

**The Broome Flying Boat compendium: a guide to navigating the
Department of Maritime Archaeology archives and collection**



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The Broome Flying Boat compendium

Explanatory note:

Since 1990 the Department of Maritime Archaeology at the Western Australian Museum and its affiliates facilitated and developed research, search and survey regimes, site inspections, surface recoveries, test excavations and protection strategies at the remains of the 15 Flying Boat wrecks destroyed during an air raid on Broome on March 3 1942. Reports, articles, public programs, a documentary, websites, artefact catalogues and a comprehensive Ph.D., followed. These and the associated photographic and film records are an extensive and diverse resource that needs be drawn into a coherent whole to enable future researchers to effectively utilise them.

Appearing in the form of a chronologically arranged précis of all that has transpired under the Department's auspices before 2018, *The Broome Flying Boat Compendium* fulfills that role. Throughout explanatory footnotes lead the reader to the materials listed above and to the Department's document and image files on its Server. These are listed in Footnote one below.¹ All other images in this work are from the Department's image collection.

Cover images: Roebuck Bay and Broome in modern times and soon after the WWII raid.

¹ THERE ARE SIX STREAMS OF RELEVANT DATA

- 1) **Hard Copy files:** Broome Aircraft Wrecks 54/02 & Aircraft WA Waters, 6/86
- 2) **Documents (Electronic):** Department Server—Maritime image—Maritime Archaeology Storage Site related (Images & docs)—Western Australia—5 North West Coast— 36 Broome (Docs).
- 3) **Slides:** In slide cabinets with copied scans on the Department Server—Maritime image—Maritime Archaeology Storage—MAD Colour slides— F1. Drawer Colonial wrecks A_C—BAW (Broome Aircraft Wrecks).
- 4) **Electronic images:** Department Server—Maritime image—Maritime Archaeology Storage Site related (Images)—Western Australia—5 North West Coast—36 Broome (Images).
- 5) **Black and White Photographs.** B&W Index. Search 'Flying Boats'.
- 6) **PowerPoint presentations:** Department Server—Maritime image—Maritime Archaeology Storage—PowerPoint Presentations.

Background and project ethos

Wreck Inspection North Coast (WINC), a maritime precursor to the modern 'heritage inventory',² included the 1978 examination of an abandoned pre-war seaplane float, and part of a Douglas DC3 downed in WWII.³ These heralded the Department's interest and involvement in a subject later to be termed aviation archaeology.⁴ The float, found part-buried above high water, was from a downed pre-war era Junkers Seaplane, removed and briefly used as a canoe before being abandoned by the crew.⁵ Recovered and taken to the Museum for treatment and stabilisation,⁶ it heralded the involvement of the Museum's scientists and restorers in the conservation of aircraft remains.⁷ With the principals in the recovery and treatment process all museum-based, they were in effect 'public archaeologists' and 'public conservators' with an obligation to present exhibitions, popular articles, public lectures and to provide interpretive materials and where suitable objects on loan to other institutions. Staffs were also required to attend to the needs and requirements of researchers, the press and documentary makers.⁸ The conserved float, for example featured in a series of exhibitions at the Museum's Shipwreck Galleries in Fremantle and then under the Department's Outreach Program were loaned to the RAAF Aviation Museum in Bullcreek. There it joined an extensive aviation collection, including objects from the Broome flying boat wrecks.⁹ Given the Junkers seaplane float was also of great social significance as a pointer to role of the Aboriginal people in saving the crew, it was partly a catalyst for the Department's growing understanding of the social ramifications of its work.

The same anthropological, outreach and public archaeological considerations evident in the DC3 and the Seaplane float instances became the norm in the Department and have permeated its involvement with the Broome Flying Boats since it first became involved in 1990.

² Sledge, S., (1979), *Wreck Inspection North Coast* (WINC). Report—Department of Maritime Archaeology, Western Australian Maritime Museum, No. 11. http://museum.wa.gov.au/maritime-archaeology.db/sites/default/files/no_011_winc_expedition_report.pdf

³ http://www.aviationheritage.org/view_image.asp?id=409. For contemporary images and an overview see <https://www.ozatwar.com/wa02.htm>.

⁴ McCarthy, M., 2004. Historic aircraft wrecks as archaeological sites. *Bulletin of the Australasian Institute for Maritime Archaeology*, 28: 81-90.

