search of FV-Z that had radioed it was being attacked by aircraft on 24 December 1941, at position 04° 43’N, 105° 57’E approx. Nothing was heard of FV-Z, but by 0809hrs:

... an oil patch was sighted and then, as the aircraft headed towards it, a number of small objects were identified as human heads. Catalina ‘W’ dropped two dinghies together with food and water. Conditions were unsuitable for an open sea landing to pick up the survivors, and the Catalina remained in the area until dusk.

After ‘Y’ [sic], flown by Sqn Ldr Stilling had returned, Sqn Ldr Jardine [37560] took off in ‘X’ on a square search for the survivors, intending to lead either the destroyer HMS Thanet, or the Netherlands submarine K-12 which was in the vicinity, to the site of the dinghy (Hendrie, 1988:71).

Hendrie (1988) is inconsistent with the serial number he uses for the aircraft that spotted the survivors of FV-Z. He is also inconsistent with the rank of Stilling. Presumably Hendrie (1988) is referring in all instances to FV-W and the mention of FV-Y is in error (AIR27/1215, TNA). Nothing more is mentioned of FV-W in Keon-Cohen’s notes for the rest of December. The notes, however, do mention the arrival of the second RAF aircraft lost at Broome that was to become FV-N in the squadron nomenclature.

The origin of FV-N is quite different to that of the second FV-W. While the aircraft’s operational history with 205 Sqn is reconstructed in this chapter, little is known about the aircraft’s history prior to joining that Sqn in December 1941. There are no known photographs of this machine while in the Squadron, but there may be earlier images. The aircraft History Card for contract number (c/n) A37, Catalina I (PBY-5), RAF No. AJ154 records that the aircraft was received at Saunders Roe Limited (SARO), of Beaumaris in Scotland (Fig. 5.1). The company was
Table 5.4 ‘The … table pertains to No. 205 Squadron at Singapore. During 1941 and through early 1942 that squadron received on charge altogether sixteen Catalinas. They are listed in the order received with their squadron code assigned. All except for the three ex-MLD boats (Y boats) would have, according to the data assembled above, worn the camouflage paint scheme as shown on A24-7 in the foto provided by Eric Mitchell’ (Dorny, 2005a)

<table>
<thead>
<tr>
<th>Serial</th>
<th>Received</th>
<th>Coded</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH540</td>
<td>1</td>
<td>FV-Z</td>
</tr>
<tr>
<td>W8411</td>
<td>2</td>
<td>FV-Y</td>
</tr>
<tr>
<td>W8413</td>
<td>3</td>
<td>FV-X</td>
</tr>
<tr>
<td>W8417</td>
<td>4</td>
<td>FV-W</td>
</tr>
<tr>
<td>W8423</td>
<td>5</td>
<td>FV-V</td>
</tr>
<tr>
<td>W8426</td>
<td>6</td>
<td>FV-U</td>
</tr>
<tr>
<td>W8429</td>
<td>7</td>
<td>FV-T</td>
</tr>
<tr>
<td>W8433</td>
<td>8</td>
<td>FV-S</td>
</tr>
<tr>
<td>Z2144</td>
<td>9</td>
<td>FV-R</td>
</tr>
<tr>
<td>exY 52</td>
<td>10</td>
<td>FV-Y</td>
</tr>
<tr>
<td>exY 53</td>
<td>11</td>
<td>FV-U</td>
</tr>
<tr>
<td>exY 54</td>
<td>12</td>
<td>FV-W</td>
</tr>
<tr>
<td>W8409</td>
<td>13</td>
<td>FV-Q</td>
</tr>
<tr>
<td>Z2151</td>
<td>14</td>
<td>FV-P</td>
</tr>
<tr>
<td>W8406</td>
<td>15</td>
<td>FV-O</td>
</tr>
<tr>
<td>AJ154</td>
<td>16</td>
<td>FV-N</td>
</tr>
</tbody>
</table>

contracted to modify the Catalinas to RAF standards before entering squadron service. AJ154 was diverted to Lough Erne, Northern Ireland, from Bermuda on 22 November 1941, on account of bad weather. It was flown to Saunders Roe the following day and beached (Ragnarsson, R., pers. comm., 25 August 2005). On 7 December 1941, it was launched and flew to Greenock (Scotland) and on 11 December 1941 was stored as a reserve aircraft. The aircraft was modified at around this time, but the type of modifications is unknown. It then joined 202 Squadron RAF at Gibraltar, on 15 December 1941, whereby it was transferred to 205 Sqn in the Far East on 24 December 1941 (RAF Hendon).

The aircraft’s Squadron letters while in 202 Sqn are unknown, which makes tracking historical data (including early photographs) difficult. David Legg, editor of The Catalina News, indicates that 202 Sqn Catalinas operated with the code letters TQ, but that they may not have been painted on their airframes (Legg, 2005; see also Halley, 1988:261). Significantly, the History Card does not record any information after the aircraft joined 205 Sqn, except that it was unaccounted for in Singapore (RAF Hendon). It was considered one of the four ‘English boats’ (as opposed to MLD) to reinforce 205 Sqn at the end of December 1941. Three of these machines would join 205 Sqn at Seletar, while the fourth remained at Koggala, Ceylon:

During most of December 1941, Sergeant [W.G. ‘Billy’] Markland [1055984] had been with 202 Squadron at Gibraltar. On 31 December, he arrived at Seletar in FV-N, one of the four so-called ‘English boats’ transferred to join 205 Squadron. His captain was Flight Lieutenant Hugh Garnell. The aircraft flew back to Koggala in Ceylon on 2 January 1942, and returned to Seletar on 6 January, carrying General Wavell to Singapore. Bill Markland subsequently took part in reconnaissance and convoy escort patrols, and he too went on the 12 January Singora raid … He flew to Batavia on 29 January and ended the month with moving the Squadron to Oosthaven [Sumatra; sometimes spelt Oesthaven] (Campbell and Lovell, 2000:41).

Shores et al. (1992a) names the pilots that ferried the Catalinas from Gibraltar to Singapore via the United Kingdom and Ceylon. Serial numbers are provided as well for the Catalinas: ‘Sqn Ldr M.F.C. Farrar DFC [FV-Q] (W8409), F/Lt H. Garnell [FV-O] (W8406) and F/Lt Tamblyn RAAF’ [FV-N] (AJ154)’ (Shores et al., 1992a:278). Garnell’s Catalina, FV-O, was the fourth machine, which stayed at Koggala instead of flying on with the others to Singapore; but again,
there are inconsistencies with who was flying which Catalina. Was Garnell flying FV-O (as indicated by the serial number above) or was he flying FV-N, as per Sid Scales account? Tamblyn, in all likelihood, flew FV-N from Gibraltar and Garnell went to Koggala in FV-O. Keon-Cohen records that the following officers (below) arrived at Koggala, but does not refer to which aircraft they were flying, except in the case of FV-O, which was now recorded as having been captained by F/Lt Hildyard and not Garnell. The officer list for those who flew on to Singapore is similar to Shores et al. (1992a278), but also included other aircrew. Two (Garnell and Singh) would later be killed in Broome:

- S/Ldr M.F.C. Farrer (D.F.C.) (37498)
- F/O J.M. Barnes (J5310)
- P/O S.P. Wilkins (33496)
- F/Lt H. Garnell (70897)
- F/O M.M. Singh (number not recorded)

On 1 January 1942, Section B in Keon-Cohen’s records indicates that the following Catalinas were available for operations (presumably FV-N was being serviced after its long flight from Gibraltar): FV-X, FV-W, FV-V, FV-Y and FV-S (AIR27/1215, TNA). FV-N, however, joined operations the following day, 2 January 1942, taking off at 1425hrs (local time – note: all times in Section B are in local time), with the call sign ‘ITON’. Station Operations were later notified that the aircraft alighted at 2220hrs. Apart from departure and arrival details, no other details for the aircraft’s mission were recorded of this day (AIR27/1215, TNA).

FV-N was then ordered out for an anti-submarine patrol on 3 January 1942 in area 2° 16’N 105° 52’E. The aircraft was loaded with eight 500 lb anti-submarine bombs. departure was at 1056hrs, but the aircraft was recalled at 16:55hrs and returned to Seletar at 1800hrs. The aircraft was then released from operations until 4 January (AIR27/1215, TNA).

FV-W reappears in Section B on 4 January 1942 as having taken off at 1420hrs, but returned to alight at 1525hrs at Seletar. Crews were ordered to fly a minimum of once per week to test aircraft and to obtain flying practice and it was probably for these reasons that FV-W flew on this day. The aircraft flew these training/test missions again on 7 and 8 January 1942 (AIR27/1215, TNA). Meanwhile (on 7 January 1942), FV-Q and FV-N were out reporting the disposition
of anti-aircraft guns at Sungai Patani (Sunai Petani – Malaysia), as well as reporting weather conditions and directing two pairs of Hudson bombers, presumably into the attack there. FV-N returning to Seletar at 0651hrs after a flight of just over 12 hours (AIR27/1215, TNA).

Further information regarding 205 Sqn operations for January 1942 indicate that attacks were carried out by flying boats on the Japanese at Gong Kedah and Singora, since the Catalinas were the only operational aircraft with the range to reach the targets. FV-Q (W8409) was lost on one of these raids (Shores et al., 1992a:278). The attacks on Gong Kedah, despite some success, were carried out by aircraft (Catalinas) that were not entirely suited to the job:

By the beginning of January 1942, Seletar had lost many of its aircraft. Catalinas were now having to be used in roles for which they had not been specifically designed, bombing raids in particular, and the Vildebeest squadrons were at last being allowed on major operations. With a Catalina carrying 16 x 250lb bombs beneath the wings, and a full fuel load, the take-off was said to have been something to behold. On full boost the twin Pratt and Whitney engines screaming their heads off, it could be a couple of miles before they became airborne. In such a condition, 205 Squadron’s Catalinas attacked Gong Kedah on January 7th, and on the 9th, four aircraft carried out a raid on the railway yards and storage areas at Singora, over the border in Siam, where the Japanese were using the railway. Three of the aircraft successfully located the target, disposing of their loads on the marshalling yards and starting a number of fires. All the aircraft returned safely to Seletar after a flight of almost twelve hours. A similar operation the following night resulted in the loss of one aircraft (Taylor, 2002:95)

Castle (2001:135) indicates that FV-N, under the command of F/Lt Stilling, was one of the Catalinas involved in the air raid on Sungai Petani on 8 January 1942 and on the following evening of 9 January 1942, the aircraft under the command of F/Lt Tamblyn, with three other machines (FV-Y, FV-R and FV-Q), bombed Singora. In conjunction with 12 Vickers Vildebeest aircraft from the ML-KNIL, 205 Sqn’s mission this day was their biggest bombing mission yet and all aircraft returned safely – only to be grounded by a monsoon for the next two days, which made flying impossible for both sides.

These initial attacks by the Catalinas soon saw reprisals. The Japanese were also bringing the battle to Seletar when on Saturday 17 January 1942 four Catalinas were caught at their moorings; two were destroyed, while strafing damaged another two:

… two Japanese aircraft — probably Zeros — attacked the Catalinas at their moorings, and ‘P’ and ‘Y’ are given as having burst into flames before sinking. Two others, ‘T’ and ‘W’ (ex-Netherlands Y-54), were damaged. Sgt Joseph H. Arch in ‘Y’ continued to fire his gun although he had sustained a fatal wound (Hendrie, 1988:72-73; see also Shores et al., 1992a:310; Castle, 2001:136-137).

Significantly, the quote above points to FV-W as having been the ex-Y-54. Another version of the story names it the ex-Y-52 and details the disaster for the squadron:

Still the torment and devastation was not over. Within the hour, at 1110, 60th Sentai Ki 21s bombed the Far East Forces HQ, while escorting Ki 43s from the 64th Sentai’s 2nd Chutai gave cover. Lt Masabumi Kunii and Sgt Maj Shokichi Omori swept down to strafe
the flyingboat anchorage at Seletar. Here the Japanese pilots mistook 205 Squadron’s Catalinas for Sunderlands, and between them claimed four in flames and one damaged. Four were indeed hit, W8429/P and Z2151/Y sinking in flames, while W8406/T and **Y52/W** were both damaged (Shores *et al.*, 1992a:309).

It was probably at this time that FV-W sustained damage to its port propeller spinner hub, which would ground the aircraft, until it was urgently needed to fly to Broome, albeit in the same unserviceable condition. Another version of the story indicates that the propeller had sustained flak damage, but perhaps on a different occasion ie, when the machine was flying and not moored. The measures taken to fix the problem reflected the desperate situation at the time (sometime after 22 January 1942, when the FV-V crashed). After FV-W sustained the damage, another propeller was sought from the wrecked FV-V, but the repair team did not have the necessary tools for the exchange. The damaged propeller was instead balanced by sawing off the ends of the two undamaged blades so that all blades were the same length (Campbell and Lovell, 2000:68).

Castle (2001:137) indicates that both FV-N and FV-W, however, were again serviceable by 19 January 1942. The 17 January air raid on Seletar had other implications for the squadron’s operations. Radio Transmission (RT) logs record no further multiple aircraft operations would take place, only single aircraft missions. All aircraft not involved in patrols were sent to dispersal areas in Sumatra (Oosthaven):

For the next week, in fact, there was little activity; only one patrol was flown daily while the remaining aircraft spent their days camouflage under palms in a Sumatran inlet, returning to Seletar at dusk … On the 23rd and 24th the squadron was back in action; on each day three Cats were out on different patrols (Castle, 2001:137).

P/O Keon-Cohen (AIR27/1215) records that FV-N participated on various patrols in conjunction with FV-W at this time. On 24 January 1942, both aircraft took-off on special operations and by 25 January 1942, FV-N was flying special operations to Batavia, soon to be the squadron’s new base. Table 5.5 lists the various operational bases the squadron used until its disestablishment in Broome at the end of March 1942.

While operating from Oosthaven, the remaining RAF Catalinas patrolled in search of Japanese convoys in conjunction with the RAAF. On 13 February 1942:

>F/Lt Hugh Garnell and his crew of Y-52/W making a sighting about 20-30 miles off the Sumatran coast. Garnell decided to attack and dived from low cloud across the lines of ships and a number of near-misses were observed. Heavy AA fire was experienced from the escorting warships although the Catalina was not hit (Shores *et al.*, 1992a:79).

In the quote above, the reference to FV-W as having been the ex-Y-52, is again confusing. The aircraft’s former identity continues to shift between Y-52 and Y-54. In the absence of primary references and with conflicting secondary sources, the identification of FV-W is uncertain.
Table 5.5 205 Squadron bases (Halley, 1988:266)

<table>
<thead>
<tr>
<th>Location</th>
<th>Day/Month</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seletar</td>
<td>08 January</td>
<td>1929</td>
</tr>
<tr>
<td>Batavia</td>
<td>31 December</td>
<td>1941</td>
</tr>
<tr>
<td>Oosthaven</td>
<td>02 January</td>
<td>1942</td>
</tr>
<tr>
<td>Tjilitjap</td>
<td>00 February</td>
<td>1942</td>
</tr>
<tr>
<td>Broome</td>
<td>01 March – 31 March</td>
<td>1942</td>
</tr>
</tbody>
</table>

Whilst at Oosthaven in late January 1942, FV-N was nearly shot down by an Allied pilot in an incident not mentioned in P/O Keon-Cohen’s account (AIR27/1215, TNA). The aircraft was on an anti-submarine patrol and ‘life-boat duties’ on 27 January 1942:

One pair of Naval fighters – flown by Lt D.B.F. Fiddes and Sub Lt H. Popham – was vectored onto an aircraft plotted on the ship’s radar [HMS Indomitable in a position a little to the south of Christmas Island], which turned out to be an unannounced Catalina from Tanjong Priok; this was FV-N of 205 Squadron, flown by Sqn Ldr Alex Jardine, which was carrying out an anti-submarine patrol; the flying boat was also required to act as ‘lifeboat’ for the Hurricane delivery, in case any were obliged to ditch en route. Unbeknown to Jardine and his crew, this flight was nearly their last, as Hugh Popham, the Sea Hurricane pilot, recorded: ‘Brian (Fiddes) and I were sent off on our first operational interception with our stomachs doing somersaults and our thumbs on the gun button – and that was one flyingboat that nearly didn’t get home’ (Shores et al., 1992b:54; see also Castle, 2001:138).

Following FV-N’s lucky recognition by HMS Indomitable’s Hurricanes, the Catalina flew a four-hour search pattern around the carrier, looking for submarines. The boredom of not finding anything was broken by the spectacle of the Indomitable’s passage to Sumatra:

A ship at speed is beautiful, whatever its intent, and the sea it rides and the intolerable blue sky that arches overhead; and the aircraft that you fly has a beauty that supersedes boredom and loneliness and fear. Towards sunset they saluted the ship with a dip of the wings and returned to Tanjong Priok for the night (Castle, 2001:139).

Sq/Ldr Jardine and his crew flew back the next morning to meet the carrier again, although the aircraft’s specific identification is not mentioned, it was probably FV-N again. After the carrier had dispatched its cargo of Hurricanes to Palembang, it rapidly moved off to the northwest.

FV-N’s next mission was to help evacuate Seletar and move the squadron headquarters staff to Java. By 0430hrs FV-N was back in the air with the squadron’s CO and five other passengers. This marked the squadron’s departure from Seletar (Castle, 2001:140). FV-N arrived back at Tanjong Priok at 0930hrs 31 January 1942 and joined the other four Catalinas that were there (FV-R, FV-U, FV-V and FV-W). These five machines were the only Catalinas left of the original 12 machines in 205 Sqn since December 1941 (Castle, 2001:141).

Section C, in P/O Keon-Cohen’s (AIR27/1215, TNA) records, indirectly reflects the worsening situation in the NEI. The records for February 1942 stand in stark contrast to the details recorded for the squadron’s operations in January. No longer is a minute-by-minute account of
the squadron’s operations recorded, just general entries for each day. As the war progressed, less information was recorded. Section C was created from records kept in the Operations Room Diary, which ‘was kept going as best as could be managed’ (AIR27/1215, TNA). While P/O Keon-Cohen wrote most of the section, W/C Councell made some contributions. Keon-Cohen, however, is reported to have suffered from fever while writing this section and, as a result, details in Section C should be dealt with caution by historians. It is no wonder that records were being poorly kept at this time; the operations room at Oosthaven, for instance, was whichever Catalina in the bay was keeping wireless watch.

Sumatra was becoming untenable by the middle of February 1942. Hendrie (1988) indicates that the squadron moved from Seletar in early February 1942 to Batavia and then, for approximately two weeks, to Oosthaven. The Japanese had taken Palembang by 15 February, putting their fighter aircraft within range of Oosthaven. 205 Sqn, as a result, was ordered to retreat to Cilacap the following day. Three remaining aircraft, FV-V, FV-R and FV-W flew there on 16 February 1942 with LACs Bowden, Brewer and Hendry, with the remainder of the squadron going to Cilacap on board the S.S. Yoma (AIR27/1215, TNA; Campbell and Lovell, 2000:67). These machines were joined at Cilacap by FV-N on 17 February 1942 and under the command of Sgt Markland, regular patrols were carried out. While at Cilacap, operations were carried out from the USS Childs (AVD-1, ex-AVP-14, ex-DD-241) and USS Pecos (AO-6). Shores et al. (1992b:194), however, states that FV-V, FV-U, FV-N and FV-W were all at Tanjong Priok (Batavia) on 16 February 1942, with Catalinas of GVT-2, GVT-3, GVT-16 and GVT-18. No mention is made of FV-R or the date of the squadron’s move to Cilacap. FV-R actually flew to Koggala on 18 February 1942 (its safe arrival not being known until 30 March 1942) and remained there, joining the fourth ‘English boat’ from Gibraltar (Campbell and Lovell, 2000:64). The squadron movements in February 1942 were probably thus: Oosthaven – Batavia – Cilacap (see Table 5.5). FV-N’s arrival at Cilacap almost ended the aircraft’s career, again by ‘friendly fire’. The Keon-Cohen/Councell (AIR27/1215) accounts do not mention the incident below:

[21 February 1942]. Tjilatjap – where three Catalinas of 205 Squadron had arrived earlier in the day from Tanjong Priok [Batavia] – saw the arrival of the American cruiser Houston during the late afternoon. As she prepared to enter harbour, she was approached at low level by Catalina FV-N flown by F/Lt J.C. Lowe. Dutch AA gunners defending the port thought the flyingboat was a Japanese raider and opened fire, blowing a hole in the aircraft’s port wing! In order to make a safe emergency landing, Lowe ordered the depth charges to be jettisoned, the explosion of which almost wrecked the flyingboat which was, in fact, damaged beyond repair. Meanwhile, Capt Rooks of the Houston, observing the dropping of the depth charges, assumed a Japanese submarine was in the area and turned back out to sea, returning half an hour later when the commotion had receded (Shores et al., 1992b:216).

Prior to this misadventure, quoted above, FV-W was reported to have had a misadventures of its own on 21 February 1942 that in part, connects with the story of FV-N scaring off the USS Houston. Second pilot Sid Scales (F/O Tucker was first pilot) describes the incident in Castle (2001:148-149). The machine hit a reef in the notorious Cilacap harbour, just as it was on the
step and about to take-off. FV-W was holed and could not alight without the risk of sinking. The crew continued to fly their patrol and sighted the survivors of the *Sloet van de Beele* and HNLMS *Van Nes*. They could only signal to the helpless survivors that help was on its way. Help indeed, was on its way and an epic rescue at sea was performed by Catalinas and Dorniers of the *MLD*. FV-W deviated to Tanjong Priok for repairs and as soon as it came off the step, taxied at full throttle to the slipway, where it was beached just in time before it could sink. FV-W was on the ground and blocked one of the most important slipways in Java at that time! Not only was the machine now a problem for the *MLD* maintenance staff, it still had four 250 lb depth charges attached to its wings, which in hindsight, should have been jettisoned before alighting.

FV-V has a connecting thread to this misadventure. The aircraft, under the command on F/Lt Lowe, was destroyed by accident when it was ordered to unload its depth charges and refuel to maximum capacity for a special operation the next day. It jettisoned them while flying too low, resulting in extensive damage (AIR27/1215, TNA). FV-V eventually made a forced landing on a sandbar near Cilacap (Castle 2001:149). Due to the loss of FV-V, FV-N was to operate FV-V’s special mission. The mission was to take Col Goodfellow to Emmahaven (Telukbayur – west Sumatra), with FV-W on patrol with F/Lt Lowe as captain (AIR27/1215, TNA). FV-N returned to Cilacap, but prior to alighting, was ordered to drop its depth charges in an effort to prevent a similar incident occurring as per FV-W. This is the same incident that scared off the *Houston*. 205 Sqn RT logs record that it occurred on 22 February 1942, but Castle (2001:149) indicates that the Americans recorded the date as 21 February 1942. No mention is made in the account above of FV-N having been fired upon by the Dutch, or of it being damaged beyond repair. Also the captain of FV-N is different in both accounts: Shores *et al.* (1992b:216) states that it was F/Lt Lowe while Castle (2001:149) states that it was F/Lt Tamblyn. However, Section C (AIR27/1215, TNA) records that Tamblyn flew FV-N and that Lowe was in FV-W. The date for the incident in Keon-Cohen’s (AIR27/1215) account is inconsistent with the date given in Shores *et al.* (1992b:216) and Castle (2001:149). The special mission to Emmahaven was to be FV-N’s last mission from Java, since the aircraft was then meant to fly on to Koggala. Keon-Cohen’s (AIR27/1215, TNA) account records that FV-N’s special mission occurred on 27 February, five days after the previous references to it having been flown on 22 February 1942.

Following FV-W’s reef adventure, only one RAF Catalina was operational at Cilacap by 23 February 1942. FV-N. F/Lt Tamblyn continued patrols with this aircraft, but the following day FV-W flew into Cilacap after Sq/Ldr Jardine had the aircraft repaired as soon as possible. Castle (2001:149) speculates that the rapid repair was due to it blocking the slipway at Tandjong Priok and that the *MLD* had to repair the aircraft to move it out of the way.

Patrols were flown for the remainder of February by FV-N and FV-W, the squadron’s last two operational Catalinas; FV-U having been abandoned in Tanjong Priok as unserviceable. It is still not recorded precisely when FV-W sustained damage to its port propeller, but perhaps the
flak damage occurred during these last patrols. It would appear the damage occurred at this time, as it probably would not have been allowed to fly patrols in that condition:

On 1 March 1942 the two Catalinas and three crews mentioned in Chapter 6 (Page 67) were still operating. F/Lt Lowe’s crew was at Tjilatjap with FV-W. F/Lt Tamblyn’s crew, with FV-N, on ‘a job to Emmahaven with Colonel Goodfellow’, was 650 nautical miles away and ‘believed to be going on to Colombo’. Surprisingly Emmahaven, or Padang, a bay on the west coast of Sumatra, was still open to the Allies. F/Lt Garnell’s crew was off duty.

FV-W was disabled – again. On patrol the previous day, the aircraft had flown too close to a pair of cruisers, mistakenly thought to be friendly, and from the resultant gunfire she picked up a five-inch gouge at the root of one blade of the port propeller. An engineer from Recgroup, the Dutch command that had been directing 205 Squadron operations from Tjilatjap, rated her ‘unsafe to fly’. Ground crew, among them Cason and ‘Dusty’ Rhodes, soon to be Tung Song passengers, had spent Sunday patiently smoothing out the gouge and trying to balance the other blades. Peter Brewer, FV-W’s ‘hooker-upper’, says that after FV-W was damaged, he and LAC Wilday spent several hours with FV-V, ditched among the mangroves, vainly trying to remove a propeller for fitting to their aircraft. As Jim Cason pointed out (see page 68), that was a futile enterprise.

After Jim Cason and his men at Tjilatjap had finished balancing the damaged propeller on FV-W, they did not get a full night’s sleep. As he recalls:

‘The last Cat ready to go, we were sent to the quayside on the evening of 1 March. The story was that we would be taken off by a destroyer as soon as possible. In the morning we were taken out by boat to Tung Song, which was in midstream when we boarded. While we were looking for Tung Song, I was helped aboard another ship, probably Dutch, when our refuelling dinghy was drifting motorless. F/O Man Mohan Singh was with us’ (Campbell and Lovell, 2000:92).

After FV-N was dispatched to Emmahaven with a military passenger on 27 February 1942, FV-W became the only RAF Catalina left in Cilacap and it continues patrols up the west coast of Borneo and the Sunda Strait on 27 and 28 February 1942 respectively (Castle, 2001:150). Keon-Cohen (AIR27/1215, TNA) indicates it was then FV-W sustained damage to its propeller: ‘Cat. Tjilatjap (F/Lt Lowe) received bullet through airscrew during last patrol inspected by Dutch Engineering Officer a/c 4/3 and unsafe to fly’ (AIR27/1215, TNA). Clearly, this is a different type of damage to the damage the aircraft received while moored in Seletar. Owing to the desperate nature of the military situation on Java by 2 March 1942, an otherwise serious problem with the port propeller would not prevent the aircraft being used to fly the long journey to Broome.

Damaged or not, by 0600hrs 2 March 1942, FV-W, under the command of F/Lt Lowe left Cilacap with W/C Councell and a crew of eight (AIR27/1215, TNA). It was believed by the Wing Commander that his Catalina was the last to leave Java, but at 1500hrs FV-N dropped out of the clouds over Cilacap and alighted on the harbour. After having refuelled (probably from the USN), the Catalina followed FV-W to Broome. FV-N should have gone to Ceylon, but F/Lt Tamblyn either misunderstood the orders or did not receive them. The Tung Song, carrying the remainder of the squadron’s personnel to Australia is said to have seen FV-N returning to Cilacap as the ship itself was pulling out of the doomed port. The ship most
probably contacted FV-N to indicate what happened to FV-W. FV-N is then reported to have caught up with the *Tung Song* and it was at this time that the Catalina took onboard its second crew: ‘… he taxied alongside Tungsong [sic] and took from her a second crew, that of F/Lt Garnell and P/O Singh’ (Castle, 2001:157). Heavily laden, the Catalina then continued its journey to Broome at 2200hrs.

Campbell and Lovell (2000:96) observe this event was not noted by anyone else and suggest that ears and memory were playing tricks: ‘[W/C] Le Fevre continues: “About the last day of February a Catalina from the West Coast of Sumatra landed near Tung Song and took on one or two R.A.F. officers who were pilots. They left for Broome, northwest Australia, as soon as possible”’ (Campbell and Lovell, 2000:96-97). The date is clearly wrong. Castle (2001:157) has either obtained additional historical data since Campbell and Lovell’s (2000) publication or has simply appropriated the story to fill in the gaps of those last few hours on Java. More likely is FV-N took on its second crew while at Cilacap. A woman is also recorded to have been taken aboard the ill-fated Catalina, but neither Campbell and Lovell (2000) nor Castle (2001) mention this. More about this woman in Chapter 6.

In concluding this section on the RAF losses in Broome, some note should be made of a remarkable alternative version to where FV-N and FV-W were actually lost. One published account suggests that they were both lost at Cilacap by a supposed air raid there on 3 March 1942 (Hendrie, 1988:73). Such an egregious error is graciously explained: ‘For some reason he places the incident at Tjilatjap … variance is possibly due to a misinterpretation of a primary source because of the world-wide scope of his book’ (Peet, 1999). Others get the location right, but err on how many RAF Catalinas were actually lost. Cooper (2002) claims that only one RAF machine was lost at Broome and that he received the information from ‘Official Records’ written, apparently, in 1959 (Cooper, J., pers. comm., 19 August 2002). Two RAF PBYs were definitely lost at Broome; one aircraft had arrived the previous night and the other, FV-N, arrived on the morning of 3 March 1942 with no time to disembark its crew. The loss of these last two machines in 205 Sqn at Broome also had deeper historical repercussions; they were carrying ‘all records, rosters, imprest accounts etc’ (AIR27/1215, TNA), relating to the squadron’s last days on Java. Those documents could have given historians greater insight into life, during the collapse of the NEI, for these airmen and the machines they flew.

### 5.3 USN Catalinas #6 (BUAERNO 1227) and #7 (BUAERNO 1243) – origins and deployment to the United States Asiatic Fleet

The two USN Catalinas lost at Broome were technologically different from the *MLD* or RAF machines. They are the oldest Catalina flying boats in Broome. The USN Catalinas were both PBY-4s, forerunner to the highly successful PBY-5s. They are referred to in this thesis by the Patwing-10 designation at the time of their loss in Broome ie, #6, Bureau of Aeronautics Number (BUAERNO) 1227 and #7 BUAERNO 1243, previously believed to be BUAERNO 1237. The following tests the validity of the two designations ascribed to these machines, as
published in Prime (2003:34) and Jung (2004:66). Relying on BUAERNO data, however, is no certain method of tracing military aircraft service histories:

The lineage and history of U.S. Naval Aviation squadrons has been a source of confusion since the birth of Naval Aviation in 1911. Much of this confusion arose from the terminology used by the Navy, the lack of a consistent policy in selecting the alphanumeric designations of squadrons, and the many establishments, redesignations and disestablishments of aviation squadrons (Naval Historical Centre, 1998).

Although both machines are given the same side number (102-P-26) in Prime (2003:34) they are referred to in this chapter with the two BUAERNOs listed above. The side numbers (those numbers and letters painted on the side of a Catalina’s hull), however, must have changed throughout the lives of both aircraft. Previously they were designated squadron numbers, but these changed when combat losses resulted in the surviving aircraft from two squadrons amalgamating into one squadron in December 1941. This was designated as Patrol Squadron (VP)-101 (Messimer 1985:87). VP-101, prior to the time of the air raid on Broome, was one of three USN PBY squadrons operating in the Pacific Theatre. It was the first of two squadrons to be assigned to the Philippines. The other two squadrons (in Patwing-10) were called VP-102 (formerly VP-26) and VP-22. The latter was equipped with PBY-5 Catalinas and did not join the wing until January 1942. VP-22, incidentally, never operated as a complete squadron, but had detachments in Ambon, Surabaya and Darwin.

Understanding the BUAERNOs for #6 and #7 is one method of retracing their histories. Not surprisingly, for reasons described in Chapter One, the Aircraft History Cards for BUAERNOs 1227 and 1237 indicate that neither aircraft was lost in March 1942 (Naval Historical Centre, BUAERNOs 1227 and 1237). The cards, nevertheless, detail aspects of the early history of both #6 and #7. According to the history card for #6 (Fig. 5.2), Contract Number 58101 was a PBY-4, which was fitted with two Pratt and Whitney R-1830-72 engines (Engine Numbers: 3889 and 3890). The aircraft was delivered to the Naval Air Station (NAS) at Pearl Harbor on 13 December 1938 and joined VP-21. This squadron later became VP-101 and joined the US Asiatic Fleet when they moved to the Philippines. Both #6 and #7 were built at Consolidated Aircraft Corporation’s factory in San Diego, California, as this was the only location building PBYs at that time. Subsequent PBYs were built at four other locations around the United States and Canada (Scarborough, 1983:50).

Transfer to the Asiatic Fleet in Manila occurred on 19 September 1939, but the flying boat arrived there on 13 December 1938. The History Card records that the aircraft was then transferred to VP-26 at NAS Pearl Harbor on 11 June 1940 (arriving there on the same date) and was later recorded to have had been scheduled for a major overhaul on 5 September 1940. It arrived on 14 August 1940, and in the interim was assigned to VP-102. The reference to this squadron is a simple pencil correction on the Aircraft History Card, which crossed out the typed VP-26 and replaced it with ‘102’ (Naval Historical Centre, BUAERNO 1227). The machine was ‘stricken-off-charge’ (SOC) as destroyed on 28 February 1942 at an unspecified location. Interestingly, there is no explicit mention of the aircraft returning to the east, except
for the reference to its association with VP-102, which later became the second PBY squadron to be established in the Philippines.

The Aircraft History Card for #7 (BUAERNO 1237), typically describes how Catalinas were given squadron designations without accurately recording the machine’s fate. Contract Number 58101 was also a PBY-4, which was fitted with two Pratt and Whitney R-1830-72 engines (Engine Numbers: 1367 and 1368). The machine was shipped and received on 27 January 1939. It is unclear where it was shipped to, but it was probably NAS Pearl Harbor as it is recorded that a squadron (unknown) was transferred there on 14 September 1939. The machine was then assigned to NAS Pearl Harbor and joined VP-26, where it was received on 16 April 1940 and formally began operations with them on 2 May 1940. The following month, on 11 June 1940, #7 joined VP-101, on paper, at the Naval Yard in Cavite (Philippines), but was not received there until 14 October 1941. The machine was formally SOC on 31 January 1942 (Naval Historical Center, BUAERNO 1237).

Quite clearly, there are problems with BUAERNOs in tracing the history of aircraft. How then can we know if BUAERNOs 1227 and 1237 were indeed the two machines lost at Broome? To answer this, it is necessary to examine other sources. One source is the squadron histories. The production output of the PBY-4 Catalina was only 33 machines. 31 of these had BUAERNOs ranging from 1213 to 1244, while the other two were for foreign orders (Hendrie, 1988:212; Kinzey, 2000:31). Of these 31 machines built for the USN, 28 saw squadron service. Appendix 5.2 lists all of the aircraft assigned to Patwing-10. The wing, as mentioned previously, initially comprised two squadrons: VP-101 and VP-102. VP-101 had 14 Catalinas with the corresponding side numbers of 101-P-1 through to 101-P-14. VP-102 also had 14 Catalinas: 102-P-16 through to 102-P-29. There was no 101-P-15, as the machine was destroyed prior to the establishment of Patwing-10, when it caught fire in the Philippines in 1940 (Graham, 1999b; Dorny, in prep.) This would have been the wing’s aircraft strength at the start of the Pacific war. Prior to their deployment to the Philippines both of the Broome USN Catalinas were assigned

![Figure 5.2 Aircraft History Card BUAERNO: 1227 (Naval Historical Center, BUAERNO 1227).](image-url)
to different squadrons and had correspondingly different side numbers. The following is a historical breakdown of these two Catalinas prior to their deployment in Patwing-10.

Kinzey (2000:31) indicates that few PBY-4s were built and that, as a result, they were originally assigned to only two squadrons: VP-1 and V-18; both belonged to Patrol Wing Two (Patwing-2). However, VP-1 was redesignated as VP-21, then changed back to VP-1 and then finally, VP-101. VP-18 changed to VP-13, ‘then VP-26, then VP-102’ (Kinzey, 2000:31) (Fig. 5.3). The squadron exchanges are elaborated on below and described ‘as a strange series of events’ (Dorny 1999a). By late 1938 Patwing-2 sent its two squadrons (now VP-21 and VP-18) to San Diego to receive the new PBY-4 Catalinas. In May 1939:

VP-18 was slated to return to Pearl Harbor as a component of Patrol Wing Two (PW2), and would thus take all three of the blister-equipped PBY-4s with them. Patrol Wing One (PW1) at San Diego squawked that this would be a mis-take [sic].

BuAero concurred and promptly redesignated VP-18 as VP-13 and reassigned it to PW1. PW2 squawked at its lost squadron when operating demands were so heavy at Pearl [Harbor].

BuAero concurred, ordering VP-13 to release one blister-equipped PBY-4 to NAS San Diego and proceeded to Pearl. Upon arrival VP-13 became VP-26, with fourteen PBY-4s, including [BUAERNOs] 1242 and 1243.

At San Diego PW1 formed a new VP 13 as the basis for the Project BAKER Transition Training effort to train more fleet air personnel in the PBY. BuNo. 1241 went back to the contractor and subsequently testing and engineering design mods resulted in the PBY-hallmark waist blister on all subsequent models.

Thus from about September, 1939, through December, 1940, VP 26 operated from NAS Ford Island with two blister-equipped PBY-4s (Dorny, 1999a).

The reference to the blister equipped PBY-4s is significant, in that new data has emerged to indicate that #7 was one of the last PBY-4s to be built and as a result, was used to experiment with a new waist position enclosure, which was to become one of the diagnostic features of the PBY-5 Catalina and all subsequent variants. #7 is now believed to have been BUAERNO 1243. Commander Lou Dorny (USNR retired) has found a contemporary source that links this number to this aircraft:

In the case of #7, lost at Broome, I have a flight log entry by one of #7’s assigned crew in late January showing ‘1243’ as the pertinent BuNo. for this plane. It is on this basis that I identify #7 as BuNo. 1243 (Dorny, 2005b).

Another source designates #7 as BUAERNO 1240 (Allan pers. comm., 30 May 2002). According to Lt (jg.) Jack Dawley’s report that machine (BUAERNO 1240) was 101-P-6 and was destroyed over Jolo (Philippines) on 27 December 1941 (Dorny, 2005b). Dorny’s discovery of the flight log book for #7 is the most reliable source so far to identify which BUAERNO #7 had, but like the Aircraft History Card for 1237, no data for that machine is
BUAERNO 1243 was received at the Flying Air Base (FAB) on North Island, San Diego on 6 June 1939 and assigned to VP-18. It was then assigned to NAS San Diego between July 1939 and 14 September 1939 with VP-13. This squadron then moved to Ford Island, Oahu, Hawai‘i and was stationed at NAS Pearl Harbor between 14 September 1939 and ca. 11 December 1939. From December 1939 till 11 March 1940, the machine was transferred to VP-26 and was to remain with them at NAS Pearl Harbor until 11 June 1940. The aircraft is then recorded to have been ferried to the Philippines from Ford Island via Midway Island (Saturday ca. 08 June 1940), Midway Island to Wake Island (Sunday ca. 09 June 1940), from Wake Island to Guam (Monday ca. 10 June 1940) and arriving at Naval Base (NB) Cavite in the Philippines ca. Tuesday 11 June 1940. They utilised Pan Am’s flying boat ramp and operated from the seaplane tenders USS Langley (AV-3, ex-CV-1, ex-USS Jupiter [Collier #3]) and USS Heron (AVP-2).

Like the MLD, flying boat operations were closely linked to tender movements after the start of the Pacific war. Although a search of deck logs etc., for these ships would assist with reconstructing the operational histories of the aircraft they serviced, such investigations go beyond the scope of this work. As with the MLD seaplane tenders, analysis of surviving documentary material may not necessarily provide useful data on specific aircraft movements (Dorny, in prep.).

Upon arriving at Cavite, VP-26 exchanged its aircraft for those in VP-21 to enable their overhaul and major maintenance schedules to be carried out back in Hawaii. From approximately 30 July 1940 until ca. 3 December 1940, VP-21 became VP-1 at NB Cavite. After December 1940, VP-1 then became VP-101, the first squadron in Patwing-10 (Appendix 5.2). The Aircraft History Card for BUAERNO 1243 stops after 22 October 1941 (Naval Historical Centre). It would appear from Frankel (1996) that VP-102 was formed on 16 December 1942 when VP-26 was disestablished (Table 5.6).
The delivery of the PBY-4s is recorded in Appendix 5.3. According to this data, BUAERNO 1227 (#6) was received by VP-1 on 13 December 1938. Given that it was assigned to VP-1, the aircraft must, therefore, have belonged to what would become VP-101. BUAERNO 1243 (#7) was received by VP-18 on 6 June 1939. VP-18 was to become VP-102. Changes over time in the two aircraft side numbers are hypothesised in Table 5.7.

BUAERNO 1243 was a significant flying boat. Various authors have commented on how the different types of Catalinas had diagnostic attributes, from which historians and archaeologists can identify Catalinas at least to a type level (Scarborough, 1983:20; Jung, 2001). Traps for the unwary exist in the historical record. For instance, the last flying boats in the PBY-3 type were modified with engine and propeller types that were later fitted to PBY-4s. Propeller and engine diagnostics are useful indicators for determining the identity of a Catalina. However, in the context of Broome, the two lost PBY-4s were differentiated from all of the other Catalinas in Roebuck Bay by sliding waist gun hatches that were generally only fitted to PBY-4 Catalinas.

As indicated above, #7 was a hybrid and although it was a PBY-4 it had features of the PBY-5, albeit in a more primitive form:

Three planes at the end of the (PBY-4) sequence assigned to VP 18 were held back for the conversion, and the heavily paneled blister shown in the photos of BuNo. 1241 resulted. All three, BuNos 1241, 1242, and 1243 were thus blister equipped. In addition, at least 1241 had the modified fin profile with the straight trailing edge (Dorny, 1999a).

