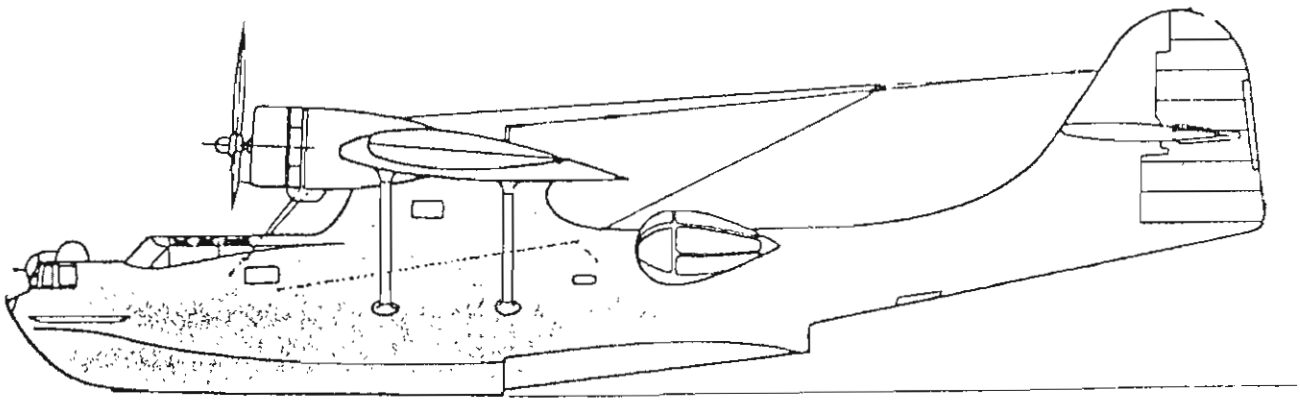
The 'Black Cats'

Report into the feasibility of locating, raising and conserving one of the four Catalina Flying Boats scuttled off Rottnest Island in the years 1945-1946



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Report - Dept. of Maritime Archaeology, WA Maritime Museum, No 125

Cover illustration: An illustration of a PBY-5 Catalina (Knott, 1981: 88)

Abstract

The Department of Maritime Archaeology at the Western Australian Maritime Museum has been requested by officers of the Catalina Club of Western Anstralia, notably President Mr Ivan Peirce and member, Mr Brian Buzzard Snr., to comment on the feasibility of locating and raising at least one of the four Catalinas scuttled off Rottnest Island in WWII. This report follows a series of similar requests, including one previous from the Hon Phillip Pendal MLA, inquiring on behalf of the Club. The RAN have conducted a search for the wrecks and recently, the well-known Fremantle identity Dr Michael G. Kailis AM, offered to assist the Club in its search where possible, further adding impetus to the initiative.

Having no legislative responsibility for the remains of wrecked aircraft and other snbmerged remains, the Department of Maritime Archaeology would normally pass on such requests and all relevant information to the Aviation Museum at Bull Creek or to the Australian War Memorial. The work requested in this instance is allied to the Department's expertise in maritime archaeology, its understanding of the complexities of conservation and exhibition and its understanding of (relatively) deep-water remote sensing search techniques, however. The report which follows focusses on these areas and on the feasibility and desirability of locating, raising and conserving one of the aircraft.

Acknowledgments

Mr Peter Bell of Albany Whale World
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Mrs Susan Cox of the Department of Maritime Archaeology, WA Maritime Museum
Ms Dena Garratt of the Department of Maritime Archaeology, WA Maritime Museum
Mr Norm Greaves of the Catalina Club of Western Australia
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The Hon. Phillip Pendall, MLA
Mr Ted Withell of the Catalina Club of Western Australia
Mr John White, B.A. (Hons), Grad Dip Mus. Stud., Curator of Military Technology, Australian War Memorial.

Introduction

The Royal Australian Navy has conducted searches for the Rottnest Island Catalinas utilising HMAS *Moresby* in recent years. Their advice and that of the Australian War Memorial, which has considerable expertise and understanding of processes involved in the salvage and the refurbishment of military aircraft, has been sought for the purposes of this study. The Department of Maritime Archaeology at the Northern Territory Museum recently reported on the inspection of a number of Catalina wrecks in Darwin waters and reference will be made to their draft report (Jung, in press). Opinion has also been sought from the Western Australian Museum's Department of Materials Conservation, which has been responsible for the conservation of a wide range of submerged material including the float from Hans Bertram's Junkers Seaplane Atlantis. This was found part-buried in beach sands just above the high water mark in the Kimberley (Department of Maritime Archaeology, WA Maritime Museum, File 1/79, *Bertram Seaplane Float*). Having an interest in submerged aircraft, Mr Alan Kendrick of that Department has assisted greatly in literature searches and editorial. Mr Arthur Jones' oral history of his reminiscences of the sinking of the Catalinas, which was prepared for his colleagues at the Catalina Club was transcribed for the purposes of this report. It appears in the appendices following. Interviews were also conducted with two other crew-members involved in the scuttlings, Mr Norm Greaves and Mr Ted Withell. Mr Peter Bell of Whale World in Albany has reported briefly on the status of a Catalina aircraft currently undergoing restoration in a hangar there.

In bringing together the knowledge, understandings and expertise of these various individuals and groups, the Maritime Museum's intention in what follows is to report to the Catalina Club of Western Australia and to other stakeholders on the feasibility of locating, recovering and satisfactorily conserving the submerged remains of the Catalinas scuttled off Rottnest Island after WWII.

Background

Soon after WWII aircraft, machinery, munitions, vessels and other war materiel emanating from the USA were either sold or disposed off in such a manner as to have no foreseeable impact on the economy or operations of the nation to whom the materiel was loaned. Often this entailed the destruction of fully-serviceable munitions and equipment, including vessels and warplanes. Scuttling at sea was common.
It was forbidden to remove even the smallest of items in the process (See, for example Jones' memoirs below). Thus four intact and fully serviceable Catalina aircraft, G-AGIE *Antaris Star,* G-AGID *Rigel Star,* G-AGFL Vega *Star* and G-AGFM *Altier Star,* were flown from their base near Crawley on the Swan River to a location to the south of Rottnest Island and there they were scuttled at the Rottnest Island Ship's Graveyard in waters considered too deep to access. The fifth aircraft in the group, G-AGKS *Spica Star,* was scuttled off the coast of Sydney a few months later (Pers. com., S. Jung, 6/1/1997).
The 'Rottnest Graveyard', which was the site of many scuttlings and abandonments from 1910, also contains WWII arms and armaments, vessels (including a redundant Dutch submarine) experimental RAN submarines and semi-submersibles (See Figure 6).

With respect to the desire of the Catalina Club of Western Australia to locate, raise and conserve one of these aircraft, a number of fundamental issues are raised. In the context of their stated aims, these will be analysed with under the sub-headings which follow.

The issues examined

i) Verification: Were there four Catalina aircraft scuttled?

There are numerous reliable accounts of the scuttling of the four Catalinas *Antaris Star, Rigel Star, Vega Star* and *Altier Star*, off Rottnest Island. These appear in the form of personal communications and published articles (See Appendices).

ii) Significance: What is the significance of these particular aircraft?

There are a number of statements of significance for these aircraft (e.g., Storey, 1995).

In precis, Storey has indicated that:

These four aircraft (called the 'Black Cats' due to their camouflage) were used in joint Qantas/RAAF flights from Perth to Sri Lanka, then the longest air route in the world. It was also one of the most dangerous and difficult.
They successfully completed 271 arduous missions over two years until July 1945, carrying vital mails and high security passengers.
The four scuttled aircraft are representative of over 100 Western Australian-based American, Dutch, Canadian, RAF and RAAF catalinas (Peirce, pers. com.). These operated from Australia on a wide variety of missions ranging from reconnaissance, bombing, mine-laying, evacuation and sea-rescue. In the course of these duties over 300 airmen were lost and only one quarter of the original aircraft survived the war in a serviceable condition. Some of these were to be involved in the Post-war repatriation of sick POW's from Singapore and other camps.
Illustrations of Catalina aircraft appear below.

Figure 1a : Catalina Flying boat. (From Vincent, 1990: 118)