⁵ <https://www.imdb.com/title/tt0258578/>.

⁶ Sledge, S., 1982. *Atlantis* Seaplane Recovered. *Aircraft (Australia)*, 61(9): 38-39.

⁷ MacLeod, I.D., 1983. Stabilization of Corroded Aluminium. In *Studies in Conservation*. 28 (1) February, 1983.

<https://www.google.com.au/search?q=conservation+of+the+atlantis+float&oq=conservation+of+the+atlantis+float&aqs=chrome..69i57j8254j0j8&sourceid=chrome&ie=UTF-8>

⁸ The latest was in 2018. <http://www.abc.net.au/news/2018-01-29/australian-adventurer-tests-survival-skills-in-kimberley/9370396>

⁹ These are listed in Jung, S., 2004, *Artefacts from Broome's WWII flying boat wreck sites: a survey of data collected 1979-2001*. *Bulletin of the Australasian Institute for Maritime Archaeology*. Volume 28: 77-9.

The Flying Boat program 1990-2018

Fifteen flying boats were lost in the waters of Roebuck Bay during a Japanese air raid on March 3 1942. This included eight PBY 'Catalinas' belonging to the RAF, the Royal Netherlands Naval Air Service Marineluchtvaartdienst (MLD) and the US Navy; two Short Empires, one belonging to the RAAF, the other to BOAC; and five Dornier X (Do 24) aircraft belonging to the MLD.¹⁰

While nine aircraft sank in relatively deep water, six wrecks (the 'drying-sites') have always remained visible at low water spring tides. Engines and other materials were subsequently raised for exhibition around Broome. Walks out to the wrecks across the mudflats also became a popular Broome pastime and outside interest slowly grew as roads into the region were improved. In 1980 the Broome Historical Society expressed concern about the intended salvage of relics by a Perth-based aviation heritage group. As a result, advice on the best means of protecting the aircraft was sought of the Western Australian Museum. Given that the State Maritime Archaeology Act could not be applied, the possibility that the 1976 Commonwealth Historic Shipwrecks Act could be invoked led to overtures to the Commonwealth Government. Reply was received that, though it could not apply its shipwreck legislation to the submerged aircraft, it would attempt to facilitate their protection.¹¹ This was on the understanding that Allied warplanes lost in conflict remain under the ownership of their parent government.¹² As an example of this on-going proprietorial interest, the Netherlands Government had earlier authorized artefact recoveries from their Dornier and Catalina flying boats, provided that it had first choice should items be required for an exhibition in Holland. In an agreement reminiscent of that established in order to deal with the VOC shipwrecks on the coast of Western Australia (The ANCODS Agreement) it was stipulated that up to a maximum of one third of the materials raised were to be available for repatriation to the Netherlands.¹³

The publication of numerous popular accounts of the air raid in the mid-1980s¹⁴ gradually increased an awareness of the nine deep-water sites.

¹⁰ Embassy of the Kingdom of the Netherlands, 2013. *Broome 3 March 1942-3March 2012*. WA Museum, Welshpool.

¹¹ This and all other correspondence appears in WA Museum, Department of Maritime Archaeology hard copy files Aircraft WA Waters, 13/86; Broome Aircraft Wrecks 54/02. Subsequent correspondence can also be found on the server through the electronic Document Stream. Item 2, Footnote 1.

¹² See Appendix 1 for an expansion.

¹³ WA Museum, File Aircraft WA Waters, 6/86.

¹⁴ For example, Gajda, [Gajda] S., 1982, To identify a Wartime Wreck: seeking the past in the tidal flats off Broome. In *The Book of Flying*, Yaff Publishing Group & Prime, M.W. 1985, *WA's Pearl Harbour: The Japanese Raid on Broome*, Royal Airforce Association, Aviation Museum. (PDF's of these appear on the Department server. See Item 2 of Footnote 1).

Poor underwater visibility and the very large tidal range at Roebuck Bay (sometimes in excess of 7 metres) combined to ensure that very few divers attempted to access them, however.

The first known unauthorized recovery of objects from the deep-water sites occurred in 1989 and included a machine gun and a child's doll. Concerned at these developments the Broome Historical Society and local identity W. (Bill) Carswell, a Canadian who had worked at Parks Canada, independently contacted the Western Australian Museum in the hope it could help stem the practice.