The operational service history of #7, however, is more complicated than previously thought. While it was originally assigned to VP-26, this Hawaiian based squadron exchanged its aircraft with Catalinas in VP-21, which at the time was serving in the Philippines. It should be noted that the squadron home bases did not change, only the aircraft they contained. The exchange of aircraft enabled VP-21’s Catalinas to be serviced and overhauled back in Hawai’i. The exchange also provided valuable trans-Pacific flying experience for crews, which paved the way to send a second squadron to the Philippines, VP-26:

It is an interesting detail to note as well what had been done with VP 26’s two planes with blister waist-enclosures. They left BuNo 1242 (26-P-11) behind at Pearl, and BuNo 1243 deployed for the exchange as the squadron lead plane. Thus, BuNo 1243 came to be the flag plane for VP 21, i.e 21-P-1. VP 26 took fourteen planes west and, the exchange completed, then flew back to Hawaii with VP 21’s remaining thirteen and then added BuNo 1242. Thus, with the exchange flight accomplished, both squadrons had their official allocation of twelve planes and two operational spares, and each squadron had one of the blister-equipped PBYs (Dorny, 2005c).

Table 5.6  Squadron background histories for VP-101 and VP-102 from 1937 (Frankel, 1996)

<table>
<thead>
<tr>
<th>Date</th>
<th>VP-101</th>
<th>VP-102</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.09.1937 Established</td>
<td></td>
<td>VP-18</td>
</tr>
<tr>
<td>01.10.1937 Redesignated</td>
<td>VP-1</td>
<td></td>
</tr>
<tr>
<td>01.07.1939 Redesignated</td>
<td>VP-21</td>
<td>VP-13</td>
</tr>
<tr>
<td>11.12.1939 Redesignated</td>
<td></td>
<td>VP-26</td>
</tr>
<tr>
<td>16.12.1940 Redesignated</td>
<td></td>
<td>VP-102</td>
</tr>
<tr>
<td>30.07.1940 Redesignated</td>
<td>VP-1</td>
<td></td>
</tr>
<tr>
<td>03.12.1940 Redesignated</td>
<td></td>
<td>VP-101</td>
</tr>
</tbody>
</table>
Table 5.7 Hypothetical correlation between aircraft side number designation changes per squadron over time — #6 and #7 (After Dorny, 1999b; Dorny, 2005c; Naval Historical Centre, BUAERNOs 1227 and 1243)

<table>
<thead>
<tr>
<th>Patrol Squadron</th>
<th>Date</th>
<th>Squadron previous designations</th>
<th>Side number</th>
<th>Patwing-10 side number after December 1941 (BUAERNO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VP-101</td>
<td>01-10-1937</td>
<td>VP-1</td>
<td>?</td>
<td>#6 (1227)</td>
</tr>
<tr>
<td></td>
<td>11-06-1940</td>
<td>VP-21</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30-07-1940</td>
<td>VP-1</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>00-12-1940</td>
<td>VP-101</td>
<td>101-P-13</td>
<td></td>
</tr>
<tr>
<td>VP-102</td>
<td>06-06-1939</td>
<td>VP-18</td>
<td>18-P-10</td>
<td>#7 (1243)</td>
</tr>
<tr>
<td></td>
<td>00-07-1939</td>
<td>VP-13</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>00-12-1939</td>
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</tr>
<tr>
<td></td>
<td>16-12-1940</td>
<td>VP-102</td>
<td>102-P-26</td>
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</tr>
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<td>VP-101</td>
<td>00-06-1940</td>
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<td>21-P-1*</td>
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<td>23-12-1941</td>
<td>VP-101</td>
<td>101-P-26</td>
<td></td>
</tr>
</tbody>
</table>

*Flag aircraft for VP-21

#7, therefore, began its operational career in a squadron whose lineage goes back to VP-18 (a progenitor of VP-102). VP-26 brought #7 (1243) to the Philippines at this time, a brand new aircraft. The machine would remain with VP-21, which in time would become VP-101, one of three squadrons in the yet to be established Patwing-10. The location of #6 and #7 in the organisational structure of Patwing-10 are listed in Table 5.8. Note that the two flag aircraft for each squadron were blister equipped – only the latest and the greatest technological innovation for the flag Catalinas! The organisation of a patrol squadron was typically two divisions of two sections each, plus two spare aircraft (Dorny, in prep.) #7 now becomes the flag Catalina for VP-101 and #6 is reassigned to VP-102. The Catalina changed squadrons during the VP-21/VP-26 exchange of aircraft, as mentioned above (see Fig. 5.3).

There are no known photographs of either #6 or #7, but there are three photographs of BUAERNO 1241, which is one of the heavy-paned blistered PBY-4s. Two of these are reproduced in Photograph 5.3 and Photograph 5.4, which show the blister modification. Another image of the machine has survived, but painted on its bows is the designation 13-P-15, although ‘12’ still appears on the upper surfaces of the wing, which led some to believe that this machine was formerly 13-P-12 (BUAERNO 1241). The blisters in this instance are not shown (Scarborough 1983:20). The machine may have been the 12th Catalina in the second VP-13, which was a training squadron that became Patrol Wing One (see Fig. 5.3).

#7 would not have resembled this aircraft (13-P-12) at the time of its loss, but most likely the machine in Photograph 5.4 rather than Photograph 5.3. While #7 was one of the exceptions to the PBY-4 diagnostic rules, another feature of these modified aircraft is that they were equipped with propeller spinner hubs that were a distinguishing feature of these two USN
machines (Jung, 2001:52-57). These are the only types of Catalinas in Roebuck Bay that have this feature.

With care, BUAERNOs and wing detachments can assist in identifying aircraft #6 and #7 (see Table 5.7). A detailed squadron lineage from 1939 for VP-101 is presented in Appendix 5.4. It is stressed, however, that the equations between side numbers and squadron designations are ‘analytical only, and thus, of course, subject to revision’ (Dorny, 1999b).

Dorny (1999b) initially surmises that BUAERNO 1243 became 21-P-1 and that when Patwing-10 was established in December 1940, the Catalina was painted with the side number 101-P-1. Appendix 5.2 recordeds this machine shot down over Jolo on 27 December 1941. If Dorny’s (2005b) correlation of BUAERNO 1243 with Patwing-10’s #7, which was lost at Broome, is to be accepted, then the data in Appendix 5.2 needs further research. Given the problems with the primary source material, how then can #6 and #7 be traced through time? Dorny (2001c) also argues the former side numbers of #6 to be ex-101-P-26 and ex-102-P-26.

When VP-102 merged with VP-101 in late December 1941, its aircraft were simply added to those remaining in VP-101 and it is assumed that they maintained their same side numbers.
Photograph 5.3  ‘PBY-4 #1241, the first with the wide-visibility blisters’ (Photo. courtesy of U.S. Navy via Wagner, 1972:13). Note the black asphalt-based anti-fouling below the water line. This was removed during the war.

Photograph 5.4  ‘13-P-12, PBY-4 BuNo 1241, was prototype for PBY-5 design changes – new tail, waist blisters and new nacelles. PBY-4 had factory installed provisions for wing and tail deicers’ (Archives via D. Lucabaugh in Scarborough, 1983:23). Note changes in blister panes indicating that this is a later version to the heavily paneled blister in Photograph 5.3. Also note what appears to be the triangular logo of VP-102.
Indeed, given the circumstances at the time, it is unlikely that their original numbers were painted over and re-applied. The re-application of insignia did not happen until the wing’s reorganisation and the adaptation of the simple numbering system. It is unlikely then that #6 would ever have 101-P-26 painted on its hull, but it is more than likely that it had the number ‘6’ painted on the airframe somewhere after the adaptation of the simple numbering system.

The former side number for #7 is recorded as 101-P-13 (Dorny, 2001c). These two numbers, 101-P-26 and 101-P-13, are used in this thesis to trace the aircraft through Patwing-10’s War Diary. In an abbreviated form, these aircraft were recorded as ‘P-26’ or ‘P-13’ and it is not until after December 1941 that historians expect aircraft to use abbreviated slang terms: ‘P-6’ (for #6) or ‘P-7’ (for #7). From research in the following section, it would appear that Lt/Cdr John Valdemar Peterson’s (USN) entries into Patwing-10’s War Diary were inconsistent with how aircraft were identified and often referred to by their previous designations after the wing’s re-organisation.

5.3.1 Patwing-10 - ‘the émigrés of Cavite’ (#6 and #7 Operational Service Histories)
It has been determined that prior to the re-organisation of Patwing-10 on 23 December 1941, the previous identities of #6 and #7 were 102-P-26 and 101-P-13 respectively. It should be noted that 102-P-26 technically became 101-P-26 when VP-101 and VP-102 merged; there never was a 101-P-26 in VP-101. This new designation for 101-P-26 is believed to have been a carry over of its previous designation in VP-102. This has been demonstrated to occur elsewhere and is most probably so in this case (Jung, 2001:71). The designation for 101-P-13 did not change until the simple number system was introduced. Not all the previous designations for #6 and #7, prior to the formation of Patwing-10, are known. However, versed with the available identity data, it is now possible to trace the movements of #6 and #7 in the historical records from the start of the Pacific war up until their loss in Broome.

In his headquarters at the NAS Cavite, the Commander Aircraft, Asiatic Fleet (Commander Patwing-10), Cpt Frank de Chant Wagner, instigated at 1930hrs 7 December (8 December, Philippines local time) 1941 order ‘WPL-46 against Japan’ (Patwing-10 War Diary). On that day Patwing-10 suffered its first casualties in both PBYs and crews. Two PBYs were the first USN aircraft lost in the Pacific war; Ensign Robert Tills was killed instantly while trying to man the bow gun in defence of his PBY (101-P-7), when nine Zeros (Mitsubishi A5M4 Claudes from Japanese carrier Ryujo?) strafed two PBYs on Davao Harbor (Malalag Bay, on the south end of Mindanao) (Crocker, 1987:23 and 31; Messimer, 1985:40; Knott, 1981:34; Shores et al., 1992a:164; Holbrook, 1942). Following an air raid at Cavite on 10 December, Patwing-10’s aircraft were dispersed: a quarter went to Olongapo; a quarter to Los Baños; a quarter with the seaplane tender Childs anchored off Nicholas Field Manila, and a quarter flew to Cavite. It is not known precisely where #6 or #7 was at the outbreak of hostilities. The first direct mention of either of these machines does not appear until 14 December 1941 when reference is made to ‘planes 1, 8, 9, 11, 23, 25 and 26 [having] departed Los Baños at dawn for Lake Lanao’ (Patwing-10 War Diary). 102-P-26, therefore, most probably at Los Baños at
the start of hostilities and either involved in the initial search for the Japanese invasion fleet, or assigned to the Catalinas set aside for offensive operations.

The next reference to this 102-P-26 is after Patwing-10 retreated from the Philippines and stationed at Balikpapan on 19 December 1941. The following 10 Catalinas were in Balikpapan: 101-P-2/3/6/8/9/11 and 102-P-23/25/26/27. No mention is made of the whereabouts of 101-P-13 at this time. The following day, nine Catalinas 101-P-1/3/6/8/9/11 and 102-P-25/26/27 were recorded en route from Balikpapan to Surabaya (Fig. 5.4). It would, therefore, appear that 101-P-13 was still in the Philippines at this date.

Further movements of #6 and #7 were not recorded until 23 December 1941, when Patwing-10 re-organised in Surabaya and adopted the simple numbering system. The remaining aircraft in VP-101 and VP-102 were merged into one squadron (VP-101) under the command of Lt/Cdr Peterson in Surabaya. Four Catalinas were sent to Ambon (6, 8, 9 and 26), under the command of Lt Keller, on the same day. Interestingly, despite the merger, the Catalinas were still recorded here in their previous designations in VP-101 and VP-102. Another four machines (1, 3, 11 and 27) were sent to Ambon, under the command of Lt/Cdr Peterson, the following day. Another two Catalinas (23 and 25) joined the other eight machines already there, on Christmas day 1941. These aircraft, worked in collaboration with MLD and RAAF aircraft. The Americans, however, specifically patrolled from Ambon ‘through the Strait of Molukka (Molucca) to the vicinity of Sangi (Sangihe) and Taluad Islands (Taluad-Eilanden [Kepulauan Taluad])’ (Patwing-10 War Diary). Again, no mention is made of 101-P-13. Despite the large number of aircraft at Ambon, Patwing-10 still had aircraft in the Philippines. Catalinas 2, 5 and 29 were sunk at Los Baños during an air raid on this date (Patwing-10 War Diary). Two days later, Patwing-10’s Catalinas in Ambon launched an attack on the Japanese forces at Jolo (Hoyt, 1979: 174-182).

The attack was the first full scale offensive action by Patwing-10 since the start of the Pacific war and it was a disaster. Four Patwing-10 Catalinas were shot down (1, 6, 9 and 7) over Jolo on 27 December 1941. It was not known that a large force of Zeros protected the Island. The loss of Catalina No. 7 (101-P-7?) is significant in that it demonstrates the inconsistencies in the record of aircraft movements and casualties. In Appendix 5.2, the aircraft (101-P-7) is recorded as having been lost on 8 December 1941 at Malalag, Mindanao. Yet the following day ‘Plane No. 7 [is recorded to have] proceeded [sic] Balikpapan on patrol from Ambon’ (Patwing-10 War Diary). There were actually two Plane 7s at Ambon – a new No. 7 and an old No.7. The ‘new’ No. 7 is recorded to have arrived at Ambon on the day of the attack at Jolo. It is recorded to have been on operations the following day, 28 December 1941: ‘Plane No. 7 proceeded Balikpapan on patrol from Ambon’ (Patwing-10 War Diary). Could this then be the first mention in the War Diary of 101-P-13 — #7, using the simple numbering system? This interpretation correlates with subsequent references to this aircraft. 29 December 1941, ‘Plane 7 arrived Ambon from Balikpapan’ (Patwing-10 War Diary). The immortal No.7 lives on, despite the destruction of two previous aircraft bearing that serial number at Malalag and
Jolo. The Catalina must therefore be #7 (ex-101-P-13). It is now being recorded in the simple numbering system. Both of the Broome USN Catalinas therefore were at Ambon at the same time.

Further evidence of the carry over of VP-102 aircraft designations into VP-101 after the merger is exemplified in the log for 31 December 1941: ‘101-P-26, Ensign McConnell, while on routine patrol, was attacked by one of four enemy fighters about 20 miles west of Sangi Island. Escaped unhit’ (Patwing-10 War Diary). It should be remembered that it is hypothesised that there never was a 101-P-26 in VP-101. Further reference to this machine now means its movements are being recorded after the wing’s (VP-102) merger with VP-101. All Catalinas were now in only one squadron. 101-P-26 must, therefore, be one of the Broome Catalinas.

In January 1942, the wing’s log begins to use the number sign prefix (#) for the first time to identify its aircraft. This may be attributed to another hand writing the log entries. Captain Wagner, on being relieved as Commander Patwing-10 ‘maintained this diary for both Commander Patwing-10 and Commander Aircraft, Asiatic Fleet’ (Patwing-10 War Diary). The use of number signs, however, is again inconsistent. The log entries for 7 January 1942 state that contact reports by two Catalinas:


On 9 January 1942, #6 is recorded to have ferried staff from Commander Aircraft, Asiatic Fleet, from Ambon to Surabaya: ‘Plane No. 26, Ensign Deede, departed Ambon for Surabaya (Hurst, L.E., C.Y., and Perry, P.S. Y.1c, … in this plane)’ (Patwing-10 War Diary). This is the first recorded association between #6 and Ensign Deede, who would later command this aircraft at the time of its loss at Broome. During this day, six PBY-5 Catalinas from VP-22 arrived in Darwin to help reinforce Patwing-10. Four of these machines arrived at Ambon from Darwin on 11 January 1942, under the command of Lt Drake. Their identity is not recorded at
this time. Their arrival in the NEI, as a result, complicates the aircraft recording procedure in the War Diary, which needs to be explained.

The first recording of #7 in the simple numbering system occurs on 12 January 1942. Lt (jg.) Sloatman, searched for Plane #28 that was shot down the previous day. The same Catalina (#7) is presumed to have departed from Ambon to Surabaya via Macassar on 13 January 1942 to pick up the crews of No. 6 and No. 9, which were shot down during the Jolo raid.

The end of operations from Ambon was in sight. A heavy air raid there on 15 January 1942 by 26 bombers and 10 fighters resulted in the loss of a Catalina:

Planes damaged and destroyed: 7, 8, and 10. Planes 7 and 8 landed and were immediately attacked, both planes damaged and beached. No fatalities. One man slightly wounded. Two Dutch Brewsters attempted interception and were both shot down (Patwing-10 War Diary).

This was the second recorded encounter of #7 with the Japanese. For the next few weeks, as the number of Catalina losses rose, #6 and #7 would be tasked with increasingly more missions, which would expose them to greater risks. However, caution must be taken when referring to either aircraft in the logs; with the arrival arrival of VP-22 additional aircraft with the numbers six and seven appear in the theatre. The above incident may be referring to 22-P-7, which, together with 22-P-8, had arrived at Ambon on that date.

Ambon was evacuated the following day. Lieutenant Commander Edgar Tilghman Neale, at 0800hrs, with four PBYs, departed Ambon for Surabaya on 16 January 1942, presumably including 22-P-7 and 22-P-8. The other two machines are not recorded, but may have been from VP-22 also (Patwing-10 War Diary). On 19 January 1942, Lt/Cdr Donaho departed Surabaya for Ambon to effect repairs to 22-P-7 and to return it to Surabaya. Evidently then, there were more than four Catalinas at Ambon and perhaps one of the machines in which Neal departed was either #6 or #7 instead of the machines hypothesised above. Nevertheless, all Catalinas would have departed from Ambon by 3 February 1942, the day of the Australian surrendered.

No further information is recorded on the two Broome Catalinas until 23 January 1942, Lt (jg.) Roberts was recorded to have been on a special patrol in #6, from which he returned at 2330hrs. #7 arrived at Surabaya from the USS William B. Preston (AVP-20, ex-AVD-7, ex-DD-344) with the crew of #28, including the aircraft’s captain Ensign Grayson, rescued after their aircraft was shot down on 11 January 1942. Two unspecified Catalinas, flown by Lt (jg.) Campbell and Lt (jg.) Brown, departed on patrol the following day. Lt Ira W. Brown would later command #6 on its final flight to Broome.

On 27 January 1942, Lt (jg.) Deede flew #7 on another patrol from Surabaya. While over Macassar Strait, Deede reported sighting ‘2 cruisers (light) 8 destroyers, 4 transports bearing 270, distance 20 miles course 225, Lat 01-10 S., Long 117-40 E’ (Patwing-10 War Diary). A
further three transports and three destroyers were seen to join the main task force. This was, in hindsight, the eastern pincer of the Borneo invasion force, which was tasked with the capture of Bandjermasin (Banjarmasin - Dutch Borneo). Unable to attack the convoys, Patwing-10’s Catalinas could only watch the Japanese move towards Java over the next few weeks.

#6 and #7 reported further contacts on 29 January 1942. Patrolling from Surabaya to Macassar and Kendari, both aircraft reported numerous Japanese vessels. Meanwhile, a Catalina from VP-22, #10 under the command of Ens Bull, departed for Darwin. While #6 returned to Surabaya that evening, #7 overnighted in Macassar and returned the following day to Surabaya. Ominously, the Catalina sighted more ships, but nothing could be done, as there were no available aircraft to intercept them. A further two Catalinas, #13 flown by Lt/Cdr Donaho and #14, under the command of Lt Drake, departed Surabaya for Darwin. The wing was being spread out. The last day of January 1942 saw numerous attacks on the patrolling Catalinas, with one aircraft #42, returning to Surabaya from Macassar with 30 bullet holes from the previous day’s encounter with fighters (Patwing-10 War Diary).

February 1942 began tragically for #7, when one of the Catalina’s crew drowned. On 3 February 1942 at 1030hrs the air raid alert was sounded at Morokrembangan. Twenty-seven bombers attacked the base, while at 1130hrs three Zeros strafed the flying boats and seaplanes caught on the water. Two Fokker seaplanes, a Dornier and a MLD Catalina were set alight. #7 escaped relatively unscathed, receiving a bullet hole in one of its fuel tanks. AMM2c Roger Walter Kampfer (USN) presumably tried to swim from #7 to the beach. The attackers left by 1230hrs, but it was not until the following day that Kampfer’s body was recovered. An autopsy showed that he had been wounded, probably by shrapnel and confirmed that he had died as a result of drowning (Patwing-10 War Diary). Kampfer, despite the eventual loss of #7 in Broome, has the dubious honour of being the only crewmember to be killed while attached to this aircraft. He was buried on 6 February 1942.

On 6 February 1942 at 0815, #7, #44 and #12 were dispatched to an undisclosed scatter base, probably Lake Grati or Teloengagoeng. No mention is made of the whereabouts of #6. Dorny (in prep.) indicates that #4, #5, #6, #8 and #10 were in Darwin attached to the Langley and that the last three were transferred to the Preston on 7 February 1942. Photograph 5.5 shows a rare photograph of the Langley in Darwin Harbour, tendering to two Catalinas. The date for the photograph is not known, but is likely to have been taken between 5 - 11 February 1942 (Dorny, 2006). One of the Catalinas is blister equipped and is therefore likely to be #10, #18 or #41 - the last of these sunk in NT waters on 19 February 1942.

#7 returned to Morokrembangan from its scatter base on the evening of 6 February 1942. The following morning it returned to its scatter base. It appears that the Allies were trying to prevent a repeat of the 4 February air raid by scattering their aircraft, or sending them off on patrol before the anticipated morning air raids, the Japanese performed with predictable regularity. Patwing-10 had all aircraft departing from Morokrembangan by 0900hrs each morning and
returning after 1730hrs. While at the scatter base, aircraft would have been camouflaged under mangroves while tied up alongside river or lake banks.

Patrols continued for #7 on 9 February 1942, in conjunction with #42 and #44, ‘in accordance with Compatwing Ten orders’ (Patwing-10 War Diary). Lt (jg.) Robinson in #7 sighted two large Japanese aircraft on this day. All aircraft either on patrol or at a scatter base, returned to Morokrembangan by 1730hrs. The War Diary sums up the wing’s disposition on 11 February 1942 with some sobering statistics as well as outlining the operations (and limitations) of its allies, namely the MLD:

N.E.I. Forces, 19 PBY’s, 18 Dorniers based entirely on Java with the exception of one plane at North Sumatra and two on Eanka or Beletin. The Dutch were patrolling the south side of Molaka Strait, western part of Java Sea to the Natoena Islands, the approaches to Tjilatjap, and a special reconnaissance to the northward from Batavia to ___. U.S.A. 12 PBY’s remaining out of 45 (started the war with 28 in Patrol Wing 10, received 12 additional (VP-22) plus 5 turned over to us by the Dutch. Total: 45. Of the 12 PBY’s, six are based at Sourabaya and six on the U.S.S. William B. Preston at Darwin, a total of only 5 are in commission. Engine times are getting very high. Yesterday we seemed to have lost contact with the enemy so this morning one plane reconnoitred Balikpapan by combined moonlight and very early twilight. Another at the same time did the same thing at Makassar. Both planes departed from Sourabaya. This procedure was resorted to because enemy fighter opposition is heavy at both places during daylight. One American PBY patrolling to the east from Sourabaya to Lat 8 south, Long. 121 east … Two planes from Darwin are patrolling to just south of Ambon, covering southwest, south, and southeast exists from Ambon. To date the American planes have had to take the most important duties because the A [sic] American planes consistently turn in complete and accurate reports, and by having a receiver here at Headquarters we get the reports promptly. Dutch reports to date have been a few hours to several days late.
The Dutch lost an X-boat today which had a forced landing in a rough sea off Madoeura Strait. Plane was demolished. The plane was one of the three returning from the south coast of Borneo, where they endeavored [sic] to rescue the destruction party from Bandermasin [sic]. This was the third plane the Dutch have lost in attempting evacuations (Patwing-10 War Diary).

Records continue for 11 February with ‘Plane 7’ having sighted an equipped whaleboat, but with no visible sign of life. The aircraft, under the command of Lt (jg.) Robinson departed for the southern patrol route at 0630hrs. The War Diary entry for 13 February 1942 records that Catalina FV-N from 205 Sqn RAF found and attacked the Japanese. Nineteen motor vessels were sighted ‘in 01-32 N., 105-59 E., course 225, speed 7 knots’ (Patwing-10 War Diary). No hits were recorded. Two American PBYs were also on patrol this day, #7 with Lt (jg.) Robinson and #44 with Lt (jg.) Christman completing patrols for the day, but without having sighted the Japanese (Patwing-10 War Diary). No sightings were made by #7 while on patrol the following day, but other Catalinas observed a large number of vessels moving down the west coast of Borneo, while Batavia reported that Sumatra had been heavily bombed and that paratroopers were being landed there (Patwing-10 War Diary). Singapore would fall the next day, while Sumatra had only a few more days.

On 19 February 1942 at 0700hrs, #7 with Ensign Barthes, flew to Cilacap. By 21 February 1942 operations from Surabaya were becoming extremely difficult. Japanese fighters were now operating from Bali, only 150 miles away, necessitating the early departure and very late return of the remaining Catalinas operating from there. Significantly, the Childs and Heron were sent to Broome to assist the Preston. The Preston escaped with extensive stern-gear damage and casualties after having been caught in the 19 February air raids at Darwin. To compound the problem, Preston touched on a shoal while entering Derby (WA), damaging its propellers. Childs off-loaded its Patwing-10 excess personnel in Broome as the additional 60 men were hampering the ship’s tendering operations. The tender also left behind one of its boats, to assist with evacuation operations (Messimer, 1985:263). This, as described in the following chapter, helped save many lives after the air raid on Broome (Photo. 5.6 and Photo. 5.7).

During the day (21 February 1942), #7 was sent to a scatter base. There is no mention of the whereabouts of #6 at this time. One explanation is that the aircraft was inconsistently recorded either as ‘Plane 26’, ‘#26’, or ‘#6’. If this is the case, the last recorded entry for this machine was on 31 January 1942, when ‘Plane #26, Ensign Hendericks, arrived Sourabaya from USS Heron’ (Patwing-10 War Diary). The reference here is to the aircraft’s last designation in VP-101 as 101-P-26. It is most probable that there never was a #26. The high range of numbers in the simple numbering system eg. #41, is believed to be a carry-over from the MLD designations.

The assumption that ‘Plane 26’ or ‘Plane #26’ is in fact #6 appears to be verified by the following reference that on 22 February 1942 ‘#26, Lt (jg.) Deede, [flew to] Derby with first of evacuees’ (Patwing-10 War Diary). Rear Admiral William R. Purnell (USN), Chief of

Photograph 5.7 ‘Doc Pratt’s foresight in leaving behind a boat when the Childs left Broome resulted in many lives being saved on 3 March 1942’ (Photo. T. Pollock via Messimer. 1985:264).
Staff under the command of Admiral Glassford, is recorded to have arrived in Broome on 25 February 1942 onboard ‘P-26’ (Messimer, 1985:262). More on this later, but it is significant to note the inconsistent reference to #6. Historians need to interpret the last days of this aircraft on Java. #7, however, is consistently referred to by its simple numbering system designation.

#7, with Lt (jg.) Brown, departed on patrol from Surabaya on the same day #6 went to Derby flying with #44 and returned without any sightings (Patwing-10 War Diary). The Catalina (#7), captained by Lt/Cdr William A. Deam, departed probably from Cilacap to Broome at an unspecified time, on 23 February 1942. Further detail on the condition of #7 on its final flight to Broome indicates it was lucky to have reached its destination with both engines:

On the 22nd the British formally announced they were getting out, and General Brereton moved his headquarters to India. In Surabaja only two planes, P-42 and P-44, were available for patrol. Two others, P-3 and P-7, were at a scatter base eighty-five miles south of Surabaja. In Surabaja, a fifth plane was being built with salvaged parts.

On the 23rd, Bill Deam and Ira Brown packed thirty-nine people and the wing’s records into P-7, and taxied out into the channel. They knew now why P-7 had not been used for patrol, and they must have wondered about their chances of reaching Broome. The wings and tail were full of bullet holes, the hull leaked like a sieve, and the starboard engine was loose in its frame. The plane’s condition was typical of what the others were like. After two takeoff attempts, P-7 staggered into the air and headed for Broome (Messimer, 1985:257).

Three Patwing-10 Catalinas are recorded to have been in Broome by 26 February 1942. The War Diary entry for the day downplays the casualties in both men and machines:

No patrols today as there are no planes available. Of the three at Sourabaya one will be ready to fly tomorrow morning; the second can fly, but has no radio (CINCAF has radio from this plane). This plane will fly personnel out of Sourabaya to Broome then remain south. The third plane can fly but has radio receiver only and floats cannot be raised or lowered.

Of the three planes at Broome, two are badly in need of engines, but can fly. The third one is good and will proceed to Sourabaya tomorrow, 27th (Patwing-10 War Diary).

#10 survived destruction in Darwin during the 19 February air raid that claimed three Catalinas from the same detachment. A fourth machine in the Darwin detachment, flown by Lt Tom Moorer, was shot down that day off the west coast of Bathurst Island, Northern Territory. Photographic records of Patwing-10’s retreat from the Philippines are extremely rare. A colour scheme for #7 has, however, recently been suggested (Fig. 5.5). The use of camouflage is consistent with that believed to have been used by the RAF in February 1942 (see Photo. 5.2). This depiction of #7 clearly shows the transitional features of the PBY-4/5 types, with all the features of a PBY-4, except with an experimental waist blister (cf. Jung, 2001).

Three images, of what is speculated to be of the last flight of #18 (Lt Moorer’s Catalina) or of #10, have survived (see Jung, 2001:77-78). However, a remarkable image of #10 has been sourced at the Broome Historical Society Museum (BHSM), which shows the aircraft being
refuelled in Roebuck Bay by the Nicol Bay. The location of the aircraft’s serial number on the tail, would indicate it was painted elsewhere, apart from below the window shown in Figure 5.5. One of the Catalina (#10) crew are comments below:

Marvin remembers the event at Broome, refuelling from that ship, and he is one of the two men up on the PBY’s wing ... the second man, which he thinks is either of the two other mechanics then on the crew, F.H. Smith or James Young...The plane in the photo [is] a U.S. Navy PBY-5, Bureau Number 2292, and at this point #10 in Patrol Wing Ten. The crew was:

- Pilot: Lieutenant (jg) Robert C. “Buzz” LeFever, USNR
- Second Pilot: Ensign Joe E. Brant, USNR
- Third Pilot: AMM1c (NAP) Maynard E. Humphries, USN
- Plane Captain: AMM1c Marvin L. Brown, USN – now living in San Diego, CA
- First Mech.: AMM2c F.H. Smith, USN
- First Radio: RM1c Ford S. Kelly, USN
- Second Mech.: AMM3c James Lawrence Young, USN
- Second Radio: RM2c Ulnar L. Hart, USN

The date of the photo remains undetermined exactly, but must have been between 21 and 27 February 1942, the only time period when #10 operated from Broome (Dorny, L. pers. comm., 12 June 2003).
According to Graham (2003a), #10 was in Broome only once in its operational service history, between 26 and 27 February 1942. The machine refuelled at Broome and then departed for Java, but returned to Australia, flying directly to the Childs at Exmouth. The War Diary entry for 27 February 1942 actually specifies the three Catalinas in Broome. The Childs reported to #10, #7 and #6 that it had seen a Japanese flying boat heading towards Broome from the south at 0350hrs. It is quite likely that the Japanese flying boat returned to attack the Childs, rather than fly on to Broome, as Childs reported being attacked by the flying boat at 0420hrs. While #6 was recorded to have flown to Derby on 22 February 1942 and no mention is made of its arrival in Broome, it is possible the diary entry is in error and that the machine actually flew to Broome on that date and not Derby. This would mean that #6 was in Broome for nearly six days and #7 for nearly nine days before the air raid. Although badly in need of engines, they were waiting to evacuate personnel from Broome. #10 returned to Java to bring out more evacuees, together with #3, #5 and #46, leaving only two USN PBYs in Broome (Messimer, 1985:267).

Admiral Purnell’s trip to Broome on 25 February 1942 is described by an account of #6 leaving Cilacap. The aircraft evidently returned to Java after its flight to Derby. The aircraft is referred to in the slang as ‘P-26’ ie, its former designation in VP-101:

P-26 was assigned to carry the admiral, his staff, and fifty pieces of baggage to Broome. Because takeoff was being made late at night, and no one wanted Purnell’s plane to go on the mud as a result of a taxiing accident, a boat was used to guide the plane out. It was a Dutch boat with a Dutch coxswain. But for some reason John Hyland was also put in the boat.

The boat led the way down the narrow channel, the PBY following closely. What nobody realized was that the boat had a top speed that was a little slower than the PBY’s taxiing speed. It was a fact that John Hyland started to notice very quickly.

Glancing back frequently, Hyland saw the big PBY getting closer and closer. The Dutch coxswain stared ahead unaware that his boat was about to be run down. The PBY was nearly on top of the boat, and Hyland had just exclaimed, “God Almighty, they’re going to chop us to pieces,” when the Dutch seaman saw the danger. Putting the helm hard over he veered out of the channel as the PBY taxied through the spot the boat had just vacated (Messimer, 1985:262).

Another version of this story indicates Messimer has mistaken the type of flying boat bearing down on the pilot boat. Dorny (in prep.) relates the same story, but this time the flying boat is a Sikorsky XPBS-5, a large four-engine flying boat. This story emerged after an interview with Lt John Hyland in 1975, who upon remembering the incident: ‘launched immediately and with enthusiasm into his experience early that morning’ (Dorny, in prep.), which is recorded to have occurred on 9 February 1942. Broome’s #6 is unlikely, therefore, to have been the aircraft that carried Admiral Purnell to Australia.

Captain of the Childs, Lt/Cdr ‘Doc’ Pratt, upon his arrival in Broome is recorded not to have been impressed with the arrangements that he found there. The concentration of flying boats, land planes and now seaplane tenders, he believed, was only inviting an air raid and that
they would be attacked any day now. He wanted to move his ship further south, to Exmouth, where the vessel could tend to flying boats making their way to Perth, or to commence patrols from the ship there, in what was perceived to be relative safety. In order to do this, he needed the authorisation of his Commanding Officer, Admiral Purnell. Pratt went ashore to find the Admiral:

After a long, hot, dusty walk through what looked like an ‘Arizona cow town,’ he came to a non-descript shack. Over the door was an improvised sign, ‘U.S. Navy Headquarters.’ Entering, he found Admiral Purnell seated in a wooden chair, his suitcase beside him. The admiral was alone.

‘Admiral, what are you doing here?’

‘Doc, I can ask you the same question.’

Before Pratt could answer, Admiral Purnell said that he was “more or less stuck” in Broome and needed to get to Perth [because the Catalinas in Broome were unserviceable?]. Pratt then explained his situation, pointing out that if the Japanese hit Broome the *Childs* was almost certainly going to be lost. He then went on to explain his alternative solution.

‘Well, what are you waiting for?’ Purnell said, getting out of the chair and picking up his suitcase.

Returning to the *Childs* with the admiral, Pratt had a boat, manned and supplied to service planes, put in the water, and he prepared to get underway. At 1745 the *Childs*, ‘with the authority of the senior Asiatic Fleet officer present,’ steamed out of Roebuck Bay and turned southwest toward Exmouth Gulf. Doc Pratt’s coincidental meeting with Admiral Purnell accomplished two things. It saved his ship, and the boat he left behind saved dozens of lives five days later (Messimer, 1985:264-265).

Lt Deam was criticised for delaying the departure from Broome of the two PBY-4s under his command. They had been there for days not knowing what to do. The War Diary entry for 2 March 1942 suggests that it was written in hindsight, rather than on the actual day:

Two PBY’s under Lieutenant Commander Deam at Broome; kept sending them orders to get out. Found out later that Deam got garbled despatches indicating that he should do something, but he didn’t know what. He was too slow on his feet (Patwing-10 War Diary).

The War Diary entry for the day of the air raid on Broome is rather non-descript. Note, however, the use of the slang term for #6:

Planes #7 and 26 destroyed on water by enemy aircraft during air attack on Broome, Australia. No casualties to plane crews.

Many Dutch women and children were killed at Broome in Dutch PBY’s and Dutch Dorniers (Patwing-10 War Diary).

The USN, of course were lucky. They escaped the raid at Broome without loss of life to their own personnel (except for those killed in a USAAF Liberator). The situation was tragically different for NEI personnel and the British. The following day, #5 alighted on Roebuck Bay,
under the command of Lt Eisenbach, most likely to pick up the crews of #6 and #7 and to take them to the Childs at Exmouth.

5.4 Conclusions

The historical background for four Broome Catalinas, whose identities were not previously well documented, was examined in this chapter. This revealed aspects of their operational service lives that have important implications on how they can be interpreted in the archaeological record.

This chapter has presented an argument for the designations of the two RAF Catalinas as FV-N (ex-AJ154) and FV-W (ex-Y-54). Two USN Catalinas were similarly not well known and their designations at the time of their loss can only be inferred from understanding their previous designations in earlier squadrons. These machines are now believed to be #6, BUAERNO 1227 (ex-101-P-26, ex-102-P-26), and #7, BUAERNO 1243 (ex-101-P-13). It is ironic that these Catalinas were carrying the very records, at the time of their loss that this work could have used to positively identify them. Archaeologists and historians researching the events in the NEI during the early stages of the Pacific war have only fragments of data to work from. For example, comments made by Clark (2001) in the review of Air Commodore Henry Probert’s (1995) book: The Forgotten Air Force, highlights the dilemma aviation historians face when researching the flying boat evacuation of Java:

Like Jefford before him, Probert (one time head of the RAF Air Historical Branch) is well aware of the deficiencies of his source material. In many ways it is a triumph of the spirit that records continued to be kept, and that men did their duty in an orderly fashion in the most extreme conditions.

Some original Middle East and much Far East source material did not survive the conflicts. The source material in the PRO and the Air Historical Branch is fragmentary. Where records do exist they may contain inconsistencies between command level records and those for units, for a number of readily understood and explicable reasons. Personal records too may be valuable for certain details but misleading for others. Personal narratives recalled today may be vivid indeed but are of course prone to gaps, while some really vivid events may come to coalesce in the recall of the narrator. Lastly, such narration long after the event can also be prone to what might best be called accretion: unconsciously the narrator weaves into his fabric material that he has come across since the events but could not have known at the time. One gives thanks that men and women who survived are prepared in this, the evening of their time among us, to share the most difficult times of their lives (Clark, 2001).

Understanding which Catalinas were lost in Broome is crucial to understanding the nature of the archaeological material and what archaeologists should expect to find. While it was previously believed that only four MLD Catalinas were lost, technical data on the background of FV-W indicates that it may have remained unmodified after its acquisition by the RAF. Similarly, archaeologists may now expect to find a blister equipped PBY-4 USN Catalina, a rare flying boat, which was a prototype to all subsequent Catalinas built. Therefore, the
material remains that archaeologists may expect to find at the wreck sites may not be what were previously expected.

The history recorded in this chapter, viewed from the perspective of the four ‘nameless’ Catalinas in Broome, provides insights into the operational service lives of not only of their own deployments around the NEI, but also of their squadron’s lineages. Their *modus operandi* against overwhelming odds was also described. This then has been a flying boat perspective of the opening stages of the Pacific war, providing valuable lessons for the later Allied deployment of flying boats. Their eventual demise in Broome could be argued to be a result of an experiment in warfare that had gone wrong - they were never meant to be front-line aircraft.
CHAPTER 6: THE ARMADA’S *FINI RESIDUUM* — the slaughter and the survivors

6.1 Introduction

I remember that any informations [sic] or instructions about the Allied flying boats on the bay were not given till we found them at the bay of Broome, and our great fruits of battle were beyond expectations (Matsumoto, 1978).

We knew the planes had gone now. I leaned against the side, weak with trembling, and looked at those in the lighter, the burned and the wounded and the frightened, and if I live till the kids in that lighter are old men I shall never forget that sight. I had four years in the last war and none of it will ever be as clear as those twenty minutes I had just been through. Back on the water fifteen boats were now just charred hulks (Xav, 1944).

The first of the four Japanese air raids on Broome was the most devastating in both material damage and human suffering (Photo. 6.1). It will never be known how many people were actually on the flying boats and hence how many were killed. In the frantic escape from Java, most people were given less than an hour’s notice to leave; there was no time to record detailed passenger lists. Generally, the families of the flying boat crews were the first to be selected, but others were taken on board too; high-ranking officials in the *MLD* and their families as well.

*Photograph 6.1  Aerial view of Roebuck Bay taken from the ‘Babs’, showing the immediate aftermath of the air raid on Broome (Courtesy Willy Piers, 2006). Note: the location of flying boat smoke columns in relation to the jetty.*
as flying boat maintenance staff and their families. In most cases, the crews knew only their immediate family members among the passengers. This chapter will help to establish who was actually in Broome at the time of the air raid and if they were on Roebuck Bay, to record their accounts of the loss of their aircraft. Appendix 6.1 provides a list of Allied personnel who have been determined to have been in Broome during the air raid. This appendix is essentially an expanded version of Prime’s (2003) research and includes the names of persons who were not previously known to have been in Broome at that time.

Historical accounts of loss by the active participants of the air raid event have significant bearings on interpreting the distribution of the archaeological material in Roebuck Bay. Although oral histories and eyewitness accounts are often contradictory this chapter aims, by the analysis and interpretation of the personal accounts at Broome on the morning of 3 March 1942, to provide a verifiable account of the events.

6.2 Methods
Primary reference material in the NAA and two key Dutch sources known as the Crommelin Report (1948) and the Coster Report (1942) provide an official version of the 3 March 1942 air raid. An overview is presented of the accounts in secondary sources, which provide additional clues as to where each of the flying boats were lost in Roebuck Bay. Aviation historian Mervyn Prime has developed a list of Allied personnel in Broome at the time of the raid. In his booklet entitled *WA’s Pearl Harbour: the Japanese raid on Broome* (1985), with successive editions with the title *Broome’s One Day War* (1992, 1995, 1998, 2002, 2003 and 2004) is still the most comprehensive study of the aircraft and of the people involved. Prime’s personnel list, however, is incomplete. A study of resources in the NAA has revealed the names of more people who must have been on the flying boats. A list of criteria, however, has had to be developed in order to track these people and to show that they also entered Australia as refugees on the flying boats at the time of the air raid.

Australia’s Department of Immigration kept records on the NEI refugees that came to Australia via Broome. The records, however, are limited. Names were often recorded incorrectly, or anglicised. Only civilians were recorded; the majority were women. Occasionally some details are provided of their children. Few records were kept of MLD personnel or those killed. Photograph 6.2 in part, addresses this problem by providing data on many of the MLD personnel who were at Broome. Who then were the refugees and what were their relationships with the MLD’s men and machines? The following criteria were used to determine who they were:

1) Date of arrival in Perth or Melbourne – usually the date they were processed by the Department of Immigration ie, 4 or 5 March. Broome is sometimes mentioned as their point of arrival

2) Mode of transport – usually given as ‘Dutch Naval Aircraft’ or ‘unknown’
CHAPTER 6: THE ARMADA’S FINI RESIDUUM

Photograph 6.2 Corpus Christi Texas, Dutch aircrew in front of Catalina Y-74. Names in bold are aircrew who were at Broome (Photographer unknown 1942 via van Hulssen 2004).