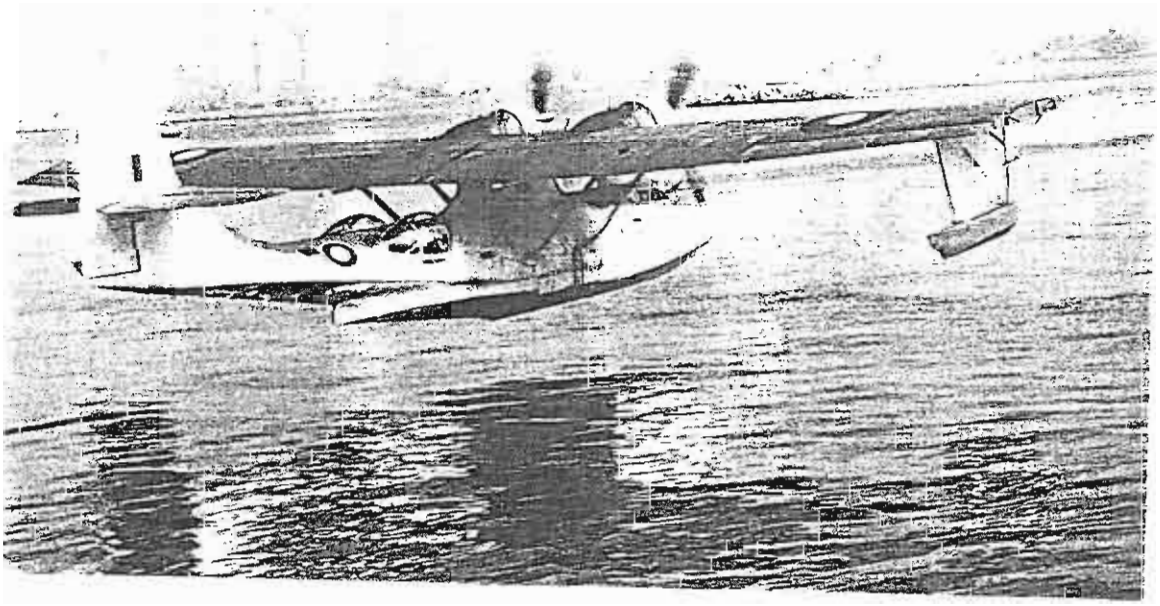
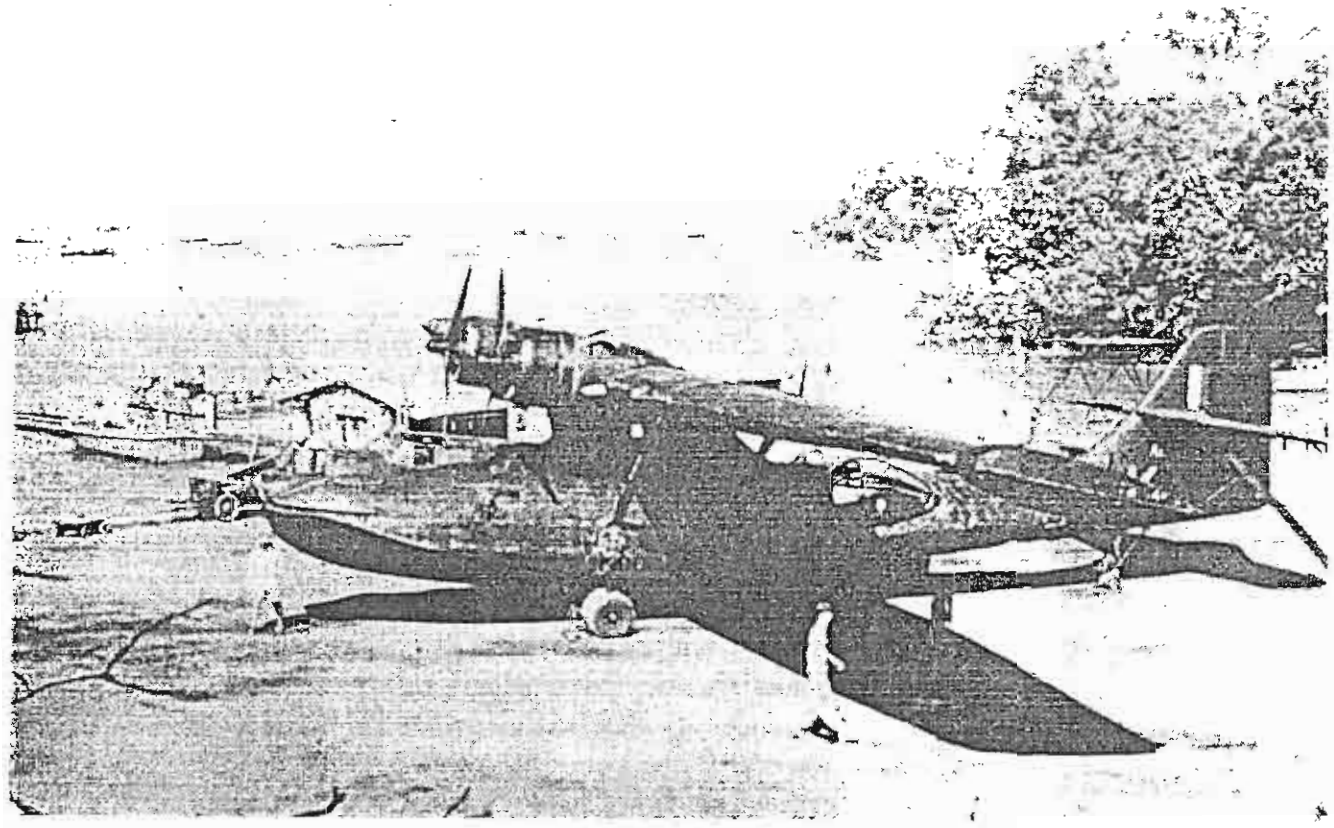
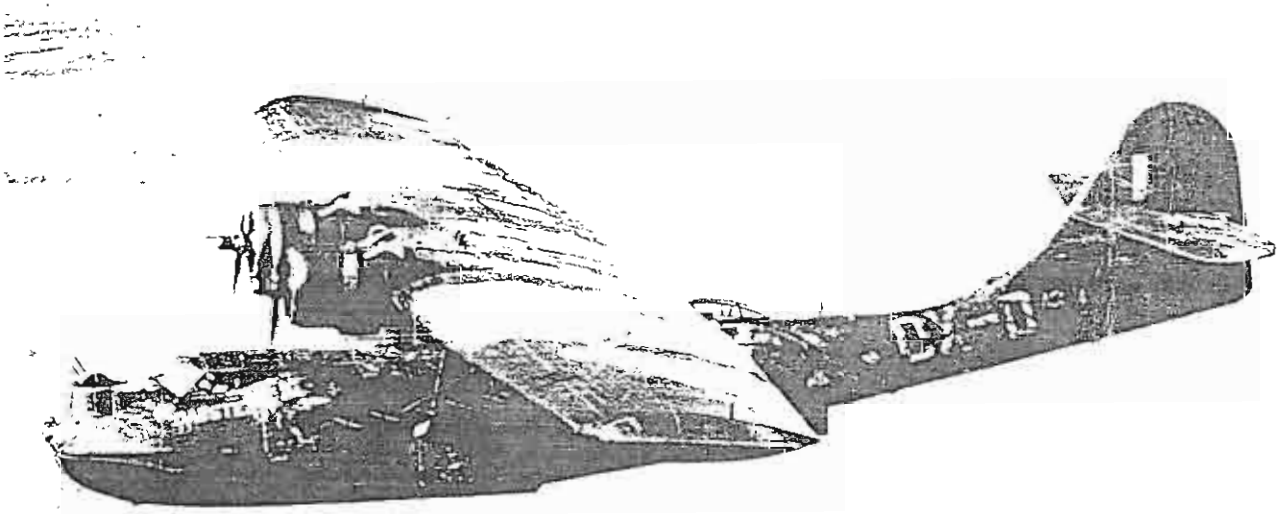


Figure 1 b-c: Catalina Flying boats ashore and airborne. (From Lewis, 1992: 41 & Vincent, 1990:112)





iii) Location: Is there an agreed location for the scuttlings ?

Unfortunately the positions given vary quite considerably. These are:

1) Source unknown. (Possibly the late Mr Digby Bull, formerly of the Catalina Club)
'293° from West End lighthouse on the 100 fathom line' (Pers. Com.).

2) Arthur Jones (Catalina crew-member) :
comments contained in 'On sinking the Catalinas'. Tape-recorded interview 24/3/1991, transcribed by the Department of Maritime Archaeology, WA Maritime Museum.
Antaris:Star : '13 miles the other side of Rottnest'. 17/1/1946
Rigel Star : '18 miles off Rottnest'. 30/1/1946
Vega Star: '13 miles off Rottnest'. 14/2/1946
Altier Star : '13 miles off Rottnest'. 27/2/1946
'This was all west of Rottnest'.

3) Ted Withell (Crew-member): Interview 28/10/1996
'5-6 miles out to sea south of the West End... Possibly 5-10 miles'.
'To seaward of the Stragglers and 5-6 miles out to sea from the West End'.

4) Norm Greaves (Crew-member: Interview 30/1/1996.
'Sunk off the south-east corner of Rottnest Island.....went out three times to the south-east of Rottnest'.

(iv) The scuttling process: what effect has this had on the aircraft?

The mode of disposal or scuttling of these aircraft will have an effect on the nature of the remains and the method used in the abandonment process will have ramifications for the recovery, conservation and exhibition of the remains.

Arthur Jones gives details of the scuttling procedure and method as follows.

'...There was an RAF bloke, Flight Lieutenant and he was to come out as an observer and we were told under no circumstances were we to take anything off the aircraft, because if it was proved we took one thing off, the Government would have to pay £80000, so he was there to see this was carried out, and he was strict to the letter being a RAF bloke and brought up in a different way to what we were. He wouldn't let us take a pin off the thing, so we didn't get anything off the first couple...'

Antaris: '... he rowed over to the blister which we had left open and the theory was that he put 75lbs of TNT in the blister and then the other charge up in the pilot's cabin and then connected the two up, light it and then rowed like hell.....then boom, up went the back one and blew the thing in half and a little while later, boom, up went the front one and it all sank and that was a perfect job. so that was the theory and that was what happened'.

Rigel: '...so we did the same thing....the first one went off, blew it in half, anyway the second one for some reason didn't go off ..... bought out three .303 rifles....after about 200 odd rounds, someone got a lucky shot. Boomph, up she went and she blazed and blazed and gradually burned and settled down and the whole lot sank...'

Vega: '...we went through the same procedure and everything went alright, so that was the end of the third one...'

Altier: '...right, so the same procedure went through and the charge was duly set, and anyway the back charge went off and blew it in half, and then the front charge went off, but it blew a lump of wing and wing tip float off and everything else settled down and this piece was left in the water floating around.....so anyway, the sergeant gave us his tommyhawk....to chop some holes in and let the water in...'

'...so anyway, that was the end of the four aircraft.... the lend-lease cats...'

There are two other eyewitness accounts of the scuttling process, those of Norm Greaves and Mr Ted Withell.

Norm Greaves in an interview on 30/1/1996 stated that '...all had explosives in them...'

Ted Withell in an interview on 30/1/1996 stated that '...charges were put into the bottom of the aircraft...' He had malaria and didn't watch much but saw one sink as a '...whole plane...'. He felt that, in this instance, the charge appeared to be set midships.

It appears from the above that, due to the presence of an RAF observer, at least two of the aircraft were scuttled without souveniring on the part of the RAAF flying crew or the demolition crew. Three aircraft at least broke into two or more pieces due to the force of the demolition charges. Mr Withell indicates that one aircraft may have descended to the seafloor intact.

(v) The search area: What is the search area?

Bull's (?), Jones', Greaves' and Withell's reminiscences indicate that the possible area of abandonment for the Catalinas is an area between 5-18 NM west of the West End of Rottnest Island encompassing the entire region between the south-east and the north-west quadrants.

The seabed in the region lies between 40-200 metres deep. It appears to be sand and shell, possibly with the occasional rock outcrop. Numerous scuttled shipwrecks of various types, sizes and vintage also lie in the area.

(vi) Site integrity: What is the predicted state of the aircraft today?