Image: Diver examining the machine gun before it was raised (BAW_81)



Their inquiries came to the author, who was by then the Department of Maritime Archaeology Inspector of Wrecks with responsibility to manage reports of finding wrecks and relics from them. The Broome Historical Society considered the matter of 'grave concern' and stated that while the relics were of 'little monetary value', 'historically they are priceless'.¹⁵ In the interim the gun disappeared, causing controversy and precipitating wider calls for the legal protection of the sites and the recovery of the materials.¹⁶ More stakeholders became involved. Amongst them was the State Minister for Tourism who wrote to the Commonwealth Minister

¹⁵ Broome Historical Society, to M. McCarthy, 12/9/1980, Aircraft WA Waters File.

¹⁶ It appears to have found its way to Melbourne.

responsible for shipwrecks in November 1990. The letter advised that the pilferage amounted to 'missing an opportunity to supplement the inventory of the local Broome museum with these collectibles, thereby enhancing the value of this tourism and heritage attraction'.¹⁷

Discussion with the Broome Historical Society, the then newly-established Air Force Association Aviation Museum at Bullcreek near Perth and the Western Australian Defence Public Relations Officer led to the Maritime Archaeology Department being recognised (albeit *ex officio*) as the lead institution in developing protection strategies.¹⁸ Meetings were also held with representatives of the Dutch consulate and given that many of the casualties from the raid were not recovered, the Department of Veterans' Affairs (Office of Australian War Graves) was also approached. They advised that War Grave legislation did not include submerged sites, however. As a result, local and Federal Police, the Department of Customs and the Department of Transport were contacted in order to ascertain whether the wrecks, the relics and any human remains contained within could not be protected by other means.

Eventually by agreement with these various stakeholders, a protective 'framework' was concocted under air navigation and customs regulations. These prohibited entry to a crash site, the removing of material from wrecked aircraft and the importation of aircraft parts without a permit. The threat of invoking these regulations and the moral implications of interference with possible 'war graves' were effective in halting the looting. By agreement with the Broome Historical Society were the *de facto* guardians of the wrecks; this 'protective' phase was to be followed by a remote sensing sweep of the bay with the intention of finding those wrecks that did not become exposed at low water spring tides (the 'deep-water' sites). A 'wreck trail' facility, allowing controlled access to any newly found sites on a strictly non-disturbance basis was also agreed upon. This was to cater for the growing number of divers in the region and to ensure the support of the Broome recreational dive industry in helping protect the sites.

Associated Surveys International conducted the first remote sensing survey gratis, under contract to Woodside Offshore Petroleum. Though fixing two possible contacts in March 1991, it proved otherwise ineffective due to equipment problems, combined with the very narrow 'GPS window' available in those days.¹⁹ In the interim the Commonwealth

¹⁷ Aircraft WA Waters File.

¹⁸ Broome Historical Society, notably President Val Burton, Mr Al Clarke, curator of the Aviation Museum at Bull Creek near Perth and Mr Vic Jeffery AM, Defence Public Relations Officer.

¹⁹ Associated Survey International. *Wreck Search Roebuck Bay*. The report is filed on the Server. See Item 2 Footnote 1

government received representations from the Royal Netherlands Embassy requesting it examine the best means of protecting all the sites in the Bay. Though this proved unsuccessful, the *ad hoc* protective strategy developed earlier remained effective in stemming the looting.

In August 1996 the Dutch-based multi-national Fugro Survey (into which Associated Surveys International was by then incorporated) undertook another side scan sonar survey. Again conducted gratis, they achieved considerable success, finding what they believed were at least five deep-water 'targets'.²⁰ Being essentially shipwreck specialists and needing advice, the State's then leading aviation researcher, the late Lindsay Peet joined the museum's team. Further, in May 1997, after becoming aware of his expertise in examining, identifying and managing PBY Catalina wrecks in Darwin Harbour, maritime archaeologist Silvano Jung was also invited to join.²¹ Around this same time the Catalina Club of Western Australia advised the department of its interest in locating, raising, preserving and presenting one of the famous 'Black Cats' scuttled off Rottneest Island at the end of WWII as part of the Lend Lease Agreements. These were specialist long-distance Catalinas painted black for the 'double-sunrise' journey from Perth to Sri Lanka.²² Another followed this approach from aviation photographer Jon Davison who was interested in producing a film about the 'Black Cat' project. When the Department concluded that this was not feasible due to location, conservation and other problems,²³ it was suggested that Davison's focus become a documentary about the Broome flying boat sites. Though a far from ideal strategy, this would enable any funds that might accrue to be applied to a search, analysis and site management program. From the outset it was understood the obtaining of funds by this means was unsatisfactory given that a poorly presented film, with little regard for the wrecks and their relics could result in unwarranted interest in the sites. Despite this, because the Museum was effectively acting *ex officio* at sites that did not come under its legislative umbrella, it was accepted that this potential funding mechanism was the only viable alternative.