1. van Tol [van der TOL Koos] (Pilot)
2. ? (Engineer)
3. ? (Engineer)
4. Polak (Pilot)
5. van Persie [Jan] (Pilot)
6. van de Plass [van der PLASSCHE Frank] (Pilot)
7. Visser (Engineer) [son killed in Broome?]
8. Vermuulgen (Engineer)
9. ? (Engineer)
10. Kuin (Engineer) [wife and son killed in Broome]
11. ? (Engineer)
12. Lippla [LIPPLAA Jan] (Pilot/Flight Engineer?)
13. Diederich (Engineer)
14. Mollevanger (Radio)
15. de Lege (Engineer)
16. ? (Engineer)
17. van Leeuwen (Pilot)
18. Verkouteren (Radio)
19. ? (Engineer)
20. Weehuizen [Henk] (Engineer)
21. Chevalier (Engineer)
22. Can [Volkert] (Radio)
23. Smit (Radio)
24. de Vroom (Radio)
25. Beckers (Engineer)
26. Shuitmaker (Radio)
27. van Vliet [Albert] (Engineer)
28. van Hulssen [Frits] (Radio/Navigator)
29. ? (Pilot/Navigator?)
30. Hofels (Navigator)
31. Jaap den Hollander (Pilot/Navigator)
32. Sjerp [Bastiaan] (Pilot/Navigator)
33. (CO NAS Corpus Christi Texas USA)
34. Burgehout (Pilot/Navigator)
35. Perie (Pilot/Navigator)
36. Persi (Pilot/Navigator)
37. Claringbolt (Pilot)
38. ? (Navigator?)
39. Hoehink (Pilot/Navigator)
3) Nationality - some born in the Netherlands, some born in the NEI, especially the children. Note: no nationalities apart from the Dutch NEI appear to have travelled on the MLD flying boats

In addition to these archival sources, secondary sources are used to compile crew and passenger lists per flying boat. These are evaluated against other information given by surviving crew and passengers themselves as to which machine brought them to Australia. Quite often, the regular crew for a particular aircraft, for example, was different to the actual people who operated the final flights. Crews were exchanged between aircraft at the last moment and some did not even know which flying boat they were in when they were attacked in Broome.

The people on the flying boats were predominantly from the NEI. There were others, however, aboard the RAAF, BOAC and RAF Short Empire flying boats and Catalinas who were either service personnel or BOAC employees. Not all the flying boats had passengers. Some only had their crews and the USN Catalinas had no one on board at all. In order to understand the archaeology of the Broome flying boat wreck sites, it is first necessary to determine which flying boats were carrying refugees, so as to predict what archaeologists should expect to find.

6.3 Crew and passengers narratives detailing the loss of their aircraft
6.3.1 The Gold Fish Club gets some new members - loss of the RAAF’s A18-10 and BOAC’s Corinna
6.3.1.1 A18-10

Being saved by a rubber dinghy earned the crew of A18-10 membership of The Gold Fish Club, a club for Allied airmen who owed their lives, after ditching in the sea, to safety gear such as life rafts and jackets (Photo. 6.3). A fitting start to the personal narratives are the accounts of what are generally believed the first two machines attacked – the Empire flying boats. The RAAF’s A18-10 was the first to be targeted by the Japanese, followed by BOAC’s Corinna, although the attacks on these two machines were probably simultaneous. The Empire boats were particularly prized catches for the Japanese, since aircraft of this size were extremely valuable to the Allies who had few large transport aircraft at this time. F/Lt Keith Geoffrey Caldwell (261491), in command of A18-10, was ashore during the air raid, but witnessed the carnage (Photo. 6.4). His comments suggest that the aircraft in Roebuck Bay were dispersed and that the RAF Catalinas were returning fire at the Japanese:

Our flying boat A18-10 was the first aircraft attacked and went up in flames immediately. All of the crew safely escaped into our own dinghys [sic], with relatively minor burns and injuries (Caldwell 1992).

Broome: statement from F/Lt Caldwell – A18-10 E.F/B – not on board.

Cpl. Ireland, L.A.C. Russell – on board. There were 7 on board altogether. There were moored 5 DO.24 Dutch of which 3 were dispersed. 2 Brit. Catalinas, 4 U.S.A. Catalinas, 2 Empire boats (1 R.A.A.F. 1 Qantas), ? doubtful 2 other Catalinas – probably Dutch – outside breakwater.
We were in middle compartment 0941 Broome time. Enemy a/c camouflage light blue and light bottle green and marking red circle. Had jettisonable tank underneath. (They kept their tanks on during the raid) There was a sound like a child’s rattle and a line of tracer. He swooped 30 feet above us. In 10 seconds he banked on his climb and flew back and repeated the performance – flattening out over the top. He departed and another a/c did the same. Between them they made 4 attacks. We showed flame in 2nd attack. Crew took to the water. Last a/c attacking us then took to Brit. Catalina. Both gunners shot up. Whole of boats cleaned up in 15 minutes. We consider 15 a/c destroyed on water. (Including a Grumman single float) (This includes – 2 doubtful Dorniers – dispersed) 1 Grumman (or S.O.C.), 2 Brit. P.B.Y.’s, 2 E. F/B’s, 5 Dorniers, 4 U.S.A. Catalinas, 1 Unidentified. On Aerodrome – 1 Hudson, 1 Douglas (Dutch), 2 B.17’s, 1 B.24, 1 B.24 crashed down coast - There was a claim that this a/c shot down 2 E/A. Also claim that Dutch airman shot down 1 with a Vickers Gun from his hip. (Wreckage claimed to have been examined and a woman pilot’s body found) (Series number: AA1966/5, Control symbol:146, NAA).

Caldwell, in his account above, evidently could only see three Dorniers in Roebuck Bay. The dispersed Dorniers were most likely the machines that were moving ie, either leaving or just arriving. More data is presented on these machines in the section on the loss of the Dornier X-3. The claim, however, of the recovery of a female Japanese pilot is spurious. The body of a Japanese pilot has never been recovered from Roebuck Bay, let only that of a female Japanese pilot.

Chapter 3 showed that A18-10 had attempted to take-off on its special mission to Timor the previous day. The aborted flight was caused by the flying boat’s cargo shifting. F/Lt Caldwell
and his second officer Fred Durham were ashore looking for planks to reinforce the hull to carry six 44-gallon drums of fuel for their flight to Timor. On board A18-10 were: Corporal Andrew Benvie Ireland, BEM, (6686) (Photo. 6.5), Doug Dick (Dickson by Deed Poll 1966) (Photo. 6.6), Jack Cummings, Cyril Moore, Terry Marsden, Frank Russell, Ross Jones and Clarrie Masters (see Appendix 6.2) (Rorrison, 1992:251; Dickson, 1992, Prime, 2004). Dickson and Ireland both provide accounts of the loss of A18-10:

Dickson: On the morning of the 3rd March, 1942 the crew excluding the Skipper and second Dickie (who were ashore being briefed), were having a mug of hot cocoa, grouped in what would have been the lounge in Qantas flights, when we noticed a group of 5 or 6 fighters wheeling on our port side, some one remarked looks like the “yanks are putting on a show”, then seconds later to our amazement there was this roaring nose and bullets smashing into the port wing and motors and flames up forward. Most of the crew ran to the front of the aircraft to exit by the port door, I went aft to get to my guns (being the armourer air gunner), one of the crew, Cyril Maude stood in front of me momentarily frozen so I poured my cocoa over his back, he quickly came to life. In the meantime Andrew had reached the rubber dinghy compartment as he had been trained to do, as he was Senior NCO in charge. As he grasped the dinghy and approached the exit the top tanks exploded and hurled him through the open door, the flames severely burning his upper torso and face, lucky the door was open, as he hurtled through the air still clasping the dinghy, which had inflated as he had hold of the release air handle. That 5 man dinghy held 13 men at one stage. Frank Russel our 2nd wireless operator followed me aft to help me get my guns up to the shelf we stood on, to protrude through a hatch in the top and mount the guns as I had them down for cleaning prior to take off. Just then there was another large explosion and Frank said as he could not swim would I help him launch the small boat or dinghy as we knew it, however, I had driven a spike into its supporting cradle [sic] the day before to stop it bouncing around and we found it impossible to extract. I glanced around for something to lever it out with and when I looked back Frank had gone, he had dived out of the hatch where we would have launched the dinghy, with his tin hat on a pair of shorts and in a very short space of time he was at least 10 metres past the wing tip doing about 14 knots, for a bloke that could not swim he was doing real well.
At this stage, I decided I may as well go too as I could not lift the guns up by myself and things were getting pretty hot up the front, so I went over to the hatch and poised to dive in, it was at this point of time that the strangest thing in my life occurred, as I bent to dive, I was restrained it was though I was being held by a hand on my shoulder, there was nobody else on board. In that time span of a second or so, I could not move and then there was this seething of the water as it was churned into foam, where I would have dived, as bullets from air attacking zeros cut the starboard wing and motors. As soon as it passed I completed my exit by diving into the water.

Andrew flew south later that day in an American aircraft, to be hospitalised and was later awarded the British Empire Medal for his bravery and fortitude in carrying out his duties under attack. The rest of us received a lift by plane to Port Hedland then a day later we received a lift from Jimmy Woods in a Lockheed Hudson to Perth. The same Woods that flew the shortest airline in the world from Perth to Rottnest Island and returned (Dickson, 1992; Cleworth, 2006:78-83).

The above quote shows the machine had certain modifications, for example, the long-range fuel tanks behind the cockpit. The machine had undergone some modification when it was taken over by the RAAF. The lack of supporting structures within the hull, as indicated by the problems the crew had handling 44-gallon drums, however, suggests that it was not modified to the extent of other Empire boats in RAAF service. Additional fuel tanks were installed on the flight deck.

Ireland’s account collaborates with Dickson’s (1992). From an archaeological perspective, the significant aspect of A18-10’s sinking was when its starboard wing and engines were severed from the fuselage by cannon fire. This is a point made by Souter (2003:118); should an Empire boat wreck be discovered in Roebuck Bay with a severed starboard wing, then that wreck is most likely to be of A18-10. However, could the second Empire boat, Corinna, have sunk the same way? Was its starboard wing cut off as well? It is not known how Corinna sank, as shall be discussed below. This highlights a problem with oral histories – if accounts of loss are available for only one machine of the same type, determining which machine is which must ultimately rely on archaeological data. In the case of the two Empire boats in Broome, both may have sunk in the same manner and, therefore, site formation processes at the time of deposition may not necessarily provide an identity for each flying boat wreck site.

A18-10 also caught fire and upon sinking, quietly smouldered it eventually slipped beneath the surface (see Chapter 3). An interview with Ireland conducted by Prospero Productions in 2001, shortly before Ireland’s death, is presented in Appendix 6.3.

The flying boat was also bristling with machineguns, which if deployed, would nevertheless not have had much bearing on the outcome of the battle; the machine was a proverbial ‘sitting duck’. If they have survived in situ, guns and ammunition then are diagnostic features of its wreck site. Corinna, conversely, was not armed (Rorrison, 1992:249).

Another significant aspect of the narratives of the sinking of A18-10 is where the flying boat was reported to have been located ie, whether or not it was on a mooring or was anchored.
One factor is that the flying boat was moored a considerable distance from the end of the jetty. Jack Cummings remembered that the machine was on moorings and not anchored. It should be remembered that there were only two (or three) permanent moorings in Roebuck Bay, which had been used by the Empire boats previously during the shuttle fights to Java (Lawton, 1992:12). Being the most precious, the Empire boats were using both moorings thereby eliminating any risks associated with anchoring (see Dornier X-3 account below):

Thinking quickly, Ireland remembered the aircraft was moored well out from the shore. Otherwise it would have been sitting stranded on the mud at low tide (Rorrison, 1992:252).

I [Cummings] realised then that it had fired upon us. We were anchored furthermore out of the 15 flying boats. We weren't anchored; we were on a buoy and the buoy was well out … After the second strafing I went into the mid-ships of the aeroplane. It was starting to catch fire then. The wing fuel tanks were alight. Fuel was starting to drop down into the hull. We didn't have our guns mounted, which wouldn't have made any difference anyhow (Rorrison, 1992:253).

6.3.1.2 Corinna

One of the two vessels doing the hard work of refuelling was the auxiliary ketch Nicol Bay, under the command of Captain Harold Mathieson (Photo. 6.7 and Photo. 6.8). Corinna was reported to have been undergoing refuelling and/or servicing by the Nicol Bay (Fysh, 1968:150). The flying boat’s passengers were waiting to embark at the end of the jetty for the continuation of the flight to Sydney, but Captain L.R. Ambrose had suggested that the MLD flying boats take precedence over refuelling, even though the Nicol Bay was alongside Corinna at the time of the air raid:

What I was trying to do was let the foreign aircraft get away first because they were the people who were in more trouble than I was. All I was doing was taking an interest in Eric Sims [in Camilla] coming down from Wyndham. I wanted to make sure he was under control before I set off myself. I was going to check that he was on his way. Then I was going to take off before Sims landed so there would only be one QANTAS boat at Broome as Brian wanted. I would have been making for Port Hedland so that I would be in the best possible position to have heard and followed any official instructions (Ambrose, L. quoted in Rorrison, 1992:255).

Despite the flying boat’s captain and passengers being ashore, some crew were on board supervising the refuelling, one of whom was C.R. Jenkins. The others are not known. Although Fysh (1968:150) records Jenkins’s account of the loss of the flying boat:

Several QANTAS staff members were aboard Corinna when the shooting started including C.R. Jenkins who was on the wing, supervising the servicing. The staccato of machine-gun fire turned his head like a top as three of the radial-engined fighters swept towards him across the sparkling water, guns blazing. Jenkins did not hesitate. He dived headfirst from the wing. It was so high, the dive took him deep into the water, probably saving his life. He stayed under as long as his breath allowed, watching with fascination as bullets smacked the surface above his head. When he finally came up for air he saw Corinna was afire and sinking so he struck out for shore, swimming until he reached an empty row-boat. Collecting a load of survivors, Jenkins rowed ashore. Other engineers about the
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Empire managed to scramble into a dinghy. Sometimes they were forced into the sea as machine-gun fire came close, but they eventually reached shore safely…

Captain Ambrose was still there with his passengers when the attack began. He watched helplessly as his own flying-boat was fired and began settling heavily in the water. Thankfully his passengers were with him, he quickly ordered them under the jetty. But there was another danger. Over one-hundred 44-gallon drums of aviation fuel were stacked conveniently at the end of the pier. Throughout the twenty-minute attack, Ambrose’s mind was to reflect constantly on what could occur if incendiary cannon shells landed among them. But the Japanese pilots ignored the jetty, concentrating on their priority targets, the priceless flying-boats (Rorrison, 1992:255).

Corinna was apparently the second machine to be attacked. The Japanese, it would seem, were keen to destroy the leviathans first, as they must have known of the firepower they could muster, at least in the case of A18-10. However, judging its surprise nature, was probably conducted by Zero Formation 1 attacking A18-10 and Zero Formation 3 attacking Corinna simultaneously. Would Corinna’s crew and that of the Nicol Bay stand by while A18-10 was going up in flames? Zero Formation 2 was, hence, committed to chasing aircraft that had become airborne just prior to the attack: Arabian Nights and the Seagull. The other flying boats were, therefore, given precious moments to establish some sort of defence, or to simply act in response to the threat, before their machines were attacked themselves.

6.3.2 End of the prototype – X-1’s battle and tragic defeat

From the Japanese account of the air raid, some flying boats were indeed moving in Roebuck Bay when they arrived, but as will be discussed, not all were taxiing to leave. One machine was taxiing to find an anchorage in the now crowded area south of the jetty and one of those was the X-1. Five accounts of the aircraft’s loss have been recorded, each from a different perspective: 1) Sara Koens – a refugee, 2) Willy Piers on his grandfather’s (Jan Piers) tragic loss of his first family, 3) the aircraft’s pilot Henk Hasselo, 4) an account by Rudd van Persie of his father’s (Jan Persie) experience. He was the co-pilot of the X-1 in Broome. The fifth account is from Jan Ruiter, who together with Jan Persie and Jan Piers, were known at that time as the ‘Three Jans’ (Piers, W., pers. comm., 28 January 2006). This account will first examine the flying boat pilots’ experiences.

Fifty-nine years after the air raid, Henk Hasselo (Photo. 6.9 and Photo. 6.10) (see end photographic A3 sheets, this chapter) was interviewed in 2001 by Prospero Productions; a Perth based documentary film making company. The Prospero interview with Hasselo is presented in Appendix 6.4.

Hasselo joined the Koninklijk Marine (KM) in 1937 and trained in Holland, first in land planes and then seaplanes. In 1939 he was transferred to the NEI and served on the HNLMS Soemba. He then served on the cruiser HNLMS Java until ordered to disembark in Singapore in early 1942. He arrived in Surabaya shortly afterwards, but spent most of his time flying out of Batavia with the MLD. He was called back to Surabaya shortly before the evacuation and sent to Lengkong (presumably with the X-1) to await further orders.
On the night of 2 March 1942, the X-1 was ordered to take on as many refugees as the aircraft could hold. Hasselo recalls that in an aircraft designed to take only six or seven crew, the additional personnel made life on board the flying boat extremely uncomfortable. It is interesting to note that there may have been up to 40 people on board when the X-1 took off for Broome. The flight itself, however, was uneventful, although Hasselo records machineguns were deployed in case the Japanese spotted them.

Upon arriving in Broome, which Hasselo (2001) states occurred at ca. 0700hrs, he began to look for a suitable spot to anchor and witnessed the chaotic scene on Roebuck Bay. After they stopped, people were urged outside to take in the fresh breeze while sitting on the sponsons under the shade of the wings. Hasselo went to the rear of the flying boat to supervise the children and make sure they didn’t fall into the water by accident. Soon he would be pushing them into the water to save their lives! They were not anchored long when the Japanese arrived. From Hasselo’s account, the Japanese were spotted before they attacked the flying boat, which gave them a few precious seconds, for the people to escape. It also gave Hasselo time to man the machinegun in the tail turret of the Dornier. The attack on the X-1 is described and Hasselo clearly fired back at the Zeros.

Interestingly, Hasselo states that the X-1 did not burn, but was holed by machinegun and cannon fire from the Zeros. He was in the flying boat for a considerable amount of time, before it took on a list that made it impossible to train the machinegun on the Japanese aircraft. Hasselo abandoned ship when the water began to rise, but not before he scored several non-fatal hits on the Zeros. He was himself slightly wounded by shrapnel.
Taking off his shoes, Hasselo dived into the water. There he gave encouragement to an unknown boy [Jacques van der Zande] to keep swimming for the shore. The boy soon tired, but Hasselo and the X-1’s second pilot, Jan van Persie who was swimming in the same direction, offered help. The trio were fortunately soon picked-up by the Nicol Bay. Hasselo (2001) believes that he wouldn’t have survived if the Nicol Bay had not arrived just in time; he had no sleep for two days and was quickly tiring in the water while supporting the child. More people were hauled aboard the Nicol Bay before it made its way to the jetty, where Hasselo was treated for his wounds.

The only other photograph of the flying boat’s crew is of Hubrecht Boslooper (Series number: B78. Control symbol: 1954/Boslooper H., NAA) (Photo. 6.11). He had been at the Dutch Naval School in Surabaya in 1941 with Rudolf Idzerda and later trained at Corpus Christi, Texas in 1943. Boslooper graduated with a further navigation qualification in 1943 and was then transferred to the RAN, which was involved in the subsequent Catalina ferry operations. He spent the remainder of the war in China Bay and was remembered as having a ‘very pleasant personality’. What happened to him post war is unknown (Laan, 1943; Ward et al., 1982:174; Idzerda, R., pers. comm., 18 August 2006).

Hasselo did not know anyone else on the X-1 except for van Persie. Van Persie’s family were also on board, including his wife, Johanna (Photo. 6.12), his mother-in-law (Johanna’s mother) Mrs Tietje van der Zande and his 10 year old brother-in-law Jacques (Jags) van der Zande (Johanna’s brother) (Series number: A12508. Control symbol: 16/2621, NAA; Series number: PP246/4, Control symbol: Dutch/van de Zande T, NAA). Jan van Persie’s account, which was provided by his son, Rudd van Persie, in 2005 is presented in Appendix 6.5. It gives a graphic description of the hectic events in Java prior to the evacuation and also appears to contradict Hasselo’s reference to the condition of the X-1 after it had first been attacked.

There are several significant points in van Persie’s narrative. He claims the X-1 did burn, despite Hasselo’s recollections to the contrary. Archaeological research of the X-1’s wreck site should be able to determine whose version is correct. Perhaps both are i.e., the X-1 did burn, but only moments before it sank. Other significant aspects of van Persie’s account shows:

- The X-1 was close to the shore and or the jetty
- That it anchored near other flying boats
- Other people in the water are identified i.e., his wife and brother-in-law who Hasselo had helped to stay afloat
- An estimation of how many were killed

There are three other accounts of the loss of the X-1 and these are a civilian, Mrs Sara Koens (Photo. 6.13 - Photo. 6.14) and a further two recollections from military personnel, Jan Willem Piers (Photo. 6.15) and Jan Ruiter, both of whom were highly skilled ground staff whose jobs were to keep the flying boats operational. These versions will be discussed together. The air raid account by Sara Koens contains particular information on the circumstances of the loss
of the Piers family as well as that from Jan Ruiter. In a letter to the Broome Historical Society Museum in February 1978, Elly Husiman (maiden name Koens, remarried 1994 as Doeland-Koens), the daughter of Simon and Sara Koens who, with her brother Piet, were all aboard the X-1 on its final flight to Broome.

She relates that the X-1 was moving to find a mooring/anchorage when it was attacked. However, van Persie’s and Hasselo’s accounts record that the flying boat had at least stopped and was anchored for a short amount of time. Whether or not the machine was moving at the time of its loss, again could possibly be determined by an archaeological investigation of the
wreck; suffice to say for the moment that the X-1 was not on Roebuck Bay very long before it was sent to the bottom.

In an unaddressed letter, probably to Mervyn Prime, Koens (1978) recounts her escape to Australia with her husband, Simon and their two children. The account highlights a number of
significant factors that are of interest to archaeologists, namely: the range of material objects these people chose to carry with them at a moment’s notice and where in Roebuck Bay the wreck of the X-1 may be:

We went back to Lake Garatie [sic], 12 o’clock was departing time. (midnight) departed from a river. The trip to Broome was uneventful. Until we landed in Broome. The motors were still running and we were cruising to berth the plane at the wall [jetty?] When Simon opened the door to stand on the wing and have a smoke (which was his habit) and at that same moment the Japs were overhead shooting at the planes already at the moorings [my emphasis].

Death of Piers’ son [my title]: Simon automatically jumped in the water yelling out the Japs are here, out, at the same moment realizing we were in the plane and getting two schapnell [sic] wounds in the arm and cheek, within seconds we were out of the plane. Piet and one of the Piers boys went out the back of the plane. The Piers boy was shot before he reached the water, and Piet safely came up after his dive. I manage to keep us together and swim away from the burning wreck, I remember looking back and seeing Mrs. Piers hanging on to the burning wreckage with her smallest son unable to swim. Mr. Piers trying desperately to get back to her with no hope. It was difficult to keep us together occasionally swimming under burning oil and Simon only able to swim with one arm. I heard Elly scream something grabbed her arm and was pulling her under, I went to her and manage to shake it off, but it grabbed me on the leg, after shaking furiously it let go. After 2 ½ hours in the water we were picked up, with a motor boat. The horror that we saw in the boat is just to much to put on paper, people burnt shot crying out for their loved ones (Koens, 1978).

Sara Koen’s detailed account provides several important clues for archaeologists, for instance, to corroborate the location data for the wreck of the X-1(see Chapter 8). The machine had just arrived and was probably relatively close to the jetty. However, there is no mention of the machine catching fire or of how it sank. Perhaps the most significant aspect of Koen’s (1978) correspondence, however, is the list of personnel on board the aircraft at the time of its loss, including data on others from other flying boats and those that made the beach landing (Table 6.1 – Table 6.3). Note the erroneous inclusion of the van der Tols in Table 6.3 (see Prime, 2003:42). Margaretha and her daughter Toosje van der Tol arrived in Broome and then flew on to Port Hedland in the Y-71 on 6 March 1942 (Staal, 2004:146 and 156). Both had been smuggled on the flying boat by Koos van der Tol, an MLD member. His daughter’s feet poking out of a tarpauline that hid them, however, were later spotted by the flying boat’s crew, but they did not turn back. Koos van der Tol arrived in Australia via Broome, but on 9 March 1942 in the hybrid Y-3.

The final account of the X-1 is that of Willy Piers, who wrote to Mervyn Prime on 16 March 2000. Willy Piers is the grandson of Jan Willem Piers (born 22 February 1902 in Haarlem, The Netherlands, called Jan). Willy Piers’ father was Jan Willem Piers (born 18 April 1923 in Den Helder, The Netherlands, called Jantje [Little John]). He appears standing next to his father in Photograph 6.15. He was not on the fatal flight because he had previously enlisted in the Royal Netherlands East Indies Army (KNIL) and was made a POW by the Japanese when Java fell. While in captivity he endured extreme suffering, working at such places as the Thai-Burma railway. He survived his internment with severe physical and mental scars and did not hear
Table 6.1 People on the X-1 (after Huisman, 1978)

<table>
<thead>
<tr>
<th>Name</th>
<th>Occupation</th>
<th>Status 1978</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan van Persie</td>
<td>Co-pilot</td>
<td>Holland</td>
</tr>
<tr>
<td>Johanna van Persie</td>
<td>Wife</td>
<td>Holland</td>
</tr>
<tr>
<td>Mrs. v/d Zande</td>
<td>mother of Johanna Persie</td>
<td>Holland</td>
</tr>
<tr>
<td>Jack v.d. Zande</td>
<td>son of Mrs. V/d Zande</td>
<td>Holland</td>
</tr>
<tr>
<td>Simon Johannes Koens</td>
<td>Tech Air Crew</td>
<td>Brisbane</td>
</tr>
<tr>
<td>Sara Koens</td>
<td>Wife</td>
<td>Brisbane</td>
</tr>
<tr>
<td>Piet Koens</td>
<td>Son born 1929</td>
<td>Canada</td>
</tr>
<tr>
<td>Elly Koens</td>
<td>Daughter born 1931</td>
<td>Brisbane</td>
</tr>
<tr>
<td>Jan Piers</td>
<td>Air crew</td>
<td>Holland</td>
</tr>
<tr>
<td>Mrs. Piers</td>
<td>Wife</td>
<td>drowned</td>
</tr>
<tr>
<td>2 sons</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6.2 Some of the passengers in the Catalinas (after Huisman, 1978)

<table>
<thead>
<tr>
<th>Name</th>
<th>Occupation</th>
<th>Status 1978</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roelof Wijngaarden</td>
<td>Air Crew mechanic</td>
<td>Holland</td>
</tr>
<tr>
<td>Imkiena Wijngaarden</td>
<td>Wife</td>
<td>Holland</td>
</tr>
<tr>
<td>Klaas Wijngaarden</td>
<td>Son</td>
<td>Holland</td>
</tr>
<tr>
<td>Jo Polak</td>
<td>Pilot</td>
<td>Holland</td>
</tr>
<tr>
<td>Mrs. Polak</td>
<td>Wife</td>
<td>Holland</td>
</tr>
<tr>
<td>Lea Polak</td>
<td>Daughter</td>
<td>Holland</td>
</tr>
<tr>
<td>Lokman</td>
<td>Pilot</td>
<td>Holland</td>
</tr>
<tr>
<td>Mrs. Lokman &amp; 5 children</td>
<td>Wife</td>
<td>drowned</td>
</tr>
</tbody>
</table>

Table 6.3 Some of the people who made the beach landing (after Huisman, 1978)

<table>
<thead>
<tr>
<th>Name</th>
<th>Occupation</th>
<th>Status 1978</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frank v/d Plassche</td>
<td>Pilot</td>
<td>Holland</td>
</tr>
<tr>
<td>Mrs. v/d Plassche</td>
<td>Wife</td>
<td>Holland</td>
</tr>
<tr>
<td>Frank v/d Plassche Jr.</td>
<td>Son</td>
<td>Holland</td>
</tr>
<tr>
<td>Jan Lipplaa</td>
<td>Pilot</td>
<td>Holland</td>
</tr>
<tr>
<td>Mrs. Lipplaa</td>
<td>Wife</td>
<td>Holland</td>
</tr>
<tr>
<td>Hedy Lipplaa</td>
<td>daughter</td>
<td>Holland</td>
</tr>
<tr>
<td>Group Com. Sjerp</td>
<td></td>
<td>Holland</td>
</tr>
<tr>
<td>Mrs. v/d Tol</td>
<td></td>
<td>Holland</td>
</tr>
<tr>
<td>Koos v/d Tol</td>
<td>daughter</td>
<td>Holland</td>
</tr>
</tbody>
</table>

about the loss of his mother and two younger brothers in Broome until after he was liberated. Jan later served in No. 321 Squadron RAF in China Bay Ceylon, servicing Catalinas (Photo. 6.16 and Fig. 6.1). His service record, presented in Appendix 6.6, gives insight into the Dornier delivery programme to the NEI. He remarried in 1945 in Ceylon and had a second family and settled in England. Jan’s second family did not know of the existence of his first family until 2001. Jan died in 1967 and his second wife died in 1998. Jan and Jantje had a falling out and the two barely communicated. The son from Jan’s second marriage, Neville Raymond Piers, recounts what he discovered about his grandmother in a letter from Elly Doeland-Koens. The letter reads:
Photograph 6.16  Jan Willem Piers (middle row, seated, fourth from left) with other 321 Squadron personnel in Ceylon. Jan Ruiter is marked ‘1’ (Photo. courtesy Neville Piers via Willy Piers, 2006).

Figure 6.1  Identification papers for Jan Willem Piers (courtesy Neville Piers, 2004).
Your grandfather like my father were always on the Catalinas flying around all the Islands looking for survivors and information regarding the Japanese. It would happen that their plane would also be shot at with the result that the crew would bail out. So on the particular morning when we landed or were in the process of landing as we were on the water but still cruising towards the other planes which were already there. And what seemed to be the natural thing to do for the crew like my father and your grandfather was to open the door and get out on the wings for a smoke As they stood there on the wing they saw these planes coming over at first thinking they were friendly, but quickly realised they were Japs shooting at all the planes, first instinct was for them to jump into the ocean, and then realised they had family on board. So screams came from all directions for us to get out and jump into the water. As my mother jumped in I followed then mum realised that your grandmother was hanging on to the wing with a child around her neck, She screamed out to your grandfather ‘Jan je vrouw je vrouw’ [Jan, your woman, your woman] both tried to swim back but the current is so strong there, that neither could reach her. The tide just carried us out. My father was also wounded so mum went to his aid, but not before she watched your grandmother being burned alive ... (Piers, N., pers. comm., 2 February 2004).

Jan Ruiter’s widow (Nettie) recounts that her husband often told her what happened to the Piers family. After seeing a story about the Broome air raid in a local paper with Willy’s name and address, Mrs Ruiter contacted him and described further what happened to his uncles and grandmother on the X-1. The flying boat was already on fire, but it would seem Mrs Piers and her two sons remained on board:

Jan Ruiter happily survived the raid, but he has told his wife very often: ‘I will not forget the screaming and the crying of the poor man who was calling for his wife and children. Not for the rest of my life.’ My grandfather had jumped into the water and tried to persuade his wife and children to do the same, but my grandmother couldn’t swim and was afraid to jump, also because there was fire everywhere. She decided to stay on the flying boat (probably near the opening of the door) and was holding her sons against her. My grandfather didn’t want to leave his family, he even tried to get on the boat again that was already burning (according to Jan Ruiter the flames looked a bit like the flames you can see when phosphorus is burning), but the current was too strong. Two members of the crew had to take him away from the boat by violence. Thanks to these men my grandfather reached the shore but he has been crying and screaming all of the time.

Jan Ruiter remembered that even under water you could hear the noise and feel the pressure of the Japanese bullets.

Although I never told this story to my dad I was able to check some details with him. My grandfather was a reasonable swimmer, but at that time he was probably unable to swim, because of the emotions. My grandmother couldn’t swim because she was very afraid of water, in a panicking way. This had an influence on the boys, because she was already afraid when the boys went out for a swim. My uncles could swim, but my grandmother was holding them tight. She always used to say, when I die, I will die together with my boys (Piers, W., pers. comm., 8 February 2006).

The account elaborates on the letter sent to Prime in the 1970s. Clearly there was a fire on the X-1, but whether this contributed to the aircraft’s loss is unknown. The flying boat must have remained afloat long enough for Hasselo to man the tail turret. The previous accounts and this recent one from Jan Ruiter also state what happened to Jan’s two sons: Cornelis was probably shot while jumping out of the flying boat and Frans probably drowned with his mother. However, exactly how they died is still not entirely certain, since the Ruiter and
Koen’s account do not agree on whether Mrs Piers and her sons were on the flying boat, or had managed to jump. Probably it was the former given Mrs Piers’s fear of water (see Appendix 6.18).

Only the three members of the Piers family were recorded as having been killed when the X-1 was attacked. These are the only known casualties. There may have been others, but their names were not recorded. The traumatic loss of Jan’s first family, most probably attributed in some way to the split between father and surviving son. Surprisingly, it was while Willy was doing research on the air raid that contact was made again. The air raid, in effect, was the common factor that brought the two families into contact again.

Willy believes Jan blamed himself for the loss of his wife Cornelia and their two sons. Recounting from memories of what Jantje had told him as a child, Willy relates the following story of a family split, only to be reunited (and introduced) in 2000. The commonality between the two families (in the Netherlands and England) is the loss of Jan’s flying boat in Broome with the resulting death of Piers family members:

When Neville received this letter he wasn’t upset, he was completely shocked! He didn’t know anything about this part of the life of his father.

I was just in time, but only just. In 2000 my father and Neville (as you understand by now Neville and I have the same age, but he is my uncle) met each other for the very first time before my dad passed away in 2001. I still think it is a shame that the two brothers have known each other for a very short time…

When the Japanese occupied Java my father decided to fly to Broome with my mother and my two brothers. When they arrived the commander decided to break the radio silence (against the wish of my father). After about ten minutes the Japanese arrived and my mother and brothers were killed. My father has buried them himself on the beach at Broome, with his bare hands. Fragments of the shot down flying boat were used as crosses, to mark the places where people were buried.

For a better understanding of the family story it is important to know that my grandfather felt very guilty about what happened in Broome. In the first place it was his decision to take his family to Broome and in the second place they died aboard the flying boat he was responsible for as a member of the crew. I know that he has never forgiven himself for this ‘mistake’.

My grandfather also held the commander responsible for the arrival of the Japanese airplanes. When he met his commander a few days later he gave him a beating. Normally my grandfather would have ended in jail because of this act of insubordination, but under the given circumstances my grandfather was forgiven for what he did. My dad has tortured himself the rest of his life with this aspect of the story: if the radio silence would not have been broken by the commander, then my family would be still alive.

Actually it is this part of the story I never trusted. I couldn’t believe that the Japanese were there by coincidence, without an obvious reason, and that they decided to shoot the aircraft after they heard the radio signals that morning (Piers, W., pers. comm., 22 February 2004).
The loss of the X-1 devastated one particular family. The flying boat’s loss, however, has had a positive outcome linking living people to a wreck in Roebuck Bay. The other Dornier losses, as will be shown in the following accounts, did not involve such a tragic loss of women and children.

6.3.3  The flying boat that wanted to leave ... without its crew – loss of the X-3
The loss of the X-3 almost has an ironic aspect. An underestimation of the tidal range in Broome saw the flying boat drift back towards Java, after its anchor failed to hold. It was thankfully not carrying any refugees and none of its crew was killed at the time of its loss. It would have been a different story if the aircraft had taken-off, but at the time of the air raid, the machine was evidently taxiing to leave. The account of its loss is related below in the words of its pilot, E.J.H. Smitshuysen (Photo. 6.17):

Morokrembangan was the big naval airbase near Soerabaya. As [we] were bombed practically every morning by Japanese “Betty” bombers, all operational aircraft were posted to secret locations, on rivers, swamps and lakes.

When the Japanese landed on Java we took off with three Dorniers at midnight from the river at Lenkong on the 1st of March. Flight leader was LTCDR Stegeman. After an 8 and a half hour flight we landed in Broome.

We refuelled on the 2nd of march [sic] and added 10 cans of fuel as we were supposed to cross Australia the next day. The open cans were stowed in the gangway.

When I returned to the bay on the morning of march 3rd, my plane had disappeared. This was due to the tide and the currents. Fortunately, it anchored again in the outer bay.
With a rubber raft I went to the aircraft, along with the two flight engineers.

I had just started the three engines and was taxiing [sic] away when all of a sudden a zero dived at me shooting. We were hit and on fire. With the open cans of fuel, we got out as quickly as possible.

We were picked up later by a motorboat.

Finally, as mine was the only flying boat in the outer bay, the conclusion is that the wreckage of the flying boat in the outer bay is that of the X-3 (Smitshuysen, courtesy Weerts, S., pers. comm., 24 January 2003).

The Dornier X-3, from the account above, is most likely to be an outlier in the geographic distribution of flying boat wreck sites in Roebuck Bay. Most of the flying boats are believed to be grouped together, but how far the X-3 taxied from the main group before it was sunk, is unknown. This and the account of the X-1 moving in towards the jetty, are the only references to a flying boat not at anchor or on moorings.

6.3.4  The Lieutenant and his family, surviving the loss of the X-20
There are no first hand accounts of the sinking of the X-20. However, the son of the flying boat’s captain recounts how his father (LTZV 2 Bastiaan Sjerp) had saved him (Photo. 6.18 and Photo. 6.19). David Sjerp who was only 16 months old at the time of the air raid, but he remembers the account that was related to him by his father:
CHAPTER 6: THE ARMADA’S FINI RESIDUUM


Photograph 6.18  X-20 crew: LTZV 2 Bastiaan Sjerp (Photo. courtesy David Sjerp, 2005).

The flight to Broome probably was uneventful and the next day, after the aircraft was refuelled, people were waiting for further instructions. Then the raid came and we ended up in the water. My mother was not a good swimmer and had she not been helped by one or two crew members of my dad she would have drowned. On the contrary my father was a very good swimmer and took care of me ... I was told that his wedding ring kept going over his knuckles and to be able to keep me he had to throw it away and never ever wanted a replacement ring ... My parents did not, to the best of my knowledge, write anything down that survived until now.

... in late 2001 I decided to go to Broome to take part in the 60th commemoration of the event. Via Internet I got in contact with the Broome Historical Society and to cut a long story short: I was there (again) on March 3, 2002! Chance would have it that at that particular time it was spring tide and a taxi driver told us (my wife and myself) that it was possible to walk out into the bay to some of the wrecks. So we got ourselves a guide (again a little story in itself) and indeed we arrived at a wreck which I could definitely identify as of a Dornier flying boat. At that time I did not really react emotionally.

The next morning I re-read part of the booklet (version 1992) of the raid written by M. Prime. And on the basis of an eyewitness account (see page 11, the first paragraph) it suddenly dawned on me that the wreck that I had touched the day before very, very probably was the wreck of our aircraft! It was one of the wrecks that are indicated in Prime’s book as that of an unidentified D0-24 aircraft (see page 44 the position marked as 1). That hit me! ... (Sjerp, D., pers. comm., 19 February 2005).

It was with regret that the author had to inform Sjerp that he had not actually ‘touched’ the flying boat that he was on. David had been taken to the Catalina wreck, closest to the shore. The location of the X-20 is still to be verified, as argued in this thesis.

Only two military personnel were most likely to have been killed, although three are shown. Sgt Heblij is also listed as having been on board the Dornier X-20 (although spelt ‘Hebley’), but given that his family are recorded to have been on the Catalina, it is most probable that he too would have travelled on that same aircraft and not on the X-20. Only a finger with a wedding ring was found of Johannes Blommert (Photo. 6.20) (Catherina Blommert, pers. comm., 31 May, 2008).

6.3.5 Wrong place, wrong time – loss of the X-23 and the X-28 from GVT-6

Arguably, all the Allied aircraft in Broome were in the wrong place at the wrong time, but for one aircraft there is no doubt: the Dornier X-23 flew off course en route. An account of the loss of the X-23 has been recorded by the then MILSGT Rudolf. J. Idzerda, who later became a Rear Admiral and Flag Officer in the KM (Photo. 6.21). Photograph 6.22 is of Ir. J.E. Woltjer, who was also one of the flying boat’s crew. Idzerda was the X-23’s navigator, and his account of the arrival and loss of the aircraft is transcribed and translated from the Dutch in Appendix 6.7 (see also Idzerda, 2006). The X-23 made first landfall at Port Hedland after its final flight from Java, but was ordered to fly to Broome to obtain fuel to enable it to reach Melbourne. A more detailed account of the loss of this flying boat states that the X-23 may have been the last flying boat to be destroyed:

That ‘my’ X 23 was fairly intact doesn’t surprise me. The Zeros initially overlooked it due to the fact that as late arrivals we had anchored somewhat apart from the others and also,
our plane was partly shielded from view under the heavy pall of smoke from the burning craft closer to shore. But then one of the Zeros suddenly turned to finish the job – very professionally … (Idzerda, R., pers. comm., 21 February 2005).

Interestingly, Idzerda (2006) did not know the serial number of Dornier that he served in at Broome. The data placing him on the aircraft comes from a crew list provided by Staal.
The circumstances of his death are unknown. The only other data for the aircraft’s final flight is a crew list. Like the other aircraft in GVT-6, it carried no refugees.

6.3.6 Heavy casualties – loss of the Y-59, Y-60, Y-67 and Y-70 from GVT-17

6.3.6.1 Catalina Y-59 and Y-60

The MLD Catalinas suffered the greatest number of casualties during the air raid, probably because of the Catalina’s greater carrying capacity – more people could physically fit inside a Catalina than a Dornier and it is said that refugees were packed in like sardines in a can. References to the loss of the Catalinas have been found for three machines, with the exception of the Y-60. The first account related below is from Frits van Hulssen (Photo. 6.23 and Photo. 6.24), who recounts the final moments in Java and Broome and the loss of the Y-59, in response to questions posed to him by Staal in 1995:

On the morning of 2nd March 1942 we were told to get the aircraft of GVT-17 (Y-59, Y-60, Y-67) ready for flying operations and await orders.

No crewmember knew what was going on, but there were lots of people milling about. How they got to know this spot near Toeloeng Agoeng, God knows.