From the evidence above, the Rottnest aircraft were disposed of in operational order, but it is doubtful if they contained a great deal of loose or personal material. Most of this would have been removed in the period the Catalinas were lying moored at Crawley base (See Jones' Transcript in the Appendices).
There is also doubt whether any of the aircraft have descended to the seabed intact. It is evident that three aircraft, at least, descended in two pieces at least and that a wreckage spread is to be expected as smaller items and hull fragments fell from the fuselages. The wreckage 'plume' would be expected to be 'opening up' down-current as a result.
In descending to the seabed, it is possible that the aircraft moved some distance horizontally from the point of scuttling. The fore and aft hull sections certainly would have separated as they fell through the water column to the seabed below. Given the relatively shallow depths in the search area, these distances are not expected to prove excessive, however. Likewise the tides of the region are expected to have had little effect in increasing the spread of the larger items as they fell through the water column, though the tides, prevailing seas and swell may have had some effect on spreading the lighter materials. Given the extent of the search area indicated by the eyewitnesses, the spread of wreckage due to these factors is of minor concern, however.

Finally, given the nature of the seabed and the material lying upon it, an aircraft, or substantial sections of one, should prove locatable using standard side scan sonar techniques.

With respect to the post-search aims of the Catalina Club, i.e. to locate and raise one of the wrecks, it is useful to briefly examine other submerged aircraft, so that some inkling on the possible state of the Rottnest Catalinas can be had.

Other examples of submerged aircraft

The flying boats in Roebuck Bay, near Broome were examined by the Department in recent years (McCarthy, 1990). For the purposes of this study, other examples were kindly bought to the compiler's attention by Mr John White, Curator of Military Technology, Australian War Memorial, Mr Silvano Jung, Researcher at the Northern Territory Museum and Art Gallery and Mr Alan Kendrick, Conservator at the Western Australian Museum's, Department of Conservation.

Relevant details are as follows.

The Ebeye Seaplanes
Three large 4-engined, Kawanishi H6K, or 'Mavis' flying boats all 80 feet long, 125 foot wingspan and 20 feet high, were located in 1965 in waters from 70-80 feet deep. One has been completely destroyed, two lie upside down (Bailey, 1989: 48-9).

Figure 2. A Kawanishi H6K Flying Boat (Bailey, 1989: 48-9). Note the corrosion.

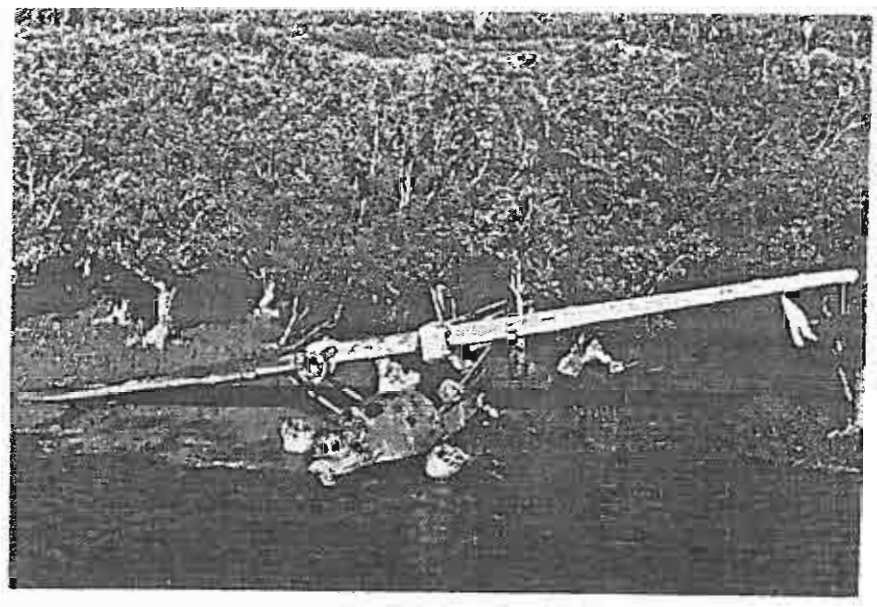
The Palau Jake
A Jake or Aichi E13A which lies just submerged in 10 feet of water at Palau, lies upright on its floats, though salt water corrosion has weakened the engine mounts to the extent that they have broken under the weight of the engine which lies canted down to the seabed (Bailey, 1991: 156-8).

The Canadair CL215
A twin engined Canadair CL215, firefighting plane was lost while scooping up water from a lake in the Gulf of Sagone. It came to rest upright, allowing the crew to escape and then sank 32 metres to the seabed, where it lies upside down (Amsler *et .al.*, 1995)

The Cocos Catalina
A Royal Air Force Catalina, JX 334 carrying passengers and heavy equipment crashed on landing in June 1945 and caught fire. Only five of the complement of 14 survived. The wreck, lying in 4-6 metres of water, has been widely dispersed over 300-400 metres due to the effect of heavy storms and swell (Matthews, ND).

The Darwin Catalinas
There are seven known Catalina wrecks in Darwin harbour. An American trio were sunk at their moorings in 15 metres of water soon after the Pacific war commenced. Four Australian craft were lost, possibly from the East Arm or Doctor's Gully Flying Boat Bases in 1945. Only four have been located. The best preserved lies upright in shallow water near the Berrimah boat ramp, with one wing crumpled under the fuselage, the tail torn off, and with the nose and one wing still clear of the seabed. The damage sustained by this and the other wrecks is part due to the disastrous cyclone which devastated Darwin in 1974 (Lewis, 1992: 41-47 & Jung, in Prep).

Figure 3 : A Darwin Catalina just before Cyclone Tracey (See account of its present state and further discussion in Jung. Photo: Darwin Aviation Museum & Jung, in prep: 10).



The Broome Flying Boats

There are the remains of sixteen aircraft lying in Roebuck Bay off Broome following a raid early in the Pacific War. Eight are visible at low water spring tides (Prime, 1985). Strafed, while at anchor, sunk and/or severely damaged, the eight visible wrecks all come to rest upright on the seabed. Being exposed at low water, they constituted a navigation hazard and were apparently demolished using explosives (Pers Com., demolition expert C. Choules to R.

Cross. Cross in prep). The remains, even after demolition, were substantial however and being accessible at spring tides, they were also subject to uncontrolled salvage until recently when their importance as heritage and tourism assets became more generally recognised.
The Department of Maritime Archaeology at the WA Maritime Museum advised on the protection and management of the less well known group of eight of these wrecks lying nearby in deeper water (McCarthy to Broome Historical Society *et. al.* File 13/86, Wreck: Aircraft, WA Waters. Department of Maritime Archaeology, WA Maritime Museum).
It is understood that 'hard hat' divers descended onto these wrecks during the war, but the extent of the work conducted on them is not known. Their existence had, until recently, been a reasonably well kept secret, but in recent years they were re-found by divers and a machine gun and other material, including a child's doll, were raised from one of the wrecks. This caused considerable controversy, causing this institution to become involved in developing protection strategies in association with State and Commonwealth and local heritage interests. These particular wrecks have yet to be physically assessed, with a preliminary series of remote sensing searches designed to locate them all prior to inspection being completed only this month by Western Australian elements of the multinational remote sensing firm of Fugro Survey, formerly Associated Survey International (Associated Surveys International, 1991, Fugro Survey, 1996). At the very least, substantial damage is expected, not only due to the effects of the strafing in WWII and possibly the demolition, but also from the effects of vessels anchoring in Roebuck Bay itself. Despite this, a great amount of military and civilian artefactual material relevant to the first years of the Pacific War and the process of hurried evacuation of civilians from a war-threatened region is expected to remain (Department of Maritime Archaeology, File 13/86, Aircraft Wrecks, WA Waters).

Figure 4 a-c Early photographs of the of the Broome flying boats at low water. (Aviation Museum of WA)