With the assistance of the Museum, Davison then took a funding proposal to the ABC, partly on the basis that they could be relied upon to

²⁰ Fugro Survey, 1996. *Wreck Search Roebuck Bay*, Fugro Survey, West Perth. The report is filed on the Server. See Item 2 Footnote 1

²¹ Jung, S., 1996, Archaeological investigations of the Catalina wreck sites in East Arm, Darwin Harbour. *Bulletin of the Australian Institute for Maritime Archaeology*, Volume 20.2: 23-40.

²² <http://www.aarg.com.au/consolidated-pby-catalina.html>

²³ McCarthy, M. (1997). *The 'Black Cats'. Report into the feasibility of locating, raising and conserving one of the four Catalina Flying Boats scuttled off Rottneest Island in the years 1945–1946*. Report - Department of Maritime Archaeology, Western Australian Maritime Museum, No. 125. http://museum.wa.gov.au/maritime-archaeology-db/sites/default/files/no._125_the_black_cats_0.pdf

give due consideration to the need to ensure the sites were not endangered by their coverage of the subject.

In the interim, Department Head and remote sensing expert Jeremy Green and his departmental assistant Corioli Souter joined Silvano Jung in Darwin. In deploying a side scan sonar they obtained corroborative imagery at a Catalina wreck, where very poor site visibility had hampered Jung's recording and site identification regime.²⁴ Around this same time, Broome identity and diver Geoff Parker began recording the 'drying sites' in Roebuck Bay during a series of spring tides, producing this record of a wreck known from earlier work to be X-23, a Dornier type flown by the MLD.

*Image: Geoff Parker's Dornier X-23 with explanatory notes typed for clarity.*²⁵

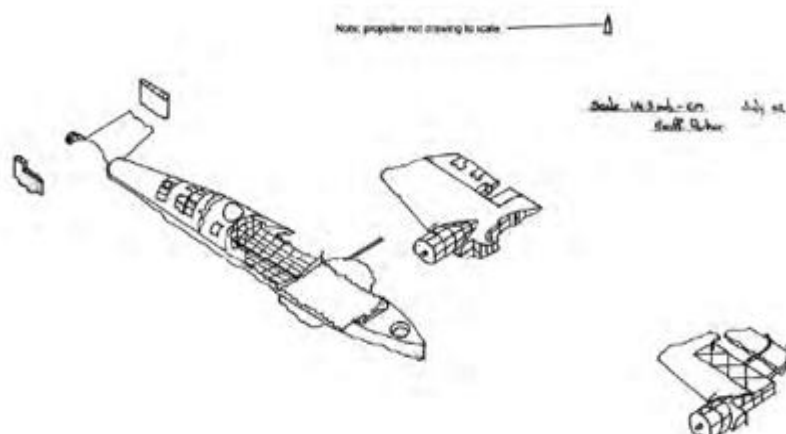


Figure 8.6 X-23 isometric drawing (Geoff Parker via WAMM). Accompanying notes:

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 1. Wreck dries out on the minus tide