At about 5.30 pm we were suddenly told to take on board as many people (refugees) as possible.

Each aircraft captain was handed over a sealed envelope to be opened when airborne. A written order revealed that we were to fly to Broome on 3 March [and set] up a new flying boat base from where to resume flying operations. We took off at dusk, 6.30 pm, and arrived Broome the next morning.

The attack began about 9.30 am. The Zeros (nine of them) were coming from land towards Roebuck Bay. The period the Zeros were over Broome, I imagine was about 20 minutes. I have no recollections of the attack itself. Every thing happened so quickly. But I remember that the Zeros made a slow fly past with open cockpits. I was injured in the raid but at the time it seemed to be a super facial [sic] injury only, which later became a granted and a lumbar laminecto was performed. Of the crew the 2nd pilot van Emmerik and 2nd engineer Spreeuw were killed instantly and went in the Y-59. I believe that a number of the passengers were killed by bullets and many were wounded. The situation after the attack was chaos. Many survivors were trying to swim to shore, but by this time tide was really going out. My recollection of that day is total shambles. It was noon when I was picked up. It was impossible to swim to shore because of the strong outward current. Thus remaining in our position was the only hope to be rescued and that is what many of the survivors did (Hulssen via Staal, P., pers. comm., 26 August 2003).
Hulssen’s narrative of the air raid and the days prior are further detailed in Appendix 6.8. In these accounts, no mention is made of how the Y-59 sank and furthermore, he does not place the Y-70 in GVT-17. Many people were killed or injured on this flying boat. Hulssen is the last survivor of the Y-59’s final crew. Photographs have been sourced for some of the other crew and some of its passengers (see Photo. 6.25 – Photo. 6.28).

Peter’s (2006:131) provides data on Josine [Josina Alida?] van Aggeren, who lost both of her parents on the Y-59. Her parents’ names are spelt correctly as ‘Aggelen’ on their gravestones in Karrakatta cemetery and yet it is recorded that Josine was on a Dornier and not a Catalina.

Mentioned previously is the lack of an account from anyone aboard the Y-60. Crew and passenger details are the only data available on the flying boat’s final flight and loss (see Appendix 6.1). This data, however, is subject to interpretation. For instance, the reference to E.G.A. SPREW is most likely to be the same person as SPREEUW, who is listed as a crewmember on the Y-59. Hulssen believes that Spreeuw was on the Y-59 as he was that aircraft’s engineer. No contact with survivors of the Y-60 or their families has been made.

Significantly, the only reference to the flying boat in the NAA is the immigration papers for Klasina Polak. Her papers record that she was a passenger in the Y-60 (Series number: B6531, Control symbol: Polak Klasina, NAA) (Photo. 6.29). This and one other, are the only known direct mention in any of the NAA records that link the Broome air raid survivors with the machines that they flew in. However, there are many other records of people who had arrived...


prior to the air raid by land plane or by Short Empire flying boat, which directly links them to particular aircraft. There were three Polaks in the Y-60 and they all survived. The only other Y-60 passenger details are the immigration papers for Elizabeth Cathleen Höfelt, who is recorded to have been on board the aircraft with her husband and daughter, all of whom also survived (Series Number: B6531. Control symbol: Hofelt Elizabeth C., NAA; Series number: A12508. Control symbol: 20/973, NAA; Series number: PP246/4. Control symbol: Dutch/Hofelt E C., NAA (Photo. 6.30).

More data has been sourced on the Heblij family, who were on board the Y-60 when it sank, from an unpublished family history of a KNILM pilot, John Gyzemyter, who was a friend of the family. This family suffered the loss of the husband, Sgt Hendrik Johannes Heblij, a two-year-old child named Henny J., while the wife Corrie Heblij-Hooghuis was severely burnt (Photo. 6.31). Gyzemyter (n.d.) writes about his meeting with Corrie and states what had happened to her since the air raid:

In Sydney one of the KNILM ground engineers gave me an identification disc with the name Heblly on it. He thought he had heard me mentioning the name, and said he had found it in one of the Lockheeds which had ferried people, injured in the Broom [sic] disaster, to Perth. We did not know that the Hebllys had been amongst the group of Navy personnel in Broome, but now I decided to go to Navy Headquarters in St Kilda Road in Melbourne and make some enquiries, the next time Dr van Mook wanted to go there. That happened within the next few days. When I presented myself at Headquarters, one of the officers was Beugeling, one of my old flying instructors. I showed him the identification disk, and he confirmed that the Hebllys had indeed been on board one of the flying boats. His file showed that Henk, my old flying mate, had been killed. His son, aged two years, was missing, presumed killed, while Corrie, his wife was in hospital in Perth with severe burns. I told him that we would contact the hospital to find out how she was and how we could be of assistance. He appreciated that, and he showed me the wedding ring they had taken off Henk’s finger. He said if I wanted to sign for it, I could take it with me to give to Mrs Heblly at some future date.

… One day a letter came from Corrie Heblly, who was still in hospital in Perth, saying that she would be released soon, and that she would love to take up our invitation to come and stay with us in Sydney.

We made the necessary arrangements, and welcomed her into our apartment [sic] some days later. We had some difficult moments of course, but Corrie was very courageous and wanted to adjust to her circumstances as quickly as she could. Although her face was terribly disfigured, through being in the burning sea off Broome, she faced the world very bravely; and we, as well as our friends, gave her as much encouragement as we could.

… Corrie received an invitation from the Dutch Navy to travel to Port Jackson in the U.S.A., all expenses paid, where she could consult a plastic surgeon and skin graft specialists to see what could be done for her burn scars (Gyzemyter, n.d.:108, 114 and 115).

This account provides a vivid reminder of the impact the air raid had on some of the survivors. No further information is known about what became of Corrie, except that she remarried and that her last name became Speelman-Hooghuis.
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Photograph 6.31  Y-60 crew and passengers: ‘My old flying mate Henk Hebley, his wife Corrie and son Henny’. Scan of a photocopies photograph of SGTV Hendrik Johannes Heblij, his son Henny Heblij and wife Corrie Heblij-Hooghuis (Gyzemyter, n.d.-facing page 114).
6.3.6.2 Catalina Y-67

The loss of the Catalina Y-67 is the most detailed report of any of the flying boats. Four accounts are recorded from: 1) Isabelle Doorman-Heyligers (the second wife and widow of Rear Admiral Karel F.W. Doorman) (Photo. 6.32 and Photo. 6.33), her son 2) Theodore Doorman, who was six years old at the time of the air raid, 3) Lt Commander Henri Juta and 4) Robert Lacomblé.

Isabelle Doorman provides an insight of the horror she witnessed when her flying boat was attacked (Appendix 6.9). She states that the Y-67 exploded after being hit on the third attack and that it sank with many people still on board. The boy swimming with her son was Robert Lacomblé. Based on his mother’s account, Theo Doorman recounts what he knew of the air raid in an email to the author in early 2005:

In the afternoon of March, 2 we arrived at the lake where a line of Catalinas was laying with the tails hanging over the lakeshore, so we could climb into the planes through the blisters.

It was near sunset and our plane had trouble starting the engines. So I guess we were the last to take off. The plane was well filled with refugees. I remember shortly after take-off the sound of our own machine-gun fire which was probably standard testing procedure. For dinner we received spoons and ate hot pea soup straight from a pan. My mother and I slept in a bunk on port side of the cabin.

In the morning we arrived at Broome, landed on the water of Roebuck Bay and anchored parallel and well within sight of the pier on our port side. Nearby, between us and the pier, a fishing vessel lay at anchor. I remember playing in the area between the two blisters with the empty shells, my toy tin soldiers and a little model fighter plane with collapsible wheels. A hatch in the floor of the tail section was open, so we could see the water. The inside of the plane ... seemed empty and apparently the crew were sitting and waiting on the wing.

Suddenly there was shouting, the roar of engines and the rattle of bullets piercing the aluminium. My mother grabbed me and shoved me under the bunk. Shortly after, when the plane was on fire, we climbed up to the flight deck. Mrs. Lacomblé, the wife of the Captain of H.N.M.S. “De Ruyter”, had been wounded and lay huddled on the starboard side. Apparently she told my mother to go on as she could not swim anyhow. We jumped into the water from a hatch near the starboard pilot seat. I lost sight of my mother and I was sucked under the burning starboard wing by a fairly heavy current. I managed to swim free and after a while I saw another boy, who later appeared to be 12-year old Rob Lacomblé. Together we dived underwater whenever we heard the roar of the Zeros.

After a time suddenly we were picked up by an American barge. I remember sitting on the port side and below me on the floor, a man with his back completely open and bleeding. After a while my mother was hauled into the barge. When she took my handkerchief out of my right pocket to treat a little wound it appeared to be soaked in blood. A machine gun bullet had pierced my trousers and had brazed my hip. After landing at the pier we took place on a little flat train to the foot of the pier. From there we went to the airfield where I remember walking past several smouldering wrecks. An Australian passenger plane took us to Port Hedland where we were lodged in a little hotel (with a candy-store opposite). About a week later we flew to Perth in Dutch Lockheeds and from there we sailed to Melbourne by S.S. “Swarte Hondt” of the K.P.M. (Doorman, T., pers. comm., 8 February 2005).
Several key pieces of information are contained within this narration. Where on the flying boat Theo and his mother were during the attack may help explain the origin of some unprovenanced artefacts that were recovered from the wrecks in Roebuck Bay ca. 1970’s/1980’s. More on these artefacts and their significance is discussed in Chapter 7.

Theo’s account helps to identify who was in Broome during the attack. The description of his future stepfather’s arrival is partially correct. J.E. Woltjer, for instance, was indeed a crewmember on the X-23, however, his flying boat did not hit a reef in Port Hedland, but flew to Broome.

Robert Lacomblé (deceased 1 December 2006), via his daughter Robin, relates the loss of the Y-67 from a slightly different perspective than Theo Doorman’s (Appendix 6.10). Like Theo, Rob lost his father on the De Ruyter during the battle of the Java Sea, but also he lost his mother in Broome when the Y-67 sank. The days leading up to the departure are described. Interestingly, the flying boat’s captain circled his heavily laden machine, to create waves, so that the flying boat could leap into the air off the crest of a wave and only just made it past the trees surrounding the flooded paddy field they were on. The account, however, does not show how the flying boat may have sank, after its flight to Broome (which for a young boy’s first flight seemed magical), but it does corroborate Doorman’s statement that he had been swimming with Lacomblé. Several diagnostic personal possessions are recorded to have been carried aboard, which if discovered would help identify the wreck of the Y-67. According to the account, the Y-67 had already alighted and was not in flight at the time of the air raid, as Lacomblé’s version suggests.
A further significant factor is Lacomblé’s description of an American barge providing assistance, thus linking his account to Juta’s of an American vessel also coming to their assistance. Given that the Jutas were near to the Doormans and Robert (they were on the same flying boat), their narratives further validate by Juta’s account.

Juta’s description of the loss of Y-67 is similarly detailed to any of the flying boat losses discussed so far (Appendix 6.11). No photographs have been found for Juta, but a passport photograph has survived of his wife, Lucie Juta, whom he discusses in his account of the air raid (Photo. 6.34), he also states Lacomblé’s mother drowned while trying to exit the aircraft, when items of her clothing caught on a waist blister machinegun as the flying boat sank. The reference to his being served tinned fruit juice from an American vessel after being rescued is similar to another account of the rescue, by an anonymous author (Xav, 1944). Lacomblé’s and Juta’s accounts, therefore, help link the references of the Y-67’s loss.

Juta’s account provides further vital evidence on how the flying boats may have sunk. Juta’s statement that the Y-67 adopted a ‘crazy angle’ during its descent to the bottom is significant in explaining the condition of the flying boat wrecks today. More on this will be discussed in Chapter 9, but suffice to say for now Y-67 probably sank according to certain ‘laws of sinking’ typical of Catalinas whose fuel tanks have caught fire. Juta, however, is clearly wrong in describing certain aspects of the raid, such as the loss of the LB-30. It would seem that a common misconception was beginning to emerge as to how the LB-30 was actually lost.

Family groups generally travelled together on the same aircraft. W.A.F. Plassche is, therefore, included in this aircraft because her husband and son are recorded to have been on the flying boat also (Series number: B6531. Control symbol: van de Plassche, NAA) (Photo. 6.35 and Photo. 6.36). Likewise, Heddy Lipplaa is added to the Y-67 passenger crew list because his mother (Photo. 6.37) is on the plane. Furthermore, Dutch names have been occasionally either misspelt or anglicised. The spelling of the name Lipplaa is recorded in the NAA, but often as ‘Lipla’ (Series number: B6531, Control symbol: Left Commonwealth/1938 - 1945/Lipplaa, NAA).

6.3.6.3 Catalina Y-70

The only account of the loss of the Y-70 is from Albert van Vliet, a crew member, who did not even know which flying boat he was on at the time of the attack (Photo. 6.38). Van Hulssen told him years later. Van Vliet, not a regular crew member, was posted to Y-70 on its final flight (Souter, 2003:119).

Appendix 6.13 is a transcript of van Vliet’s 2001 interview with Prospero Productions. The suddenness of the attack gave him no time to do anything except to slide off the cockpit canopy where he was sitting. Significantly, van Vliet mentions that the Y-70 caught fire, but not during the first attack:
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… on the first run the plane didn’t catch [sic] fire, I thought, maybe I swim back to the plane and then the next Zero came over and caught fire and that was it and we start swimming to the jetty (Vliet, 2001).

The Japanese pilots, it would appear, launched simultaneous attacks on the flying boats. The occupants of Y-70 had no warning until bullets started flying around them. The lack of warning and the large number of people on board, resulted in this flying boat recording the second largest number of casualties, after the Y-59.

There were eight people from the Lokman family on board the aircraft, two parents and six children (Staal, P. pers. comm., 26 August 2003). The loss of four of their six children is perhaps the greatest recorded tragedy of the air raid. Their father, J.H. Lokman, requested their death certificates in 1950, but was denied because their bodies were not recovered (Series number: MP742/1/0. Control symbol: 98/1/100, NAA) (Photo. 6.39). This archival document, however, does show that the family was on the Y-70. Jeannette Lokman survived the air raid with two of her sons (Photo. 6.40). She is believed to have had another son and a daughter after the war. She died in the Netherlands in 1989 (Piers, W., pers. comm., 17 January 2006). Mrs Jeannette Lokman is shown in Photograph 6.41 with her with 11-year-old son, Johan Hendrik Jr., although the NAA does not record his name (Photo. 6.41).

The photographic evidence relating to the two Bruyn women is interesting. According to the criteria used to track down people in the NAA files, both women were registered in Australia on 5 March 1942, and are hence, believed to have been at Broome for the air raid. Hendrika Katherine Elisabeth de Bruyn-Blom (born 7 September 1911) was most definitely in Broome for the air raid and she did arrive by flying boat (Photo. 6.42). She was married to A.J. de Bruijn (Photo. 6.43). They lost a child (Arina Anke de Bruyn ) in the air raid and later adopted Josina Aggelen who lost both her parents also in the air raid. A statement on Mrs. de Bruyn-Blom’s N.S.W. immigration papers declares the following:

No papers of identification produced. Stated all papers destroyed at Broome on 3rd March, 1942 when Japanese planes attacked and destroyed Dutch Naval Plane in which she was travelling (Series number: SP11/12. Control symbol: Dutch/Bruyn-Blom, NAA).
Because Grand Rapids offered them a peaceful haven where they might build new friendship ties among persons who speak their native tongue, three Dutch mothers have come here with their children after perilous and tragic flight from The Netherlands East Indies ahead of the Jap invaders. MRS. LODEWYK VAN SERMONDT, seated at left, holds on her lap her son, HERMAN, born soon after the refugees reached Australia. Standing beside her mother is INEKE. MRS. GARRET DIEDRICH, seated, pointing to the flight route in an atlas, and her children, EVERT (on floor) and GERDA, standing beside her, went for three days without food when they finally reached northern Australia. MRS. JOHAN HENDRIK LOKMAN, standing in rear, lost four of her six children in the escape and was herself wounded. Beside her are her two sons, JOHAN HENDRIK, JR., left, and JOHNNY. Husbands of the three women are still fighting with the Dutch air force’ (Unknown newspaper clipping via Piers, W., pers. comm., 9 January, 2006).
Hendrika Johanna de Bruyn-Gieles (born 1904) and her son Klaas (aged nine) were recorded by Perth immigration officials on 5 March 1942 (Photo. 6.44). Despite the absence of data, she meets the criteria for having been in Broome (ie, date of registration and nationality) and, therefore, may also have been in Broome during the air raid. The only clue on her immigration papers of their presence in Broome is that all of her papers are said to have been lost, presumably when their flying boat sank (Series number: PP246/4. Control symbol: Dutch/de Bruyn, H.J., NAA). She and her son are also erroneously recorded to have been French (Series number: A12508. Control symbol: 20/510, NAA).

Determining that both these women were on the flying boats during the air raid helps explain another problem with the de Bruyns; too many were listed. There must have been two de Bruyn families that travelled on different flying boats: the Y-59 and the Y-70, but which family travelled on which flying boat is unknown. If this was the case, there should be three de Bruyns per flying boat. The passenger list for the Y-59 also includes two additional children called de Bruyn: Matthijs and Adrianus. They both survived the air raid. Personnel numbers 36 – 39 in Appendix 6.1, therefore, are all from the same family, but it is uncertain which flying boat they were on.

Two photographs have been discovered showing Rear Admiral Doorman and Isabelle, the Hendrikse couple, KTZ Pieter Johannes Hendrikse and his wife Jenny Hendrikse-van der Putte, and KLTZ Jorinus Schraver at a dinner party in Java on 4 May 1940. The occasion was a farewell dinner for Admiral Doorman, who was retiring from his command of the Dutch Fleet Air Arm in the NEI. The dinner was held at the navy club called ‘Modderlust’ at MVK Morrokrembangan (Photo. 6.45 and Photo. 6.46). The Hendrikse couple died probably as a result of drowning. Jenny could not swim and it was reported that she and Pieter were found dead, together in an embrace (Doorman, J.M., pers. comm., 19 February 2005).

6.3.7 FV-N’s final battle – lost without a shot being fired?
The battle scarred FV-N and its crew, it seems, were not prepared to go down without a fight. The X-1 is confidently believed to have fired back at its attackers. This was the only known flying boat to do so, but there are several references to FV-N having returned fire too and there is some archaeological evidence to support this.
One reference to the RAF Catalina engaging the Japanese shows that the machine had at least let off a few rounds of its waist blister Lewis machinegun: ‘Dickson’s reaction was identical to Cummings’: ‘Those crazy Yanks were putting on a show again.’ Then, in his own words, “All Hell broke loose!” Retaliating flashed through his mind; a Lewis gun was firing from a nearby RAF Catalina’ (Rorrison, 1992:253). LAC Jimmy Bowden (Photo. 6.47) recorded an account of the aircraft’s loss. He was in Hollywood Hospital, Perth, recovering from his wounds at the time:

**Narrative:** L.A.C. Bowden stated: - We had arrived from JAVA at 0600 hours (WST) on the morning of March 3, 1942, having flown all night. Soon after our arrival we tried to get a dinghy to take us to the shore, but without success. A motor-boat from a ship
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Photograph 6.45 Y-67 and Y-70 passengers: ‘Left to right: Mrs. Hendrikse (died at Broome), my grandfather captain K.W.F.M. Doorman, his (second) wife I.J.J.J. Doorman-Heijligers (mother of Theo, survived Broome), commander P.J. Hendrikse, he had the command of the navy airfield Morokrembangan at Soerabaja from 1937-1942 and was ... killed at Broome’ (Photo. courtesy Jan Maarten Doorman,

Photograph 6.46 Y-67 and Y-70 passengers: Hendrikse giving a speech, Admiral Doorman is seated to his right. Officer to the left of Hendrikse with his eyes closed is commander J. Schraver, second in command of Morokrembangan (Photo. courtesy Jan Maarten Doorman, 2005). Note: Schraver’s wife, Marie Caroline Schraver-Kam, is seated far right, at end of the table.

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[Childs?] anchored close to where we were moored passed within a hundred yards but completely ignored our signals.

I emphasise [sic] this because I am convinced that if we had been able to get ashore casualties would have been infinitely less. This also applied to other a/c moored not far from us.

The attack: About 0935, so far as I can remember, I was in the inner cabin of the a/c when I heard the sound of high-revving a/c engines. Fl/Lt Garnell, the captain of our a/c, called to me that he did not know whether they were ours or not, and ordered me to man the rear gun.

I hurried to do so, but only succeeded in placing a magazine on the gun when I was hit five times: across the bridge of the nose, twice in the left shoulder, once in my right hand, and once in my right thigh. I saw the enemy a/c not thirty feet away from me. It was a Navy ‘O’ Type.

Swift and sudden: The attack was carried out so great a speed and at such low level that almost as soon as I realised I had been hit, the Japanese a/c was out of sight again, appearing to climb almost vertically.

They apparently dived, fired and climbed again all in a matter of seconds.

Catalina sinks: The Catalina was badly holed and began to sink. I think she also caught fire but I cannot be sure of that because I dived overboard and started the long swim to shore. I was hampered from my wounded shoulder. I had covered about a mile and a half when I was picked up by a boat which put off from the shore.

Casualties: We had aboard a woman named Mrs Schneider. She told me later that Fl/Lt Garnell fell dead from a bullet in the heart while trying to ... shield her with his body. The second pilot [Man Mohan Singh] was also hit, but managed to get overboard. He could not swim however, and was drowned.

Of the remainder of the crew, two others were killed, a Sergeant W/T operator, and an air gunner.

Another flying boat [which] was moored near us suffered heavily too. Most of its casualties were civilians.

I personally helped to drag the bodies of four or five children from the water. We tried to bring ashore several women who had been wounded, jumped overboard, and had been drowned.

I did not see the Japanese a/c that was shot down. This must have happened while I was in the water. I lost a lot of blood and my recollection in consequence is hazy.
Had we had the slightest warning of impending attack we could at least have got our guns into action as flak. As it was we were merely a sitting target (Bowden, 1942).

Bowden’s (1942) account contradicts Rorrison’s (1992:253) statement that an RAF Catalina had opened fire on the Japanese. It would appear that Bowden did not have any time to fire from the waist blister positions and that he was wounded while attempting to do so. The above quote also shows that there was another passenger on board, who was not recorded in Castle (2001) or Campbell and Lovell (2000). The mysterious Mrs Schneider, who is believed to have been Dutch, is also not listed in any of the official Dutch sources concerning the air raid (see Appendix 2.2). Her account graphically describes the death of Garnell, the Catalina’s captain, and suggests she herself survived the air raid. Her presence on the flying boat would also suggest that she joined the aircraft at Cilacap and not from the Tung Song. Only three women are recorded to have boarded the ship; Mrs Schneider is not listed as one those (Campbell and Lovell, 2000:82-83, 99-100).

No further mention is made of this woman in any of the accounts of the air raid. However, Bowden (in Campbell and Lovell, 2000:215-216) elaborates on how she got on board, also confirming that FV-N’s second crew was not loaded at sea from the Tung Song, but from Cilacap:

Near the wharf at Tjilatjap, Sgt Doig and I saw a car with a revolver and ammunition on the seat and a pair of flying boots on the floor. Since it seemed to be abandoned and we were leaving, he took the gun and I took the flying boots. Soon afterwards both crews boarded the aircraft and we prepared to fly to Australia.

As we prepared to cast off a rowing boat approached a blister with a lady on board. She pleaded to be taken with us. What with a full load of fuel and a double crew on board we were unwilling to add to the weight, but after a lot of argument she was allowed on board. We managed to take off after two very long attempts and set course for Australia. On 3 March 1942 we touched down at Broome.

The tide was out a long way, and so we were unable to go ashore. At about 9 a.m. I was sitting up in the engineer’s seat when I saw some aircraft approaching. Suddenly one of them broke off and attacked a Dornier flying boat, one of four [sic, but perhaps he did not see the X-3] in the bay. It went up flames. The same fate befell the others. I dashed to the starboard gun position in the blister. Unfortunately our lady passenger was against my ammunition pans, completely frozen with fear. I tried to move her but it was hopeless – she wouldn’t budge. Two of the others picked her up and dumped her overboard.

I grabbed a couple of pans and as I was loading my guns a Zero attacked the aircraft next to ours. It did a half loop, half rolled and came at us. It all happened so fast I didn’t have time to cock the guns and release the safety catches. He fired his cannons and we just went up on flames. Inside and out. He was using explosive ammo.

As I couldn’t swim I tried to make my way forward to get a life jacket, but was met by others trying to get out. One sergeant shouted to me to get the hell out, then picked me up and threw me overboard. I went straight down. I was wearing the flying boots which I had found abandoned in Tjilatjap. I managed to roll myself into a ball and get my boots off.

It was then that I realised I had been hit. My nose and left forearm where bleeding badly. I shouted for help. Sergeant Doig came to my rescue but gave up when the weight in his
pocket of the Colt .45 and the ammo for it threatened to drag him under. He wasn’t going to be parted from that Colt .45!

Two other chaps came to help and took off all my clothes, and in doing so pushed my head under water. I was convinced that I was going to drown. In those dire circumstances I prayed for help. Hitherto, like many of us, I was not a particularly religious man. Suddenly I was able to swim perfectly well on my own. So much so that when we saw a boat coming towards us, my two rescuers couldn’t keep up with me. I heard one say to the other, ‘Look at that bastard. He said he couldn’t swim!’

I was hauled aboard a pearl fishing boat and we started to look for survivors. First we pulled our Dutch lady out. She had been hit in the back but seemed OK. Next a beautiful young lady was pulled out but, although I did all I knew to save her, she died. Then to my horror saw three very young children face down in the water, clinging to each other. They were all dead. I cried (Bowden, quoted in Campbell and Lovell, 2000:215-216).

This seems a more recent account and is significantly different to the one Bowden gave in 1942. For instance, he had first stated that FV-N did not catch fire, but was holed in many places. The latter version suggests the aircraft exploded in flames. Perhaps both recollections are in part correct: FV-N exploded after Bowden had hit the water, and not while he was in the aircraft. Mrs Schneider must have survived her injuries; otherwise the account of Garnell’s death would not have been conveyed to Bowden.

Photograph 6.48 depicts a group of 205 Sqn members in Singapore, during the Pacific war. The photograph shows many RAF members who were aboard FV-N when in Broome. This is the only known photograph of P/O Man Mohan Singh. His surviving flight crew remembered him and in the following quote, describes the tolerances flight crews must have had of each other:

W/Cdr. Burgess was a man who might well be described as of a gentle nature. An excellent Administrator his personality successfully welded a mixed grill of Englishmen, Canadians, Australians, New Zealanders and ultimately a Sikh into an excellent and happy team (AIR27/125, TNA).

Singh’s introduction to the squadron resulted in a lesson in cultural tolerance. His crewmembers adjusted accordingly:

The additional pilots were mostly from England but included amongst them was one Indian, P/O Singh. This officer rather upset Headquarters operations when, shortly after his arrival, the crew to which he belonged was ordered to reach Datum point in the China Sea at first light. The usual procedures were set in train and at the appropriate time prior to take-off, transport duly arrived at the Officers’ Mess for F/O Garnell and P/O Singh. Singh was not available. It appears that his religious duties called upon him to pray for at least one hour on that particular morning and nothing would shift him. It was far too late to arrange for any other aircraft to take over the duties so that Headquarters, despite its increasing impatience, had to accept the situation. Needless to say, appropriate arrangements were made on future occasions. Singh was in one of the aircraft which was destroyed at Broome. Not a very good swimmer, he was assisted until he was able to gain support from some floating timber. Subsequently he disappeared and must necessarily have drowned. Ultimately, not only the original nine Catalinas, but all of the seven reinforcing Catalinas with the exception of Graham’s aircraft were destroyed in the Far Eastern waters (AIR27/125, TNA).
CHAPTER 6: THE ARMADA'S FINIS RESIDUUM


Group Captain Alex Jardine (pers. comm., 30 January 2005) remembers Singh too. Singh’s turban apparently took an hour to arrange in the mornings and gave him trouble when trying to fit headphones over it. Singh was well liked by his comrades and his loss was regarded with great sadness. The account erroneously suggests that the transfer of FV-N’s second crew occurred at sea from Tung Song:

Before Tamblyn set course for Australia, however, he sent a message to his friend, Flt Lt Hugh Garnell, suggesting he and his crew leave the Tung Song and join him aboard his aircraft for the flight to Broome, which they did. In the event the departure was further delayed owing to an hour-long prayer ritual fervently undertaken by Garnell’s Sikh copilot, Plt Off Man Mohan Singh, which was to have disastrous consequences (Shores et al. 1992b:303). [An unfair assessment - an hour’s delay wouldn’t have made any difference]

None of the bodies of FV-N’s casualties was recovered, but their personal details are presented in Appendix 6.14. All personnel on board FV-N are listed in Table 6.4, which has been compiled after years of exhaustive research: ‘Finding out who the casualties were was fairly easy, but it took the authors five years to discover the names of all the other aircrew aboard the two R.A.F. Catalinas’ (Campbell and Lovell, 2000:215). Those from 205 Sqn who arrived in Melbourne by train, including Tung Song and RAF Catalinas passengers in Broome, are listed in Appendix 6.15.

6.3.8 No one on board – fate of FV-W, #6 and #7
It is difficult to reconstruct the loss of aircraft if no one was aboard to witness how they were attacked. Three of the flying boats lost at Broome fit into this category; the RAF’s FV-W and the two USN Catalinas #6 and #7. Noted in the previous chapter, FV-W arrived the day before, but the USN machines were in Broome for at least a week before the air raid; grounded due to lack of maintenance. Campbell and Lovell (2000:215) record the experience of FV-W’s navigator, Len Kenihan, as he waited at the end of the jetty for a boat to take him out to his aircraft, but there is no account from the American aircrews as to where or how their Catalinas sank.

The only details on this ‘no one on board’ category are crew and passenger lists. It is not known which particular aircrew were on #6 and #7, apart from Brown and Deede. Table 6.5 lists those aboard FV-W. Table 6.6 lists all of the USN Catalina crews.

6.3.9 Arabian Nights and the Seagull - description and loss/description and survival respectively
Flying in a KNILM Lockheed Lodestar, an anonymous writer with the pseudonym of Jan van Apeldoorn (1943) witnessed the final moments of Arabian Nights (Appendix 6.16). It took off from the aerodrome just as the Japanese arrived and was promptly shot down. The aircraft is believed to have crashed off Gantheaume Point. Apeldoorn’s account details the break-up of the aircraft as it hit the water and records some on board survived the crash. Only two people are said to have made it ashore, one of whom died before being rescued:
### Table 6.4 Personnel on FV-N at time of loss (Prime, 1977)

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank</th>
<th>Serial Number</th>
<th>Occupation</th>
<th>Fate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tamblyn H.</td>
<td>F/Lt</td>
<td>85697</td>
<td>Captain</td>
<td>(1),(2)</td>
</tr>
<tr>
<td>Foot W.E.</td>
<td>Ft/Sgt</td>
<td>748055</td>
<td>2nd Pilot</td>
<td>(2)*</td>
</tr>
<tr>
<td>Barnes J.M.</td>
<td>Observer/Navigator</td>
<td>15310</td>
<td>P/O</td>
<td>(1), (2)</td>
</tr>
<tr>
<td>Miles S.J.</td>
<td>FISgt</td>
<td>?</td>
<td>Navigator/Observer</td>
<td>*</td>
</tr>
<tr>
<td>Dalton J.</td>
<td>Sgt</td>
<td>955738</td>
<td>W/AG</td>
<td>(2)*</td>
</tr>
<tr>
<td>Doig T.R.G.</td>
<td>Sgt</td>
<td>572748</td>
<td>Fitter</td>
<td>(2)*</td>
</tr>
<tr>
<td>McKiernan C.</td>
<td>Sgt</td>
<td>407437</td>
<td>Air Observer</td>
<td>killed*</td>
</tr>
</tbody>
</table>

**First crew**

**Second crew as passengers**

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank</th>
<th>Serial Number</th>
<th>Occupation</th>
<th>Fate</th>
</tr>
</thead>
<tbody>
<tr>
<td>H. Garnell</td>
<td>FILt</td>
<td></td>
<td>(captain-pilot)</td>
<td>killed (1)</td>
</tr>
<tr>
<td>M.M. Singh</td>
<td>FIO</td>
<td></td>
<td>2nd Pilot</td>
<td>drowned (1)</td>
</tr>
<tr>
<td>W.G. Markland</td>
<td>Sgt</td>
<td></td>
<td>W/AG</td>
<td>killed*</td>
</tr>
<tr>
<td>H. Ellerby</td>
<td>FISgt</td>
<td></td>
<td>W/AG?</td>
<td>Killed*</td>
</tr>
<tr>
<td>J. Morris</td>
<td>LAC</td>
<td></td>
<td>Engineer</td>
<td>killed*</td>
</tr>
<tr>
<td>A.P.J. Bowden</td>
<td>LAC</td>
<td></td>
<td>Engineer</td>
<td>*</td>
</tr>
<tr>
<td>Pozzi</td>
<td>Sgt</td>
<td>573938</td>
<td>WAG</td>
<td>*</td>
</tr>
<tr>
<td>Schneider</td>
<td>Mrs</td>
<td></td>
<td>Female passenger</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
(1) arrived in Singapore on 30/12/41 on one of the three Catalinas sent from Scotland.
(2) on train from Fremantle to Melbourne.
* these men may well have also arrived in Singapore on 30/12/41.

### Table 6.5 Personnel assigned to FV-W, but ashore at time of loss (Prime, 1977)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Serial Number</th>
<th>Name</th>
<th>Occupation</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>F/Lt</td>
<td>33498</td>
<td>Lowe J.C.</td>
<td>Captain</td>
<td>(1), (2)</td>
</tr>
<tr>
<td>P/O</td>
<td></td>
<td>Crudden T.F.J.</td>
<td>2nd Pilot</td>
<td>(1), (2)</td>
</tr>
<tr>
<td>Sgt</td>
<td>407437</td>
<td>Kenihan V.L (M.L.?)</td>
<td>Navigator</td>
<td>(2)*</td>
</tr>
<tr>
<td>Sgt [LAC?]</td>
<td>1051880</td>
<td>Wiseman J.</td>
<td>WAG</td>
<td>(2)*</td>
</tr>
<tr>
<td>Sgt [Fitter IIE?]</td>
<td>981214</td>
<td>Brewer P.</td>
<td>Engineer</td>
<td>(3)*</td>
</tr>
<tr>
<td>LAC [Fitter IIE?]</td>
<td>940570</td>
<td>Wilday A.E.</td>
<td>Engineer</td>
<td>(2)*</td>
</tr>
<tr>
<td>?</td>
<td></td>
<td></td>
<td></td>
<td>An unnamed gunner</td>
</tr>
<tr>
<td>W/Cdr</td>
<td></td>
<td>Councell R.B.</td>
<td>Passenger</td>
<td>(2)</td>
</tr>
<tr>
<td>Sgt</td>
<td>407553</td>
<td>Pimlott K.R.</td>
<td>Passenger- (Navigator from Garnell’s crew)</td>
<td>(2)</td>
</tr>
</tbody>
</table>

Notes:
(1) arrived in Singapore on 30/12/41 on one of the three Catalinas sent from Scotland.
(2) on train from Fremantle to Melbourne.
* these men may well have also arrived in Singapore on 30/12/41.
Yet, if we could not admire the coast we were approaching, we could feel the highest admiration for the navigational skill of our under-officer pilot. He brought us across the waste of water to the waste of land as truly as though he had been flying on a radio directional beam. There, dead ahead, was the pearling port of Broome, smoke plumes identifying it as the only habitable place on this section of the coastline.

‘Gosh!’ exclaimed the U.S. Air Corps engineer. ‘To look at this place, you’d never guess they needed to light fires to keep warm’.

‘Talking of fires’, I said, ‘There’s a boat on fire down there. No, on the starboard bow. Look, you can see the portholes’.

‘That’s no boat,’ came from the air mechanic. ‘It’s a plane on the water. The wings are gone. Must have been a crack up, but there’s something mighty queer about it’.

The pilot thought so, too, and brought the plane in a descending turn to permit a closer inspection. The first run gave the evidence, but a second was made for confirmation. The plane was a Liberator and it had been shot down. Six of the crew were swimming round in the shark infested sea.

Those smoke plumes at Broome, five miles farther on, now explained themselves. The Japs had been over; might still be over! All eyes raked the sky for signs hostile planes.

Two things saved us. The delay caused at the Bandoeng airstrip by the recalcitrant starboard motor, and the fact that, after shooting up the Broome airfield and flying-boat base, the Japanese pilots swung away to chase the only machine to escape the holocaust – a float plane from the U.S. cruiser Houston, herself earlier sunk in Java waters (Apeldoorn, 1943:213-214 and 215).
The Seagull’s (BUAERNO #9961) origin is described in Shores et al. (1992b), but in error. The Seagull was on board the USS *Houston* (CA-30, ex-CL-30), which was part of the Timor convoy from Darwin (Powell 1988:74; Dorny, 2005d). The convoy was spotted, however, and attacked by Japanese bombers on 15 February 1942. Prior to the attack, *Houston* sent off her observation aircraft, lest they be a fire hazard should the ship receive a hit. There appears to be two incidents of the ship being attacked and sending off its Seagulls. The first was recorded to have been on 4 February 1942 when Lt Tom Payne’s Seagull was catapulted prior to an attack by Japanese bombers. Ensign Walter Winslow is quoted in Shores et al. (1992b:160; cf. Winslow, 1982) indicating that Lt Jack Lamade and his rear-seat man, RM2c Robert L. Tubbs were stranded on board theirs:

4 February 1942. Wednesday. On the approach of the bombers, *Houston* had attempted to launch her SOC-3 scout floatplanes, but only that flown by Lt Tom Payne had got clear before the guns opened fire. A second floatplane, with the crew strapped in, had suffered an engine malfunction and, as Ens Walter Winslow later wrote:

‘Jack (Lt Jack Lamade, the pilot) was having one hell of a time. Concussion from one of the guns positioned just behind Jack’s plane instantly ripped away most of the fabric from its tail section. He (and his gunner) sat there helpless as the bombers moved closer.

After the first attack Jack (and his gunner) scrambled out of the plane, pretty shaken. It had been nerve-racking sitting in the cockpit while friends blew the plane to bits with concussion and the enemy dropped bombs around them.

Jack’s damaged plane was quickly stripped and, because it was a fire hazard, pushed over the side. Even with a dead engine and pilotless, the little seaplane looked as though she might make a perfect landing, but just at the last moment the nose of her pontoon dug into a wave, and she cart-wheeled, sinking almost immediately’ (Shores et al., 1992b:158 and 160).

Amazingly, the same thing happened prior to the attack on the Timor convoy, but this time it was Ens Winslow’s aircraft that was blasted to pieces while sitting in the catapult cradle, waiting to be launched. There appears to be an inconsistency with which pilots got off the *Houston* and at what date, otherwise within two weeks the *Houston* would have destroyed two of its own Seagulls! A study of the *Houston*’s deck-log, if it has survived, may help solve this confusion:

With the threat of Allied reinforcements possibly landing on Timor, the Japanese High Command designated the convoy a priority target. At 1100 on 16 February, Japanese bombers were sighted off *Houston*’s starboard bow, and her two SOC-3s were ordered off, the crews briefed to fly to Broome. Lt Jack Lamade was catapulted just prior to the attack, and reached Broome safely but, as Ens Winslow waited to be launched, the cruiser’s big guns opened fire, the concussion shredding the fabric covering the tailplane and rear fuselage of his aircraft’! (Shores et al., 1992b:174).

Regardless of which Seagull had been blasted on board the *Houston*, Lamade and Tubbs did make it to Broome. In an interview given by him ca. 1984, Lamade states they had been in Broome for approximately two weeks (which agrees with the data that he was from the *Houston*, ex-Timor convoy, Darwin) and had assisted in the refuelling of flying boats for the evacuation flights. He also states that he had taken off from the ship near Lombok, which is
inconsistent with him having come off the *Houston* while in the Timor convoy. Perhaps then the Seagull was on the *Houston* prior to the Battle of the Java Sea on 27 February 1942, which was much closer to Lombok than Timor? The *Houston* was sunk during that battle.

The *Childs*, meanwhile, entered port. Lamade and Captain John Pratt, of the *Childs*, knew each other. Pratt told Lamade to meet him at Exmouth Gulf after the ship left Broome. Shortly after Lamade and Tubbs prepared for the flight to Exmouth, when the tide in Broome was sufficiently high to refloat his stranded Seagull. Lamade explains he had considerable trouble getting airborne with Tubbs suffering from dengue fever (Lamade, 1984).

Mervyn Prime interviewed Mr. Bill Ellies, who was in Broome at the time of the air raid, on Sunday 24 July 1977. Ellies (1977) erroneously describes the fate of Lamade’s Seagull [which he actually refers to as a ‘Grumman J2F floatplane] as having sunk in Matilda Bay (Perth), since it was slightly damaged, presumably as a result of combat damage with Kudo’s Zero. However, the aircraft is recorded to have made subsequent landings at Exmouth Gulf (where it met the *Childs*), Shark Bay and Geraldton before reaching Perth and, therefore, could not have been damaged to the extent Ellies claimed (Dorny, 2005d). Actually this aircraft was most likely destroyed with the U.S.S. *Indianapolis* (CA-35) on 30 July 1945 (LeBaron, 2005).

### 6.4 Results and Conclusions

I am not going to stand there [and say] there is that [flying boat], and that one, there is that one … there is other things you have to think about at the moment, like the people on board … (Hasselo, 2001).

Henk Hasselo’s comments shows how archaeologists should not expect to obtain specific details of the location of aircraft in Roebuck Bay from the survivors – they were too busy responding to the situation to concern themselves with the historical record. The flying boats came to Broome in groups from different places in Java. Most aircrew did not know who was in Broome and which flying boats had arrived until after they were rescued.

However, the accounts of the survivors (aircrew and passengers) in this chapter have provided insights into the air raid, which significantly change the previous perceptions of events. The destruction of the flying boats on Roebuck Bay was a battle, albeit a one-sided battle, with many Allied casualties. The Japanese were lucky to escape with minimal losses, which was mainly due to their having taken the Allies by complete surprise. With a modicum of warning they could at least have had a chance to unload their passengers and ready their weapons for some sort of defence.

This chapter has identified most of the people in Broome during the air raid, from documented sources and from data provided by the survivors themselves. In order to achieve these aims it was necessary to establish criteria to identify people, who came to Australia on 3 March 1942 (see also Appendix 6.17). This and other criteria helped determine the Broome survivors. The
research in this chapter is the first examination of archival records in Australia relating to the refugees. Additional imagery of some of the crew and passengers has been discovered, which illustrates the human face of the event. Records relating to these people in the NAA also helped establish the circumstances of their arrival in Australia, but the details of the aircraft that they were on were rarely, if at all, recorded. History, for these machines, stopped when they sank.