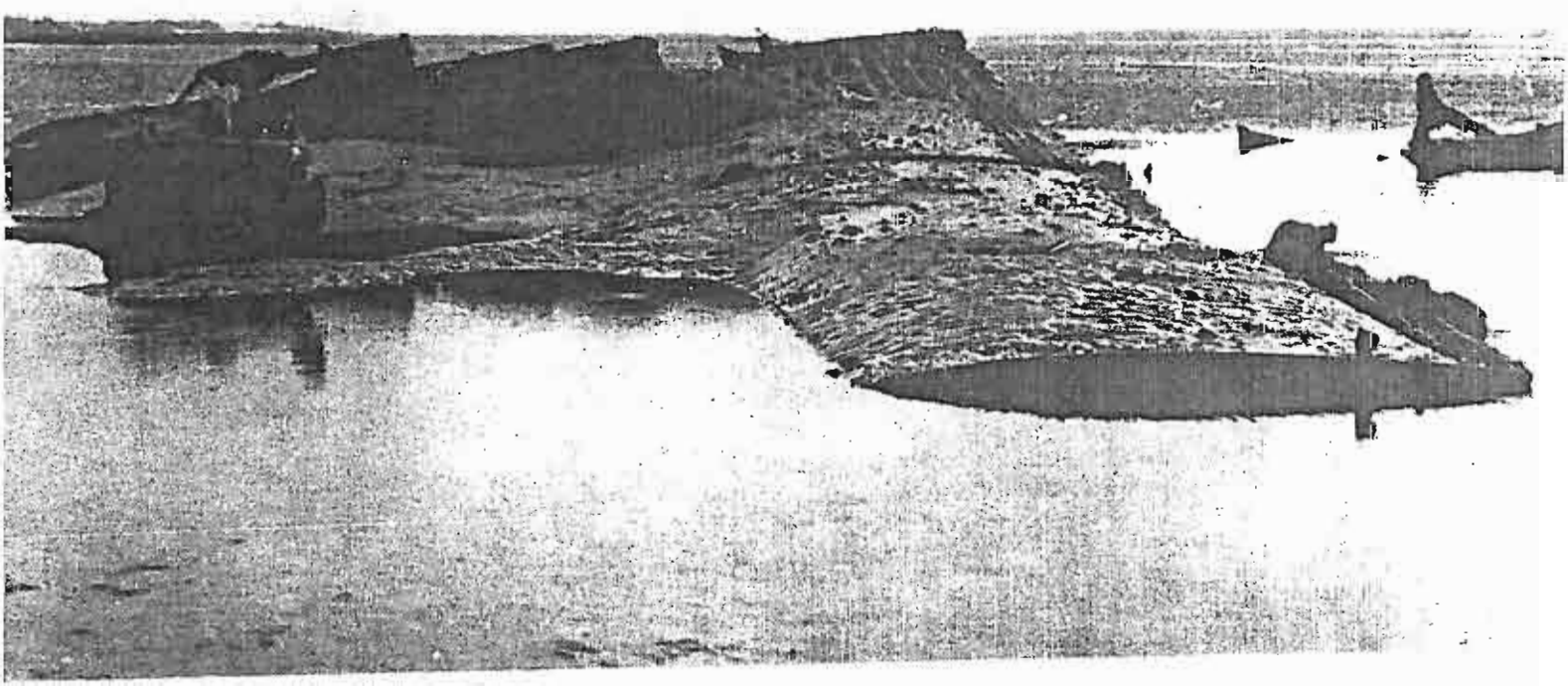
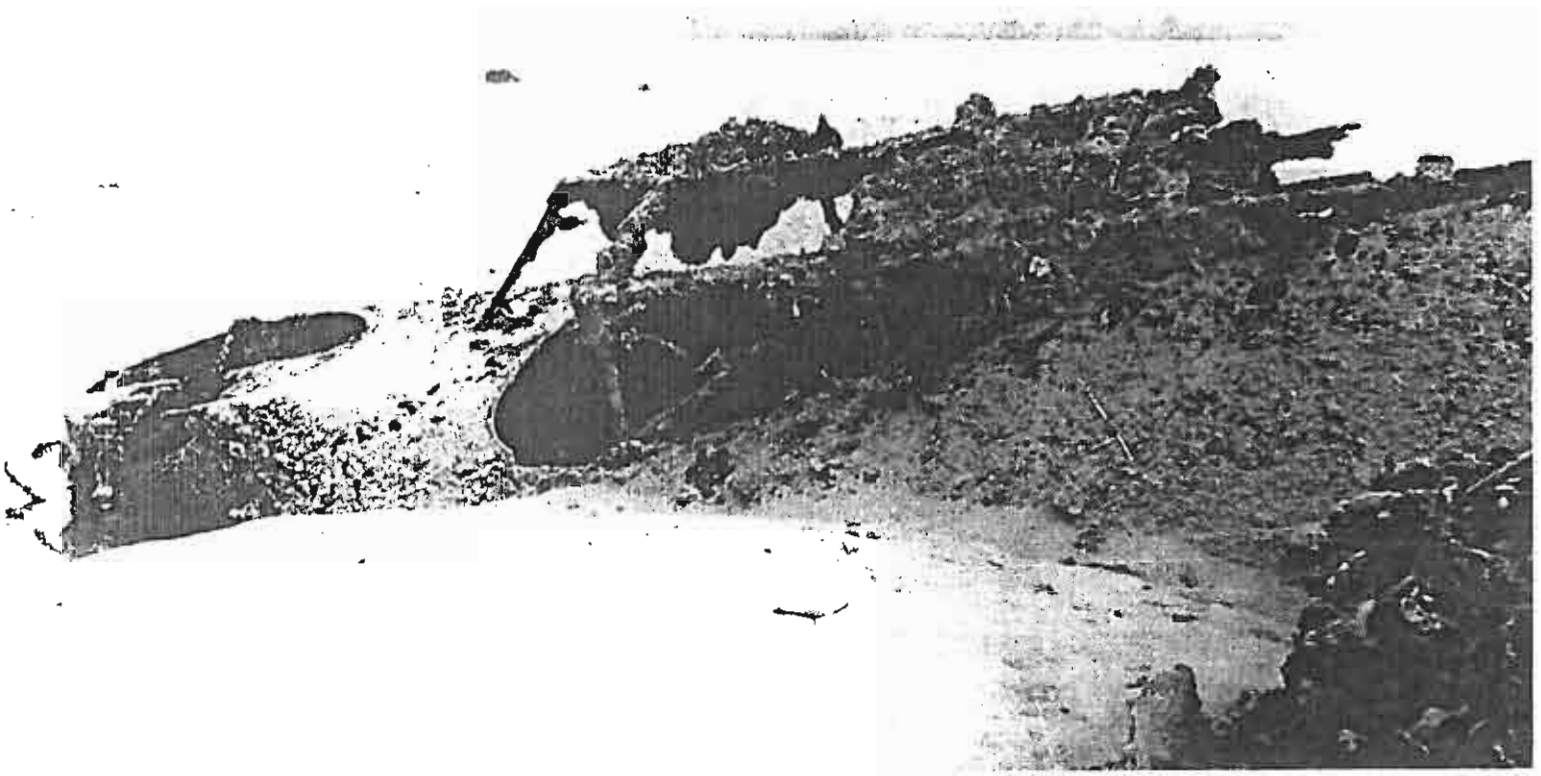


Figure 4 b-c Broome flying boats at low water, showing the extent of burial in the sediments (Photos Aviation Museum)



(vi) The archaeological significance of submerged aircraft wrecks

It appears evident from the very small sample listed above that the wrecks of flying boats generally can constitute sites of importance to archaeologists, historians, aircraft restorers and enthusiasts.

Indications from this sample are that those which come to rest in shallow water will sink upright, while those in water deep enough to allow it, will sometimes invert due to the weight of the engines up on the wings. Fifty years of corrosion in a salt water environment in either case will most likely lead to severe corrosion and possibly the collapse of the engine mounts. Being a combination of ferrous metals and aluminium, those parts of the aircraft designed to carry weight will prove most susceptible due to the advanced processes of bimetallic corrosion (White, pers com).

It is also evident that within the framework of underwater archaeology, submerged aircraft wrecks potentially form a class of archaeological site in themselves. Within that class of site, it is possible to attempt to identify sub groups of sites with decreasing archaeological/museological/technological insignificance. The compiler has proposed an embryo 'classification of use' to researchers and potential excavators/salvors based on his experience with maritime archaeology generally (McCarthy, 1996). Clearly it is an area than can be developed, with Jung's research entitled 'Archaeological investigations of the Catalina wreck sites in East Arm, Darwin Harbour (in press), a useful beginning.

As a beginning the following archaeological classifications (which reflect similar categories for shipwrecks) are suggested.

Group A aircraft wrecks

One grouping of sites would be remains of aircraft that have sunk in a fully operational and active circumstance. In itself this group would contain a number of categories.

Category 1
The first class of site would be remains of aircraft that have sunk in a fully operational and active circumstance and which now lie completely intact. These aircraft generally have landed on water or mud in a reasonably controlled fashion and have sunk to the bottom sediments without disintegrating. They are potentially a source of significant structures, materials, artefacts and information. This data is little altered by any but the incident that caused the aircraft to be forced down, by the impact with the surface itself, or though natural transformation processes. These transformation processes are water movement, corrosion and biodegradation.
Normally these Category 1 wrecks will appear as sites lying in (comparatively) deep water or inaccessible mud away from the effects of wave action and human interference. Within this group there would be subsets. Those wrecks lying in fresh or nearly fresh water, given that they have been proved capable of recovery, restoration and exhibition, would contrast with concreted structures, lying in a saline and/or coralline, warm water environment. The latter have yet to prove a viable proposition with respect to raising and restoration (White pers com).

Category 2
A stark contrast with Category 1 would be former fully operational aircraft susceptible to heavy corrosion and/ wind and wave action. Even if these are inaccessible to human interference, those parts of the airframe that are not buried in the seabed rapidly disintegrate. The remainder will lie buried in the sediments, though the effect of sulphate reducing bacteria may ensure that the corrosion processes are continuing. Despite these ongoing processes, and the loss of a great deal of material and data through natural processes, significant artefactual material remains on site.

Category 3

These aircraft sites would possibly be those once forming Categories 1&2, but which have been subject to human interference by professional or recreational salvage. This element of itself, can be categorised according to the extent of the interference and the degree of salvage.

Group B aircraft wrecks

Group B sites could be those abandoned with all their fittings and/or fixtures, but not containing any of the accoutrements of action as in the group above. They have been deliberately abandoned in flying condition and the material remains on-board is expected to reflect that fact.
Within Group B, there would appear categories similar to group A.

Group C aircraft wrecks

These sites would be stripped aircraft, similar to the commonly encountered abandoned shipwreck hulk. Material and information gleaned from these sites is most often limited to structural detail of fittings and fixtures deemed unsuitable for salvage and/or reuse before the hulk itself was abandoned. Occasionally artefactual material could be found in inaccessible locations, but its context is most often unknown, or the material itself is fragmentary. (In abandoned ship hulks this material appears in the bilge, which being often full of foul water, makes the recovery of such material initially undesirable).
Again within Group C there will appear categories similar to Group A.

The Rottnest Island Catalinas would fit into Group B, given their scuttling as operational aircraft previously cleared of loose items.
Clearly, other factors such as the relative rarity of a particular aircraft, its contents and its associations with a particular person or event(s) will have a bearing on the categories above. This is one of the arguments that the Catalina Club of Western Australia have put with respect to the 'Black Cats'.

(vii) Recovery and conservation of the Rottnest aircraft. Is it possible?

Mr John White, the Curator of Military Technology, Australian War Memorial, made the following comments with respect to the potential raising, conservation and exhibition of one of the Rottnest Island Catalinas in an interview conducted for the purposes of this study on 9 December 1996.

The Australian War Memorial has successfully conserved aircraft engines taken from submerged sites at Kota Baru in Malaysia. The process has taken from 6 months to a year, requiring treatment tanks, the provision of facilities and chemicals.
Though the Catalina type, which was designed for use at sea had corrosion inhibition systems, (See Jones' transcript) the process continues in a submerged environment. It has been found that similar large-bodied types such as the *Mavis* flying boats in Rabaul waters have collapsed over the years, partly due to their own weight. i.e. the high-wing type do not necessarily sink into the sediments up to the wing, and being largely unsupported above the seafloor, they have collapsed over time. A major factor in this collapse has been the enhanced corrosion of the bi-metallic ferrous and aluminium material at vitally important parts of the structure. This has ramifications for any attempt to lift or support the wreck(s) at those points.
Having large internal spaces, the Catalina type is expected to experience invasion by the seabed sediments, resulting in a substantial increase in weight.

Experience has shown that a large vessel will be required on which to mount the salvage equipment and/or crane. A large transport barge will also be needed.
The hull will need to be supported and secured in a purpose-built lifting frame. Holes will need to be bored into the aircraft to secure it to the lifting frame, further weakening the structure.
Though there are instances of successful recoveries from fresh water e.g., the Great Lakes, 'There has yet to be a successful restoration of an aircraft taken from a salt water environment'.
Mr Kendrick, Mr Jung and Dr Ian MacLeod, Head of the WA Museum's Department of conservation have expressed similar concerns.