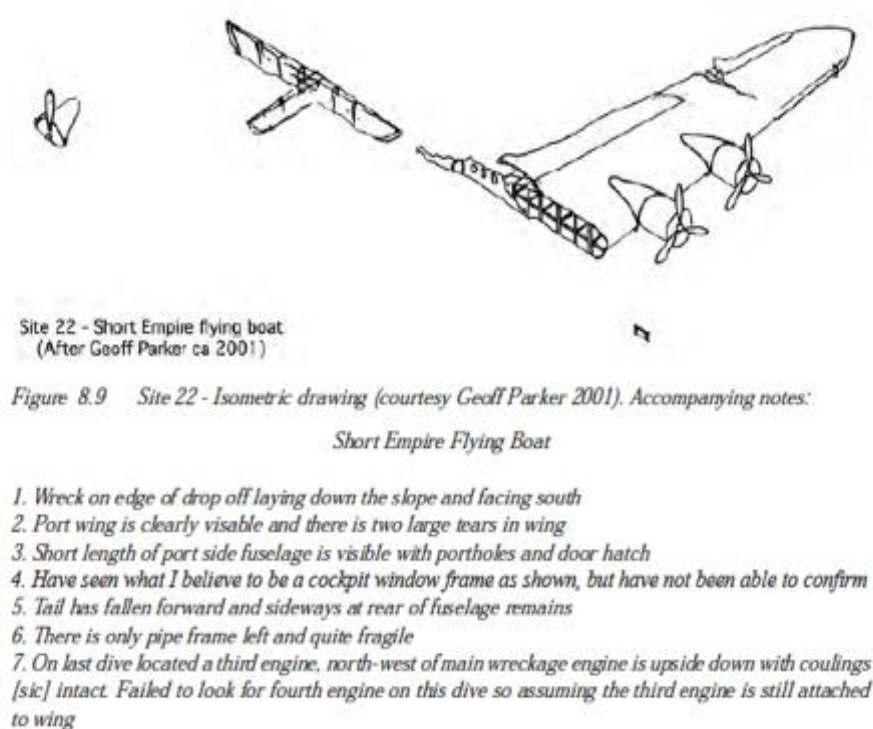
Parker and his team had also searched for deep-water sites, applying a variety of methods including echo sounders and grapple hooks. Often

²⁴ Jung, S., 2001, *Wings beneath the sea: the aviation archaeology of Catalina flying boats in Darwin Harbour, Northern Territory*. Unpublished Masters Thesis, Northern Territory University, Darwin.

²⁵ Reproduced from Silvano Jung's Ph.D. p. 234.

these were deployed after sympathetic locals divulged the location of their favourite fishing ‘spots’ or when turtles were consistently seen rising from the same places in the bay. Apparently as protection against sharks, they would seek refuge under wreckage and often slept there. In mid 1999, while on holiday in Broome, the Department’s chief diver Geoff Kimpton joined Parker, assisting with GPS ‘fixes’, site descriptions and in recording plans of two unidentified Catalinas. Parker also recorded an unidentified Short Empire type in deep water.