Previously, many errors regarding the NEI Dutch were recorded. This chapter has helped to address these problems, such as determining the correct spelling of names and the number of family members/aircrew per flying boat. After researching this data, it was then possible to reconstruct the air raid event as each machine was being attacked. Figure 6.2 graphically describes the distribution of known personnel per flying boat and shows the MLD Catalinas sustained the greatest casualties. Total numbers do not include three unknown NEI women and two unknown children, who are buried at Karrakatta.

The analysis in this chapter, suggests 182 people were on the MLD flying boats. Fifty-three of these were known to have been killed; 33 are missing believed killed. These casualty figures are quite likely to be even higher, if the unknown people on board the flying boats are taken into account. The number of missing is based on the Karrakatta Cemetery data i.e., those who are known to have died, but are not buried in Karrakatta. However, claiming that these people are missing because they are not buried in Karrakatta is incorrect.

The remains of the Dutch and a Malay killed in the second air raid, including three people from the Carnot Bay DC-3, were exhumed from the Broome war cemetery on 23 January 1950. Twenty-six people were re-interred at Karrakatta on 10 February 1950 (including the Carnot Bay and second air raid victims) and a further four unknown were re-interred in Indonesia (Allan, 1976). An unknown number were re-interred in the Netherlands. The total number of people buried in Broome prior to the re-interment is unknown. More bodies were added to the Broome cemetery in a decomposed and unidentifiable state, days after the air raid (Prime, 1976). Four were re-interred in Java’s Menteng Pulu, Batavia cemetery. These were: C.F.J. Albinus, J.F.M. Blaauw, H. J. Heblij and D.A. Hendriksz (Piers, W., pers. comm., 17 January 2006). Several of the names listed in the Crommelin report (1948 – see Appendix 2.1), which were recorded as missing, are now buried at Karrakatta, but after subtracting these finds from Crommelin’s total (48 originally), a verifiable figure comes to 32 missing people.

Table 6.7 lists the names of known people still missing in Roebuck Bay, including those possibly interred in Indonesia or the Netherlands. One person, Hendriksz, originally buried at Broome, was exhumed, re-interred in Java, exhumed again and re-interred in Karrakatta (Tyler, 1987:118). An unknown number of those originally buried in Broome were re-interred in the Netherlands.

The survivors’ accounts have important implications regarding how archaeologists and historians can interpret the wreck sites of the flying boats today and, in some instances, predict
Figure 6.2 Number of Broome Dutch casualties per aircraft. Note: 'other' represents the unidentified bodies of three women (originally five were found, but two were identified later as Borsch-Baas and A. Kramer) and two children (< 4 and 12 months) at Karrakatta Cemetery (Verheij, G., pers. comm., 5 July 2004).
where they may be located. It would seem that all the flying boats caught fire during their depositional phase in Roebuck Bay. Some machines, such as A18-10, sank in a particular way. For instance, should archaeologists predict, if an Empire boat wreck is found with a severed starboard wing that that wreck site would most likely be that of A18-10, based on the accounts of its loss? This will be further discussed in light of the archaeological evidence presented in Chapter 9. Personnel accounts of the air raid, therefore, have provided important clues that nonetheless need testing in the field.

<table>
<thead>
<tr>
<th>Table 6.7</th>
<th>Known people missing (presumed dead) from the MLD flying boats</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>X-23</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>MILMATRTLG Houten C.L. van † [body found, perhaps re-buried ?]</td>
</tr>
<tr>
<td><strong>X-20</strong></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>SGTSCHR Blommert J. †</td>
</tr>
<tr>
<td>3.</td>
<td>KONSTMT Walters J.H. †</td>
</tr>
<tr>
<td>4.</td>
<td>KPLTLG Kweekstra A. †</td>
</tr>
<tr>
<td><strong>Y-59</strong></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>MILMATRVGMR Albinus C.F.J. †</td>
</tr>
<tr>
<td>6.</td>
<td>LTZ 2 KMR Borsch M. †</td>
</tr>
<tr>
<td>7.</td>
<td>SGTVGMR Emmerik B. van †</td>
</tr>
<tr>
<td>8.</td>
<td>VGTLGMT [FE2?] Spreeuw E.G.A. †</td>
</tr>
<tr>
<td>9.</td>
<td>Child Bruijn de A.A. †</td>
</tr>
<tr>
<td>10.</td>
<td>Child Borsch J.G. †,</td>
</tr>
<tr>
<td>11.</td>
<td>Child Emmerik B.A.P. van †</td>
</tr>
<tr>
<td>12.</td>
<td>Doctor Vermeij J. † (Doctor van J.M. Arendz)</td>
</tr>
<tr>
<td><strong>Y-60</strong></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Child Heblij H.J. †</td>
</tr>
<tr>
<td>14.</td>
<td>Mr Hoogvliet - Duijtschoff J.C. †</td>
</tr>
<tr>
<td>15.</td>
<td>Child? Visser F.J. †</td>
</tr>
<tr>
<td><strong>Y-67</strong></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>HOMSD Kramer A.A.C. †</td>
</tr>
<tr>
<td>17.</td>
<td>Child Amsterdam C.F. †</td>
</tr>
<tr>
<td>18.</td>
<td>Child Amsterdam J.H. †</td>
</tr>
<tr>
<td>19.</td>
<td>Child Amsterdam M.A. †</td>
</tr>
<tr>
<td>20.</td>
<td>Mr Kramer-Maat W.T. †</td>
</tr>
<tr>
<td>21.</td>
<td>Doctor Kramer †</td>
</tr>
<tr>
<td>22.</td>
<td>Mr Lacomblé-Silvergieter L.E. †</td>
</tr>
<tr>
<td><strong>Y-70</strong></td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>SGTVGMR Brandenburg L.C. †</td>
</tr>
<tr>
<td>24.</td>
<td>KLTZ Schraver J. †</td>
</tr>
<tr>
<td>25.</td>
<td>Child Brandenburg †</td>
</tr>
<tr>
<td>26.</td>
<td>Child Lokman Hendrika Adriana †</td>
</tr>
<tr>
<td>27.</td>
<td>Child Lokman Jeannette †</td>
</tr>
<tr>
<td>28.</td>
<td>Child Lokman Jan †</td>
</tr>
<tr>
<td>29.</td>
<td>Child Lokman Johannes †</td>
</tr>
<tr>
<td>30.</td>
<td>Mr Schraver-Kam M.C. †</td>
</tr>
</tbody>
</table>
CHAPTER 7: MATERIAL CULTURE – previous studies, a survey of flying boat artefacts collected 1979-2001

7.1 Introduction

Dismally, and as is usual with antiquities which ‘surface’ without known provenance or history, the research effort can only reconstruct with existing knowledge what might have been the lost archaeological context – rather than learning new knowledge from an actual context reliably reported (Chippindale, 2002:66).

This chapter summarises the results of a survey of artefacts collected from the WWII flying boat wreck sites in Roebuck Bay. The survey catalogues and interprets the artefacts from four Catalina (Site 11 and Site 26) and Dornier (Site 14 and Site 27) wreck sites that are exposed wholly or partially during SLW. These wreck sites, despite their high visibility, are not well known. Site 10 and Site 13, for instance, have not been previously publicised. It is established here that artefacts recovered from these sites reveal significant clues as to their identity and about the people that were on board at the time of loss.

Prior to the first archaeological excavations in 2001 by the WAMM, diagnostic artefacts had been removed from the flying boat wreck sites without recording provenance or documenting conservation support. Nevertheless, it is argued here that such artefactual material is still a useful resource. This chapter re-establishes the lost context of artefacts by examining evidence of the circumstances of their removal. Data from a well known yet unprovenanced collection are examined, together with information from an assemblage excavated by archaeologists from the WAMM. Using this combined approach brings non-contextualised material ‘into mainstream archaeological record systems’ (Holyoak, 2002:662). This will enable further archaeological research in Roebuck Bay to build upon established quantifiable data.

The unprovenanced artefact collection examined here, which will be referred to as the Stan Gajda Collection (after its collector. Note: his name is sometimes erroneously spelt as Gadja), is housed at the Royal Australian Air Force Association Aviation Heritage Museum at Bull Creek, Western Australia (AFAHM) and at the Broome Historical Society Museum (BHSM). The Gajda collection is the most publicised and significant unprovenanced collection of artefacts from the flying boat wreck sites. Despite the collection’s lack of recorded context, it still holds important clues and can assist the interpretation of the wreck sites in Roebuck Bay.

7.2 The first archaeological surveys and steps towards resource management

The first recorded archaeological investigations of aircraft wreck sites in Western Australia were made by Sledge (1978:61-62) from the WAMM, which aimed primarily at recording the extent of the maritime archaeological resource on the Australian northwest coast, but also included an inspection of the remains of the German seaplane Atlantis near Cape Bernier. Since the late 1970s, the WAMM has maintained a research interest in submerged aviation wreck
sites and activities were directed at locating the deeper water flying boats lost in Roebuck Bay. McCarthy (2002) summarises these research efforts in 1991, when a side scan sonar survey was conducted. The survey was hampered by equipment failure, but further work by Fugro Spatial Solutions Pty Ltd did discover an undisclosed number of wreck sites (McCarthy, 2002:9).

The WAMM’s research activities again focused on Broome when an opportunity arose to return there in 2001 for the making of a film documentary ‘Bay of Fire’ (Prospero Productions, 2002). The filming provided the necessary resources for another side scan sonar survey of Roebuck Bay, resulting in the discovery of many new cultural features.

The Western Australian Government, through the *Heritage of Western Australia Act 1990*, declared the Broome flying boat wreck sites as interim heritage places on 20 December 2002 (Government Gazette, 2002:6037) and permanent places on 17 April 2003. Arguably, the Broome flying boat wrecks had no effective legal protection previously, with only ‘a loose mix of legislative and management strategies … put into effect that have sufficed until recent times’ (McCarthy, 2002:9). It has taken over a decade of work to achieve their recognition as archaeological sites (McCarthy, 2002:10). The Western Australian initiative represents the first time that located submerged aircraft wreck sites are formally protected as heritage sites in Australia. The WAMM’s excavation of a submerged Catalina flying boat in Broome is significant in this respect, as it was the first time archaeological standards were applied to the recovery of aviation cultural material found in Roebuck Bay.

### 7.2.1 A history of salvage and the first archaeological excavation

The Broome flying boat wrecks have been the focus of attention for aircraft salvors and antiquarian collectors virtually since the day of their loss. A contemporary visitor to the wrecks, ironically, complained that not enough was salvaged initially, resulting in a waste of valuable resources:

> The raid of 3rd March did nearly two million pounds worth of damage. During the next three weeks not one individual of the various armed services visited Broome to undertake salvage. Thousands of pounds worth of material could be salvaged, particularly from the wrecked flying boats in the Bay – I, in company with two other officers of the Public Service salvaged two to three thousand pounds worth of valuable precision instruments including a bomb sight by Watts of London, valued at some hundreds of pounds. On one of the wrecked Catalina flying boats I found a complete set of Codes that would have been invaluable to the enemy. These particular codes were later destroyed but there would be many more in the other wrecked machines. Yet, no attempt was made to destroy or salvage them (Series: A1196, Control symbol: 15/501/247, NAA).

Group Captain H.N. Warren of the RAAF Metrological Service made these comments in 1942. Although leaving the wreck sites undisturbed in wartime was seen as a waste of resources, their abandonment and subsequent *in situ* preservation has left behind an archaeological assemblage at the wreck sites. A further account of the range of material left on the wreck sites (a chilling reminder of the human loss), is translated from the diary of a Mr. H. Neeb who...
was a Medical Officer 2nd Class in the KNIL during WWII. The diary was sent to the Head of (Dutch) Intelligence in Melbourne, but a copy was given to Theo Doorman by N. Neeb, the son of H. Neeb. It relates to Neeb’s escape from Timor to Australia, where he made landfall:

At 20.15 we arrived at the Beagle Bay Mission, 48’ South of Cape Leveque. Here all of us spent the night and the 5 April following morning, Easter (Sunday), we continued our journey. At 16.00 we had travelled the remaining 99’ to Broome and reported to C.O. Maj. Gibson. We were lodged at the hospital. 6-9 April Waiting for further transportation to the South we spent our days resting. On one of those days, at Low tide, some of us searched the wrecks of the Dutch East Indies’ and American seaplanes from Java, that were destroyed in the water about two weeks ago during a Japanese air attack. Looking for names and valuable objects we were deeply saddened by the eery [sic] surroundings. Rotting suitcases with men’s, women’s, and children’s clothing, bags, hats, shoes lay covered by a thin layer of mud in the barnacle encrusted destroyed airplanes. An eery and distressing monumental grave (Neeb, n.d.:8. Trans. Doorman, 2006).

Many artefacts have been removed over time from the wrecks and these represent a vast collection of unprovenanced material, ranging from military accoutrements, such as machine guns, to personal objects of some of the refugees and children’s toys. Aircraft parts too have been removed; engines and propellers are used today as terrestrial reminders of the air raid (Photo. 7.1 – Photo. 7.5). Peter Bibby, a local Broome historian, lists the objects that may be found around Broome in Appendix 7.1. The caption for the inset in Photograph 7.1 records how the Garstone brothers recovered a propeller, probably from one of the two Dorniers exposed at SLW. Its recovery was seen as a rescue mission from the sea to conserve the object, but not necessarily to preserve it:

Sea giving up its secrets

The sea near Broome is giving up its secrets due to the efforts of two brothers, John and Dick Garstone, and a colleague, Craig Kennedy.

John and Dick are at present salvaging the ship Adourin and recently they salvaged the remains of two Dutch flying boats that were shot down in 1942.

The engines of the aircraft were floated to the surface using big buoys, drums and chains and with the help of the oil exploration company, Bocal Pty Ltd.

The engines were attached to the drums at low tide and floated in on the high tide. It took six tides and three days to get them ashore.

One of the engines will be donated to the Broome Historical Society… (Broome Historical Society Museum).

Much, however, has been left behind in the archaeological record in Roebuck Bay, partly due to its location. One visitor to Broome during the 1970s and 1980s was aviation enthusiast, historian and aircraft restorer San Gajda (Photo. 7.6). Although he did not record his collection methods, or the location of the wreck sites he investigated, he had the foresight to leave part of his collection to the AFAHM and the BHSM. This has enabled studies such as this, which has managed to relocate some of the artefacts from the Dornier X-1. Tools were also recovered from a Dornier, which were stamped with the aircraft’s serial number (Photo. 7.7).
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S. Jung, Ph.D. thesis, CDU, Darwin: 

Photograph 7.1    The Taiji Street Dornier propeller (Photo: Jung 2003). Scale in 20 cms. Inset: the Garstone brothers with the propeller after salvage.

Photograph 7.2    The Short Street Catalina (?) engine (Photo: Jung 2003). Perhaps from B-17 Flying Fortress at aerodrome?

Photograph 7.3    The Broome airport Dornier propeller and engine, formerly in Bedford Park, Broome (Photo: Jung 2001).

Photograph 7.4    The Broome Hovercraft Tours’ Dornier engine (Photo: Jung 2003).

Photograph 7.5    The BHSM Dornier engine at the front of the BHSM (Photo: Jung 2006). Note: the engine is now at the rear of the museum in 2007.

Gajda (2003) also found diagnostic artefacts at other Dornier wreck sites, X-20 and X-23, but the precise location of those wrecks was not recorded, nor have the artefacts been cited for this study. According to copies of correspondence between the Consulaat der Nederlanden in Perth and the AFAHM, the Marinemuseum in Den Helder (the Netherlands) was supposed to have first choice of the artefacts recovered by Gajda in 1981. They were in fact asking for ‘up to a maximum of 1/3 (one third) of the total amount of articles salvaged’ (Claassen, 1980). However, Mr. Harry de Bles, the director of the maritime museum in Den Helder has since confirmed that the museum did not receive any artefacts (Kreuger, B., pers. comm., 28 March 2003).

Photograph 7.7 spanners recovered from a wreck site in Roebuck Bay, which identified it as the X-1, photographed at the AFAHM (Photo: Jung, 2002).
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Gajda (2003) also describes wrecks of RAF and MLD Catalinas, but does not record how he came to identify the RAF machine. One indication how he interpreted the MLD machine, however, is a flight instrument panel from a Catalina flying boat, which was cited at the AFAHM. The instruments are labelled in Dutch (Photo. 7.8 and Photo. 7.9). Given that there were four MLD Catalinas lost in Broome, which one the panel was obtained from was unknown, until recently.

7.3 Origins and early analysis of finds

The surviving artefacts can be categorised into two main groups: Class A artefacts that relate to the flying boats themselves ie, pieces of aircraft structure or items that would normally have been carried, necessary for the operation of the machine and Class B artefacts that consist of personal items of the crews and passengers. With the absence of paintwork and serial numbers, Class B artefacts, such as maintenance tools and domestic items in particular, were instead found to be useful in identifying particular wrecks. On MLD flying boats at least, domestic items now appear to have been routinely engraved, by hand, with the serial number of the aircraft they belonged to.

Gajda (1983) was the first to record that domestic items, such as eating utensils, held clues as to the identity of individual aircraft. He discovered this fact not in Roebuck Bay, but at Anna Plains Stations, south of Broome. One of the Dornier flying boats to escape from Java on the night of 2 March 1942 had missed Broome and had to alight on the sea. Its crew burned the aircraft the following morning, since they believed that the Japanese would land an invasion force soon and capture the stricken machine. This was the Dornier X-36. It was learnt that eating utensils from this wreck site were marked with the aircraft’s serial number, a useful indicator as to how the Broome wreck sites could be identified:

Recalling a story told to me by an elderly local identity, of items he had recovered from a Dornier wreck at Anna Plains station in 1942 – the plane was the X-36, and eating utensils were stamped with this number, I decided to carefully clean up some of the open-ended spanners in the hope that these too were marked in a similar manner (Gajda, 1983:52).

Likewise, some of the tools recovered from a Dornier wreck site in Roebuck Bay revealed the aircraft’s identity. Despite the crude ‘conservation’ treatment, the aircraft serial number could still be discerned on spanners that were recovered:

These tools were placed in an oven and heated up thoroughly, then quenched in cold water to remove the bulk of the marine growth, then into a tub of common vinegar for a couple of days in order to gently remove the remaining crusts and scale. Finally, wearing rubber gloves and armed with a stiff nylon scrubbing brush to give these tools their final clean-up, the very first spanner revealed the number X-1, etched into the metal. After a period of further cleaning all the other tools turned out to have the same number marked on them … This is also, as far as is known, the first time that one of the Broome aircraft wrecks has been positively identified … This was a fitting conclusion to an interesting salvage exercise and also answered if only partially the often asked question – “Which plane is which out there?” (Gajda, 1983:52).
It has been mentioned above that Gajda (2003) went on to identify other aircraft wrecks in Broome, but unfortunately many of the artefacts he found, on which he based his identifications, are lost. The diagnostic tools recovered from the Dornier X-1 have, however, been retained at the AFAHM. These artefacts were photographed and catalogued in 2002 as part of this current research. Compared with the extent of the material recovered by Gajda in 1981, it is apparent that much has since been lost or retained in private uncatalogued collections (Appendix 7.2). Moreover, similar diagnostic material was not found at the BHSM, which houses artefacts acquired from donations by ‘well intentioned Broome residents from years past’ (Howard, 1990). Mr. Bill Carswell, for example, donated items such as bullets, buttons, buckles, a torch, coins and part of a toy car. Which wreck site he collected those objects from, however, is not recorded.

7.3.1 The Stan Gajda collection re-interpreted

In 2003 the author was contacted by Stan Gajda, who had seen reference to archaeological fieldwork in Broome published on the Pacific Wrecks Database website (see http://www.pacificwrecks.com). He helped source the origins of the artefacts in Appendix 7.2 and in particular, the flight instrument panel from the then unknown MLD Catalina. Previously, it was not known which wreck site the panel was recovered from, but after viewing photographs taken by the WAMM team in 2001 of the Y-59, Gajda confirmed that that was the same wreck site he had recovered the panel from. Apart from a magneto and the pilot’s wheels, no other artefacts had been recovered and, as far as it is known, the wreck site has not been disturbed since (Gajda, S., pers. comm., 28 and 29 July 2003).

Similarly, the RAF Catalina was identified on the assumption that because objects found at the wreck site were labelled in English, rather than Dutch, that it must be RAF. Gajda was not aware that there were also USN Catalinas lost in Broome (Gajda, S., pers. comm., 31 July 2003), whose flight instrument panels and other labelled objects must also have been in
English. Despite this, engine diagnostics of the machine he identified confirms his hypothesis. Photographs taken of the wreck site, ca. 1942, show the propeller still attached to the port engine. Its spinner hub is of the later PBY-5 type, whereas the USN lost PBY-4s, with markedly different spinner arrangements (Jung 1996:28). Furthermore, the identification of this wreck site can, hypothetically, be narrowed down to a particular aircraft – FV-N. Given that FV-W was an ex-MLD machine (Y-54), its instruments, for instance, would have been labelled in Dutch (see Chapter 5).

Also mentioned above is the problem of how Gajda identified the Dornier X-23 (Photo. 7.10 and Photo. 7.11). No evidence has been published to verify the aircraft’s identity. Below is Gajda’s explanation on how he identified the X-23:

Another wreck that was probed for relic content was the Dornier just beyond the RAF Catalina that just about everybody goes to. The one the sextant was recovered from. This was also treated with the water pump and hose and was found to contain a very large amount of material which was largely left. Samples were brought out for conservation and restoration with the intention of adding to the Broome relic display at the Perth aviation museum. Some items subsequently cleaned very clearly had X-23 stamped on them, particularly a stainless bomb shackle made to attach to the wing externally (Gajda, S., pers. comm., 22 July 2003).

On MLD flying boats then, not only were eating utensils and tools marked with the aircraft’s serial number, but also components of the aircraft, Class A artefacts. The artefact responsible for the X-23’s identification, unfortunately, has since been lost. Despite this, a further detailed description of the artefact has been provided:

The X-23, I recovered a device about six inches long made in stainless steel that had quick-release, just like a bomb shackle, from inside the hull. This had X-23 very clearly stamped on it. This device cleaned up beautifully and was working again like new. I suspect this was in the Broome DC-3 collection which pretty well disappeared. I am sorry but this is one of the very few items I did not record photographically (Gajda, S., 2003. pers. comm., 31 July 2003).

Other objects are identified and sourced by Gajda in Appendix 7.2. Subsequent examination of the artefacts at the BHSM in 2003 has relocated some of the items, previously believed to have been lost, but they were missing important site location information. Gajda’s artefact collection, prior to being kept at the BHSM, was housed in the fuselage of a non-operational C47A ‘Skytrain’ that had crashed at Broome (Photo. 7.12). This ad hoc museum was eventually abandoned and its artefacts were ceded to the BHSM. In the process, many artefacts were lost and those that did survive were found to have missing information.

7.3.2 Wreck site classification
McCarthy (2002:9) has stated there are two types of flying boat wreck sites in Broome’s Roebuck Bay. Type One sites are submerged during the neap tides, but become exposed during SLW and are referred to as drying sites. Type Two sites are fully submerged sites and are never exposed during the SLW. To this list can be added a third: Type Three, semi-submerged,
which during the SLW are still partly covered by water (Parker, G., pers. comm., 22 January 2003). These site types have a direct bearing on the level of human impact they have received over time and subsequently, the types of artefacts archaeologists should expect to find at those wrecks. Given their accessibility during Broome’s massive SLW (9.6m. to –0.7m. based on the 2003 tidal predictions), the drying sites have been extensively impacted by visitors who can walk out to the wrecks across the mudflats. With the advent of SCUBA diving, Type Two wreck sites have been impacted by human visitation as well, with the resultant loss of such enigmatic finds as a porcelain doll’s head (McCarthy n.d.). It is this third site type, however, that has to date provided the most amount of information in terms of the shear density of both classes of artefacts, some of which are indicative of particular aircraft.

The WAMM team in 2001 excavated a Type Three wreck site and conducted a surface collection at another wreck site of the same type. Unlike the problems associated with excavating during the SLW, diving during the neap tides affords time to conduct an excavation (Gajda, 1983:51; WAMM, 2001). This has resulted in the discovery of an assemblage with some delicate artefacts (see Appendix 7.2).

7.4 Re-establishing links between artefacts and sites – the photographic evidence

Holyoak (2001:260-261) states that the RAF recorded information about the manner of aircraft losses and the circumstances of their crews, but that exact aircraft wreck location information was unnecessary. The locations of aircraft wreck sites were, therefore, generally omitted and in the rare instances where they were recorded, the location is often either erroneous or imprecise. This is the situation with the Broome aircraft wreck sites. Consequently, many artefacts housed in the non-archaeologically recovered collections, such as at the AFAHM and at the BHSM, could not readily be associated with specific wreck sites. Research efforts, therefore, must focus on an important class of evidence recorded during the artefact recoveries – the contemporary photographic evidence.

Gajda (2003) in the late 1970s and early 1980s photographed the contemporary condition of the wreck sites he investigated. Even though wrecks were identified on the basis of
artefactual evidence, the locations of the sites the artefacts were recovered from were not recorded. Given that each wreck site has particular features that are unique (determined by the circumstances of their loss and post depositional effects upon them), photographs provide a useful insight to where the wreck sites identified by Gajda lie.

First one of the most obvious correlations of artefacts with wreck sites is a Catalina said to be RAF. Photograph 7.13 shows an exposed Catalina wreck site taken in 1979. The bow gun turret and cockpit canopy are key features that have survived the intervening years up until that time. Archaeologists from the WAMM inspected this wreck site during a SLW event in August 2001 (Photo. 7.14). The canopy frames evident in the earlier photographs have since disappeared, but it is nonetheless the same wreck site that was photographed and identified as a RAF machine (FV-N).

Similarly, photographic correlations can be made with the Dornier X-23. Unlike some of the other machines, identified on the basis of artefacts with the aircraft’s serial number, no such evidence has been brought forward to verify this particular wreck’s identity. How Gajda (2003) came to identify this wreck is unknown. The wreck site has the most complete empennage (ie, the tail surfaces of an aircraft) and bow section of any of the exposed Dorniers wreck sites. Photograph 7.15 was taken in 1981 and compared with an image of the wreck site taken by the WAMM in 2001, it is clear that they are the same machine (Photo. 7.16).

Artefacts are again used to identify the Dornier X-20. Only one photograph of the wreck site of what appears to be a sailplane section (Gajda, 2003) has been published. Similarly, the precise location of the unidentified Dutch Catalina, as with the X-1, was not recorded. Comparisons, however, between Gajda’s 1979 photographs of what he refers to as the unknown Dutch Catalina with photographs taken by the WAMM in 2001 indicate that the wreck is of the Y-59 (Photo. 7.17 and Photo. 7.18). A distinguishing feature of this Type Three Catalina wreck site is that both engines have bent propellers, because of post depositional disturbance.

A distinguishing feature of the Dornier X-1 wreck is the preservation of the flying boat’s port wing sponson. After making a comparison between Photograph 7.19, taken by Gajda (1980) and Photograph 7.20, taken by the WAMM, it is evident that the images are of the same machine.
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Photograph 7.15  Top inset: ‘Side view of nose/cockpit section of the Dornier Do24 X-23 at Broome in 1981. Turret mounted in nose was the same as the rear turret ...’. (http://www.pacificwrecks.com/people/visitors/gajda/australia/broome/x23/do24_x23nose.jpg)

Photograph 7.16  Above: Bow view of the Dornier X-23 showing gun turret (Image Number: P82101333, WAMM 2001).
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Photograph 7.17 Top inset right: Unknown Dutch Catalina where the AFAHM’s flight instrument panel was found (Photo: Gajda 1977).

Photograph 7.18 Top inset left and above: Type Three wreck site, the Y-59. Note: bent propeller on starboard engine (Image Numbers: P8220203 and P8220208, WAMM 2001).

Photograph 7.19 Top Inset: ‘Port side sponson, refueling [sic] hatch can be seen, wing section on top’. http://www.pacificwrecks.com/people/visitors/gajda/australia/broome/x1/x1portside_sponson.jpg

Photograph 7.20 Above: Comparison views of the X-1 wreck showing port side sponson (Image Number: P8220189, WAMM 2001).
Prime (1998:44) has published a map with the location of the X-1 in relation to the other wreck sites found in Roebuck Bay (see Fig. 2.1). The map is still very much a guide, rather than an accurate location for the wreck sites mentioned. It is of interest in that it only portrays two types of wreck site found there, which happen to be: Type One, drying and Type Three, semi-submerged. The locations of the deep water wrecks, Type Two as noted by McCarthy et al. (2003), at that time were an unknown entity.

Twenty years after Gajda’s collection activity, archaeologists from the WAMM recovered a range of material culture items at a previously unidentified wreck site. These items are described in a following section.

7.5 The 2001 WAMM excavation of the MLD Catalina Y-59

Two wreck sites were chosen for artefact collection. They were selected primarily for logistical and diver safety reasons, therefore, they both occur in shallow water (McCarthy 2001). The first site was Site 10 (or ‘Catalina 8’ - WAMM site code), the second, Site 11 (or ‘Catalina 26’ - WAMM site code). Those from Site 10 were collected from the surface. Site 11, however, was excavated using a water dredge in a one 2 x 2 metre quadrant in the navigator’s compartment. Significantly, two eating utensils were recovered. These objects both bore the aircraft’s serial number, Y-59 (Photo. 7.21 – Photo. 7.23). Thirty-five artefacts were excavated. Objects such as radio components were found, as well as other accoutrements necessary for a fighting machine ie, bullets etc (see Appendix 7.2). However, there were also other artefacts found that belonged to the civilian refugees and crew (Appendix 7.3). With the declaration of the Roebuck Bay wrecks as heritage objects in 2003, all artefacts from them are also protected. The excavated assemblage from the Y-59 and those collected from the surface at Site 10 are also now State property. They have been accessioned into the WAMM’s collection as ‘Broome Aircraft’ numbers (BAC).

The level of organic preservation at the wreck site was good. Rubber and clothing material survive, as attested by artefacts BAC 14 and 17 respectively. A number of shoe soles were uncovered; some may have belonged to women on the aircraft (Photo. 7.24). The rubber sole shoe of BAC 14 is remarkably well preserved, with a tread pattern clearly visible. Shoe upper sections have not survived, but the tapering sole towards the heel of BAC 16 points to a non-military design. Other artefacts may have belonged to women: BAC 29 milk [cosmetic] jar (Photo. 7.25 and Fig. 7.1) and BAC 35 is a cosmetic compact case. However, if a gender value is to be ascribed to this object ie, that it belonged to a woman on the flying boat as opposed to a man who may have brought it aboard as gift or a memento etc., then the social context of gender specific objects needs to be described:

Face make up was in short supply and news of a fresh stock of well known branded lipsticks at the local chemist meant that the shop sold out within an hour. Munitions workers were encouraged to wear make up as a protective barrier to the grit and chemicals they worked amidst.
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Photograph 7.21 BAC31 – a) overall view of fork with serial number revealed, b) BAC30 – overall view of fork with concreted handle (Jung 2002).

Photograph 7.22 BAC31 – close-up view of fork with serial number revealed (Photo: J. Carpenter 2001).

Photograph 7.24 Class B artefacts excavated from the Catalina Y-59.
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Figure 7.1 BAC29 cosmetic jar drawing.
Women working in dangerous conditions were helped to keep up their morale and Max Factor officials from America visited munitions factories handing out the new pancake make up and lipstick. Ponds cold cream, Vaseline and Vitapointe conditioning cream for hair were the few items usually available (Weston-Thomas, 2006).

Reid-Smith (pers. comm., 5 December 2005) suggests that BAC 29 could have been used for cosmetics. It was most likely a reusable jar that may have contained drugs, as well as cosmetics:

The angular design appears as though it is of the later 1930s. These small jars - sometimes called night stand jars - would be used repeatedly over and over once the original contents had been used ... (Reid-Smith, K., pers. comm., 5 December 2005).

The compact case (BAC 35) has also been described as having most probably belonged to a woman. Its form indicates that it has an American origin and probably dates from the early 1940s:

… interesting looking at the cosmetic case. I thought [at] first it might be a rouge case or pill case, given the type of clasping, but the shallow/deep balanced recess and size is definitely a compact powder case ... Out of interest, I suspect the woman who owned this compact would have been of Dutch nationality, mainly because during the war years, many women both at home and abroad, would often purchase items with a nationalistic flavour. In this instance, the colouring being orange, would have been indicative of the Netherlands (Reid-Smith, K. pers. comm., 5 December 2005).

What is the significance of such personal finds, given that the assemblage found is representative of a people in crisis, not just due to the loss of their aircraft, but also before they even boarded in Java? Personal recollections of the events leading up to the departure from Java provide some insight. Mrs Doorman, for example, who was on the Catalina Y-67 at the time of its loss, commented on how they were only given short notice to leave. What types of objects would women such as Mrs Doorman have taken with them on their journey to Australia? She states:

I heard of a chance of getting out by plane, and packed a very few things: passports, souvenirs [sic] and portraits. We had no time to get money. Our party consisted of several cars: men, women and children. All had left their things within [an] hour’s notice, or even less (Doorman, n.d.:16).

Sara Koens, who was on board the Dornier X-1, indicates some specific items of value were taken on board. Burnt marriage papers and other important documents were recovered from her bag after it had been washed up on the shore, but a considerable amount of money and jewelry was not recovered (Koens, 1942). Objects such as BAC 29 and 35, however, provide an insight into what women found to be important. Lt. Commander Juta’s account of the raid’s aftermath is indicative of the importance of such ordinary items in restoring some dignity to his wife Lucie after their ordeal in the water when their Catalina (the Y-67) was sunk:

I took my wife to a shop and bought for her a pair of shoes, khaki short [sic] and shirt, a lipstick and a comb. The short [sic] were badly needed as all the butoons [sic] of her frock had come off. When my wife asked for the lipstick, the big Aussie cowboy who
served her as best as he could said sarcastically; ‘Look here lady, don’t you know there is a war on?’ Nevertheless, this five and ten cent store could supply the item concerned so important [sic] to a woman’s appearance (Juta, n.d.).

One other artefact useful in explaining the significance of the excavated assemblage is BAC 40 (Photo. 7.26 and Fig. 7.2), a medallion that has been determined to have belonged to one of the refugees. The inscription on the bottom section, ‘Blom & van der Aa’ refers to an insurance company, which was taken over by Aon insurance brokers. One of the partners in Blom and van der Aa is still surviving, Mr. Blom, who after being contacted about the object’s origins surmised that:

… it was taken with someone who wanted to proof/establish his business identity in Australia … communications between occupied Holland and the NEI were limited at best so basically Blom and van der Aa in the Netherlands lost contact with the operations in the NEI. They had six offices in the NEI and they were authorised insurance agent for Employers, a name also shown on the medallion. Further they had at the time a management contract for an UK/Australian firm called Java Cies (Verheij, G., pers. comm., 13 March 2003).

7.6  Toys and gender – determining possible links between passengers and the Catalina Y-67 via artefactual material

The occurrence of apparently gender specific items such as cosmetic cases and jars in the Y-59 assemblage, however, cannot be readily associated with a female passenger, let alone to one particular person. Their occurrence on the Y-59 may be for altogether different reasons. Objects such as BAC 29 and BAC 35 are, therefore, androgynous (Fredericksen, 2005:71). Other objects, however, bear significantly on both the identification of wreck sites and that of individual people. One group of artefacts at the BHSM, toys, has links to living people today who remember owning them as children. Theo Doorman remembers one toy in particular, a metal aeroplane (see Ellis, 2001).

Photograph 7.27 shows two views of the toy aeroplane in the BHSM collection. The plane appears to be some sort of fighter, judging by the cannon on the leading edge of the wings. It is made of pressed metal and it appears to be a hollow toy. The feature that Doorman remembers about his toy aeroplane was that it had a spring-loaded undercarriage, the remnants of which can be seen as two square holes near the wing roots. There are other toys in the BHSM, one of which appears to be a soldier (Photo. 7.28). Photograph 7.29 shows Doorman with a diorama of two opposing miniature armies. The toy aeroplane may be Doorman’s, but given that other boys were on the flying boat and that Doorman does not remember the soldier specifically, it may not necessarily have been his:

Amazing! Yes, I am quite sure of the fighter plane. Because of the specific size, which I, as a small boy, remember as being large and also, as I wrote to you, because it had undercarriage wheels which could fold and were held by little springs. The two square holes in the wings indicate where these wheels were fastened. I was very fond of the toy and that was probably the reason my mother packed it with the few things we took with us. Of course I’m very much interested where exactly it was found. I think I was playing
in the section of the blisters, but I don’t remember the exact spot I was when the attack started.

As to the tin soldier. I remember I had with me a tin box with some tin soldiers. My tin soldiers came from a little shop in the Chinese section of Surabaya. I remember the shop with a little table with two or three young children painting the soldiers that their parents cast. So they were manufactured by Chinese. The car I don’t specifically remember but it would be very likely my mother also put something like that in the box (Doorman, T., pers. comm., 12 February 2005).

Doorman’s recognition of the toy aeroplane has two very important ramifications for interpreting the unprovenanced artefactual material that was removed from the wrecks in the past. Firstly, the toy aeroplane ascribes gender – it belonged to a boy. This could only be done because the object was recognised by someone living today as having belonged to him. Could Theo have made a mistake? Perhaps it was someone else’s toy plane? The second ramification of Theo’s
toy plane recognition is that the Y-67 (the Catalina that brought Theo and his mother to Australia), was at some time in the past located. The toys in the BHSM are therefore in all probability from the Y-67, but where is the Y-67? Given that the Type Two wrecks are not well known, the Y-67 is therefore, most probably one of the Type Three wrecks (Site 13 or Site 10), which have been in the public eye since the first SLW after the air raid. The toys in the BHSM are recorded to have been donated by Barry Dawson, who was the CEO of Broome airport. His widow, Margaret, indicated Barry had acquired the toys from people who thought he would take care of them because of his position at the airport (Dawson, M., pers. comm., 1 November 2006).

7.7 Conclusions

The air raid over Broome resulted in the loss of non-combatants and Allied and Japanese servicemen. This conflict has left behind a distinct class of material culture that has, until recently, not been studied by archaeologists ie, the archaeology of evacuation. Chapter 6 identified that the Y-59 was one of the most densely packed of the MLD Catalinas and that it was, therefore, one of the best wreck sites to investigate the types of artefacts the Java refugees would have carried with them. The excavation team did not know this at the time. Given that some of the flying boats did not carry refugees, the choice of the Y-59 as the excavation test site was fortuitous. Furthermore, the wreck site survived relatively uncontaminated by past salvage activities in Roebuck Bay, thereby enabling the WAMM’s discovery of some spectacular objects of significant archaeological value; artefacts revealing the wreck site’s identity and providing insight into the types of objects people take with them when fleeing their homes in times of crisis.

This study, a survey of an unprovenanced artefact collection and an archaeologically-excavated assemblage from the flying boat wreck sites in Broome, reveals and re-establishes the archaeological context of finds. In the intervening years, unprovenanced collections from the flying boat wreck sites have resulted in artefacts becoming lost. However, those items that could be re-located in this study have been shown to provide an insight into the identification of specific aircraft. Excavation of the Y-59, for instance, resulted in the first positive identification and verifiable location of a flying boat wreck site in Roebuck Bay.
In order to reconstruct the lost archaeological context, referred to by Chippindale (2002:66), of the unprovenanced flying boat collection at the AFAHM, it is necessary to examine the artefacts and the existing evidence of the circumstances of those finds. Previous studies were concerned with the artefacts themselves and what interest they had for the finder. The context and the circumstances of their finds were of little interest. This is not to suggest that early investigations were wrong, but that the study of aircraft wrecks can be done a better way, given the advances in archaeological method and theory in the past two decades. Although written in the context of ancient sites, comments made by Sir Charles Peers in 1929 are equally valid in relation to aviation archaeology:

The examination of ... sites can no longer be regarded, as was unhappily the case in former days, as a mere search for antiquities. The thing found is of value, whether to history, art, or science, but the circumstances of its finding are of even more evidential worth. The ideal excavation is one in which all the evidence is recognized and recorded, a task which demands no ordinary degree of knowledge and experience (Peers, 1961:82).

A small find, such as a child’s toy, can be crucial to the identification of the wreck sites they were taken from. The collector, however, did not understand the significance of Doorman’s toys for locating the wreck site of the Y-67. The unprovenanced collection at the BHSM, in effect, represents a second tragedy for the flying boats and their active participants. The very objects that could help archaeologists understand the flying boat wreck sites today were removed from their original contexts (within the hulls) with the concomitant loss of data. This work, however, has incorporated a study of an unprovenanced collection, together with new knowledge acquired from archaeological research to develop our understanding of the
wreck sites in Roebuck Bay. For example, the artefacts collected from the Dornier X-1 can now be related to a wreck location, but only after the link between history and archaeological material is reestablished by reassessing the unprovenanced antiquarian collections of the past. Unfortunately, many such collections have no acquisition records or photographs of the sites and the data has been lost forever.
8.1 Introduction

The students, sitting in a classroom cluttered with a variety of twisted and broken airplane parts, study the image. A few hands hesitantly go up...‘It looks like he overran the runway,’ one student says...‘No,’ Wall retorts, clearly ready for just that sort of response. ‘Describe factually what you are seeing, and leave your opinions at home’...The rest of the hands go down. Wall helps them out: ‘The right side of the forward fuselage has compression buckling. The props are not feathered. There is substantial deformation with crushing. And see these people walking around? Have they touched anything? You now have a contaminated investigative area.’ For this group of 33 aspiring air crash investigators, school has begun (Adams, 2001:1).

This chapter presents the results of a non-disturbance survey of 10 flying boat wreck sites that have been discovered in Roebuck Bay. Five machines are still unaccounted for. The located wreck sites are mapped and diagnostic attributes are recorded to help archaeologists understand which particular machines have been located. Survivors of flying boat losses provide important clues to the current spatial distribution and extent of the archaeological resource. This is the first archaeological investigation of Roebuck Bay to use non-disturbance methods to obtain data from the wreck sites that contribute to understanding the nature and extent of the cultural material in Roebuck Bay.

Preconceived notions of a flying boat wreck site formed by an aircraft sinking at moorings or at anchor, predict that the wreck should consist of: wings, engines, tail and fuselage and that such elements would not be spread far from the original location of where the aircraft sank. However, these elements may not necessarily have survived at each wreck site, thereby hindering aircraft type recognition. A survey method is presented to develop a technique that identifies structural elements that are indicative of different types of Catalina flying boats, since these are uniquely identifiable on the basis of surface attributes, whereas others, such as the Dorniers being of the same type, are not.