Discussion

The depths of water in which the Rottnest aircraft lie are their greatest asset with respect to their protection from the most damaging of all post depositional effects, human interference. As a result, theses sites will contain in and around the hulls all of the original equipment and fittings. This will make them an attractive proposition to interest groups such as the Catalina Club of Western Australia and to aircraft restorers generally.

Location
Given unlimited time, funds and equipment, it will be possible to conduct a search for the 'Black Cats'. The standard side-scan sonar equipment such as that currently being deployed by the RAN is currently limited to depths not exceeding 130 metres, however.

Inspection
With current technology, notably the self-propelled, one atmosphere 'Wasp' suit common to professional diving in the petroleum industry, once an aircraft is located, a thorough inspection can be effected. This will result in a visual and oral record of the remains. The latter can be transcribed, the former will be in video and still format. A standard, high -powered remote operated vehicle (ROV) could also be deployed, though possibly with less satisfactory results.
It is expected that, with one possible exception, the Catalinas will be found lying in at least two pieces on the seafloor, possibly with those sections still containing the engines inverted. Equally the engines themselves may no longer be attached to the aircraft. Their mounts may have corroded in the intervening 50 years, in similar fashion to the 'Jake' or *Aichi E13A* noted above.

Previous Searches.
The Royal Australian Navy has been involved in two remote sensing searches for the catalinas using side scan sonar equipment on board the survey vessel HMAS *Moresby*. Lt P. Hiatt, Survey Officer HMAS *Moresby* has prepared a report which shows the two search areas chosen by the RAN and their datum points of 31° 58'S 114° 17.3'E and 32° 10' S, 115° 23'E., respectively. One area is based on the c. 300° from the Rottnest lighthouse report mentioned above and the other is based on the evidence gleaned from the remainder of the reports. Both search areas have an inner 2.5NM and an outer 7.5NM search zone as described by Lt Hiatt. Figure 6 shows the search area and Figure 7 a&b show the regions within those two zones that have been searched by the RAN to date.

Figure 6: The Rottnest Island Graveyard
Excerpt from AUS 114, Approaches to Rottnest Islaud. Source: Wreck inspection Department. WA Maritime Museum.

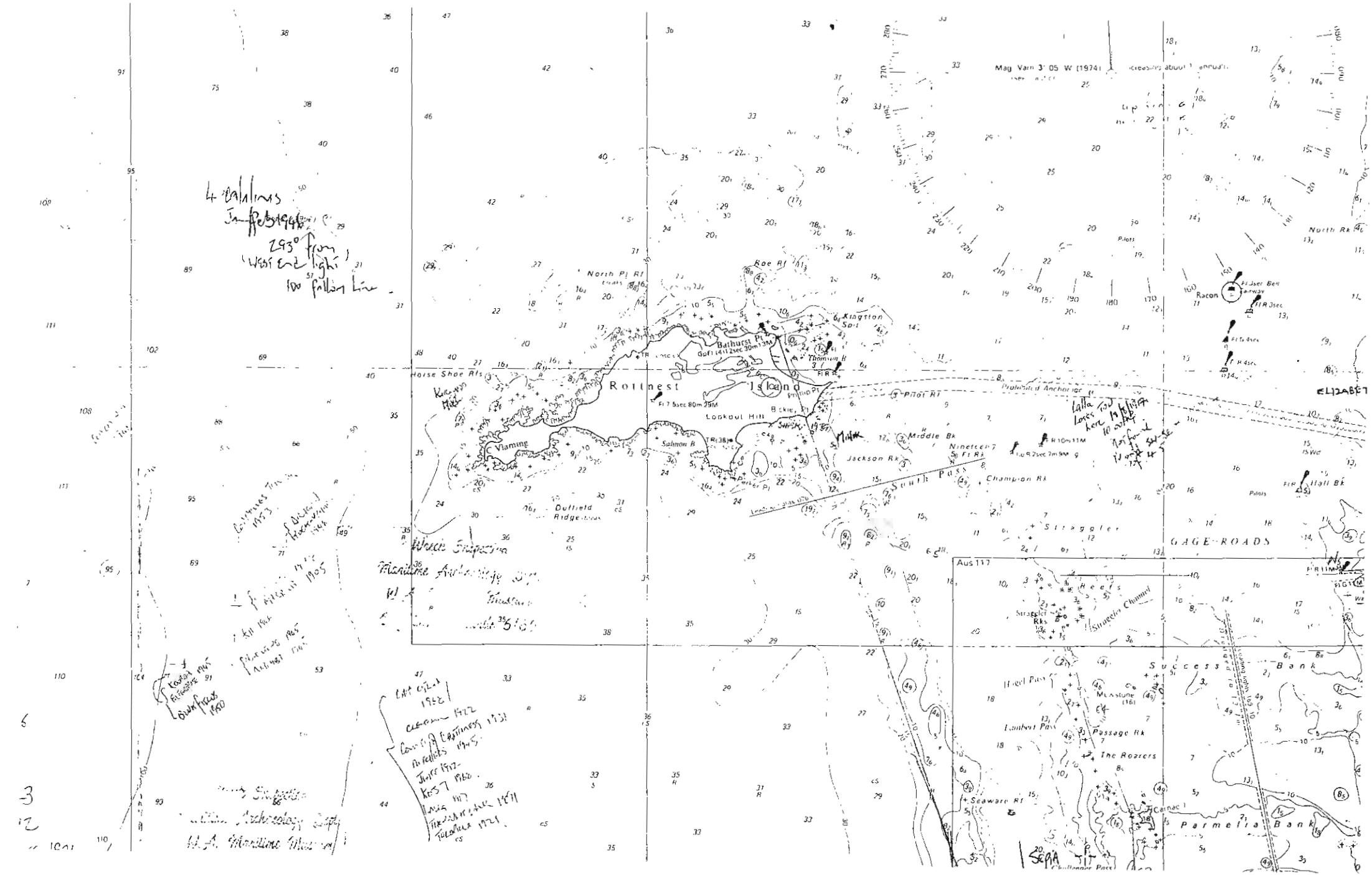


Figure 7a . The RAN search areas (Lt. P. Hiatt, RAN). The Chart Excerpt is from AUS 754. Details from AUS 114 (Figure 6) have been added to the RAN plot of the search areas on AUS 754.

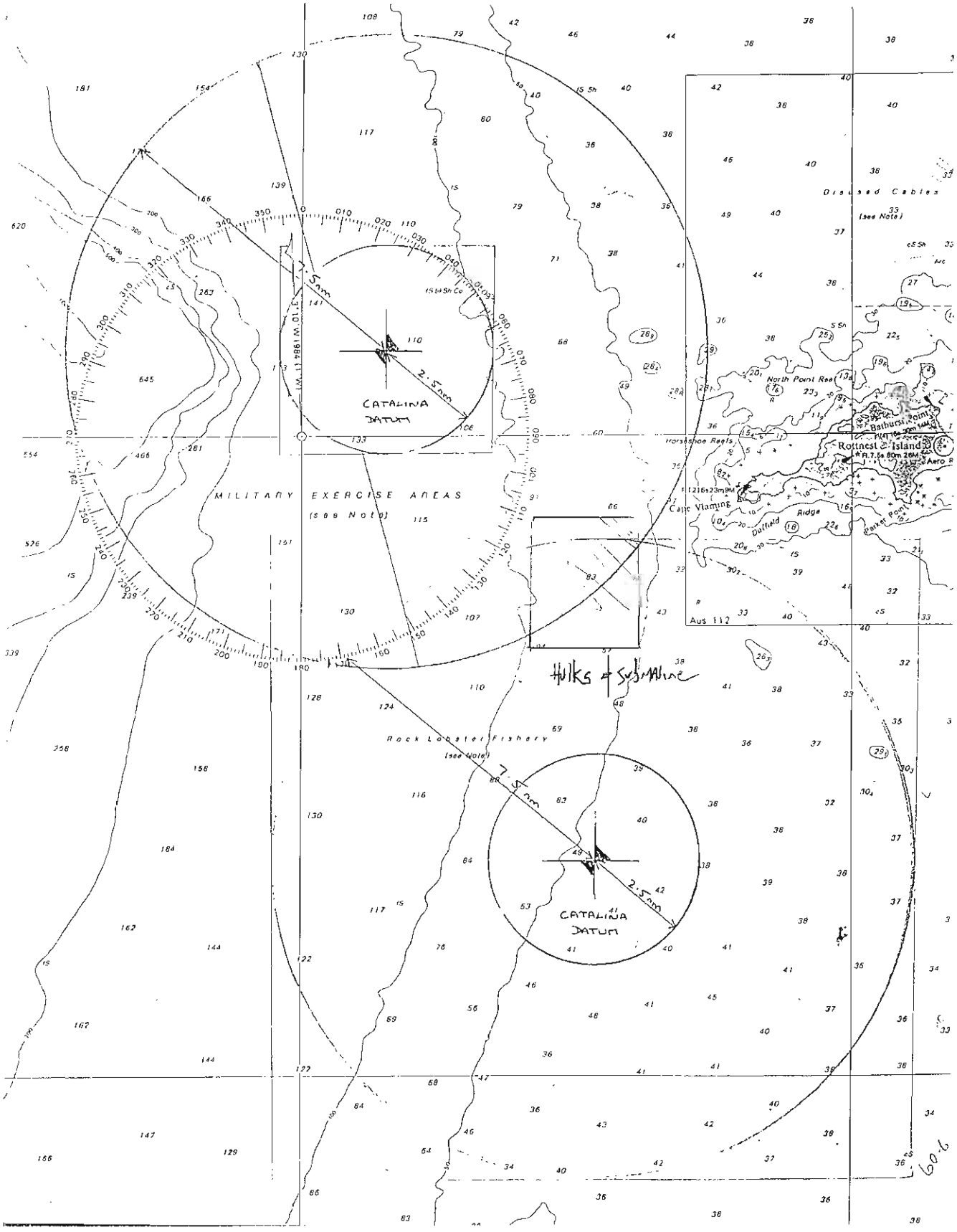
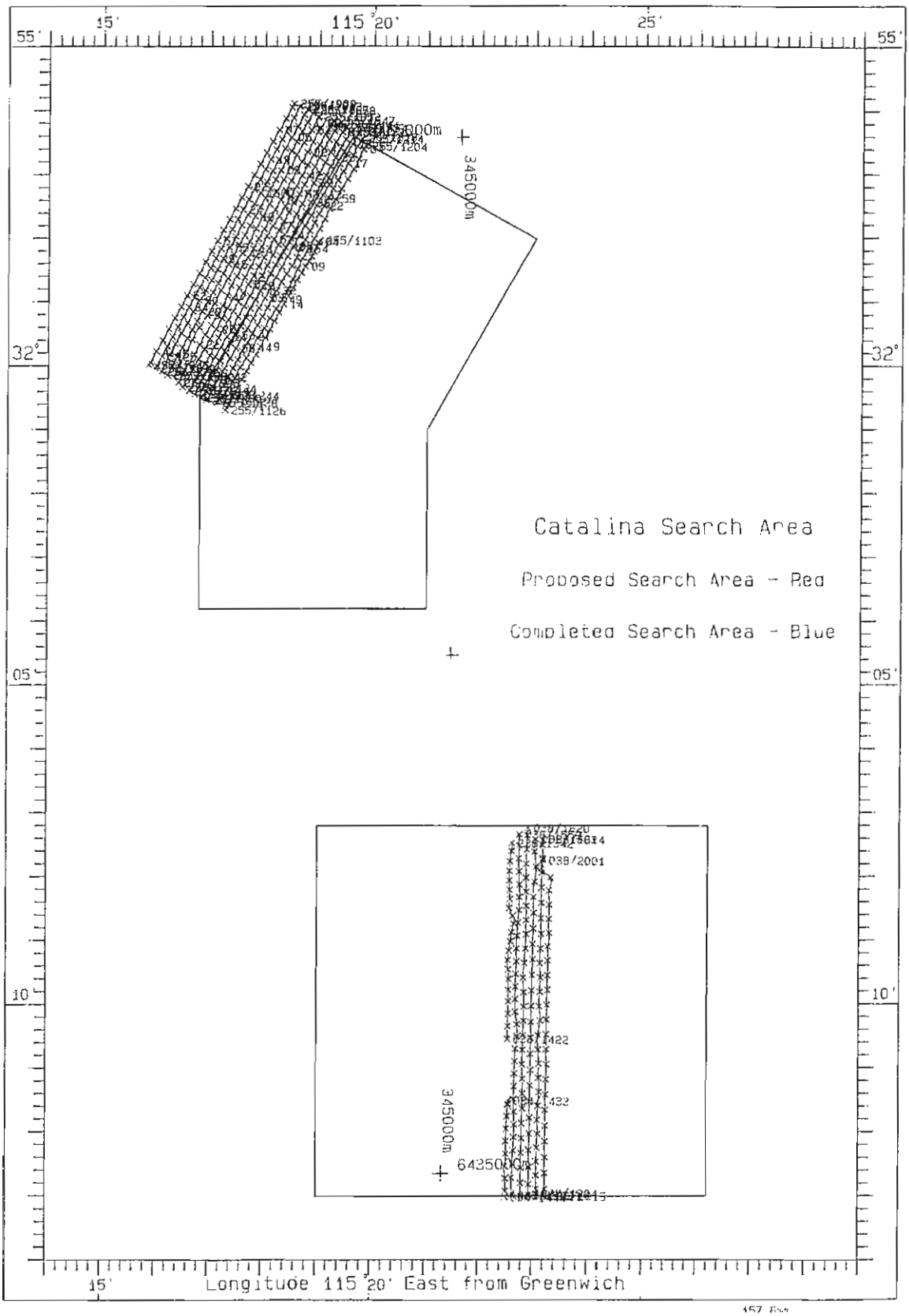