Image: Geoff Parker’s Short Empire with his explanatory notes typed. ²⁶

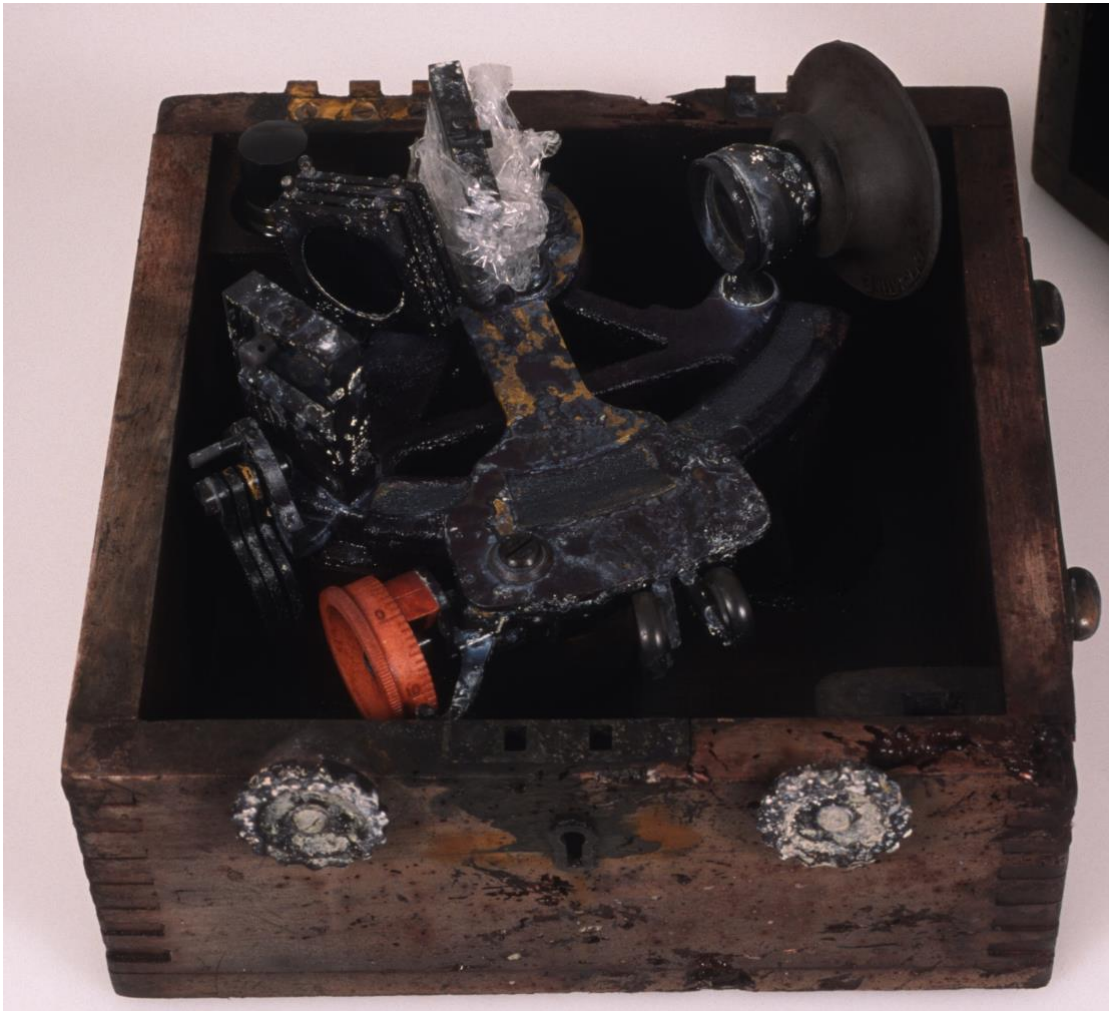


In conducting further research, Parker also examined one of the drying Catalina wrecks at low water, and in predicting it would have been stored underneath the navigator’s sea, reached in through the sediment and recovered a sextant in its box. This was donated to the Museum, given an

²⁶ Again from S. Jung’s thesis. These images and others produced with G. Kimpton’s help have been widely used, appearing also in the Department’s subsequent nomination of the flying boats to the Register of Heritage Places under the *Heritage of Western Australia Act 1990*.

artefact number, BAC 46, (Broome Aircraft 46), photographed and conserved.²⁷

Image: The sextant in its box.



At the 15 November 2000 meeting of the Museum's Maritime Archaeology Advisory Committee (MAAC) a listing by the Northern Territory government of their Catalina wrecks for protection under their

²⁷ See Department image Server. Colour slides. Colonial Wrecks A_C Folder BAW (Broome Aircraft Wrecks 62-80)

heritage legislation was tabled. In the ensuing discussion MAAC Chair Professor David Dolan advised that, contrary to the prevailing understanding, the Broome wrecks could be protected under Western Australia's State Heritage Act. His logic as a senior member of the Western Australian Heritage Council with a good working knowledge of its powers was based on the understanding that 'it [the Heritage Act] does not [require] that places of significance have to be on dry land'. Should the required wreck site assessments prove positive, this seminal observation opened the path towards formal legislative protection for the Broome sites under the Heritage of Western Australia Act.²⁸

Shipwreck Detectives

When the ABC did not take up Jon Davison's proposed documentary, he was linked up with Ed Punchard and Julia Redwood of Prospero Productions. This film company had a strong shipwreck and maritime heritage focus and with Punchard a Graduate of the Department's course in maritime archaeology, Prospero had long-standing collegiate links with the Department. Having also examined the 'Black Cats' and the Darwin aircraft as possibilities, Prospero adopted Davison's concept, considering it an ideal fit as one of their developing 'Shipwreck Detectives' series.