Surveying the Catalina wreck sites offers archaeologists the potential to identify surface attributes. These are those structural attributes (wings, engines, fuselage and tail) that are indicative of the three Catalina types reported to have been lost in Roebuck Bay: PBY-4, PBY-5 (Model 28-5MNE) and PBY-5 (Mark I), aircraft which can be linked to different services. A survey of the wreck sites also provides data to help determine whether the located wreck sites are in situ, given the post depositional disturbances that have acted upon the sites for the past 66 years.

It is beyond the scope and resources of this research to investigate all of the side scan sonar data obtained by the WAMM (see Appendix 2.1). Instead, the field survey aimed at inspecting those wreck sites (not just Catalinas) that have been reported by local Broome divers and the
WAMM. No detailed archaeological surveys have been conducted at these wreck sites. Detailed site recording and the interpretation of what was investigated in the survey of 2001 were not supported by the film producers (Prospero Productions), who financed the work. Prospero went to Broome to make a documentary. Their work was only a preliminary archaeological study of the extent and condition of the cultural material in Roebuck Bay. The WAMM’s remote survey, however, provided the first glimpse of the overall morphology of the wrecks in deep water (Type Two). This study will provide a benchmark by which to better understand the Type Two sites. For example, are all 15 flying boat wreck sites still in Roebuck Bay and should they be expected to be located in deep water?

One fortuitous and important source of data to answer this question is the only known photograph of the 3 March air raid, which was taken by the ‘Babs’ (see Photo. 6.1). The photograph shows at least seven smoke columns (SCs) rising from Roebuck Bay, but more significant is the indicated distribution of the armada in Roebuck Bay. Archaeological data discussed in this chapter provide an interpretation of where five missing flying boats may have sunk and provide an insight into the archaeological resource that has been located, but not well understood.

8.2 Survey method

The primary aim of the fieldwork survey method was to develop a simple, consistent wreck site recording method that allowed the recording of attributes indicative of Catalina type. The survey method also recorded the condition of located Dornier and an Empire flying boat. A general understanding of the layout of the assemblages at all wreck sites was required to explain site formation processes. This assisted in determining how each flying boat sank.

Given that three types of Catalina were lost in Roebuck Bay, each type operated by a different service, the study of diagnostic attributes of Catalina wrecks afforded the best way to link wreck sites to a particular type. The corollary of this is that aircraft will be identified by service, but not necessarily narrowed down to individual aircraft. Only the excavation and recovery of diagnostic artefacts can distinguish individual flying boats of the same type. The exceptions here, however, are the two Empire flying boats. Although of the same type (S.23s), they are distinguishable because one was extensively modified for military use and the other was not (see Chapter 3).

8.2.1 The three survey techniques

In response to the environmental extremes of Roebuck Bay, three surveying techniques were adopted: terrestrial, underwater and aerial. The underlying technique to develop a site plan for each wreck site was to use the fuselage as a base line to which other structures or features could be related. In this way, a drawing of a high profile site can be obtained in a short amount of time (Riley, 1996). Compass bearings were taken of significant features such as fuselages and wings. Determining the orientation of the fuselage at each wreck site helps determine if a
wreck site is in situ, or has been moved by tides or subsequent human activity. Theoretically, all the hulls of the flying boats should be orientated in the same direction ie, the direction of the current plus or minus several degrees to account for windage, since they all are known to have sunk within 10 to 15 minutes of each other. It is unlikely that a disturbed site (one that has been physically picked up and moved elsewhere) would have the same orientation as sites that are in situ.

For several days of the year, king SLW tides expose the Type One wreck sites. This presents a 40 minute window (approximately) to inspect and map these wreck sites. However, this technique was found problematic as not all the material culture at each wreck site could be seen. Some wreck sites, for instance, were still awash even during king SLW ie, the Type Three sites. It was, therefore, not possible to view key features of these sites, such as hull interiors and propeller details, during the terrestrial inspections. Even though these wrecks are exposed, it was still necessary to inspect these wreck sites during the neap tides using SCUBA. During neaps the Type One wreck sites are in shallow water (about 4 metres deep), which affords ample bottom time to inspect features that are otherwise covered in murky water during SLW.

Episodes of king SLW also afford an opportunity to search for wreck sites or debris that are possibly not in the same area as the flying boat wreck sites. Perhaps the ‘Babs’ photograph did not cover the entire anchorage/mooring area? It most certainly did not cover the area where Kudo’s Zero crashed. Therefore, the use of aerial surveying methods aimed at documenting the known Type One wreck sites from the air, but also at searching other areas exposed for only a brief period of time, that might contain material culture from the air raid. A helicopter (Robinson R22) utilised during a king SLW event in August 2003, aimed at: ‘site recording, interpretation and discovery … useful for site prediction’ (Schlitz 2004:52).

8.2.2 The defabrication survey method
A defabrication method was used during both the terrestrial and the underwater surveys. This is a process of dismantling a known airframe line drawing using computer graphics and linking it to the recorded archaeological data (Fig. 8.1; see Jung, 2001:126). The wreck site plans were developed by omitting the lines for the structural elements missing or altered on the wreck sites. In effect, this is working backwards from an already established set of aircraft plans, rather than constructing a drawing from scratch, using hundreds of measurements (Anderson, 2006). This technique helps determine the overall distribution of major structural elements that indicate what may have happened to each of the flying boats as they descended through the water column. Thus an initial understanding of the archaeological material at each of the wreck sites is developed within a relatively short number of dives. The dates and times for the underwater wreck site inspections are recorded in Appendix 8.1.

The site plans produced with this defabrication method are drawn to an approximate scale, which presents the condition of each of the wreck sites. Surveying in poor visibility should
Figure 8.1 An example of line work used in the defabrication method: Dornier Do 24K-1 V-3 line drawings (after Geldhof, 1979; facing pages 120 to 121; de Zwart, A. 1999. 'Dornier Do-24 Homepage': URL <http://www.dornier24.com> Viewed 6 November 2001).
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not affect the accuracy of measurements taken, but the time to do the work. To have accurately recorded all of the 10 located wreck sites in Roebuck Bay would not have been feasible given the number of sites being investigated and the resources available. By using a defabrication method, however, wreck site recording will determine: a) what is missing, b) what is out of place, and c) what are the diagnostic attributes in the archaeological record.

One wreck site, the Y-59, was chosen as a control site for the accuracy of the defabrication method, mainly because it was the excavation site for the 2001 field season and because it is in shallow water. The wreck site was initially surveyed using the defabrication method during the 2003 field season and it was also surveyed using a triangulation method, which recorded distance and bearings to features on the wreck site from fixed datum points. Four starpickets (Points ‘A’ to ‘D’) were driven into the sediment near major features, such as wings and fuselage.

The sample size is 10 wreck sites out of a total 15 machines (66%). These 10 wreck sites (Sites: 10, 11, 13, 14, 20, 22, 23, 24, 26 and 27) are all target numbers identified in the side scan sonar survey in 2001. All of these targets are wreck sites. However, when some targets were inspected, such as T03 and T28, nothing, or only a debris field, was found. It is argued that debris fields do not represent the location of former sites. Something of the airframe and engines should exist at a location before that location can be declared to indeed be that of a wreck site proper (ie, the site of initial deposition), rather than a debris field. For consistency, non-disturbance wreck site inspections are recorded in the following sections in the numerical order established in Chapter 2.

8.3 Site 10 – Unknown PBY-5 Catalina

A wreck site is partially exposed at king SLW tides lies in approximately 4.5 metres during neap tides (Photo. 8.1). It is a PBY-5 Catalina, which narrows the aircraft’s possible identity to either an MLD or RAF machine. The wreck site was not known by Gajda while he was excavating exposed sites, but since it is visible at king SLW, it is quite likely to have been visited by divers in the past.

Little remains of the fuselage aft of the navigator’s compartment. The fuselage lists to port, and consists of the cockpit and bow gun turret (Photo. 8.2). The turret was found in the stowed position (turned to starboard). This section of the fuselage is what can just be seen at SLW. Other visible elements at SLW are the tip of one perpendicular blade of each propeller. The port engine is attached to the port wing, but some of its engine mounts have collapsed and the engine is at a slight tilt forward, resting on two of its propeller blades. No trace of the empennage or waist blister compartment was seen, although the hull’s planing bottom was seen to taper into the sediment, suggesting that the keel up to the sternpost is intact.

The port wing and central wing section is upside down, but the engine’s propeller spinner can nevertheless be discerned, which clearly determines the power plant to be a Pratt & Whitney
Photograph 8.1  Aerial view of Site 10 during SLW. Note: canoe provides a convenient scale (Photo: Jung 28 October 2003).

Photograph 8.2  View of the bow, showing bombardier’s window and remnants of the bow nose cone. The outer sheeting of the nose cone is missing (Photo: Jung, 2003).
R-1830-82, characteristic of a late model PBY-5 (Photo. 8.3). Neither of the propellers were found to be bent, hence, their visibility at SLW, protruding out of the water. The starboard engine was found some five metres abeam off the starboard side of the fuselage, virtually in the same place as where it would have been on an intact wing. Its location suggests that it was once attached to the starboard wing, but became detached once its mounts had corroded. The starboard wing beyond the starboard engine mount was not found and is believed to have moved post deposition. The aircraft’s fuel tanks (in the mainplane between the two engines) are relatively intact and it would appear that the sailplane section of the starboard wing was severed after fire had consumed a section of the mainplane to which the starboard engine was attached. The position of wing on the wreck site is consistent with fire having destroyed the aircraft’s mainplane, which always results in the break-up and detachment of the wing from the fuselage.

A surface collection was conducted at this site by the WAMM in 2001, which resulted in the retrieval of a number of artefacts. Further artefactual material was seen in the remnants of the cockpit and navigator’s compartment, consisting predominantly of instruments, gauges and stainless steel cylindrical water containers. The pilot seats were found, including rudder pedals, but no control yoke was seen. The wreck site was mapped for this study and a site plan was produced (Fig. 8.2). The bow is orientated to the southwest.
8.4 Site 11 – PBY-5 Catalina Y-59

A similar wreck site layout to Site 10 is found at Site 11, which was excavated by the WAMM in 2001 and positively identified as the MLD’s Y-59 on the basis of artefactual evidence (see Chapter 7). The wreck site is similar to Site 10 in many respects, but there are subtle differences.

The wreck site was found to be in 4.5 metres of water during neaps, but it is exposed during SLW (Photo. 8.4). It was inspected during a king SLW event in 2003, when sea levels dropped to -0.65m below chart datum. The site is still partially submerged during SLW and it is only by diving that internal structures and artefactual material can be studied in situ.

The Y-59’s fuselage extends from the bow to the step on the planing bottom, but it is mainly sections below the flying boat’s water line have survived. The most intact section above the water line is the navigator’s compartment through to the bow, including the cockpit. The bow sits on an even keel, but its gun turret is missing (Photo. 8.5 and Photo. 8.6). The bow, like Site 10, points to the southwest. The forward section of the fuselage was found to contain loose artefacts, such as stainless steel water containers and personal items (Photo. 8.7 and Photo. 8.8). The pilot seats are still in the cockpit, but unlike Site 10, the control yoke is still in situ, albeit missing its steering wheels, which are most likely to be at the AFAHM. Rudder controls were seen at both the pilot and co-pilot stations.
Aft of the navigator’s compartment, the gun deck or waist blister compartment was seen, together with belts of .50” machinegun bullets, floor gantry and a gun mount (Photo. 8.9). A striking feature of this section of the fuselage is that it has only survived below the waterline, which suggests that fire may have flowed down into the waist gun compartment and destroyed the aircraft aft of the mainplane.

The relatively intact nature of the mainplane between the engines indicates that the flying boat was destroyed in a similar fashion to Site 10. The break in the wing occurs outboard from the
starboard engine location. The fuel tanks are relatively intact, although it would appear that a fire had occurred there, which accounts for the missing wing sheeting over the fuel tanks. The fire, therefore, was not intense or prolonged enough to consume all the frames of the fuel tanks, which would indicate that the mainplane had sunk prior to being completely consumed by fire. This is typical of all Catalina flying boats that are reported to have sunk by fire – the mainplane becomes separated from the fuselage.
The wing, similar to Site 10, is upside down and virtually intact all the way to the port wing tip, which was seen in 2006, three years after the initial site inspection, after it had become exposed (Photo. 8.10). Some sections of the port aileron were seen, indicating the intact nature of the wing. The starboard sailplane was found, just to the north of the port wing, but it can only be seen while diving, as it lies in a depression or scour zone between the leading edge of the port wing and the port side of the fuselage.

Both engines on the Y-59 wreck site have bent top propeller blades. The top blade on the port propeller is bent forward and the top blade of the starboard propeller is bent backwards. This is a result of post depositional disturbance, most probably done by the Garstone brothers, who had been earlier fouled upon wreckage in the bay (Gajda, S., pers. comm., 5 August 2003). The propeller spinners on both of the Y-59’s propellers have also been damaged. They are both for the R-1830-82 power plant, but their outer casings are missing (Photo. 8.11 and Photo. 8.12).

Further debris is found between the two wings and it has been suggested that the port engine rests upon the tail cone. Geoff Parker’s isometric site plan shows the tail cone in this location, including the opening for the tunnel gun position (Fig. 8.3). Parker’s site plan is said to be of the Y-59, however, apart from drawing the bent propeller on the starboard engine, the wreck site depicted appears to be Site 10. The starboard engine of the Y-59, however, was found approximately 12 metres off the port bow and not close to the starboard bow as depicted in Parker’s drawing (Photo. 8.13 and Fig. 8.4).

Photograph 8.10  Y-59 port wing tip and aileron, after the shifting sands have exposed the structure (Photo: Jung, 9 October 2006).
Photograph 8.11  Y-59 starboard engine and propeller with blade bent forward. Note: bent top propeller (Photo: Jung, 2003).

Figure 8.3  Wreck site isometric drawing said to be of the Y-59 (Geoff Parker 2001). Accompanying notes:

Catalina Float Plane

1. Top of propellers are exposed on minus tides
2. This wreck is the one we excavated
3. Wreck is facing south
4. Starboard engine has fallen off wing and is laying on top of the mooring anchor
5. Starboard wing is laying correct way up but on port side of plane and facing in opposite direction
6. Port wing is upside down and is laying on starboard wing
7. Wing has broken at starboard engine position
8. There is part of the tail fuselage laying upside down, gun opening is shown
9. Front half of the fuselage is intact below cockpit area then tapers down to keel at stern
10. Tail section has broken off at step

Photograph 8.13  Y-59 oblique aerial (Photo: Jung, 28 October 2003). Note the location of the starboard engine in relation to Fig. 8.2.
8.5 Site 13 – Unknown Catalina (The forgotten site)

A wreck site has been overlooked or not known about previously to researchers is a badly broken up Catalina referred to in this thesis as Site 13. The wreck site lies in 4 metres during neaps and was found to be exposed during the king SLW events. This is a Type 3 wreck site, partially exposed.

The largest element of the airframe to have survived is the mainspar (Photo. 8.14). Its condition, again, is remarkably similar to Site 10 and Site 11, in that its fuel tanks are also preserved. The wing is inverted and the top section of the flight engineer’s compartment is still attached. The starboard sailplane section is missing, broken off at the location of the starboard engine mount, just like on Site 10 and Site 11. The port engine and propeller are still attached to the wing. The propeller has a blade perpendicular to the sky, which indicate that it supported the weight of
Photograph 8.14 Sr Carmel Posa at Site 13. Mainspar section looking towards the Y-59 (Photo: Jung, 2003)

Photograph 8.15 Site 13 propeller, flight engineer section and port wing struts (Photo: Jung, 2003).
the wing at some stage (Photo. 8.15). This appears to be another patterning in the orientation of propellers on wreck sites whose engines were not running at time of loss – one blade always turns perpendicular when the propeller has the weight of the wing upon it (Jung, 2006).

Unfortunately, the propeller spinner was not seen, as it was buried in sediment (Photo. 8.16). The base of this perpendicular propeller can only be seen while diving, since during SLW it is covered in murky water. A scour zone has formed in front of the wing, which is still filled with water at this time. This is the only structural feature on the wreck site to indicate what type of Catalina the machine is. Excavation may reveal further diagnostic structural elements or artefacts. The other engine (starboard) was found lying face down, some five metres off the port bow. It too may still have its propeller attached, but would require extensive excavation to reveal it. The starboard engine mount was found nearby, which would indicate that it and its concomitant engine may have become detached at time of loss. This would also apply to Site 10 and Site 11, whose detached engines lay some distance from any wing structure.

The separation of the wing from the fuselage must be attributable to fire and to the sinking of the mainplane before too much damage was caused to the wing. Fuel leaking from the tanks ran into the waist gun position and set the aft section of the fuselage on fire. This is another patterning that is emerging in the archaeological record of these three Catalina wrecks discussed so far. However, the difference between Site 13 and the other two Catalina wreck sites is that the fuselage forward of the mainplane is poorly preserved (Photo. 8.17). The fuselage appears to have burnt down to the water line, as only its outline is discernable. Only about half a metre of the fuselage is exposed above the mud. Furthermore, there are no covered or enclosed areas of the fuselage - the whole top portion has disappeared. Like Site 10 and Site 11, the fuselage is orientated to the southeast (Photo. 8.18 and Fig. 8.5). This indicates that if salvage had occurred at the wreck site, it was probably salvaged in situ, rather than having been moved to its current location.

*Photograph 8.16 Site 13 port engine and propeller showing buried spinner (Photo: Jung, 2003).*
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Photograph 8.17 Site 13 cockpit and bow gun turret. The turret has collapsed from the bow. Scale in 20 cms (Photo: Jung, 2003).

Photograph 8.18 Site 13 aerial view (Photo: Jung, 28 October 2003).
8.6 Site 14 – Dornier X-23 and Target 16

8.6.1 The last to die - Dornier X-23

This wreck site was identified by Stan Gajda as the X-23 on the basis of artefactual evidence (see previous chapter). This is the best-preserved hull of the exposed wreck sites. For instance there is a section of the fuselage that is still enclosed. The other wrecks discussed so far have all open fuselages; their tops probably having been destroyed by fire. This wreck site is also only one of two Dorniers found in Roebuck Bay to date. It is a Type One site and during neaps, it lies in 4 metres of water (Photo. 8.19). The fuselage has a list to port and is facing southwest.

A striking feature of this wreck site is the intactness of the fuselage, particularly the bow (Photo. 8.20). The bow section’s keel, however, is broken and lies at a slightly different angle to the rest of the fuselage. Aft of amidships the dorsal turret ring is still intact (Photo. 8.21).
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Photograph 8.19  Site 14 - port stern quarter view of the fuselage.

Photograph 8.21  X-23 aft fuselage section.
Gajda had excavated forward of this area and as a result, artefactual material may still be found, trapped inside the fuselage enclosure (Gajda, S. pers. comm., 6 June 2004). The port sponson has survived, but no trace of the starboard sponson could be seen. The twin rudders of the empennage are on site, but have collapsed from their original mounting. No tail gunner turret was seen.

Photographs of this wreck site were taken ca. 1942 and it would appear the flying boat’s wing had initially collapsed on top of the fuselage (Appendix 8.2). The wing’s current location, therefore, is not in situ since the time of the aircraft’s sinking. The wing is broken in two places, which has separated both sailplane sections (Photo. 8.22). The centre section of the wing and starboard engine were not found. This missing engine may be one of the engines found in Broome Town. Having been removed from the wreck sites without regard for context, their provenance is not recorded. However, both the extant engines on site are missing their top propellers, which appear to have been neatly sawn-off and removed, surely by souvenir hunters. Interestingly, one sailplane section is upright (starboard) and the other (port) upside down, as attested by the exhaust ports on top of the starboard engine (Photo. 8.23 and Fig. 8.7).

Another inspection was carried out on the Type One sites in October 2006, revealing further structural elements. The sands around the wreck site have moved since the 2003 wreck inspections, revealing the starboard sponson next to the starboard wing. A wing strut is still attached to the sponson.

8.6.2 Target 16

One suggestion is that the central wing section with its concomitant engine and propeller lie some 100 metres to the east of the main wreck site, referred in this thesis as Target 16. Parker has indicated that the ‘upright propeller’ emerging from the sand is the X-23 missing engine and propeller (Fig. 8.6). It lies a considerable distance from the X-23 main wreck site, more so than recorded by Parker (Photo. 8.24 and Fig. 8.7). The 2006 wreck site inspections indicate this ‘upright propeller’ is actually a wing strut and that it and other debris at Target 16 are most likely a debris field associated with the nearby X-23. The top of the strut has broken away, revealing a hollow structure. Propellers are not hollow towards the tips.
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Photograph 8.22  View towards the fuselage from the starboard wing.

Photograph 8.23.  Aerial view of Site 14 (the X-23). Port engine (top) up side down; starboard engine (lower) right way up (Photo: S. Jung 28 October 2003).
Figure 8.6  X-23 isometric drawing (Geoff Parker via WAMM). Accompanying notes:

Dornier flying boat

1. Wreck dries out on the minus tide
2. This site was corrosion tested by Carps [Jon Carpenter]
3. Fuselage lies facing south with a list to port
4. Tail has broken off at step
5. Port wing is upside down and facing port side of plane
6. Starboard wing is right way up and 14 metres forward of bow
7. Both engines have propellers missing
8. Middle section of wing and engine are missing but there appears to be a propeller blade standing out of the sand, 30 metres to the east

Photograph 8.24  Target 16, view of the ‘upright propeller’ (actually a wing strut) looking towards the X-23 (Photo: Jung 28 September 2003).
Site 14 - DORNIER X-23

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<th>Key</th>
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<td>1. bow section and gun turret</td>
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<td>2. cockpit</td>
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<td>3. break in hull</td>
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<td>4. sediment filled mid section</td>
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<td>5. rear fuselage</td>
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<td>6. dorsal turret</td>
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<td>7. empennage</td>
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<td>8. port rudder</td>
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<td>9. starboard rudder</td>
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<td>10. port wing (upside down)</td>
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<td>11. port engine</td>
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<td>12. missing propeller</td>
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<td>13. wing struts</td>
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<tr>
<td>14. starboard wing (right way up)</td>
</tr>
<tr>
<td>15. starboard engine</td>
</tr>
<tr>
<td>16. starboard sponson</td>
</tr>
</tbody>
</table>

Note: dotted lines represent buried structures

INSET

Target 16 strut/debris
main wreck site

Figure 8.7  Site 14 (X-23) wreck site plan. Note proximity to Target 16.
8.7 Site 20 – Unknown Catalina tail section

Surveying the four deep water wreck sites revealed a similar pattern in their layouts. Site 20 was only found to contain a Catalina empennage. Further surveying should locate the rest of the fuselage, wings and engines. The sonar data shows what may be a wing (see Appendix 2.2) and, usually, where a wing is found, the fuselage is not far away. This site lies in 20 metres of water during neaps.

The Catalina tail is the most complete empennage yet found. It is severed aft of the waist blister compartment (Photo. 8.25, Photo. 8.26 and Fig. 8.8). The cruciform horizontal stabiliser and rudder are missing, but the top of the tail is complete. It stands about two metres above the sea floor. Little is understood about what happens to Catalina tails when they sink, since few have been seen. They have probably become detached as a result of burning fuel running down the wings and into the waist blister compartment and into the bilges. The whole integrity of the

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*Photograph 8.25* Site 20 view of fuselage in front of tail.  
*Photograph 8.26* Site 20 view of rudder position. Note: reef anchor.

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*Figure 8.8* Site 20 tail elevation view. Location of Photographs 25 and 26 indicated.
empennage is thereby compromised and the tail becomes detached. It would appear that in most cases they drift a considerable distance from the main wreck site before finally sinking.

Further field surveys are required before much else can be recorded about this site. Sonar imagery of this site indicates that significant structures exist in this area. Without the other elements of the wreck (bow, wings and engines) it is difficult to determine the provenance of this find. Given that the US Navy’s two PBY-4 Catalinas were in Broome for nearly two weeks, it is quite likely they were moored in deep water, near the permanent BOAC moorings.

Theoretically, the only likely reason the flying boat wrecks discussed so far are in relatively shallow water is that due to their crews did not knowing where they were. Arriving during the night, flying boats simply dropped anchor as close to shore as possible. Even if they became stranded at SLW, they would not have been so for long before the tide floated them off again. Therefore, further surveys of Site 20 may reveal that this wreck site is of a US Navy Catalina, since the MLD and RAF appeared to have anchored much closer to shore.

8.8 Site 22 – Short Empire flying boat

This wreck site was not inspected during this survey due to weather, time and logistic constraints. However, there has been some documentation of the wreck site and this data is discussed here. The historical account of the loss of A18-10 indicates that the aircraft’s starboard wing was severed from the fuselage when it was attacked (Ireland, 2001). The archaeological evidence at Site 22 indicates that this flying boat has a severed starboard wing, which appears consistent with the historical account. Only one Short Empire wreck site has been located, therefore it is argued here that it is yet to be positively identified. Formal identification must wait until both wreck sites are discovered. Meaningful comparisons could then be made, given that it is unknown how the second machine of the type sank.

Site 22 lies in approximately 20 metres during neaps and the fuselage points to the south. Parker’s (1999) isometric drawing of the wreck shows the port wing upright with two engines, both with their propellers (Fig. 8.9). A blade on each propeller has turned perpendicular to the surface. Upon subsequent inspections, Parker located an engine on the starboard side of the fuselage, which could possibly be still attached to a wing, although the wing was not seen. The engine is recorded to be upside down, which would indicate that if it were still attached to the wing, then the wing too would be inverted. If it is there, the wing has become buried in silt. Given that the starboard propeller also has one perpendicular blade, it may have supported the weight of a wing at some stage. The propeller hubs on the port wing engines are well preserved and are of the Bristol Pegasus type engine with pitch mechanisms visible (Photo. 8.27). These engines never had a spinner.

The fuselage has burnt to the water line and the empennage has separated from the fuselage. Although not drawn on the isometric, Parker describes the tail as being upside down having
Figure 8.9  Site 22 - Isometric drawing (courtesy Geoff Parker 2001). Accompanying notes:

Short Empire Flying Boat

1. Wreck on edge of drop off laying down the slope and facing south
2. Port wing is clearly visible and there is two large tears in wing
3. Short length of port side fuselage is visible with portholes and door hatch
4. Have seen what I believe to be a cockpit window frame as shown, but have not been able to confirm
5. Tail has fallen forward and sideways at rear of fuselage remains
6. There is only pipe frame left and quite fragile
7. On last dive located a third engine, north-west of main wreckage engine is upside down with couplings [sic] intact. Failed to look for fourth engine on this dive so assuming the third engine is still attached to wing

Photograph 8.27  Site 22 - Propeller spinner being filmed for Prospero’s production’s ‘Bay of fire’ (Photo. No: P8160027 WAMM).
flipped forward and settled to the side of the fuselage. The port wing lies very close to the port fuselage. It has fallen from its wing root and this may have happened post deposition, after corrosion in that section weakened the root. The wing, therefore, may have formed an overhang when it sank.

Andy Ireland’s account of having been blown out the forward hatch was as a result of the top fuel tanks exploding. The placement of additional tankage behind the flight deck was a measure to extend the range of the aircraft (Fig. 8.10). Note: the floor-reinforced gantry was not installed on A18-10. It should also be remembered that A18-10 was fully fuelled up for its long flight to Timor and back. This may explain why little remains of upper sections of the fuselage – the fire that ensued was intense. One diagnostic feature of the fuselage is the aircraft-type portholes on the port side and also visible is the port rear hatch (Photo. 8.28).

It is not known if Corinna had the same fuel system modifications as A18-10. Corinna was certainly modified; it would not have resembled the luxury airliner it once was, but if additional fuel tanks were also installed on the flight deck, the machine may have exploded and burnt the same way as A18-10. It was fuelled-up ready for its flight to Sydney. Burning aviation fuel must also have extensively damaged it.
Ammunition and weapons have yet to be discovered at Site 22. It is recorded that A18-10 was a man-o-war, bristling with weapons, but one single bullet has yet to be found on the wreck site. The absence of guns would suggest three possibilities: i) that they were salvaged/pilfered, ii) that they are still on site, but buried within the fuselage or, iii) that the wreck site is of the unarmed Corinna.

8.9 Site 23 – Unknown PBY-5 Catalina (the ‘Parker-Kimpton sites’)

Colloquially referred to as the ‘Parker-Kimpton sites’, Site 23 and Site 24 are both argued to be PBY-5 Catalina flying boats (Kimpton, 1999). They were both located by Geoff Parker and Geoff Kimpton (then WAMM) in 1999 and identified as Catalinas. A sketch plan was produced for Site 23 in 2001 that indicated the wing was broken through the fuel tanks (Fig. 8.11). Some details of the visible port propeller spinner were recorded, but that research did not determine its type. Wreck inspections conducted for this thesis details the wreck site further, suggesting that this machine sank in a predictable manner, thus indicating the wreck site being in situ since the time of its loss.

The wreck site lies in 12 metres during neaps. It is, hence, a Type 2. The bow is relatively intact, but appears extremely thin and fragile. It is listing to port and faces west-northwest. Its gun turret could be discerned and it is in the stowed position (Photo. 8.29 – Photo. 8.32). The anchor locker was seen, but it was missing its anchor and locker hatch. The anchor was deployed and could possibly be underneath the fuselage. The anchor cable is still attached to the reel mechanism inside the locker. Cockpit features could also be identified such as the steering yoke and both pilot seats, although the steering yoke was missing its steering wheels (Photo. 8.33). No flight instruments, however, were seen.

Figure 8.11 Site 23. Wreck site Sketch plan (WAMM 2001). Note: collapse of the wing and tail near the bow.
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Photograph 8.29 Site 23 Bow view - list to port.

Photograph 8.30 Site 23 Bow view showing gun turret.
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Photograph 8.31  Site 23 gun turret top in the ‘stowed’ position (facing to starboard).

Photograph 8.32  Site 23 anchor locker and anchor cable.
Both engines were found, although the starboard engine (on the port side of the fuselage) has fallen face down off its engine mounts and its propeller spinner could not be seen (Photo. 8.34). Curiously, the exhaust collector ring has been neatly cut up in sections, perhaps souvenired by unknown site visitors. This is similar to the exhaust collector ring on the starboard engine of Site 11 – the Y-59, whereby similar ‘sampling’ was observed. However, another engine diagnostic could clearly be seen – the engine’s exhaust port, which is characteristic of an R-1830-82 power plant (Photo. 8.35 and Photo. 8.36).

The port engine is attached to the port wing, both of which occur inverted on the starboard side of the fuselage. The engine has partially collapsed off its mount and its propeller spinner is covered in silt. However, the side of the spinner could be seen, which shows that it is a cylindrical-shaped spinner, typical of a PBY-5 (Photo. 8.37).

A distinctive feature of the wreck site is the wing. This is a classic example of wing disintegration as a result of damage to fuel tanks between the two engines (Fig. 8.12). This was a phenomenon observed at all of the Catalina wreck sites in Darwin Harbour that were recorded to have burned (Jung, 2001). In this case, wing separation resulted in a wreck site layout mirroring that of an intact aircraft ie, the port wing is upside down on the starboard side of the fuselage and the starboard wing has settled upside down on the port side. This almost certainly occurred during time of loss and does not reflect post depositional disturbance. This is the first wreck site to
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Photograph 8.34  Site 23 evidence of salvage – neatly cut-up exhaust collector ring on the starboard engine. Scale in 10 cms.

Photograph 8.35  Site 23 starboard engine exhaust port – side view.

Photograph 8.36  Site 23 starboard engine exhaust port – front view.
Photograph 8.37  Site 23 port engine propeller spinner – side view. Note: the four ridges on the side (Photo: Jung 2003).

Figure 8.12  Site 23 wreck site plan. Note starboard wing on port side.
be inspected that shows a clear separation of the mainplane around where the fuel tanks were located. Subsequently, the flight engineer/galley compartment is open, but covered in silt. The other Catalinas have severed wings, rather than a mainspar separated through the fuel tanks.

A similar feature to some of the other Catalina wreck sites (eg, Site 11) is the occurrence of the tail cone, settled forward, but upside down. The tail cone has fallen on top of the port wing and one of the port engine’s propeller blades. The mainplane and engine, therefore, sank before the empennage.

8.10 Site 24 – Unknown PBY-5 Catalina
The pattern of wing separation though the fuel tanks is again repeated at Site 24. Unlike Site 23, however, the mainspar has broken into two sections, both of which occur upside down on the same side of the fuselage (to starboard). The initial dive on this wreck site almost immediately discovered artefactual material. A pair of binoculars was found inside the bow, which has what appears to be cannon damage (Photo. 8.38). This was the only wreck site, other than the Y-59 to still contain on the surface artefacts relating to the crew and perhaps the passengers too.

The wreck site lies in 12 metres during neaps and its bow (or what was discerned to be the bow) was found to face almost due west. The port wing still has its engine attached, together with its propeller. Again, one blade of the propeller is perpendicular and pointing to the surface, indicating that the engine turned when the wing’s weight was borne upon it. The propeller’s spinner hub can clearly be seen and it is determined to be of a PBY-5 Catalina (Photo. 8.39). It is damaged with missing outer sections of the conical spinner, which most likely has corroded away.

The leading edge of both wings lie facing each other and they are splayed out at an angle, which converges at the wing tips, allowing a gap of approximately one metre. At the wing tips, however, are wing tip pontoons and support struts, not seen at any other wreck site yet inspected (Photo. 8.40 – Photo. 8.42). The port wing is clearly distinguished by the extant pitot-tube (Photo. 8.43), which is again a feature not seen at any of the other wreck sites. Both wing tips are on site as well as an extensive amount of wing sheeting.

The starboard engine has fallen from its mount and rests face down in front of its nacelle on the wing. Despite this, the engine still exhibits diagnostic features of the R-1830-82 power plant, namely the oil cooler. This was clearly seen on the side of the engine (Photo. 8.44 and Photo. 8.45).

The condition of the fuselage is poor. The bow could hardly be discerned and appears to have burnt completely along the water line. No trace of the bow gun turret was found, although Parker indicates that the forward machinegun is still in situ (Fig. 8.13). This was not seen during the 2003 inspections, but a hull longeron was found there, which Parker may have misinterpreted as a gun barrel (Fig. 8.14). Parker relates that an anecdotal story may explain
Photograph 8.38  Site 24 Binoculars found at the bow (Photo: Jung 2003).

Photograph 8.39  Site 24 Spinner hub on the port engine propeller – outer casing is missing, much like in the case of the Y-59.

Photograph 8.40  Site 24 starboard wing pontoon.
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Photograph 8.41 Site 24 starboard wing pontoon struts towering towards the surface.

Photograph 8.42 Site 24 port wing pontoon collapsed upon the under side of the wing.

Photograph 8.43 Site 24 pitot tube on the port wing.

Photograph 8.44 Site 24 oil cooler on the upright starboard engine.

Photograph 8.45 Site 24 oil cooler on the starboard engine – close-up (Photo: Jung 2003).
Figure 8.13 Isometric site plan (courtesy Geoff Parker 1999). Accompanying notes:

Catalina Flying Boat

1. This wreck is on the edge of the drop off and is the site that Jeff Kimpton and myself first dived
2. I believe the machine gun to be at the front of the bow and facing south
3. Starboard wing engine has fallen off and is standing upright on propeller
4. Wing is upside down and is facing to the stern and wing float is in the up position
5. Port wing is upside down and on the starboard side of plane with wing float laying on top of wing
6. There is what I believe to be a metal helmet under the starboard side of the plane
7. Since completing this drawing I think the wing has broken off at starboard engine, as in two of the other wrecks I have observed this to have occurred

Figure 8.14 Site 24 wreck site sketch plan.
the poor condition of the forward section of the fuselage. The wreck was apparently loaded with grenades and subsequently blown up by (presumably) RAN divers. The condition of the wreck site’s fuselage is similar to Site 13. Both wreck sites may have been subjected to the same site formation processes.

8.11 Site 26 – PBY-5 Catalina FV-N
Gajda (pers. comm., 15 March 2005) identifies this wreck site on the basis of having seen artefacts there marked in English: an artificial horizon and radio chassis. These objects were later exhibited in the Douglas C47A ‘Skytrain’, but were since lost when the collection was moved to the BHSM. The site has been photographed consistently since the aircraft’s loss, probably because this is the first wreck site people encounter when walking from Town Beach at SLW. The oldest photographs of the wreck site date from 1942, when it was visited by military personnel. These photographs show considerable detail, which archaeologists can use to interpret the wreck site by understanding the site formation processes the wreck site has undergone, as well as determining what type of Catalina it is.

Eric Lawrence’s photographs from 1942 show the extent the flying boat was damaged (Photos. 8.46 – 8.48). The forward section of the bow, including cockpit and gun turret, are well preserved. Hull damage on the starboard side was minimal, but on the port side, the fuselage sheeting is badly damaged. This is not from corrosion, but from damage caused by fire. The bow gun turret, however, is shown in the open position. This is the only Catalina flying boat wreck site that has been inspected in Broome with an open turret. Whether this represents a frantic struggle to defend the flying boat or whether this is post depositional is not known. The flying boat was anchored when it sank as attested by the anchor cable, which is visible emerging from the anchor locker, as well as the deployed snubbing post.

It was recorded that some of the flying boats were inspected shortly after the air raid to salvage machineguns from them. This most certainly would have occurred at the Type One wreck sites. Regardless of what may have caused the turret to be turned to port, it should be remembered that a defence was said to have been put up by a RAF Catalina. Bowden’s account indicates that he was wounded before he could let off a single round from the waist blister compartment. Perhaps then someone was operating the bow turret too, although this was not recorded.

The wing is obviously damaged, but a detailed inspection of the wing indicates that it did not burn in the fuel tank section. Rather, the starboard wing was severed outboard of the starboard engine. The mainspar is relatively complete and it had collapsed on top of the fuselage. Note, however, that the still attached port engine has a ‘Y’ shaped configuration propeller, which indicates that it was not yet bearing the weight of the wing. Unfortunately, the port propeller is now missing from the wreck site. If the propeller had survived today, it may have been used as a key in identifying the wreck site. FV-N was recorded to have a damaged port propeller. A further diagnostic feature of the then visible port propeller, however, does indicate that the
Photograph 8.46. ‘Damaged flying boat, believed to be a Dornier [sic]’ (Photo: Eric Lawrence 1942). Note: no damage to port bow.

Photograph 8.47. Original photo has the following written on the back: ‘Damaged flying boat inverted engine actually from the wing on damaged side. Jaylen Kendall just on top of nose’ (Photo: Eric Lawrence 1942). Note: flying boat believed then to be a Dornier. Note fire damage to starboard bow.

Photograph 8.48. Visitors to Site 26 (FV-N) in c.a. 1942 (Mervyn Prime Collection, Broome Historical Society Museum n.d.). Note: perhaps photographed by Eric Lawrence?
flying boat was indeed a PBY-5, which is consistent with the wreck site having been identified as FV-N.

The starboard engine was found at the wreck site in the 1940s, lying face down on the port side of the fuselage. It is still there today, but it would appear that its oil tank and engine mount have been removed or corroded away (Photo. 8.49). The engine was certainly higher in the 1940s than it is today. The upper horizontal surface of the engine still has its exhaust collector ring and exhaust ports. Cross referencing these exhaust ports indicates that they are of the same type as that found on Site 23, which is further evidence that both these wreck sites are PBY-5 Catalinas (Photo 8.50).

The bow has deteriorated considerably since the air raid (Photo. 8.51). The bulkhead between the navigator’s compartment and cockpit, which would have held the aircraft contractor’s plate, had survived the sinking event, but not the constant effects of periodic exposure to the air over 60 years. The fuselage aft of the mainplane was badly damaged during the attack and it would appear that early photographs of the wreck site show that it had burnt to the water line. The empennage had survived, although the horizontal stabiliser was damaged. The stabiliser is all that remains of the empennage today, even though the leading edge of the tail fin was extant in the 1970s (Photo. 8.52 and see Appendix 8.2).

Early photographs of the wreck site show the starboard pontoon upside down and facing towards the tail. The wing is no longer there, but it can be extrapolated from these early images that the wing was most likely on the starboard side of the fuselage and facing the same way as the pontoon. Aerial photography of the wreck site reveals the overall extent of the material found there (Photo. 8.53). A site plan was developed, which in particular, shows the ‘intact’ port wing, much of which was buried at the time of the wreck site inspection in 2003. The bow is orientated to the west (Fig. 8.15). The damage to this wing is similar to that at Site 10 (the Y-59), and Site 13 – all have severed wings rather than wings broken through the fuel tanks as per Site 23 and Site 24. Site formation processes are similar in all – wings becoming inverted. This phenomenon occurs regardless of the depth of water.

8.12 Site 27 – Dornier X-1

Another wreck site close to the beach is Site 27, formerly identified as the X-1. The wreck is easily accessible by walking from Catalina Beach, rather than from Town Beach. Like Site 26, this wreck site was photographed in the 1940s, but only one image has survived (or was taken) (see Appendix 8.2). Gajda photographed the wreck site in detail in the 1970s, providing a clearer indication of the surviving cultural material.

On Site 27, the wing was found broken in two sections: the port wing on the port side, tilted at angle, and the starboard wing almost perpendicular to the fuselage as per an operational aircraft. It would seem from the early photograph of the wreck site that its wing was broken in two sections, as a result of combat damage. The port wing is the best preserved and, surprisingly,
Photograph 8.49. Site 26 view from port bow at SLW (Photo: Jung 2003).

Photograph 8.50. Site 26 exhaust ports on the starboard engine (Photo: Jung 2003).
Photograph 8.51  Site 26 view from starboard bow at SLW (Photo: Jung 2003).

Photograph 8.52  Site 26 view of the tail and main spar box section facing west (Photo: Jung 2003).
some dark green paintwork has survived (Photo. 8.54). The starboard wing’s upper surfaces have been peeled back; probably post depositional due to tidal currents and storm surge.

Two of the aircraft’s engines are still on the wreck site, in situ in relation to the wing. The starboard engine is missing and both of the extant engines (port and central) are missing some or all of their propeller blades. The centre engine propeller is missing its top blade, which was predictably perpendicular as per a propeller that supported the weight of the wing. A significant aspect of this engine’s spinner is that it would have looked similar to that of the early model Catalinas of Patwing-10. The spinner is gone, but the remains of the base of the spinner can still be seen. Patwing-10’s two Catalinas would have spinners almost identical to this example, since both PBY-4s and Dorniers had propellers with conical shaped spinners (Photo. 8.55 and Photo. 8.56).