Figure 7b . The RAN search areas (Lt. P. Hiatt, RAN): A condensed version of the Track Plot Sheet. Showing the area searched by HMAS *Moresby* to date.



Excavation
Experience has shown that where a properly conducted excavation and /or recovery regime cannot be mounted (due to advanced corrosion, unforseen costs, logistical problems or time constraints) the salvage of an engine, a machine gun or two, instruments and other loose attractive items often serves to satisfy those who initiated or funded the search and recovery process (See examples in Jung). Many would find this apparent compromise unacceptable, especially in instances where it was originally envisaged that an entire aircraft be recovered. On the other hand, in coming to the realisation that the recovery of a particular aircraft was not possible, some would see this as a useful compromise. This is a wide spectrum of opinion to consider.
As noted by Mr White, the removal of sediments from the hulls would be an essential prerequisite to the raising of the wreck(s), if that step were decided upon. In our opinion this excavation would need to be conducted according to standard archaeological practice, for fear of losing material and/or useful information. This is currently not possible, though the removal of sediments in a gross fashion is feasible with present technology.
In essence, it is believed that a properly conducted archaeologically-based excavation of the site(s) in the depths envisaged is not possible at the present time.

Raising
The most dangerous time for any shipwreck material or structure is in the transition from just below the surface to the deck of the transport. There the object is put at risk from the effects of wind and waves, sometimes critically. The comments above re the differential corrosion at the lifting points, structural integrity overall and the need to attach lifting devices to the hulls, hold good in this instance and may preclude such a step.

Restoration
The comments of the conservators Jung, Kendrick, MacLeod and White render the recovery of one of these aircraft a problematic exercise.
Mr White's comment that 'there has yet to be a successful restoration of an aircraft taken from a salt water environment' is of fundamental concern, given the depth of water, the size of the aircraft themselves, the logistical problems and the costs involved with their location, inspection, raising and refurbishment.

Conclusions

Significance
On the basis of the evidence above, the historical importance of the 'Black Cats' is undeniable.

Search
Given their significance, a search for the four wrecks is warranted.
The uncertainties of the positions given for the scuttlings has ensured that a very large area needs be searched, however. Considerable costs are to be expected in this phase as a result. Funding for this stage needs be obtained with the understanding at all levels that there is considerable uncertainty about the position and state of the aircraft themselves and there is some doubt that any remain intact. A sponsor willing to search the area on an opportunistic basis, in similar fashion to the HMAS *Moresby* searches to date is the most viable option.
This may also indirectly result in the location of other 'graveyard' wrecks such as the hulks of many former sailing ships and barques, steamers, dredges, barges and a Dutch submarine, the *K XI*. These appear in Figure 6 in the area south west of Cape Vlaming between the 50 and 100 metre contour lines.

The submarine *KXI* lies at c. 32° 04'S., 115° 22' E., on the border of the two RAN search areas for the 'Black Cats'. Its relocation could have some significance for the RAN with respect to submarine search and rescue exercises.

Inspection of the Remains
An inspection of the remains found in the stage above is possible and potentially useful. Preliminary predictions as to the state of the wreck(s) can be tested and this will add to the body of knowledge on submerged aircraft wrecks generally.
This phase is an essential pre-requisite to any decision-making that will ensue. Again costs will be high, though sponsors in the Western Australian diving industry may find the potential PR benefits attractive once a wreck is located. Recreational mixed-gas diving is now entering a phase where diving in these depths will become more frequent. Recreational divers are now beginning to target the 'graveyard' ships as possible dive sites and professionally-trained divers may follow suit. Being in its nascent stages, it is not recommended that this form of diving expertise be utilised in the near future. The possibilities need be noted, however.

Excavation
Decisions about the feasibility of conducting a proper archaeologically-based excavation must await the successful outcome of the search, location and inspection phases.
The hull(s) will most certainly be (part) filled with tonnes of sediment. If a decision is made to raise an aircraft, there will be considerable excavation required both internally and externally as a result. A properly-conducted archaeological excavation of the Catalina hulls cannot be commenced with the current technology.

Raising
A decision on this phase would need await the results of the stages above. Given the size of the project, logistics and the difficulties that will ensue, this will prove the next most costly phase behind restoration. Both stages may in fact prove impossible due to the effects of corrosion.
The removal of an aircraft from the seabed is a decision for the various stakeholders, given that the wrecks were deliberately scuttled and abandoned, affording them little legal protection at the moment. Any decision of this nature would have to predicated upon the provision of appropriate conservation facilities, equipment and staff and then an appropriate place in which to house and/or exhibit the remains.

Restoration
The fact that a similar enterprise has yet to prove successful, poses fundamental questions whether the Catalina wrecks in deep water off Rottnest Island should become, in effect, the 'testing-ground' for the raising, conservation, refurbishment and future management of an aircraft recovered from a salt-water environment.
Clearly there are many, as yet untested, variables. These clearly need be tested in far less taxing circumstances and on a much smaller scale before raising and restoration is attempted in this instance. This raises the question of what alternatives are there in the short to medium term?

Alternatives. There are many alternatives which need full consideration before funds are committed to the raising and restoration of a Rottnest Catalina.

(i) A later model (Canso) of Catalina PBY 5A is being restored at the Amberley Airforce Base. Costs in this instance have been estimated at $100000.
(ii) An operational Catalina could be purchased and flown in from overseas at a cost of $250000 (Peirce, pers. com.).
(iii) There is currently interest in the raising and restoration of a crash-damaged Catalina off Townsville (recent TV news item).

(iv) A partly restored Catalina lies in a hangar adjacent to Albany Whale World. It has an uncertain future following the recent tragic death of its owner the aircraft enthusiast and whale-spotting pilot, Mr John Bell. The Catalina Club is aware of the existence and status of this aircraft, Number A 24-46, which originated from the USA and came here in 1943. The plane a PBY 5, operated out of Rathmines (NSW) and undertook a mine laying sortie to New Guinea. Having returned to Darwin, it caught fire was towed back 200 miles from Melville Island for repair. It remained operational in 1945 to be sold in 1947 to a Mr Campbell. Mr Bell purchased it from Victoria and brought in back to Albany in pieces by trailer. The aircraft is 50-60% complete and collaborative work is being conducted with the Amberley group (pers com Peter Bell).

Recommendations

The notion of excavating, raising, conserving and exhibiting one of the Rottnest Island 'Black Cats' should not be considered at this time. Even if they were found intact on the seabed, the experimental nature of the enterprise indicates that this phase should await the successful raising, conservation and evidence of long-term stability of a smaller, more easily handled aircraft, or a similar craft raised from saline water. This 'proving' stage may not occur for a considerable time. A similar case in maritime archaeology is the author's raising of the compact horizontal trunk engine from the SS *Xantho* (1848-1872) after over a century in a saline environment. Others are awaiting the success of this venture before giving consideration to similar or larger ventures (McCarthy, 1996).