Plans for fieldwork utilizing funds tied to the proposed film evolved and in February 2001 it was agreed Jeremy Green was to manage the remote sensing phases and liaison with Prospero, while the author was to coordinate the archaeology, site management and liaison with Broome and other stakeholders. Throughout the planning process and given that the proposed film would further highlight the presence of the aircraft wrecks, it was stressed to all that

... the archaeology and ethical management of the sites would remain the sole focus of all bar the film crew... [and that] all funds raised for the aircraft wrecks element of the series are to be put back into the aircraft sites partly because they are further endangered by the very act of performing the necessary inspection and management work on them.²⁹

As part of the agreed filming regime, Davison joined as a consultant, while Green and Souter were selected to be the principal 'shipwreck detectives'. Filming was also to feature an oral history program conducted by Souter. Prospective interviewees included some of the original WWII

²⁸ MAAC Resolution, Aircraft WA Waters, 13/86; Broome Aircraft Wrecks 54/02.

²⁹ McCarthy to Green, File Broome Aircraft Wrecks 54/02: Vol 3.

flying boat aircrew that were invited to Broome by Prospero Productions and were to be flown up and accommodated as part of the film budget.³⁰

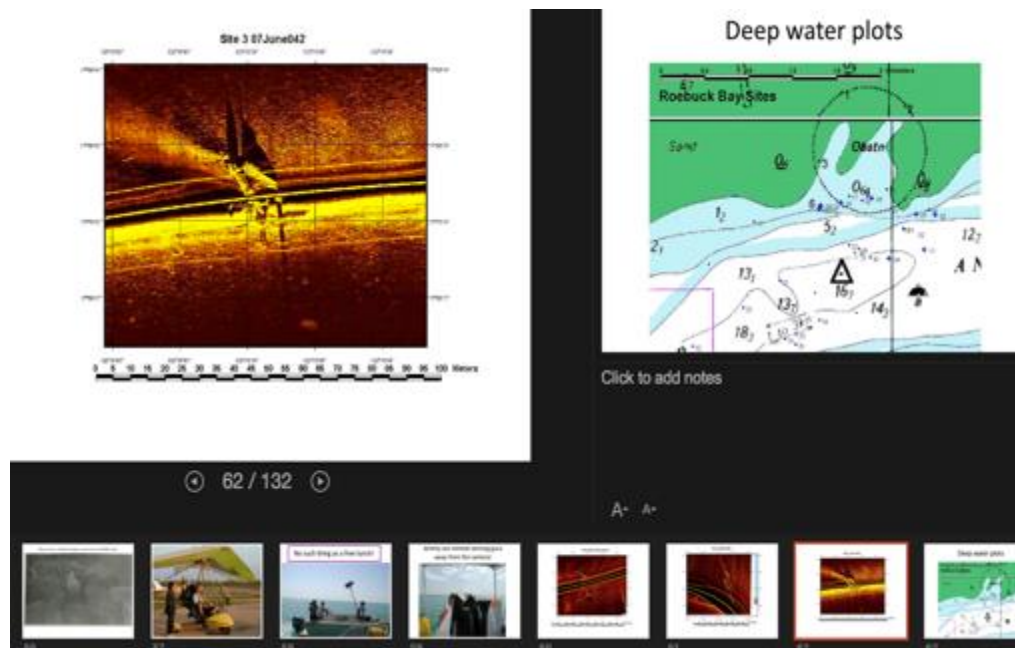
Site analysis and test excavation

The provision of boats and expertise gratis by local divers John Lashmar and Geoff Parker and the Prospero funding arrangement enabled the Museum to commence its first round of fieldwork in June 2001.³¹

Conducted under Green's direction, the side scan sonar survey produced numerous 'strikes', or 'targets'. These were 'fixed' with GPS and marked with buoys in order to facilitate diving when tidal and other conditions allowed.

Image: A Montage, from one of the author's PowerPoint presentations

Including a side scan sonar record of one wreck with preliminary plots of the 'strikes' alongside. Below, indicating the extent of the powerpoint resource is a microlight aircraft used by Prospero in its filming, the workboats used and other side scan sonar images.



³⁰ Stored in Oral History Transcripts. For an analysis see Souter, C., 2003. *Port of Refugees: archaeology and oral history of WWII flying boat wrecks in Broome Western Australia*. Bulletin of the Australasian Institute for Maritime Archaeology. 27:115-20

³¹ Green, J.N., 2002b, The application of side-scan sonar and magnetometer to the location of archaeological sites. *Bulletin of the Australasian Institute of Maritime Archaeology*, 26: 119–131

Each evening the dive records were compared with the Museum's side scan sonar records and with Parker and Kimpton's earlier manual records.