In contrast to the only other Dornier flying boat that has been found, the X-23, this wreck site’s bow has not survived (Photo. 8.57). The only remaining section of the fuselage is that encompassing the fuel sponsons and the empennage. Gajda excavated in the amidships section, which is still exposed today showing the hull floors (Photo. 8.58). The port sponson is visible and the port wing has settled upon it (Photo. 8.59). The hull’s floor was largely awash during SLW and it is possible that its structure extends right to the empennage. The upper hull surfaces aft of the mainplane, unlike the X-23, have not survived, but what could be made out of the centre line of the fuselage is that it is facing almost due south (Photo. 8.60 and Fig. 8.16).
Figure 8.15 Site 26 wreck site plan.

8.13 **Target 29 – X-20 wing section/debris**

Gajda discovered diagnostic artefacts including and ammunition box, which were labelled with the serial number X-20 at another site close to the shore. Structural elements of the flying boat, however, were also found. The inverted wing section, which marks the debris field (Target 29 - note: Target 28 is a fishing boat near the new jetty and it is exposed during SLW), is still *in situ* (Photo. 8.61 and Photo. 8.62).

The wing section and artefacts prompt the question; is the site a post depositional debris field or does the debris mark the site of the X-20’s original location? It is argued here that the former is the most plausible explanation for this site.

Of all the wreck sites investigated so far, this is the only ‘site’ that does not have engines, fuselage or wings. This suggests Target 28 represents a debris field of the X-20, rather than the site of the X-20 proper. Photographic data shows that only two Dornier flying boats are Type One sites. The three unlocated Dornier wrecks must be Type Two. Target 28 is most
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Photograph 8.54 Site 27 port wing and engine collapsed off its mount (Photo: Jung 2003).

Photograph 8.55 ‘John Looby beside the No3 engine. Upper blade has been sawn off’ (Photo: Gajda ca. 1970s). Note: fog bank behind John.

Photograph 8.56 Site 27 No. 2 engine in 2003 still with cowlings. Scale in 20cms.

Photograph 8.57 Site 27 wreck site overall from the ground.
Photograph 8.58  Site 27 starboard sponson and hull interior floor looking aft. Scale in 20cms.

Photograph 8.59  Site 27 port sponson and the port wing (partial) collapsed. Scale in 20cms.
likely, therefore, a dump site from previous salvage activity, either during WWII or post war. The debris does not constitute the remains of an in situ flying boat wreck site. This will be explained further in section 8.17, in light of additional flying boat material found elsewhere in Roebuck Bay.

8.14 Target 30 – Simpson Beach Catalina sailplane section
It is unlikely the wreck sites would have escaped some form of dispersal over Roebuck Bay, given that they occur in a region subjected to cyclones and large tides. One location, Target 30, may have resulted from such disturbances. The site consists of an upside Catalina sailplane section at Simpson Beach, about one kilometre from the main group of wreck sites (Photo. 8.63 – Photo. 8.66). The site is exposed during low tide, near the site of the old Broome meatworks, which is now an up-market housing estate.

Could the wing section have floated there in a semi-submerged state with the incoming tide on the morning of 3 March 1942? Perhaps a would-be souvenir hunter left it behind to pick up at another time? Perhaps it represents an adaptive re-use of the flying boats wreck sites in the near-by fish trap? Regardless of the origins of the sailplane, its location at Simpson Beach indicates that materials from the sites have moved from their original context. Whether this dispersal of objects is due to cultural or natural site formation processes is unknown.
Figure 8.16 Site 27 (X-1) wreck site plan.

**SITE 27 - DORNIER X-1**

**KEY**
1. shattered bow section
2. fuselage floor frames amidships
3. port sponson
4. port sponson fuel tanks
5. port sponson fuel inlet
6. port wing (right way up)
7. port engine (propeller missing)
8. port wing tip
9. main spar - trailing edge missing
10. empennage
11. port rudder
12. starboard rudder
13. starboard wing (right way up)
14. middle engine (propeller missing)
15. starboard engine & propeller missing

Note: dotted lines represent buried structures

area excavated by Gajda

0 1 2 3 4 5 10m

S1 2003
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Photograph 8.62  Target 29 wing section debris at the location of where the X-20 artefacts were discovered. Scale in 20cms.
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8.15 Target 31 – Unknown material on Middle Ground

The side scan sonar survey in 2001 did not go over the area known as ‘Middle Ground’ in Roebuck Bay. Middle Ground is exposed during SLW, therefore, it was believed that if any cultural material had survived there, it would already have been reported. The aerial survey discovered that this was not the case and that cultural material does exist there. A previously unreported find is referred to here as Target 31 (Photo. 8.67).

Target 31 occurs south southeast of the Y-59 wreck site and is within an obstruction area marked on AUS 50 (see Fig. 2.2). What constitutes the obstruction areas on the chart sheet is not known. Ground inspections are warranted at this site to determine what its make-up. The object also prompts the return to archival sources. An explanation of this and of other unknown targets is discussed at greater length in Chapter 9.
8.16 Discussion and analysis

A key datum point in the ‘Babs’ aerial photograph that archaeologists can use to geo-reference and predict where the flying boats have sunk is the old jetty. Projecting an imaginary datum line from the end of the jetty shows that all of the flying boats, with the exception of one, lie to the east of this line. The visible smoke columns (SCs) have been numbered and transposed onto the AUS 50 chart, which has been skewed and stretched to maintain the location of known wreck sites, with the chart-plotted location and angle of the old jetty (Fig. 8.17).

Another datum point is the location of SC2 in Figure 8.17. It must relate to the wreck site closest to the end of the jetty, which is Site 26. Wreck sites such as the X-23 and the X-1 are obscured. Idzerda (see Chapter 4) indicated that his flying boat (the X-23) was the last to be attacked as it was by then obscured by smoke. The location of his flying boat, therefore, correlates with Japanese photographic intelligence, as its SC could not be seen.

The WAMM’s side scan sonar survey of Roebuck Bay used the ‘Babs’ aerial photograph as a clue to where the armada had sunk (see Photo. 6.1). It was not known then which SCs correlated with which wreck sites:

This photograph … clearly shows the area of Roebuck Bay with about eight aircraft burning in the foreground (and two aircraft on fire on the airstrip). From the geometry of
Figure 8.17 The geo-rectified correlation between SC numbers and known wreck sites and unverified Target numbers. Inset: plan view of smoking wreck sites.
the aerial photograph, it was possible to rectify the picture and place the burning aircraft in their correct geographical orientation. Since the picture clearly shows the smoke from the fires blowing towards the NW, it is known that there are no other aircraft to the east and the major concentration of sites is approximately where the sonar targets were found (Green, 2002: 127-128).

Green’s assessment of the distribution of flying boats in Roebuck Bay is most likely correct. Archaeological data, obtained from this survey, indicate the incidence of known wreck sites correlate with data from the ‘Babs’ photograph. The distribution of the located wreck sites matches the distribution of SCs. However, it is argued that not all of the flying boats were on fire; either they had already sunk, or had yet to be attacked when the photograph was taken. For instance, there are two known wreck sites to the west of Site 13 that do not correspond to a SC (ie, Site 10 and Site 11).

Although only seven wreck sites are represented by SCs in Figure 8.17, archaeological data indicates that the known wreck sites obscured by smoke brings the total number of wreck sites to 15 – the actual number of flying boats lost. However, not all of the visible SCs can be correlated to known wreck sites. For instance, archaeological site inspections are yet to verify if SCs 4 and 7 still mark the actual location of wreck sites.

SC1 is an outlier; possibly a flying boat leaving the anchorage/mooring area. The sonar survey failed to find any substantial cultural material at that location (Target 2). Site inspections may reveal a debris field, but it is argued that anything more substantial is unlikely because the flying boat represented by SC1 is most likely to have been moved, for reasons discussed in the following chapter. The other unverified target numbers (T18, T19, T21 and T25) are, therefore, predicted to mark the location of the four missing flying boats (Table 8.1). If all the wreck sites are thus accounted for, Site 29 (the X-20 debris area) could not possibly be of a wreck site proper.

8.17 Conclusions

… the memory of what happened in the war, it comes back out of forgetting just as the same way as the aeroplanes come out of the tide here. And there’s only a little left, or there’s a vest there or barnacle encrusted wing …, but if you dig down deep in history you find, just as you do when you go under water, that there are well preserved things there and there’s a whole pattern of the drama that happened with the sinking of an aircraft and the death of people (Bibby, 2001).

This chapter focused on a non-disturbance survey of 10 located wreck sites and four debris fields/isolated finds in Roebuck Bay. In order to better understand the located wreck sites, they were mapped using a defabrication method that works back from an established set of aircraft plans. The results help to predict where the unlocated wreck sites are. A hypothesis has been put forward in this chapter that argues that all but one of the flying boats lost during the air
raid at Broome have been located in the WAMM’s 2001 side scan survey, albeit four of these possible wreck sites are yet to be verified.

This non-disturbance survey indicates that seven of the eight Catalinas reported to have been lost are now located, and that most of these can be identified as a PBY-5s. Site 13 and Site 20, however, are yet to be identified as a specific Catalina type, since vital diagnostics could not be determined. At Site 13 the propeller spinners are buried. Site 20 only comprised of an empennage, which is unfortunately missing its rudder. Side scan sonar data of this site shows that the location does contain a considerable amount of cultural material, which may represent other elements. Its location in deep water would also suggest that it may be one of the two US Navy PBY-4s, since they were reported to have been in Broome at least a week before the air raid, and hence, would have been moored in deep water.

Of the missing flying boats, three are Dorniers, one is an Empire flying boat and the other a Catalina. However, even though some of the flying boats are recorded to have been dispersed in Roebuck Bay, such as the X-3 that was taxiing to leave, all of the machines must have been moored or anchored in the area to the southeast of the jetty. The ‘Babs’ photographer, hence, captured the scene of the armada’s demise in its entirety. However, the complete disappearance of a Type One wreck site, as represented by SC1, is worrying. Clearly there have been post depositional processes at work, but now with an understanding of the distribution, number and

<table>
<thead>
<tr>
<th>Number of flying boats</th>
<th>SC Number/Site or Target (T) Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/T02 (not verified)</td>
</tr>
<tr>
<td>2</td>
<td>2/Site 26 (Catalina FV-N)</td>
</tr>
<tr>
<td>3</td>
<td>3/Site 13 (Unknown Catalina)</td>
</tr>
<tr>
<td>4</td>
<td>4/T21 (not verified)</td>
</tr>
<tr>
<td>5</td>
<td>5/Site 20 (Catalina tail)</td>
</tr>
<tr>
<td>6</td>
<td>6/Site 22 (Unknown Short Empire)</td>
</tr>
<tr>
<td>7</td>
<td>7/T25 (not verified)</td>
</tr>
<tr>
<td>8</td>
<td>Site 10 (Unknown Catalina PBY-5)</td>
</tr>
<tr>
<td>9</td>
<td>Site 11 (Catalina PBY-5, Y-59)</td>
</tr>
<tr>
<td>10</td>
<td>Site 14 (Dornier X-23)</td>
</tr>
<tr>
<td>11</td>
<td>Site 23 (Unknown Catalina PBY-5)</td>
</tr>
<tr>
<td>12</td>
<td>Site 24 (Unknown Catalina PBY-5)</td>
</tr>
<tr>
<td>13</td>
<td>Site 27 (Dornier X-1)</td>
</tr>
<tr>
<td>14</td>
<td>T18 (not verified) (Empire “boat?”)</td>
</tr>
<tr>
<td>15</td>
<td>T19 (not verified)</td>
</tr>
<tr>
<td><strong>Predicted locations of flying boats based on side-scan sonar data</strong></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>T16 (X-23 debris?)</td>
</tr>
<tr>
<td>17</td>
<td>T29 (X-20 debris)</td>
</tr>
<tr>
<td>18</td>
<td>T30 (sailplane section)</td>
</tr>
<tr>
<td>19</td>
<td>T31 (debris on Middle ground)</td>
</tr>
</tbody>
</table>
condition of the surviving wreck sites, archaeologists can help explain the impact of these post depositional factors.

The following chapter puts forward an interpretation of the site formation processes in Roebuck Bay based on the archaeological data presented in this chapter. Additional historical data discovered during the course of this research reveals the cultural site formation processes that have impacted upon several wreck sites. This history of salvage may explain what happened to the machine at SC1 and the condition of some of the Type Two wreck sites. Humans, it is argued, have had the greatest detrimental impact on these wreck sites.
CHAPTER 9: HOW TO DESTROY A FLYING BOAT WITH A MITSUBISHI ZERO - cultural site formation processes at Broome

9.1 Introduction

I believe most of them [the flying boat wrecks] that were ... [dredged] up, blown up and taken further out and exploded. So they’ve been disturbed a lot already (Bibby, 2001).

The sites inspected in Chapter 8 are argued in this chapter to be in situ and their layouts to indicate how they sank. Given their relatively intact nature, it is believed the wreck sites have changed little in the intervening years. Based on the archaeological evidence, possible site formation processes are reconstructed.

It is argued here that extensive primary salvage of main aircraft elements has not occurred, except at one wreck site, which is believed to have been moved elsewhere. For instance, machineguns are reported to have been taken from some of the wrecks to defend Broome from further air raids, but the perceived imminent threat of a Japanese invasion precluded the recovery of bodies within their burnt-out hulls. People were preoccupied with saving their own lives and leaving Broome as soon as possible. No interest was shown by the military towards salvaging the wreck sites, even after the threat of invasion had subsided. It was seen by some to be a waste of military resources at a time of war (see Chapter 7). Similarly, there was no post-war interest in salvaging the wreck sites. Some flying boats, especially the refugee carriers are war graves, since they may contain human remains buried in a sand matrix in or around the hulls.

Primary salvage is largely that undertaken during the recovery processes by owners or other agents with a pecuniary interest in a vessel’s loss. Others were salvaged because they formed a shipping hazard, there were many reasons. Secondary salvage is that which is carried out ‘by individuals or groups other than those directly involved at the time [of loss] ... and it generally occurs after an abandoned site is relocated and then salvaged by people without a “primary” interest in the site’ (McCarthy, 2000:59). These categories have been supplemented with the terms ‘opportunistic salvage’ and ‘systematic salvage’ to take into account that:

… a purely temporal distinction fails to allow for continuing access to a wreck, whereas primary/secondary places emphasis on legality and does not encapsulate the range of possible access to both the wreck proper and the wreck products off-site (Gibbs, 2006:14).

The Broome flying boat wreck sites fall into the secondary salvage or systematic salvage category as well as re-entering a systemic context whereby they have become the focus of attention to pilgrims (ie, the active participants of the air raid) and tourists (Schiffer, 1977:15-16; McCarthy, 1983). Human visitation, however, has had a devastating impact on wreck site fabric, much worse than in situ degradation (Edney, 2006). Chapter 7 illustrated the information
loss from wreck sites that occurs when people take artefacts from these sites without recording the context of finds. The very reason why people have been able to find artefactual material remaining in the flying boat hulls must be because the wreck sites were not the subject of primary salvage.

Post depositional site formation processes at the wreck sites are described in local folklore as having severely impacted on the fabric and location of the wreck sites today. The oral history of the Broome wreck sites is ‘subject to the abstraction that characterises historiography, and they bring their own values and interests in their accounting of time past’ (Deetz, 1988:17). For instance, although the Royal Australian Navy (RAN) is believed to have cleared Roebuck Bay of its flying boat wrecks shortly after their loss in 1942, archaeological data suggests that the supposed extent of the salvage work is inconsistent with the oral history of the naval officer who was in charge. Not ‘all’ of the wrecks sites were said to have been specifically destroyed by the RAN, but the claimed extent of the salvage, it is argued here, did not happen. All of the wreck sites inspected in this thesis are, therefore, defined as a continuous site type, based upon Muckelroy’s (1977; 1978:182-214) concepts of continuous and discontinuous site types. Continuous site types are succinctly paraphrased as:

... relatively localized in their remains of the hull and any cargo or ... fittings, as opposed to discontinuous sites [whose] elements ... are widely scattered, with no single specific locus of the wreck site (Anuskiewicz, 1998:228).

A wreck site locus, or continuous site type, is defined in this chapter as the fuselage with the keel surviving as far as the stern post (Fig. 9.1). Furthermore, wings and engines will be no more than 20 metres from the fuselage. Aircraft wreck sites, like shipwreck sites, often have opened up and partially disintegrated fuselages and artefactual material scattered over a large area. Quite often, very little of the airframe remains intact after a crash. In the case of ship hulls, maritime archaeology’s ‘principle concern is with establishing the hull’s original form, since it has often not only partially disappeared, but also fragmented and distorted, accommodating itself to the contours of the sea-floor’ (Muckelroy, 1978:183). In this instance, the salvage would have resulted in the formation of discontinuous sites in Broome, rather than what is evident in the archaeological record today. In aviation archaeology, for example, the Catalina crash site at the Cocos (Keeling) Islands is a discontinuous site, since very little remains of its forebody and afterbody and that the mainplane and debris area lie a considerable distance from where the fuselage was believed to have been located (Jung, 2006).

There appears to be a pattern, or regularities in wreck site layouts of flying boats sunk on the while on the water. Power-on crashes, or wreck sites that have had their entire airframes salvaged are quite different. This signature pattern observed at Broome is referred to as ‘wing inversion’, a phenomenon where the disarticulated wings are an upside down mirror image of those on an operational aircraft. This has been observed at other flying boat wreck sites where flying boats were destroyed by fire while on the water (Jung, 2001). A burning Catalina produces a distinctive pattern in the distribution of its archaeological material (Photo. 9.1). A
Figure 9.1. Typical flying boat hull terminology (After Thurston, 1978; Scarborough, 1983).

Photograph 9.1 ‘After rescuing her crew off the coast of Japan, an American submarine sets this crippled PBY afire with her guns. Sub crews scan the sea for downed fliers as they go about their job of destroying Jap [sic] shipping’ (Hyman, 1945:253). Note: this view would have been similar to what Japanese pilots saw at Broome.
hypothetical break-up sequence, based on the archaeological data, is suggested for the Broome wreck sites. This chapter finds that the missing wreck sites are still likely to be in Roebuck Bay.

9.2 Site formation processes - cultural and natural

Site formation processes are cultural (c-transforms) and natural processes (n-transforms) that act upon archaeological sites (Schiffer, 1996:7; Raab and Goodyear, 1998). These processes shape the fabric of their morphology as well as artefacts within sites. Cultural site formation processes acting upon shipwreck sites are in most cases accidental, but are sometimes purposeful, such as in the case of warfare or ship abandonment, which results in different patterning in the archaeological record (see Richards, 2002). These formation processes, form sites as well as act upon them from the moment of deposition, referred to as S-A processes:

In sociocultural systems many of the activities carried out, such as discard, abandonment, and loss, result in contributions of material to the archaeological record. These activities exemplify the type of cultural formation process primarily responsible for the archaeological record, whereby materials are transformed from systemic context to archaeological context. They are known as S-A processes (Schiffer, 1977:16).

Natural site formation processes, particularly in ship and aircraft wreck sites, are the effects of ‘time, tide, corrosion etc …’ (McCarthy, 2004:83). In Broome the greatest natural impact on Type One and Type Three sites (exposed at SLW), is a tropical cyclone. Bird (1992) records the devastating impact of cyclones on Aboriginal shell midden sites in north Australia. Similarly, Jung (1996) illustrated the impact of cyclones on a Type One site in Darwin Harbour, which have literally blown apart aircraft structures and spread them over a large area. How then can archaeologists interpret the cultural material in Roebuck Bay since both cultural and natural site formation processes have been at work on the wreck sites? How can archaeologists make distinctions between ‘the effects of natural processes from cultural ones which act on the final distribution of shipwreck [and aircraft] remains?’ (Lenihan and Murphy, 1998:235).

These distinctions are made in this thesis by adopting a middle-range theoretical approach that provides a bridging argument between what happened to the flying boats when they sank and what archaeologists find at those wreck sites today. The inferences made about how the flying boats sink are based upon the archaeological data presented in Chapter 8.

9.2.1 A discussion of middle-range theory and its application to aviation archaeology

Binford’s (1982:128-130) concept of middle-range research has come to be defined as a theory that ‘intended to provide logico-empirical bridges between the static phenomena evident in the contemporary archaeological record and the behavioural dynamics that are inferred to have produced those phenomena’ (Raab and Goodyear, 1998:212). The theory is borrowed from sociology, but has been appropriated by archaeologists who have had to adapt the theory’s original meaning because unlike sociology, the discipline is faced with interpreting material traces of past behaviour (Raab and Goodyear, 1998:214). The term, as used in archaeology, is
narrowly linked to site formation processes in order to explain how and why archaeological sites are created:

In sharp contrast [to sociology], most current usages of ‘middle-range’ theory in archaeology are far more narrowly focused on the methodological issues of site formation processes. This emphasis in fact continues the development of a materialist epistemology for archaeology begun by certain practitioners of the New Archaeology, most notably Binford. The fundamental objective of such an epistemology is to ground inferences about past human behaviors by developing a reliable methodology for differentiating the effects of behaviour from the many other causes of the material record (Raab and Goodyear, 1998:218-219).

Middle-range theorists in archaeology look at the present range of human and animal behaviours to explain how archaeological sites in the past were formed. Middle-range theory, however, is applicable to many other types of studies. One geological example used for describing middle-range theory is:

... the doctrine of uniformitarianism: the processes that now operate to modify the Earth’s surface are the same processes that operated within the geological past. It is necessary to understand the ongoing geological processes in order to provide the bridging arguments necessary to assign meaning to the objects of the geological past. One must have, for instance, a knowledge of contemporary glaciers in order to interpret the glacial features of the remote past. Precisely the same issues face contemporary archaeologists when they attempt to interpret the material remains of past cultural practices; the archaeologist must also frame hypotheses to account for the formation and deposition of these physical remains. Bridging arguments are then required to translate the general hypotheses into specific outcomes, which can actually be observed in the archaeological record (Thomas, 1979:395-396).

A classic example of the application of middle-range theory in palaeoanthropology cited in Johanson and Shreeve (1989:231) is of the interpretation of bone concentration in South African caves. It had been previously believed that the bones belonged to animals that had been butchered by hominids. The observation of leopards feeding in trees was found to create a similar assemblage, which ultimately forced palaeoanthropologists to change their interpretations of the site. Similarly, archaeologists studying the recent past, such as that represented by aviation archaeology, can turn to the photographic record of past events, as well as recording the events evaluated from oral histories.

It is impractical to experiment on flying boats to see how they sink after they have caught fire; the flying boats that survive today from WWII are far too precious to set fire to. Accurate scale models or computer modelling would suffice, but doing this kind of experimental archaeology is beyond the scope of this thesis. Applying a middle-range theory approach to the analysis of the Broome flying boat wreck sites, therefore, is the only practical solution to explaining their current condition.

The application of a middle-range approach is constrained, which limits its direct application to the events of 3 March 1942. For instance, there are no photographs of the Broome flying boats sinking, apart from the image taken by the Babs, but even then, the aircraft was too high to take
detailed photographs of how the flying boats sank. In order to overcome this problem, other photographs of the types of flying boats lost at Broome need to be investigated. Photograph 9.1 is very important in this respect and will be discussed further below. Another problem is that only one of the survivors’ accounts actually states how the flying boats sank. Clearly then, the use of photographic material showing how flying boats, Catalinas in particular, sink after catching fire are vital in understanding how these machines sink after battle damage. Rather than relying on anecdotal data, the following sections will explain what formation process are most likely to have occurred in Roebuck Bay.

9.2.2 Natural site formation processes at work on the flying boats

Cyclones, to a lesser or greater extent, are likely to have resulted in the break-up and redistribution of aircraft structures at Type 1 and Type 3 sites. However, these sites lend themselves to photography during their periodic exposure at SLW. These photographs are documented in Appendix 9.2. The wreck sites have been periodically photographed (FV-N and the X-23) and both show small changes in their layouts.

Early photographs of FV-N show both wings at the site, but only the port wing has survived today. It is likely the missing starboard wing has been moved or buried by tidal and or cyclonic action. Sections of the tail have also disappeared, most likely attributable to the high corrosion rates the wreck sites must suffer, being periodically exposed to the air (see MacLeod, 2006). WWII photographs of the wrecked X-23 show wings on either side of the fuselage, but today, all wing structures occur on one side of the wreck, still relatively close to the fuselage. The impact of cyclones on the Roebuck Bay sites, therefore, seems minimal, since material is generally not dispersed over a large area.

When underwater, all the wreck sites are subjected to current, particularly during peak flow periods. Underwater surge has recently been demonstrated to have a damaging impact on high profile sites, where hulls and superstructures are proud of the seabed. The recent impact on the deep water wreck sites Araby Maid (55m) and Rhein (64m) in the Dry Tortugas, Baja California, demonstrates that deep water does not necessarily protect a wreck site from storms (AEU, 2006). However, because the Type Two wreck sites in Broome lie in a relatively narrow deep water channel, they are possibly protected from the Indian Ocean swells during cyclonic conditions. Many have become partially buried, which may also have helped stabilise them. Understanding the effect of underwater typological features in the preservation of deep water wrecks is beyond the scope of this thesis. However, one natural site formation phenomenon was observed, which may have helped preserve the wreck sites in both deep and shallow water; ‘scouring’.

Scouring occurs on the leeward side of wrecks. Tidal currents wash sediment away, resulting in a depression. Sediment builds up on the windward side of the wreck, in effect burying structures. The site of the X-36 at Anna Plains Station is almost entirely buried except for the tips of its propellers, probably as a result of this process. This complex process appears to be
cyclic. Craig Stien’s photographs of FV-N in the 1980s shows the port wing exposed, but now (in 2006) it is buried (see Appendix 9.2). Furthermore, the port wing tip of the Y-59 was buried in 2003, but exposed in 2006. Clearly, sedimentation fluctuates at the site.

Sedimentation of the wrecks helped stabilise them as attested by the main structural elements remaining relatively static. The discovery of artefacts (many of which are fragile such as a silk parachute and leather shoes on the Y-59) within sediment in the hulls, suggests that site stabilisation occurred shortly after deposition.

9.2.3 Cultural site formation process

The depositional phase in the history of a wreck site begins from the moment of sinking until impact with the sea floor. It is, therefore, a singular event. Understanding this initial break-up and deposition is a central goal for archaeologists. For example, Ballard (1989 and 1990) reconstructed the final voyages of the *Titanic* and *Bismarck* to the seabed on the basis of the condition of the material at those sites and recently the HMAS *Sydney* and HSK *Kormoran* were similarly interpreted (Mearns and Perryman, 2008). Similarly, aircraft crash investigators do this as well, whereby the final moments of an air disaster are reconstructed from the material evidence at crash sites (MacKay, 1982; Adams, 2001; Reasons, 1990).

Forces act upon structures as they descend to the sea floor and patterns emerge in the distribution of elements within a site. An example of this is the ‘water-line’ theory, which purports that shipwrecks tend to settle in sediment up to their waterline (Riley, 1988b:191). This is applicable to wrecks that have not broken up before making their descent to the sea floor. Shipwrecks, however, are generally believed to right themselves while descending through the water column. Even after capsizing, the *Bismarck* righted itself before hitting the bottom. In the case of the *Titanic*, its wreck site layout suggested to researchers, on the basis of the distribution and condition of the shipwreck that it had broken up near the surface; the bow planing down in an upright condition:

... Certainly, until we discovered the *Titanic*, most people believed that she had left the surface intact ... Given the facts - a 1,970-foot distance between the two main pieces of the hull on the bottom, the cluster of additional wreckage in the vicinity of the stern, the absence of a skid mark between the two pieces, and the fact they are pointing in different directions and upright on the bottom - it does seem almost certain that the ship broke apart at or near the surface ... The heaviest piece of all was the intact bow section, which had slowly filled with water over the previous two-and-a-half hours and now planed down and away from the surface still upright and at a slope, gathering speed. (Given enough depth to stabilize, all shipwrecks should rest on the bottom on their keels, since these are the heaviest parts of the ship.) (Ballard, 1989:201-203).

Similarly, aircraft that impact heavily on the surface of the water break-up in a predictable fashion (Photo. 9.2). In flying boats that have crashed, the cockpit/bow section is invariably forced back towards the mainplane, sometimes resulting in the separation of engines from wings and/or wing from fuselage (Photo. 9.3). However, on a flying boat that has sunk at moorings/anchor, the destructive forces are different. Main aircraft elements settle close to the

CHAPTER 9: ARCHAEOLOGICAL SITE FORMATION PROCESSES
Photograph 9.2 Wreckage of an Avro Anson aircraft (possibly no. NJ141) of No. 73 Squadron RAAF floating in the water 20 nautical miles east of Jervis Bay. The aircraft continued to float until sunk by naval gunfire. It had made a forced landing due to engine failure. The crew, who were not injured, were picked up by a naval escort and taken to Sydney. A message from the pilot received by other patrol aircraft of the squadron via lamp through the naval escort was ‘Tell my wife not to keep dinner. I’m going to Sydney with the Navy’ (J. Swan Collection, AWM Photo No. P02393.009).

Photograph 9.3 Sikorsky XPBS-1 c/n 4400. Wrecked Jun 30, 1942 when struck floating log while landing in San Francisco Bay after flight from Pearl Harbor (Larkins 2005; see also URL: http://home.att.net/~jbaugh/firstseries2.html) Accessed 18 February 2007). This crash damage is similar to the Cocos Is. crash.
fuselage, albeit in a disarticulated state. Furthermore, ships and aircraft differ widely in density and structure. They, therefore, might be expected to sink differently. However, the Broome flying boat hulls all ended buried upright and to their waterline.

Post deposition, wrecks become stabilised by sediment, but cultural processes again act on them once salvage is undertaken. The type and extent of salvage work on a wreck site, however, is poorly understood, since this type of work is often not documented in ship or divers’ logs. How many wreck sites were impacted, or by who and in what way was not recorded. In the course of this research, new data has emerged, however, which proves that the flying boat wreck sites were the subjects of a secondary salvage effort shortly after their loss. It is argued below, however, that this does not necessarily explain the condition of the wreck sites today, but rather how many wreck sites archaeologists should expect to find.

9.2.4. Catalinas and other cultural material that skew the Roebuck Bay data set
The number of targets found by the WAMM side scan sonar survey in 2001 suggests that wreck site debris even sites proper may be found to the west of the old jetty in deep water. It is argued here that before trying to determine the location of the missing wrecks, it is first necessary to control for other sites or other cultural material not associated with the air raid that may also be in Roebuck Bay. For instance, there were more Catalinas lost in Broome after the air raid, but in different circumstances. Could Roebuck Bay be their graves as well? Is the occurrence of flying boat wrecks in the bay indeed a result of a singular event, or was the bay used as a dumping ground for other flying boats lost at Broome after 3 March 1942? The following suggest that they are indeed the result of a singular event.

The RAAF Catalina A24-76 crashed at the aerodrome on 19 December 1944 after doing air sea rescue (ASR) work for a Liberator strike from Corunna Downs (WA). It was, however, carrying a load of beer for 43 Sqn at Darwin (Appendix 9.1) (Vincent, 1981:113; Graham, 2003b; Cleworth, 2006:98-101). The fate of this wreck is unknown. Another Catalina loss occurred on 28 October 1945 when A24-70 was blown ashore during a storm (Vincent, 1981:111; Series number: A705/1. Control symbol: 32/17/266, NAA). The flying boat was severely holed and subsequently abandoned. Anecdotal information suggests that it was abandoned in the mangroves up Dampier Creek, becoming amongst other things, a de facto playground for children (Photo. 9.4 and Appendix 9.1). A24-70 was clearly abandoned in a mangrove area, but its current location is not known either. These wrecks were probably broken up for scrap, since they are no longer there. They were on land and would have been easily accessible and in the case of A24-76, an obstruction on the aerodrome. It is not believed, therefore, that they could have been moved and dumped further out in Roebuck Bay amongst the 1942 losses.

Interestingly, archaeological material recently discovered in Dampier Creek suggests one of these flying boats broke up there and, hence, not in Roebuck Bay with the other flying boats. A waist blister compartment gun mount was found by a local Broome resident at the edge of the mangroves, southeast of the Broome International Airport’s runway (Fig. 9.2). The part’s serial
number confirms it is from a Catalina flying boat, but whether it came from A24-70 or A24-76 is unknown. The latter may have been converted to components in Broome or flown out and scrapped elsewhere. A24-70, it is believed, became fully immersed in seawater during high tides and was subsequently abandoned. The gun mount is most likely to have come from A24-70 because it was found near where A24-70 was wrecked.

Other aircraft thereby eliminated, we can be reasonably certain that any aircraft debris will be from the 3 March air raid. Figure 9.3 shows a sketch map of Roebuck Bay depicting the location of two permanent moorings, three channel markers and a SHW mooring adjacent to the jetty. The moorings were crucial for the Empire flying boats operating the shuttle flights between Broome and Java. Captain Lester Brain, in charge of QEA operations for the shuttle flights, was desperate to get these moorings put down before the service commenced, which shows there were no facilities for flying boats prior to these flights (Series number: MP203/1. Control symbol: 135/102/214, NAA). A.B. Corbett, the Director-General of Civil Aviation, outlined what flying boat mooring facilities were laid down, in a communication to Brain:

Following from Hussey [Captain - QEA] Broome addressed you care Aviat Melbourne begins have decided three mooring positions one nearest jetty permanent three fathoms one mile from jetty two safest permanent three fathoms two miles from jetty three loading moorings two hundred yards from jetty for use neaps and high waters STOP expect lay temporary mooring Friday one position five marker buoys Saturday STOP refuelling Sunday evening or Monday morning STOP permanent mooring two position Tuesday second permanent one position Wednesday temporary to loading position at first low water following STOP only launch sixteen foot whale boat inboard engine twentyfour foot launch about ten days good launch at Derby plenty dinghies here STOP jetty one mile from low water line Hussey ends - signed Corbett 5 February 1942 (Series number: MP203/1, NAA).

This is the first confirmation of how many moorings were laid down and where. There is a correlation between ‘permanent mooring 2’ and a located flying boat wreck; Site 22, an Empire flying boat. If Empire flying boats occupied the only moorings in Roebuck Bay, then the missing flying boat should be at ‘permanent mooring 1’, which corresponds to Target Photograph 9.4. Children posing on A24-70 (Broome Historical Society Museum, n.d.)
CHAPTER 9: ARCHAEOLOGICAL SITE FORMATION PROCESSES

Figure 9.2. A machinegun mount, believed to be the only archaeological remains of either A24-70 or A24-76 found in Dampier Creek by Shayne Thomson ca. 2006 (Photo: Jung, 2007).

Figure 9.3 Proposed permanent QEA mooring buoy arrangement and layout of channel marker buoys in Roebuck Bay (Series number: MP203/1, NAA).
18 (see Fig. 2.6). Target 31 is almost certainly an old channel marker, however, the location needs to be inspected on foot, as it was only seen from the air. Targets to the west of the axis line of the old jetty are also probably channel markers, except Target 2. Interestingly, the third permanent mooring for use during neaps and SHW still appears to be roughly *in situ*. This is a typical RAAF/QEA mooring block of concrete that has been seen at several former flying boat bases in north Australia ie, East Arm and at Gove in the Northern Territory (Photo. 9.5). These blocks were probably standard naval moorings, as the same type was used to anchor the anti-submarine boom net in Darwin. Two RAAF mooring buoys, chains and blocks were transferred from Port Hedland on board the *Nicol Bay* (Series number: MP203/1, NAA). These would have had the ‘Sunderland’ type rubber buoys attached. The third permanent mooring (next to the jetty), however, is *in situ* because after 28 March 1942: ‘...The concrete sinkers could not be lifted by the “Nicol Bay” [since it had fled to Port Hedland] and are still on the mud by the jetty and the chain is still on the wharf’ (Series number: MP203/1, NAA).

A number of temporary mooring buoys were also set, which may have skewed the side scan sonar survey results. By 25 February 1942, the *Nicol Bay* had laid down six moorings. Why would Brain have wanted to set more permanent moorings, if only one Empire flying boat was expected to be at Broome at any one time? It is not specified whether or not all of the moorings recorded to have been set by *Nicol Bay* were actually for the channel markers or for flying boats (Series number: MP203/1, NAA).

When the two Empire flying boats sank, they took their precious mooring buoys with them to the bottom. After the air raid, two further moorings were set to service subsequent flying boat operations. Made simply of 44-gallon drums attached to chain, these were later found to be an obstruction to shipping and were later deliberately sunk (Fig. 9.4). On 14 March 1942, the Control Officer at Broome, A.C. Richardson, recorded attempts made to recover the original moorings, but once the *Nicol Bay* had left Broome, there were no suitably sized vessels to recover the concrete blocks:

> It is desired to advise that attempts have been made by the Base staff to recover the moorings lost during the raid by Japanese aircraft on the 3rd. March 1942, but so far have not met with any success.

> As these moorings were laid in from three to four fathoms at low water and are now possibly fouled by the wrecks, not much hope is given for the recovery of this equipment as the only means of recovering same is with a hand grapnel, towed behind a launch.

> With the coming of low water springs attempts may meet with more success.

> Two more temporary moorings have now been laid about 500 yards south of the jetty (Series number: MP203/1, NAA).

Clearly then, cultural site formation processes have been adding to the archaeological material in Roebuck Bay, prior to and after the air raid. The acting manager for the Harbour and Light Department, Mr K.G. Forsyth wrote the following while in Fremantle on 13th August 1942, indicating that the temporary moorings themselves had become an obstruction to navigation:
Further to our recent telephonic conversation regarding the moorings buoys placed in position at Broome by your Mr. Richardson, I confirm these buoys, in their present position, had become a danger to navigation.

Owing to the lack of suitable craft at Broome, the Wharfinger was unable to lift the buoys for removal to a more suitable place, and therefore he was obliged to sink the buoys at the moorings.

Although the loss of the chain and anchors is regretted, this action was necessary in the interest of shipping using the port of Broome (Series number: MP203/1, NAA).

In a letter dated 5 September 1942, the Works Director at Broome, Mr H.B. Sturtevant wrote to the Director-General Department of Civil Aviation informing him that if they wanted to recover the Sunderland type buoys sunk with the flying boats that there were no ‘luggers now in Broome nor would it be possible to obtain divers or their gear’ (Series number: MP203/1, NAA) and that they should ask the navy for assistance presumably with a lugger and divers. This sets the scene for the future salvage work at Broome, as it is now believed divers were sent sometime after September 1942.

Buoys, however, were not the only obstructions posing a hazard to shipping. Given that no wreck site has been seen at Target 2, but that Japanese photograph data does show a flying
boat on fire at that location, this raises the question of what could have happened to it and perhaps other missing flying boats in Roebuck Bay? Anecdotal information from local Broome residents suggests the wrecks had been broken up with explosives and moved. However, it was not until a fortuitous meeting between the daughter of the RAN officer in charge of the salvage and McCarthy, who was presenting a talk to the Kimberley Society about the museum’s 2001 work in Broome. When Daphne Choules-Edinger mentioned that her father was involved in the salvage work on the flying boats, the Broome flying boat mystery appeared to be solved (Choules-Edinger and Marsh, 2003). Ms Choules-Edinger father’s name is Claude Choules. He was a demolition officer on HMAS King Bay (later referred to as AV708 in the Royal

Figure 9.4 Chart showing location of the replacement moorings after the air raid (Series number: MP203/1, NAA). Note: the moorings are almost due south from the end of the jetty.
Australian Army) that was sent to Broome in late 1942 to clear the flying boat wrecks for a proposed future flying boat base at Broome. Choules, a veteran of World War I, was 102 years old in 2003. He is still alive today as of 2007 (Casellas, 2007). The following recounts his version of events while King Bay was working in Broome.

9.3 HMAS King Bay in Broome

The auxiliary schooner HMAS King Bay (237 tons) was originally built as a lighter at Fremantle WA, but following the declaration of war with Germany the vessel was taken over by the RAN as an examination ship in July 1940 (Lenton, and Colledge, 1968:298; Nesdale, 1993:112, Dickson, 1998; Martin, P., pers. comm., 8 April 2004). On 2 September 1939 the Examination Service was established at all Australian ports, whereby the examination ships, manned by Australian Naval Reservists, were to stop vessels about to enter port, identify them and to search for contraband (Gill, 1985:64). The King Bay was later transferred to the army in February 1944. The ship’s operations in Broome during 1942, however, are a complete mystery (Photo. 9.6). No ship’s logs are known to have survived for that period, nor are there accounts from personal diaries:

Unfortunately it is often the case that there are few, if any, operational records on the smaller craft that were requisitioned for war service, and those that do exist tend to be sparse and incomplete.

We have very little information on the activities undertaken by HMAS King Bay and as far as is known, the only log books that exist for her are held by the Australian War Memorial, and relate to her later war service with the Australian Army (Mitchell, B., pers. comm., 3 June 2004).

The only reference for the King Bay having been in Broome at all is from a website listing RAN ships. King Bay is referred to as 'a 237-ton motor ketch requisitioned in July 1940. She served as an examination vessel at Fremantle, a tender to a shore establishment and helped clear the harbour at Broome of wrecks after Japanese air-attack' (Wilkins, 2007). In a 2003 interview Claude Choules claims the ship was in Broome and equipped with a team of four divers to salvage the flying boat wrecks and probably some of the sunken moorings.

9.3.1 Choules and Herber accounts

Following the fortuitous meeting between McCarthy and Edinger, an interview was organised with Claude Choules (Photo. 9.7 and Fig. 9.5). Corioli Souter from the WAMM was provided with a list of questions, relating to the ship’s stay in Broome and the salvage work they did. This interview is presented in Appendix 9.2. To summarise the findings from the interview, the results provided many useful insights into the extent and nature of the salvage operation that took place, but there are gaps and inconsistencies between what was said to have occurred and what is found in Roebuck Bay today.

The King Bay was in Broome for approximately four months from November 1942 until February 1943. During this time it did also spend a week in Port Hedland rescuing two grounded
CHAPTER 9: ARCHAEOLOGICAL SITE FORMATION PROCESSES


Photograph 9.6 ‘Wallal Beach, WA. Starboard side view of the auxiliary schooner King Bay beached. The photograph was taken prior to her being requisitioned by the RAN in 1940-07 for service as an examination vessel at Fremantle’ (Id. No. 300905 Naval Historical Collection, AWM).

Photograph 9.7 Chief Petty Officer Claude Choules RAN in 1936 (Photo: courtesy Daphne Choules-Edinger via Kevin Kenneally).