While awaiting proof that an aircraft can be succesfully conserved and properly stabilised after nearly half a century in a saline environment, alternatives need be considered if the Catalina Club of Western Australia wish to proceed with the exhibit of an aircraft in the short term. If the refurbishment and exhibition of any of the Catalinas mentioned amongst the 'alternatives' above would prove a satisfactory option to the Catalina Club of Western Australia, then this option needs be thoroughly examined. The Whale World Catalina seems a logical choice, having an apparently uncertain future and having seen service on Australian shores.

A search for the Rottnest Catalinas is warranted but given the uncertainties noted above, this phase should be the result of opportunistic deployment of a remote-sensing array by a vessel conducting trials or traversing the area. The RAN have conducted such a search and may do so again in the interests of the Club and maritime/aviation history generally. Remote sensing firms could equally be interested in testing their equipment in the area.
A search could indirectly result in the relocation of one of the many hulks in the Rottnest Graveyard. The centring of a search area around the known coordinates of the Dutch submarine *K XI,* which lies well within the parameters for the Catalina search, could prove beneficial in that the possibilities are multiplied and the potential returns to the RAN at least are vastly increased.

If an aircraft is found, then an inspection is also warranted, but again this should be conducted by an agency or firm wishing to deploy such equipment close to Fremantle as a trial or public relations exercise.

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Appendix

1) ARTHUR JONES ON SINKING OF THE CATALINAS

....who was serving at the time in 43 squadron and based at Rathmines, NSW and was recorded on the 24/3/1991. On about the 3/1/46 myself and a fellow by the name of Johnny Evans who was a flight engineer up in the sergeants' mess at Rathmines having a drink and the orderly officer came in and asked where there any West Australian's in the mess. Now my first thoughts were the old saying ' don't volunteer for anything', but we thought it was rather unusual for them to come in and ask this, so I said 'yes, I am a West Australian' and there were no flight engineers, he said we want a flight engineer and a fitter air-gunner. Auyway, Johnny who I had been with for quite a time, he said 'I am not doing anything and I am waiting around, so, yes, if you can't get a West Australian I will volunteer'. So anyway he said come down and report to the orderly officer tomorrow morning so we duly sent down and said there are no flight engineers from West Australia here, so you can have this job. Flight Lieutenant Ted Withall and FL Ted Hodgesou, myself, Arthur Jones and Johnny Evans were duly got together and told that there was a job to do in Perth, WA. As the three of us hadn't been home for some considerable, we thought this was good, so we said what is the job, he said ' Oh no, I am sorry, we cau't tell you, its a top secret job, but you will be given orders when you get to Perth'. So anyway, all the arrangements were made, and he said will we be coming back to Rathmines, 'Oh yes, coming back to Rathmines when the job is finished so, anyway we tried our best to find out what was going on and nobody would tell us, so on the 6/1/46 we set off from Rathmines and flew in a military aircraft via Melbourne, Para..., Ceduna, Forest, Kalgoorlie to Perth, and some of the times were quite humorous, I can't remember what plane it was, but the uumber was VHClQ, I can't remember what type of plane it was, but looking at the thing, Sydney to Melbourne was 3.5 hours, and Melbourne to Parafield was 2.5 hours and so it goes on, but anyway, 1 will be making a photostat copy of all these times, so I won't go into that at the present time. But anyway, as 1 say, we set off and we got to Perth on, we must have stayed in Melbourne over night, and we had another plane then, an A6593 which they got us out of bed and we took off at 5 am which we weren't very impressed with, but that was on the 7/1/46 and we eventually got to Perth on that date at 1720 hours.

Next day we had to report to air force headquarters in the Terrace which you all remember was Air force House and that's where I went to when 1 first joined up and this is one of my last jobs before I was demobbed. Anyway, we get to Air force House and we all go in and the big noise there said yes have a special job for you, you are going to these four catalinas that have been on lend-lease from America and have been used on courier work between Crawley? and Ceylon, because of the terms of the lend-lease if the Australian Govt want them they have to pay £80,000 and we don't want to, we can't spend that sort of money and this is what is happening to all the lend-lease, so its got to be destroyed. But, strangely enough it was a big secret mission, but on that same day, as far as I can remember, that day or the day before was quite a report written up iu the *West Australian* which I cut out at the time, but over the years something happened to it and its lost, so if you want to read that report, you can probably go back into the archives around about that date and find out. Anyway, that's beside the point, that's what happened. So, we were given these orders, this is what you do, and anyway, he said the first thing for you, the fitter-gunner and myself and Johnny Evans to get down to Crawley and see what state these are in, nobody has been near them, they have been locked up and that, but they are up on deck and, oh no, 1 am not sure whether they were up on deck or in the water. But anyway, I have an idea they were up on deck, but auyway, that is beside the point. Johnny and I went down and all the motors had been inhibited apparently, and they were in quite good condition so we got the motors started without much trouble on the first one, but before we go any further I might mention all these catalinas had names of the stars, there was *Antaris*, *Rigal*, *Vega* and *Altier*. So if I mention these instead of saying catalina you will know what they are all about. So we started off with one, *Antaris*. Went all over the hull and everything and checked it all over and we didn't know whether it had been weakened by standing there for such a long time, but anyway, we eventually said right, this was is air-worthy and sea-worthy, so we all duly got down to Crawley, it was round the point where the sea-scouts place eventually was, I think they had a big shed there or something, that's where we were. Now, there was Ted Withall who was the skipper, Ted Hodgeson second pilot, Johnny Evans the engineer and myself the TA. We were told there was a crash boat had gone out the night before out to Rottnest and we could get on the radio to him to see what was going on, whether they thought the weather was too rough because they played to part in picking us up after we had ditched the aircraft. There was also an RAF bloke, Flight Lieutenant, and he was to come out as an observer and we were told under no circumstances were we to take anything off the aircraft, because if it was proved we took one thing off, the government would have to pay £80,000, so he was there to see this was carried out and he was strict to the letter being an RAF bloke and brought up in a different way to what we were, he wouldn't let us take a pin off the thing, so we didn't get anything off the first couple, but anyway, there was also the man that was to do all the blowing up was a fellow by the name of Peter Ploughman, he was a lieutenant navy demolition expert and he arrived down with some pretty big hefty parcels and he had two charges of 75lb of TNT done up in, I am not an expert, but anyway he had these doue up so they were loaded on the aircraft and he said there was no danger, no danger until they are all hooked up and so on, so we

got on to the crash boat and they said if the weather didn't look too bad, so we duly got in and took off, headed over Canning Bridge, took off over Canning Bridge and away we went and we hadn't been home for a long time, we were getting 16/- a day capital city allowance and we hadn't been home for quite a long time, so we thought by-gee, we are going to make this last, because we were all staying at home and Johnny Evans stayed at my place in South Perth and then he went and stayed at the YMCA in Murray Street later on, because he was a little bit more free, he was able to roam around and do what he wanted to do, so anyway, we got out there and, as I say we hadn't been home for a fair while, and we say, no, its a bit rough to land today, we will go for a bit of a flight, so we went round and had a fly for a couple of hours and then we got on the crash boat, and said, look are going back to Crawley, we will have another go tomorrow, and that was on the 16/1/46. So on the 17/1/46 we took off old *Antaris* again and got on to the crash boat, yes the weather doesn't look too bad, so we got out there 13 miles the other side of Rottnest and we decided, yes, we will have a go, so we put her down and the crash boat came over and took us all off and he had a dinghy there which he tied up to the blister and Peter Ploughman got out and loaded the gear and that and we put a rope on it because there was a bit of a swell, and he, being a navy man, I suppose he was pretty good with a rope, he rode over to the blister which we had left open, and the theory was that he put 75lb of TNT in the blister and then the other charge up in the pilots cabin and then connected the two up, light it, and then rode like hell and we towed the rope and got him back onto the crash boat and then stood off about 1/2 a mile and waited to see what happens, and by the time we got him back on board the crash boat, he was shaking a bit, he said, by gees that was a bloody hairy sort of a thing to do, so anyway we stood off and waited a while and nothing had happened, and then boom, up went the back one and blew the thing in half and a little while later, boom, up went the front one and it all sank and that was a perfect job. So that was the theory, and that was what happened, that was the 17th, so there was a lapse of 12 days. I think we must have said 'oh its a bit rough' and so on and so on, so we were 12 days between the first and the second one. On the 29/1/46 *Rigal* was the next one, we did the same thing, we went out, a bit rough, so we went for a 2 hr flight, I think one time we went down there Albany, another time we went up near Geraldton, as far as I can remember, I might be stretching it a bit, but I think we did that. Anyway, on the 30th out we went again and that was 18 miles off Rottnest. So we did the same thing and Peter Ploughman set the charges again. We stood off and the first one went off, blew it in half, anyway the second one for some reason didn't go off, so we thought gosh what are we going to do, but none of us blokes could understand why they couldn't have got someone from the Navy out there or something, and just blew it out the water instead of all this business like we did. It was a hairy sort of a job, and we said to Peter Ploughman 'what happens', he said 'it is hairy, things can go wrong'. But anyway, they didn't fortunately. So, the second charge didn't go up in the pilot's cabin and so the sergeant in charge on the crash boat, he brought out 3x303 rifles and we had about 500 rounds of ammunition so there is three of us start of pumping ammunition torch into this the ?? well you wouldn't think, you know having the experience during the war, you wouldn't think he would put so many bullets into thing without it going up. Anyway, after about 200 odd rounds, someone got a lucky shot. Boomph, up she went and she blazed and blazed and gradually burned up and settled down and the whole lot sank and we had to make sure there was nothing floating because of danger to shipping and that, so anyway the second one (2nd side of tape commenced here) was destroyed without any problems and then we duly got back in the crash boat and went back to Fremantle and up the river to Perth which was quite a long trip so that was the end of the second one.

Right, that happened on 4/2/46 and then there was a long delay of 9 days to 13/21/46 and the thing about this whole business was that we weren't too sure of the conditions of hulls and so on, and after going through the war we didn't want four of us to be reported missing and killed in action or something out the other side of Rottnest, because we thought that would be a bit crummy, but the other thing was, as I say, there was a long delay between them, but perhaps we just stretched it out because we knew we had nothing else to do and we were just waiting to be demobbed and hanging around at Rathmines and so on. Anyway, the third one was 13/2/46, that was *Vega*. We took off at 7.30 from Crawley and we had already been in touch with the crash boat and once again the same four members Ted Withell, Ted Hodgeson and Johnny Evans and Arthur Jones went out and we had the same RAF bloke, where they dug him up from I don't know, but he wasn't a very cooperative sort of bloke, and he was a stand offish sort of a fellow, but anyway, we couldn't do anything about that, so we just had to put up with him. Anyway, we got out and it was still a bit rough so we went for another test fly for a couple of hours and then back to Crawley and then the same thing happened on the 14th, got in touch with the crash boat and they said the weather looks pretty good so we went out and we decided then that we would put it down, that was 13 miles off Rottnest and we went through the same procedure and everything went all right, so that was the end of the third one.

The fourth one was a little bit more to it. We went on the 14th which we destroyed *Vega* and that was the third one, and it was not until 24/2/46 that we took *Altier* out, we went out, we didn't leave before 10 am I think, I remember it was a little bit rough and the weather calmed down a bit, so we went out and once again, we will have a test flight, so we did a couple of hours test flight around, but this time, we had a fellow by the name of Flight Lieutenant Swan, as the pilot, I think Ted Withall, from memory rightly, was recalled or had to go back to Rathmines or something, I can't just remember what it was, Flight Lieutenant Swan, I didn't know him and I can't remember much about him, he obviously was a skipper on cats, and I thought Ted Hodgeson, they would have let Tom Hodgeson to fly because he was a good pilot too, but they brought this other fellow, but I don't know where he came from, someone might be able to, I believe you've had contact with Ted Withall, so he

might know or Ted Hodgeson, I am not sure. So, anyway that was *Altier*, 24/2/46. We went out and did a two hour test flight and then, was three days, we must have prolonged it a bit more, three days 27/2/46 we left Crawley at 1200 hours and we said yes, we will land it, the weather was reasonable, so we landed about 13 miles off Rottnest, this was all west of Rottnest I might add, so what's his name, Eric said 'have we any deep sea divers amongst our members', well if you had deep sea divers you could probably get a hell of a lot of good stuff off there, but it would cost a lot of dough, but anyway maybe someone in the future might get a few pieces from it. Right, so the same procedure went through and the charge was duly set, and anyway the back charge went off and blew it in half, and then the front charge went off, but it blew a lump of wing and wing tip float off and everything else settled down and this piece was left in the water floating around, it was a fairly, you know what the floats like, a fairly big hefty lump of stuff, so well they said 'well you can't let that float around, we will have to get rid of it, so it was decided that Johnny Evans and myself wonld get in the dinghy, of course we, there was a 3 or 4 ft swell, or maybe a little bit more, so anyway, the sergeant gave us his tommyhawk, little tommy hawk out of the kit of the crash boat, and we tied a big long rope on and so we let it off, and so Johnny and I got this thing, it was a bit hairy, when the float was going up we were going down and we were up and down like a fiddler's elbow, bnt anyway, I said you hang on to me Johnny and I will do the chopping, so the idea was to chop some holes in and let the water in, so I kept chop, chop, chop, chop, and got about 8 or 10 holes in it, I made a swipe and it went right through and the thing stnck, and he said 'let the damn thing go', and the sergeant yelled out 'hey, don't let that go I will be in strife, that is part of the equipment, I will have to put in a report about that' and I said 'blast the report'. If I had hung on to it I wonld have been pulled under with it, because it had started to go under pretty quickly, he said 'Johnny, let the damn thing go'. So anyway, I let it go and down went the tommy hawk, so we pulled back, the old sergeant he was real upset, I said 'Oh come on, we have just sunk four times 80,000', he said 'that doesn't mean a thing yon know what the RAFs like, I've got to put in a report about that, loosing the tommy hawk', and I said 'you've got a gem of an excuse for it haven't you', and he said 'Oh, well I suppose so'. So anyway, that was the end of the four aircraft. But when the crash boats were out there, the crash boat was out there each time, the blokes, the fishermen they used to lay cray pots out from Rottnest and just some of the crays, inadvertently, somehow or other, found their way on board the crash boat and there was just the point, there was cooking facilities there and how it happened, I don't know, but in a couple of occasions we had a nice lot of cray fish, but in the finish, after about the second one, apparently the fishermen must have known what was going on and after the second one there was, the sergeant got a blistering and was accused of doing this ..not on your life mate, no, we wouldn't do things like that'. So anyway, after the second one he said 'that's the end of it fellows, I wouldn't dare go near them again' , I am not saying that we took them, but we just happened to find a few of these things aronnd. Anyway that was just a little side-track from what had happened.

That was on the 27/2/46 the last one went down and it was a bit nostalgic, and then on the, I don't know why it was on the 27/2, it wasn't until 6/3/46 that we flew from Perth to Sydney on an RAF Transport Command plane, and I remember it was a Liberator, and the pilots name was Flying Officer Horn, and we flew direct from Perth to Sydney and it was a little bit different to what it is now, it was 9 hours, we flew at night, we took off at 1800 hrs from Perth and it was a 9 hour flight, anyway, that was the end of the whole procedure, so I hope that this has helped you Eric, and I don't know that there is anything else that I can tell you. That was the whole story as far as I know of the destruction and destroying of those 4 land-lease. I did hear, and I have an idea you have got someone in our Association that flew those things, but they tell me that with extra fuel tanks they had a range of about 32 hours, now that might only be hear say, but I have an idea that's how long, you know, what flying time they had.

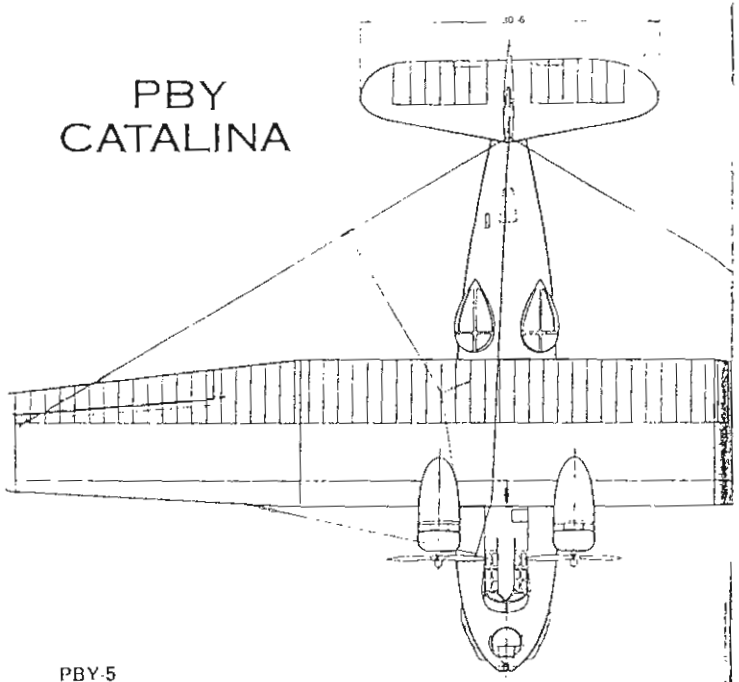
So anyway, that's the end of the story and this is Arthur Jones signing off and I hope that a few fellows can listen to this then they will know the end of it. I would like to know all the beginning of it, but I suppose someone, somewhere along the line has got some recording of the flights and what happened etc, I believe they were used for VIPs and special communications and all that type of thing, but it would be a bit hairy now, flying, wouldn't it for 32 hours, I don't know whether there is any plane that can do this without re-fuelling, it was a pretty mighty achievement. I was just looking through my log book and I think the, you know 19, I think I had nearly 20 hours on one trip up on the islands, and it was a long time. Anyway, I am not going keep reminiscing, all you want to know is about the lend-lease cats and that's about it.

So this is Arthur Jones signing off on the 24th March 1991.

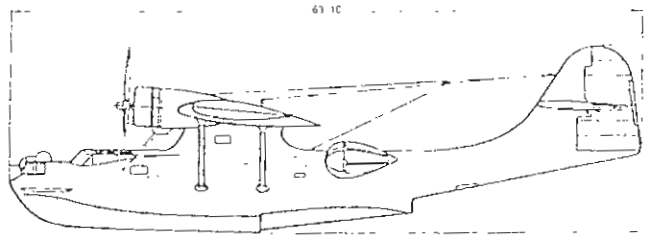
2) Details of the Catalina Type

From Knott (1981 : 88-89)

PBY
CATALINA



PBY-5



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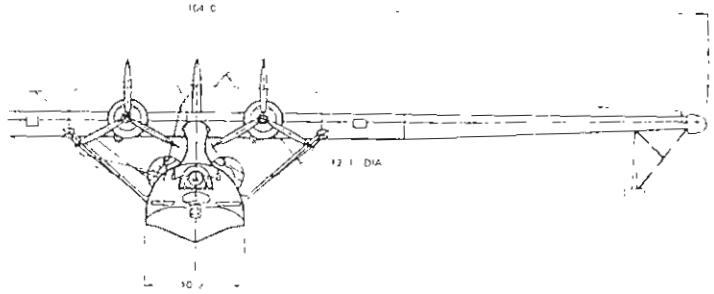

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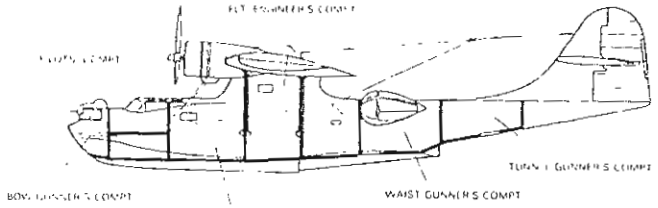


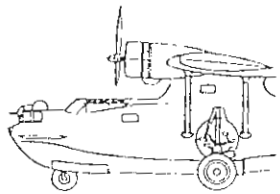
NAVIGATOR/RADIOMAN/RADARMAN'S COMPT

WAIST GUNNER'S COMPT

PBY CATALINA

	PBY 5	PBY 5A
Wing span	104 ft	104 ft
Length	63 ft 10 in	63 ft 10 in
Height	18 ft 10 in	20 ft 2 in
Wing area	14000 sq ft	14000 sq ft
Gross weight	31800 lbs	34000 lbs
Engine (2)	R 1830	R 1830
Horsepower (T.O.)	1200	1200
Max. speed (7000 ft.)	195 mph	180 mph
Cruising speed	110 mph	117 mph
Service ceiling	18000 ft	15000 ft
Range	2850 mi	2550 mi

Performance data approx



PBY-5A

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