Figure 9.5 ‘Old age wearies WA naval veteran’ (Western Australian, 25 April 2002).
vessels there. The salvage team did not travel on the ship to Broome, but were flown in from Fremantle. Divers in standard dress, it is said, were diving everyday. Their task was to clear an area for a proposed flying boat base by removing wrecks and replacing sunken moorings. Divers placed explosives underneath the flying boat hulls to destroy the wrecks. Once the structure at each wreck site was reduced to manageable sized sections, probably by multiple explosions, those sections were hauled aboard the King Bay and dumped into deeper water. Choules was adamant that the salvaged sections were dumped in the 100-fathom (182m) line in Roebuck Bay. Souter pointed out that the only water near Broome approaching that depth was adjacent to Entrance Point close to the new jetty, known as ‘Roebuck Deep’ (AUS 50, 1973), a short distance from the wreck sites. The secondary discard of the salvaged sections from the flying boats may very well then be in Roebuck Deep. The WAMM side scan sonar survey in 2001 did not cover that area. Significantly, Choules did not remember how many wreck sites or which particular aircraft were salvaged.

One other eye-witness account of King Bay’s operations in Broome, collaborates parts of Choules’ recollections. This account is from Able Seaman Keith Maxwell Herber (87 years in 2008), who was on board the ship at this time (Photo. 9.8 and Photo. 9.9). He remembers seeing suitcases with khaki clothes and human bones in the salvaged wrecks. Significantly, he mentions that at least two wrecks were salvaged and that this work was done in late 1943, not late 1942:

You will note that I was first drafted to the K.B. on 10.7.43 when it was engaged in examination duties. It ceased these duties about 21.10.43. The crew was removed and myself and another A.B. were assigned to the ship to attend to moorings and cleaning duties as required.

On 15.11.43 the crew to go to Broome were assembled on board and 2 or 3 days later we sailed.

The times of working on the wrecks were dictated by the tides. I don’t remember the scope of the work but I feel there was more than one [salvaged].

The explosives were placed at low tide and when the incoming tide covered the wreck[s] they were exploded.

The ship’s company, if memory is correct, consisted of:

| Captain     | W/O   | (his name may have been Gunn) |
| Exec Officer| W/O   | ?                               |
| Diving Officer| W/O | ?                               |

C.P.O. Claude Choules
E.R.A. Harry Sykes
Cook    Sid Bull

1 Leading Seaman
3 (?) divers A/B

The name of one of the A/B’s was [Lionel?] Gardiner.

Approx. 8 or 9 A/Bs (Herber, K. pers. comm., 22 October 2008).
Herber’s recollection of two wrecks being salvaged may explain the debris field with the X-20 artefacts. Perhaps the wrecks closest to the jetty were salvaged, i.e., Target 2 and Target 29? It should be noted that only Type One wrecks were blown up. No Type Two wrecks were, therefore, salvaged, but Herber (pers. comm., 19 December 2008) did not rule out the possibilities that the deep water wrecks were searched for.

While the accounts of Choules and Herber do indicate secondary salvage in Broome, its specific nature is not clear and it conflicts with the archaeological data. Furthermore, it is most unlikely diving was conducted ‘everyday’, mentioned in Choules’ account, since the environmental factors that limit diving today must surely have impacted in 1942/43. Given that King Bay’s time in Broome was during the wet season, traditionally the lay-up season for pearling luggers, diving would also have been hampered by monsoonal squalls producing rough seas. It is posited here that King Bay would not have had suitable diving conditions (i.e., neap tides) to physically move all 15 wrecks, especially the large Empire flying boats, at the time King Bay was recorded to have been in Broome (Photo. 9.10). The archaeological data indicates that all the flying boats investigated in this thesis are in situ and that therefore King Bay only moved significant sections from one wreck site, Target 2 or SC1. The reason is that the wreck sites exhibit patterning in the layout and distribution of aircraft elements that is consistent with a flying boat sinking at moorings as a result of fire. The break-up sequences to describe these processes are discussed in the following section.
9.4 Inferred site formation process - ‘wing inversion’

Our cat was a sinking hulk with smoke pouring out of her. She was slowly keeling over at a crazy angle (Juta, n.d.).

Fire easily consumes an aluminium airframe. Accelerated by fuel, it results in a catastrophic failure of the mainplane. In the Catalina-type flying boat, fuel tanks are located in the centre section of the mainplane, between the engines and above the engineer’s station. What appears to have happened in the Broome examples is that the ruptured fuel tanks leaked burning fuel down the wing and into the blister compartment, causing the empennage to eventually break away (see Photo. 9.1). The structural integrity of the wings themselves fails, causing them to collapse around the fuselage (Jung, 2001:166). This often results in what is referred to in this thesis as ‘wing inversion’, where the port wing settles upside-down on the starboard side of the fuselage (upside down) and vice versa for the starboard wing.

McCarthy (2004:83) points out that aviation archaeology is akin to aircraft crash investigations, whereby crash site investigators have been ‘waiting for the archaeological world to catch up and to realise what important information can be had and what innovative methods are being used in this field!’ One method of interpreting an airframe at time of loss, is to investigate a phenomenon known as ‘wing clapping’:

Photograph 9.10 Salvage of an Empire flying boat. Location unknown, date unknown (Series number: A705/1. Control symbol: 9/25/13, NAA). Note: heavy lift capacity crane in use in Rose Bay or Batavia, also Australian registration for aircraft in foreground.
Assume now that the wings are the first to break off while undergoing the same dive-pullout scenario. The wings will break off upward, and the fuselage and tail may continue like an arrow shaft. Often the wings, as they break off upwards and back, impact with portions of horizontal and vertical tail parts. Such impact evidence is indicative of the wings breaking before the tail.

When both wings break simultaneously, it is not unusual to see that they impact each other as they depart the airplane. This phenomenon is known as clapping or wing clap. This is indicative that they broke simultaneously while under high positive g loading. This result is usually from pilot input or uncommanded flight control input (McCormick and Papadakis, 2003:172).

The above generally refers to an aircraft in flight, but the term ‘wing inversion’ is used in this thesis to take into account the crash of sinking flying boats into the sea floor through the water column. This pattern has been observed elsewhere at other Catalina wreck sites that caught fire (Jung, 2005). This is a general rule, since other forces act upon wing surfaces during their decent to the bottom. Sometimes both wings can settle on the same side, albeit upside down. This phenomenon is produced when a flying boat capsizes once one of its wings has broken away or has taken on water (Photo. 9.11). The now water filled fuselage can also drag the still attached wing over in a 90° arch (Photo. 9.12). While at this angle, this wing too will most likely detach.

The flying boat’s hull ‘has a negative metacentre height and, therefore, when at rest on the water the boat is, laterally, unstable’ (Gouge, 1935:695; Gould, 2000:77). Loss of a float will, therefore, result in the hull capsizing. It would not have been necessary to target fuel tanks or engines, as the destruction of a sailplane section would equally have caused the machine’s loss. The extent of wing inversion is also attributable to at least two other factors: depth of water and the amount of damage done to the mainplane before it sinks. Wing inversion clearly occurred at Site 23, but to a lesser extent at Sites 10, 11 and 13. This is because these machines, it is argued, sank in a similar manner, due to the type of damage they sustained. Two types of damage are believed to have occurred, known as the ‘centre-of-mass damage’ resulting in classic wing inversion and the other, ‘engine-wing’ damage. These are explained below.

9.4.1 The theory of ‘Centre-of-mass damage’

General fighter principles for destroying multi-engine aircraft dictate that pilots either aim for what is known as a ‘centre-of-mass’ or ‘engine-wing’ attack. Conceivably, the attacks on the two Empire flying boats may have utilised both techniques, since it is recorded that A18-10 (in particular) had its starboard wing severed by cannon fire. Subsequent passes then targeted the flying boat’s centre-of-mass, hence the fuel tanks behind the cockpit exploded, throwing Sgt Ireland out of the hatch on the flight deck. In the centre-of-mass attack, the best position to attack was apparently from ahead so as to avoid the side machineguns of a bomber. The fighter would, therefore, be attacking the greatest area, or centre of mass:

Nothing prevents a fighter attacking a bomber in a pursuit curve from targeting the cockpit—except the bomber’s defensive fire. In a head-on attack, aiming for the cockpit is easier than trying for an engine because you are putting the gunsight on the center of mass, and
Photograph 9.11  A United States Army Air Force (AO-10) Catalina, which suffered pontoon damage after a heaving landing in Tampa Bay, Florida. It is Actually Serial # 44-34067 not 43-4067, which was a B-25J that crashed in Switzerland on 7 February 1945. This Catalina was later salvaged - it did not sink (Ragnarsson, 2006; Johnson, 2003). Note: the Catalina almost capsizing to starboard due to the submerged starboard wing tip and pontoon. Both pontoons have been damaged.

Photograph 9.12  ‘NZ4046 — the final moments before sinking’ (Harrison et al., 1997:231). Note: although this Catalina did not burn, it is capsizing given that the starboard wing, seen here, is dragged down by the fuselage and port wing.
if you have wing guns that converge a certain distance ahead, when you open fire your rounds will converge toward the center of mass (cockpit) from the outer wings and then back again as you close the distance and scoot on by. If you are piloting a fighter with centerline guns, targeting the center of mass still makes sense because it is a bigger target, and rounds that strike the front of the fuselage will pass through until they hit something. Since, in a head-on, closing at about 750 fps [feet per second], you’re only going to be in firing range for less than two seconds, targeting center of mass is the only hope you have of getting hits. It’s not an ideal way to attack a bomber, but is the safest from the point of view of reducing the risk of defensive fire. The pursuit curve is the best way, giving you plenty of time to pour rounds into the engine-wing-fuel tank-crew compartment area. But it can also be the riskiest if the bomber is well defended.

If the head-on was the most effective way to shoot down a bomber, GAF [German Air Force] night fighters would have been trying to use it against Bomber Command planes. Instead, they developed equipment and tactics to attack from an undefended position. And they didn’t bother to target the cockpit at all. They went for the engine-wing-fuel tank area’ (Annon., 1998).

9.4.2 The theory of ‘Engine/wing damage’

Engine/wing damage in the archaeological record is exhibited by a break in the mainplane, whereby fuel tanks remain relatively intact, but the wing breaks through an engine nacelle. This has occurred at several Type One sites in Broome. Figure 9.7 shows a typical wing attack by cannon fire, resulting in the loss of wing integrity.

If an engine nacelle/mount has been damaged after the flight engineer’s compartment has disintegrated, both wings occur on one side of the fuselage. The detached wings being dragged down by the weight of the engines, leading edge first cause this. The wings become inverted at this stage, but before they hit the bottom, they are carried by the current and settle at an angle greater than 90° to the fuselage ie, they are swept. The leading edges of the wings fold back and face each other. The detached engine finished some distance from the wreck locus.

This pattern of damage appears to apply to Site 10, the Y-59 and Site 13, which are both Type One sites. Site 24, a Type Two site, however, exhibits a similar pattern. Here fuel tanks show evidence of fire damage (ie, absence of wing sheeting, showing only ribs), but the centre wing section was not destroyed completely before the flying boat sank. Site 10 and the Y-59 are
1. Japanese pilots aim at the greatest area of mass - the fuselage/wing intersection, setting fire to the fuel tanks. The fuselage is also holed by many hits and begins to sink.

2. Fire destroys central wing section, separating the mainplane. Fuselage descends to the bottom with a list to port. Fire has also destroyed the waist blister compartment resulting in a separation of the empennage, which becomes inverted. The weight of the still attached engines drag the wings downwards.

3. The port wing has settled on the starboard side of the fuselage, upside down and the starboard wing has settled on the port side, upside down. The port engine has partially collapsed from its mount and rests at an incline. The starboard engine has detached completely from its mount and lies face down. The tail cone, all that remains of the empennage, has settled upside down on top of the port wing.

Figure 9.6 Hypothetical breakup sequence of a centre of mass attack (typical), resulting in wing reflection. Site 23 depicted.
Figure 9.7 Hypothetical breakup sequence of an engine/wing attack (typical), resulting in wing separation at an engine mount, instead of through the fuel tanks. The loss of the Y-59 is depicted.
almost identical in this respect and although the starboard wing is missing on Site 10, it is probably in the same position as on the Y-59 wreck site. The same is applicable for Site 13, which has a missing starboard sailplane section. Further inspections at both sites on the port side of the fuselage may locate the missing wings buried there.

Site 26 (FV-N) is known to have had its starboard sailplane section upside down on the starboard side of the fuselage, but that part of the wing is not there today, or has become buried. The flying boat’s fuel tanks are relatively intact, which would suggest the machine suffered wing failure due to an engine being destroyed. Therefore, some sites exhibit both types of damage while others show only one. Engine-wing damage does not always result in wings settling on only one side of the fuselage. The two Dornier sites show centre-of-mass damage, and their wings initially collapsed straight down on top of their fuselages. The later settling of the two sailplane sections on the port side of the X-23 is most likely caused by storm/cyclone activity moving the wings off the fuselage. Despite the two types of damage, the significant aspect of all the wreck sites is that all aircraft elements are close together and not dispersed over a large area. The fuselages have intact keels, but their tops show the evidence of the conflagration that caused their destruction.

9.5 Discussion and conclusions

... And there’s only a little left, or there’s a vest there or barnacle encrusted wing and, but if you dig down deep in history you find, just as you do when you go under water, that there are well preserved things there and there’s a whole pattern of the drama that happened with the sinking of an aircraft and the death of people (Bibby, 2001).

An understanding of site formation processes that affect flying boats recorded to have been lost while at anchor, indicates that these are continuous site types. Aircraft elements are found in a locus of debris and structures, rather than being dispersed over a large area. Natural site formation processes have had a minimum impact on the wreck sites inspected in this thesis. Cultural site formation processes appear more complex than originally thought, given the mass of material taken from Roebuck Bay. Other Catalinas were lost and many moorings and channel marks were laid down, which skewed the side-scan sonar data. Although the two other Catalinas lost in Broome were probably not dumped in Roebuck Bay, but salvaged, moorings and channel markers were most likely not salvaged.

The secondary salvage of the Broome flying boat wrecks, demonstrated here, did occur. The oral historical record from the commander of a RAN salvage team only partly explains this naval mystery (Choules-Edinger, 2003). The extent of the RAN’s salvage is predictably ambiguous; such activity is rarely recorded and it is only through interviews with the participants that some idea of what may have happened to wreck sites can be determined (Garrett et al., 2006:81). Analysis of the archaeological data indicates the extant wreck sites have escaped the ravages of past salvage behaviour. Wreck sites were either destroyed in their entirety or left alone, probably because not all were found by the RAN in the time available during 1942-43. The
results show the 10 wreck sites investigated in this thesis are \textit{in situ}. They were not the subject of primary salvage and, hence, represent a snap shot of the time they sank.

Secondary salvage of the wreck sites commenced virtually on the day they were lost. This is well documented, for instance, guns were recorded by W/Cmdr W. Nicklen to have been recovered probably from the Type One sites, so as to help defend Broome from further attacks:

\begin{quote}
All salvageable guns were removed. 22 were returned to Pearce for repair and about 6 are mounted at Broome and Port Hedland for aerodrome defence. I did not have the heart to despatch these 6 guns South, as they were all that they had at Broome and Hedland for their defence. A considerable number of magnetos and instruments have arrived in Perth, and are being sorted out. Other equipment salvaged from the flying boats was placed on luggers which left Broome recently (Nicklen, 1942).
\end{quote}

Other flying boats arriving shortly after the air raid, were also using the flying boat wreck sites for spare parts:

\begin{quote}
Two more Catalinas drifted into Broome from Tjilatjap on the morning of 7 March. One of these had been abandoned in Java as being unserviceable. Collecting bits and pieces from other wrecked aircraft, the Dutch pilot eventually got it serviceable. He came across from Tjilatjap with no radio and no anchor, but obtained an anchor from one of the wrecks at Broome which was exposed by the low tide (Bennett-Bremner, 1944:102).
\end{quote}

Unfortunately salvage today continues at the wreck sites by tourists who seek to acquire new items for their collections (see Griffiths, 1996; Steinberg, 2005). All of the wreck sites investigated in this thesis showed some evidence of secondary salvage. For instance, none of them was found to have weapons; some had neatly cut off sections from the exhaust collector rings off their engines — this could only have happened post deposition. A pistol however, was recently recovered by a well-meaning site visitor who thought to hand in the object so that it could be preserved. Other anecdotal information suggests artefacts taken from the sites are sold at Broome’s local Sunday market, despite those wreck sites having been protected by heritage legislation in 2003 (McCarthy, M. pers. comm., 19 June 2007)! The wreck sites investigated in this thesis, therefore, are not pristine, but to a certain extent, contaminated. However, artefacts that suggest the wrecks are \textit{in situ}, were found on many of them.

The wreck sites exhibit a pattern in the layout of aircraft elements that is consistent with that of a flying boat sinking at moorings or at anchor as a result of fire. Wings, particularly in the case of Catalinas, become inverted on the sea floor and occur relatively near the fuselage. Two other indicators that the flying boat wrecks in Broome are \textit{in situ} are the direction the wrecks are facing and the attitude of the fuselages themselves.

Comparison of the site plans for each of the wreck sites with fuselages, wings and engines is shown in Figure 9.8. All the fuselages point west-southwest or due south - none point north or east. It would appear from their orientations that the current and windage was acting upon the fuselages right until they hit the bottom, their anchors holding them in the direction of
Type 1 and Type 3 - Exposed and semi-exposed wreck sites at SLW

The current while they sank. The wrecks are, hence, weathercocked. Furthermore, all of the fuselages are upright. If these wreck sites are the product of secondary discard (ie, produced by salvage and subsequent dumping in deeper water elsewhere), then it should be expected that fuselages would not be as complete. King Bay would not have had the capacity to lift a sediment-filled fuselage, which is why the wreck sites are said to have been blown to pieces, to facilitate them being brought on deck and dumped elsewhere. If the extant wreck sites were dumped, their fuselages would likely be upside down and facing in any direction.

The wreck sites in Roebuck Bay exhibit two types of damage resulting from either exploding fuel tanks or engines and wings having been severed by cannon fire. Both types of damage result in wing reflection to some degree, and all aircraft elements remain close together on the seabed. This is inconsistent with the oral history of the salvage event.

Figure 9.8 Comparison of the Broome wreck site layouts per site type. Not to scale.
The results of this chapter indicate no aircraft material to the west of the old jetty. The secondary salvage of the flying boat wrecks in Broome, it is believed, account for the complete destruction, removal and subsequent abandonment in deeper water of only one wreck site that is known to have been to the west of the jetty. This means that there must be another four wreck sites near the known Type Two sites. The probable reasons why they have not been discovered is that no-one has understood the patterning in Roebuck Bay’s cultural material, and no-one has had an opportunity to ground truth all of the targets determined by the WAMM’s 2001 side-scan sonar survey. This chapter also indicates in order to test some of the claims made in oral histories, a further survey is warranted in an area where flying boat wreckage was not previously expected to be discovered; Roebuck Deep.
CHAPTER 10: CONCLUSIONS AND FUTURE WORK

10.1 Introduction
Aviation archaeology is an emerging sub-branch of historical archaeology. This chapter summarises the results of an integrated historical and archaeological research strategy, which aimed to develop the study of aviation archaeology, based on the recording and analysis of the assemblage of flying boat wreck sites in Broome, WA. Determining which-plane-is-which in Roebuck Bay is an enduring research question. This thesis represents a further step towards understanding the extent and condition of the cultural material that aviation archaeologists find there.

This thesis examines a new class of wreck site — submerged aircraft and in particular flying boats. The study of these flying boats provides an insight into the lifeways and social history of the people who operated these machines at a time of crisis, just as do shipwreck sites (Hudson and Pettifer, 1979). By examining these relationships archaeologists can further investigate the archaeological record, by recognising patterns both in the historical and archaeological data sets. In this way, a verifiable account of the past can be created.

In Broome the archaeological material visible today relates to a battle, 66 years ago. That event resulted in the loss of, among other aircraft, 15 flying boats from four nationalities. The research in this thesis identifies those wreck sites and predicts where archaeologists may expect to find more flying boat cultural material in Roebuck Bay.

Broome’s flying boat wreck sites today are tangible reminders of the air war that occurred in WA. How archaeologists and historians compile, validate and present that data has increasing significance with the passing of the active participants of those events. The flying boats at Broome, will ultimately represent an enduring ‘touchstone’ to past and those associated with it, from the participants and their descendents, to the tourists, aviation enthusiasts, historians and archaeologists, whereby:

embodied history is inseparable from place: from the deeply personal scale of individual familiarity to the cultural landscapes inscribed on world heritage registers, physical places and objects are society’s ‘touchstones’ (Ireland and Lydon, 2005:1).

10.2 The significance of the Broome flying boats — research results in a global perspective

10.2.1 Of floatplanes and Dorniers
Broome’s sunken aerial armada prompts the question what WWII flying boat wrecks may have survived at other aircraft wreck loci, around the world. For example, Olongapo, in the Philippines, is recorded to have seven USN flying boats, all lost in the same air raid, but virtually nothing is known of their fate. In Indonesia, however, the archaeological record
of the MLD occupation was briefly hinted at with the discovery of scuttled aircraft in what Countryman and McDaniel (2000) describe as ‘a treasure-trove of aviation history’. Eight Fokker T.IV floatplanes and five C.11 were found in the Kali Brantas River. They simply did not have the range to fly to Australia and were scuttled by their crews in 1942. A planned recovery of a number of the wrecks failed to gain the approval of the Indonesian government. They were left in situ, but the subsequent construction of a dam resulted in their location being drowned. Previously, the locals ‘remember that before the dam was constructed they were able to glimpse the ghostly warplanes - their machine guns still aimed at the sky - whenever dry seasons caused water levels to drop. Surprisingly, scavengers never disturbed the site’ (Countryman and McDaniel, 2000). The Kali Brantas and Broome wreck sites are the only archaeological record of the MLD’s WWII service.

Other MLD machines, such as Dorniers, survive in a systemic context. The Militair Luchtvaart Museum at Soesterberg in the Netherlands has ‘de Owes Lobbes’ (the good old fellow). It is a Dornier Do 24 TT restored as a K-1 of the MLD. Another wrecked Dornier may still be in Darwin Harbour, the former X-10, which was handed over to the RAAF and became the A49-5, one of six Dornier flying boats operated by them. The sixth machine was converted to a houseboat on the Murray River (Prossor, 2001). Unfortunately four of them were scrapped (Photo. 10.1). The discovery off the Darwin esplanade of a possible flying boat wreck in 2003, prompted a group of high school students to believe it was a Short Empire flying boat, but if anything, the ‘wreck site’ location was more likely to be of A49-5 (Fig. 10.1). Disappointingly, neither of these flying boats was indeed found, only a reef at 31 metres. This shows the danger of claiming to have found a site, without archaeological verification. The only flying example is a Dornier Do 24 ATT (No. 4529. RP-C2403 c/n 5345), which was flown around the world by Claude Dornier’s grandson, Iren, in his honour (Photo. 10.2).

Other Dorniers exist in the archeological record, such as the Narvik Dornier wreck site, at 41 metres, and off the point of La Galère, near to the Islands of Port-Cros, at 88 metres. None of these was a MLD machine. Broome has the only located and accessible MLD Dornier flying boat wreck site. There are others, possibly at Surabaya and elsewhere in Indonesia, but none have been reported. The X-36 is the only other possibility in Australia, apart from A49-5, but that may be difficult to find in the shifting sands of its location in the mud flats off Anna Plains Station.

10.2.2 MLD (PBY-5) and USN (PBY-4) Catalinas

None of the original Catalinas delivered to the MLD in Java survived the war. Apart from a number of highly modified examples, so far they are only found in Broome’s archaeology. One of the RAAF ex-MLD machines, for example, became a house boat on the Murray River, but only its fuselage survived the transformation (Prossor, 2001:78-79). The only other example is an ex-MLD machine handed over to the USN and lost at Darwin Harbour as #41, believed to be a follow on from its MLD designation Y-41. That wreck has been found (Jung, 2001). The only MLD Catalina to have survived in a terrestrial environment is at Lake Boga. It was
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Figure 10.1 ‘Wrecks of four Dornier flying boats owned by the Dutch at outbreak of war and used extensively in defense [ie, defence] of East Indies ... Repair Depot at Lake Boga, Vic’ (State Library of Victoria. Accession number(s): H98.100/4110).

Photograph 10.1 ‘Wrecks of four Dornier flying boats owned by the Dutch at outbreak of war and used extensively in defense [ie, defence] of East Indies ... Repair Depot at Lake Boga, Vic’ (State Library of Victoria. Accession number(s): H98.100/4110).

Students find war wreck in harbour

By NIGEL ADLAM

A group of schoolchildren found the wreckage of a World War II plane at the bottom of Darwin Harbour yesterday.

They dived into the wreck, a four-engined flying boat which crashed in 1942. Visibility was poor, but there was a high school student and aட gratis and the forward cockpit of the fuselage.

Teacher Steve Coddin said: “It was heavily encrusted with coral. The students were taken to the site by Coral Divers. The wreckage is two nautical miles from Drovers' Gully. We came up from the divers were really amazed,” he said. Helen Deverill said: “There could be people who went there were no ghosts down there.”

The wreckage was carrying weapons and other materials from the Netherlands in Queensland when it crashed.

Coral Divers boss Sasha Müller said the plane's heavy load may have made it easier for the crew to use it as a target.

The wrecked plane was later transferred to the Australian War Memorial, which is preserved.

“Of course, it is not a site where you can dive,” Mr Coddin said. “The students did well.”

The students were Helen Dwyer, Ines Setiawan, Lewis Marshall, Anokai Lancaster, Carolina Barua and Edward Dostine. Picture: MICHAEL MARSHALL.

Figure 10.1 ‘Learner divers (from left back) Mitchell Mappas, Helen Dwyer, Ines Setiawan and Mia Trantham, (front) Lewis Marshall, Anokai Lancaster, Carolina Barua and Edward Dostine’ (Adlam, 2004:4).
designated as the RAAF’s A24-30, but the exhibit is a hybrid – an amalgamation of parts from a USN and a MLD PBY-5 (#41 [BUAERNO 2305], designated #46 and the Y-72 respectively). It was flown out of Morokrembangan to the USS Childs at Exmouth Gulf, departing Java on 1 March 1942 (Dorny, 2005).

Examples of Patwing-10 Catalinas are more rare. Two have been located in Darwin Harbour, but they are yet to be identified (Jung in prep.). Given that seven of the eight Catalinas lost at Broome have been located, either #6 or #7 must be in the found set of wrecks. Elsewhere, a PBY-4 survived in a highly modified condition, as a paddlewheel house boat called Paddlecat (Jung, 2001:185). Recently, however, another PBY-4 has been found in Malalag Bay, the Philippines. The wreck still contained the remains of Ensign Tills who was killed during the Japanese air raid that sank his flying boat (Rutherford, 2008). An archaeological assessment of the wreck, unfortunately, does not appear to have been produced.

10.2.3 The Short Empire flying boat in the archaeological record

While there are operating examples of Catalinas and at least one Dornier, as well as examples of these two types in museums, there are no Short Empire flying boats except in the archaeological record. This section examines the potential discovery of other Short Empire flying boats elsewhere in the world. The most likely place to find such wrecks is in Norway, although Papua New Guinea may also have a site.

The loss of Caribou and Cabot in Norway resulted in wrecking events, but the site where Caribou was sunk is now part of reclaimed land (Appendix 10.1). Cabot’s wreck site, however, has a fish farm over it. It is in relatively shallow water. A diver, Jon Hveding, describes what appears to be a discontinuous site type:
I have been diving quite a lot in the area of “Cabot”, and one large part is close to the shore at 1-3m deep, but the wreck seems to be split up by the sea, there is debris on the bottom in the whole area. I brought a camera, but it did not work, so unfortunately, I have no pictures yet. I will try to take some the next time I am there (Hveding, J. pers. comm., 15 May 2003).

Unfortunately, Hveding’s subsequent dive on the wreck site with an underwater camera resulted in a camera flood, but he describes the two wrecks further:

In my childhood, I saw some of the engines of “Caribou” sticking up from the mud where she burned. She still lay at the same spot, but unfortunately, the city council made a large filling in the area to enlarge the harbor, burying the wreck completely. She is therefore unaccessible [sic] now. About “Cabot”, one of her engines is stored at the Norwegian Aviation Museum here in Bodø. I have located two of the other. I think the third is a bit further out in the sound. There are fragments of the fuselage-plates in a large area around. I have also seen bits of china and electric gear. The main piece of the wreck is a large chunk of the fuselage-bottom with two engines on either side. We have also found an old anchor on the other side of the sound, which can be from Cabot (Hveding, J. pers. comm., 11 April 2004).

Other potential wreck sites present a sombre list; many disappeared without a trace of their crews and passengers, while others had casualties: 1) Camilla off Port Moresby [Basilisk Point] in about 200m (Cassidy, B. pers. comm., 5 March 2003; Series number: A705/1. Control symbol: 32/17/101, NAA; Series number: A11083/1. Control symbol: 906/262/P1, NAA), 2) Corio off Timor, 3) Corinthian in Darwin, 4) Australia between Lisbon and Bathurst off Portugal, 5) Circe off Java and of course probably 6) Corinna in Roebuck Bay. Apart from Australia, which was the subject of some primary salvage shortly after time of loss, the Broome Short Empire and Cabot, are the only ones anyone has ever seen. The last Short S.23 Empire flying boat in a systemic context became tea rooms in Mechanics/Mission Bay Auckland – Aotearoa was subsequently broken up in 1950 (New Zealand Herald, 1950; Sims, 2000:237 and 238; Brown, 1939) (Fig. 10.2, Fig. 10.3 and Photo. 10.3). Pacific Chieftain’s (VH-BRE) dumping at sea off Norfolk Island, is a tantilising example of another of Shorts’ flying boats, the Short Sandringham (Photo. 10.4). The sea, therefore, holds many examples of large flying boats. How they disappear from seemingly well-known waters is a mystery. In Darwin Harbour, for example, where a plethora of small craft hit the harbour’s fish stocks every weekend, no one is yet to report the location of three large flying boats lost there. An inch underwater is as good as a mile!

10.3 An identity for the Broome flying boat wreck sites

Archaeology demands that site identification or determining the spatial distribution of events, must be one of the primary aims of researchers (Legendre, 2001:127). Recording engine diagnostics was the primary method for distinguishing wreck sites of a particular model of Catalina flying boat (the PBY-5) used by different nationalities — the Dutch and British. Specific wreck site identities, however, were determined by compiling the secondary resources and by assessing what previous archaeological research had determined.
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Figure 10.2 ‘Old flying-boat’s end’ (New Zealand Herald, 1950).

Photograph 10.3 ‘Aotearoa was taken by Messrs Carter and Maybee [sic] and displayed at the Mission Bay site of the Walsh Brothers’ Flying School. There, she lay as a seaside attraction, being taken away for scrap in the early 1950s (The New Zealand Herald via Sims 2000: 237).
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Initial investigations of the wreck sites determined on the basis of artefactual evidence, past behavioural aspects that archaeologists can use to identify sites. The MLD, for example, engraved every tool and eating utensil with the aircraft’s serial number, a practice which continues to this day (Sjerp, D. pers. comm., 2 March 2007). Aside from these diagnostic artefacts, other more unusual artefacts can help to provide a clue. For example, it is now known that not all of the flying boats were carrying refugees. The occurrence of children’s toys or of women’s cosmetics at wreck sites clearly point to those sites as the refugee carriers, i.e., the X-1, X-20, Y-59, Y-60, Y-67 and the Y-70. The X-3, X-28, FV-N and FV-W only had their crews aboard at time of loss, while the USN’s #6 and #7 had no one on board.

The identification of wreck sites in this thesis is summarised in Table 10.1. Ten of the 15 flying boats recorded to have been lost, have been located, including seven of the eight Catalinas. The identification of Site 22 as the Short Empire A18-10 of the RAAF has tentatively been made from a correlation to the oral histories of loss, which indicate the aircraft’s starboard wing was severed by cannon fire. It is unknown, however, if the second Short Empire lost at Broome (Corinna), was destroyed in the same way.

10.4 Future work

Contemporary recordings of events are often incomplete, erroneous and rarely relate to the specifics demanded of archaeology. Passenger details for instance, were not recorded; neither were the locations of the wreck sites. Historians, therefore, also now need to examine the archaeological data in order to interpret history, particularly the history of secondary salvage. The archaeology at Broome examines the signatures of those events, or more appropriately the lack thereof. For instance, the located wreck sites are all continuous site types and the discovery of delicate artefacts in the excavated assemblage would indicate that the located wrecks were not subjected to explosive charges during salvage operations by HMAS King Bay.

Memories of hearsay become less clear over time. The secondary salvage conducted by the RAN salvage team in Broome later in 1942 or 1943 has been interpreted in this thesis as having

Figure 10.3 The handover of artefacts from the ‘lost’ Aotearoa (unknown, courtesy Ida Mabee).
impacted on only one wreck site. This is most likely the X-3, since historical accounts by its crew suggest its wreck must be an outlier to the found group of wrecks. The outlier’s location is either a Type One or Type Three wreck site, but nothing can be found at that location today. Some secondary salvage is believed to have occurred, but the reported extent its impact is doubtful. As a result, it is interpreted from the spatial distribution of wreck sites, in conjunction with historical photographic evidence, that four of the five missing wreck sites in Roebuck Bay must still be *in situ*. Future survey work in Broome should focus on locating the missing wrecks, which are predicted to be at the following target numbers: T18, T19, T21 and T25. All of these targets are Type Two ‘sites’. It is unlikely RAN salvage operations affected them because they lie in deep water and the RAN had only a relatively short window of opportunity to work in Broome. Their divers must have been subjected to the same environmental constraints divers face today. The disappearance of HMAS *King Bay*’s logs for the period of the vessel’s

Table 10.1  Known wreck sites and debris fields, Roebuck Bay

<table>
<thead>
<tr>
<th>Locality Number</th>
<th>Target Numbers and Site Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Site 10 – Unknown PBY-5 Catalina</td>
</tr>
<tr>
<td>II</td>
<td>Site 11 – PBY-5 Catalina (Y-59)</td>
</tr>
<tr>
<td>III</td>
<td>Site 13 – Unknown Catalina</td>
</tr>
<tr>
<td>IV</td>
<td>Site 14 – Dornier Do 24K (X-23)</td>
</tr>
<tr>
<td></td>
<td>Site 16 – Debris field (relating to Site 14?)</td>
</tr>
<tr>
<td>V</td>
<td>Site 20 – Unknown Catalina (tail site)</td>
</tr>
<tr>
<td>VI</td>
<td>Site 22 – Unknown Short Empire S.23 (A18-10?)</td>
</tr>
<tr>
<td>VII</td>
<td>Site 23 – Unknown PBY-5 Catalina</td>
</tr>
<tr>
<td>VIII</td>
<td>Site 24 – Unknown PBY-5 Catalina</td>
</tr>
<tr>
<td>IX</td>
<td>Site 26 – PBY-5 Catalina (FV-N)</td>
</tr>
<tr>
<td>X</td>
<td>Site 27 – Dornier Do 24K (X-1)</td>
</tr>
<tr>
<td></td>
<td>Site 29 - Dornier Do 24K (X-20 debris field)</td>
</tr>
<tr>
<td></td>
<td>Site 30 – Unknown Catalina (sailplane section)</td>
</tr>
</tbody>
</table>

*Photograph 10.4  ‘Pacific Chieftain, after being stripped of all salvageable parts, is towed offshore and scuttled. Later locals would regret that she hadn’t been kept as a significant exhibit in the local museum’ (Australian Aviation, 2004:28).*
assignment to Broome, is a missing piece in the puzzle that would have helped interpret the impacts of their activities.

The structural features of Catalina wreck sites indicate the effects of ‘wing clapping’ in aircraft whose wing integrity had been compromised by the destruction of fuel tanks in the wing. On submerged sites, this has been defined as ‘wing inversion’, to take into account an aircraft’s descent in the water column. The occurrence of this at Catalina wreck sites indicates that they are in situ. Further investigation of Dornier and Short Empire flying boat wreck sites may reveal similar principles of wreck site layout. In the Dornier, the wing is most likely to collapse onto the fuselage or to lay adjacent to the fuselage on the seafloor because Dorniers, unlike Catalinas, carried the bulk of their fuel load in sponsons attached to hull, which upon being holed or catching fire, will most likely cause the loss of the aircraft. Wing inversion on twin engine Catalina flying boats will result in the fuselage resting upright on the seafloor. The empennage is also likely to separate and settle inverted on top or near the fuselage body. Both Short Empire flying boats will need to be investigated before anything meaningful can be determined regarding that type’s breakup sequence.

The spectacular results of Gajda’s diggings at Type One sites and an archaeological excavation at a Type Three wreck site, are but samples of the types of materials still in situ. There remains, therefore, an excavation potential at all the wreck sites. Further finds will hopefully identify wreck sites and provide other insights into the archaeological signatures of crises caused by a hurried evacuation. The Y-59 assemblage shows women were also likely to take their cosmetics, which were just as important as documents and toys for the children to keep them entertained on a long flight. Further excavation may even reveal the remains of some of missing people.

10.5 A heritage wreck site trail for Broome?

Every year the huge tides in Roebuck Bay expose six wreck sites for several days. During these days, tourist flock to see them. Some walk the kilometre from Town Beach, while others ride hovercrafts. The development of a future heritage trail or underwater park/preserve will provide an avenue for the dissemination of the data and promote further understanding of the submerged cultural material in Roebuck Bay (Hannahs, 2003; McCarthy, 1981). To this end, a wreck site flyer for a heritage trail of the Type One and Type Three sites has been developed (refer Appendix 10.2). The flyer was designed as a single, double sided A4 sheet in black and white, so as to enable quick photocopying upon request. This was done in response to the BHSM’s request to produce something to provide answers to visitors’ enquires about the wrecks: what are they [the most common question], when best to visit them, what type of flying boat can be seen, how many people and who died on what wreck.

In addition to the flyer, a wreck site pamphlet could be developed for each wreck site, for each place has a different story and different associations for different people. It was important to Sjerp, for instance, to touch the flying boat that brought him to Australia some 60 years earlier. Unfortunately he was taken to a Catalina and not a Dornier! The same occurred to Willy Piers
when visiting Broome in ca. 2000. He was sold a photograph of the same wreck site and told it was the plane his family was on (Piers, W. pers. comm., 3 January 2006).

A simple flyer, followed by wreck site pamphlets, followed by interpretative signage at Town Beach would be a natural progression (Philippou and Staniforth, 2003). Ultimately, perhaps, wreck site plinths could be placed at each flying boat for the benefit of divers as an adjunct to an underwater heritage trail. The wreck sites could then be buoyed to prevent damage from dragging anchors.

10.6 Future implications for aviation and maritime archaeology

If aviation archaeology is but nascent worldwide, in Australasia it is virtually non-existent. The recovery of missing aircrew and passengers at wreck sites (almost always done by military personnel), typifies the work done at such sites, and rightly so. The recovery of human remains is the prerogative of the services whose members are often found at such crash sites. This should be the first aim of aviation archaeology – to recover human remains. Such work, however, should be conducted to archaeological standards. Obsolete aircraft, as O.G.S. Crawford has indicated, are strictly archaeological and this thesis reinforces this important point. Unfortunately, archaeology is the last concern of aviation salvage work, which is still essentially antiquarian in nature. The intrinsic value of the airframes, engines and artefacts represents much more to these people than what those objects can reveal about past lifeways. Whereas an understanding of the circumstances of loss, the post depositional changes and the archaeological processes enables other researchers to further expand the history.

New classes of archaeological sites are continually being evaluated in maritime archaeology in a revisionist approach that seeks to determine the extent of maritime activities. Before, the focus was on shipwrecks; the lure of sunken treasure has entranced salvors for centuries, but with the advent of archaeological principles and standards in the 1960s and 70s, came the realisation that shipwrecks were a valuable archaeological resource and not just repositories of gold and silver. Maritime archaeologists are now investigating other types of sites such as jetties, submarines and as argued here, submerged aircraft wrecks including the archaeological manifestations of maritime aviation.

Maritime aviation and the archaeological study of sites and artefacts relating to such an activity, is in the middle ground between maritime archaeology and aviation archaeology – ‘neither fish nor fowl’ (Fysh, 1968:147). While there are many land-based aircraft lost in the sea, lakes and rivers, it is not ironic that in Australia, flying boats make up the largest percentage of the type of aircraft found. Western Australia is the only state or territory to protect located sites. This is not a universally accepted premise in Australia. The Northern Territory, for example, still fails to acknowledge the historical and archaeological significance of its Catalina wreck sites, despite the rarity of the machines and their association with the air war in north Australia. Such sites are not automatically protected, but have to endure a nomination process that is subject to the power of veto and the whims of local government ministers, who often sacrifice sites that stand it the way of industrial developments. It is hoped the rest of the world will see the
value of such sites as the archaeological manifestations of a changing lifeway:

These sites are now fading from personal memory to collective history, and it is important that the dramatic changes brought to the area ... during this time are not forgotten (Garrett et al., 2006:82).

The Broome flying boat wreck sites, however, have re-entered a systemic/living context, whether as garden ornaments, museum exhibits or curios at the airport gate, or destinations for a morning or afternoon walk at low tide. The wrecks are still used for a number of reasons, not only as a sites for tourism, but of commemoration for the people that lost their lives on 3 March 1942 in a bid for freedom. The 2007 return to Broome for the first time since the air raid by Theo Doorman, for example, evoked the sense of closure and peace these wreck sites now present in the relatively tranquil setting of Roebuck Bay (Photo. 10.5).

The Japanese air raid at Broome resulted in the formation of an archaeological record in Roebuck Bay. How and where that submerged cultural material was deposited has been interpreted in this thesis. The contribution that this data makes to aviation archaeology is that it records and verifies significant archaeological sites, which have high artefact densities, despite the years of pillaging and immersion in sea water, an in situ diagnostic airframe structures. The artefacts from these sites provide a poignant insight into the early stages of the Pacific war, which was characterised by the heavy loss of material and personnel retreating in the face of Japanese military conquests in southeast Asia. Those people that got out of Java, for instance, were lucky and once in Australia, felt erroneously safe. The fact that many people were killed in Broome is a testament to Japanese air power and the technological superiority of their aircraft. The flying boat wrecks in Broome are the archaeological manifestations of those dark days in early 1942.

For the first time, this thesis has compiled the historical and archaeological data associated with the air raid. In the process, passenger and crew lists have been researched in an effort to determine and verify who the people were on the flying boats. Photographic data presented in this thesis, of some who were killed and some who survived, provide a human face to the assemblages on the sea bed. In archaeological terms, there is still the need to identify the
located wreck sites, as well as to locate at least another four flying boats still missing. From a management perspective, there is very little information available to the public who visit the wrecks. The results of this thesis will provide the necessary data to provide a greater awareness of WWII archaeological sites in Australia, which as the years pass, will become increasingly significant. They should not be forgotten on the sea bed.
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