Image: Silvano Jung, Geoff Parker and Jeremy Green examining side scan sonar records.



The test excavation and surface recovery regime

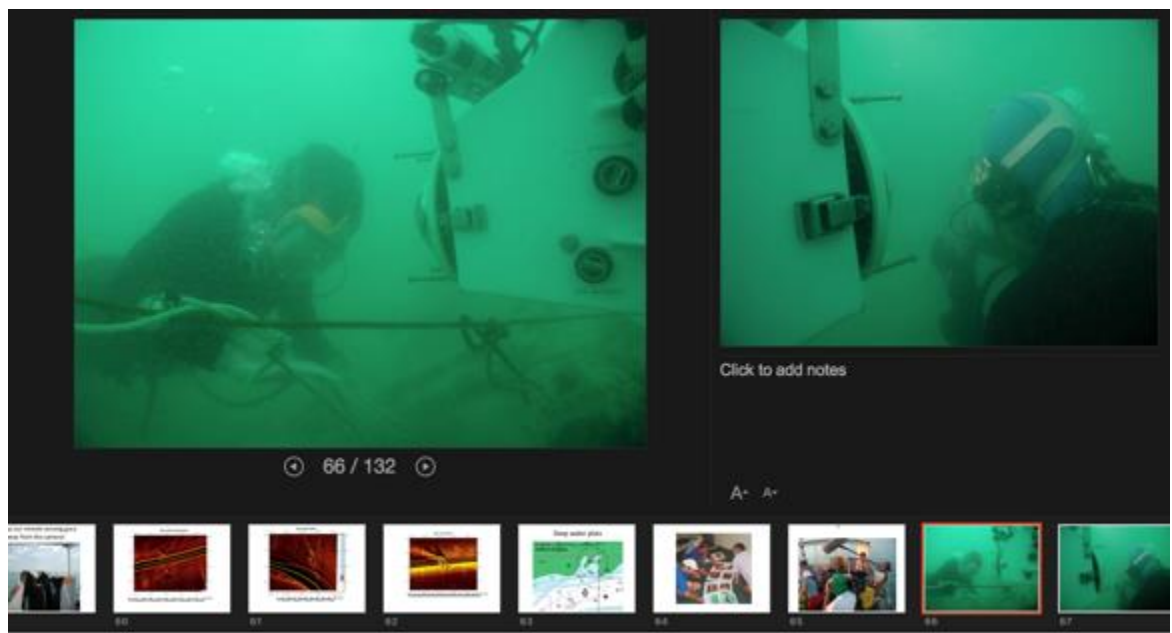
While two sites, a Catalina and a Short Empire, lay in c.15 and 20 metres of water respectively, each with less than one metre visibility, a Dornier and a Catalina were located in depths of 6 and 8 metres respectively, both with good visibility.³² These and one other shallow site were selected for further inspection, limited surface recovery and where-indicated a test excavation. As is standard practice, each of these activities was recorded in detail manually and with still and video photography. At the evening debriefings, that included staff, consultants, volunteers and Prospero, each site was explained, sketched on a white board and after

³² Wreck Inspection Day Book #9 1999-2004 3-22 June 2001. pp. 35-70 & 10-20 August 2001 pp. 71-80.

draft site diagrams and preliminary analyses were produced, these were entered into the expedition Day Book.³³

When conditions allowed Green and Souter conducted their inspections and excavations ‘to camera’ as part of the Prospero film agreements. When conditions were not ideal, they and other staff also conducted inspections and excavations. These were recorded using manual means, the departmental underwater cameras and video photography.

Image: A Montage, from one of the author’s PowerPoint presentations with divers working to the Prospero in its filming. Below images, again indicating the extent of the powerpoint resource.



Conservator Jon Carpenter conducted the pre-disturbance survey and a corrosion study. He was also responsible for post excavation artefact handling, stabilization and transport in concert with Souter as artefact manager.

³³ The original is housed with all other Department Day books in the Department’s Day Book boxes. A scan of the original and a typescript appear on the Broome Document Server.

Image: Corioli Souter, Jon Carpenter & Jeremy Green managing the artefacts.



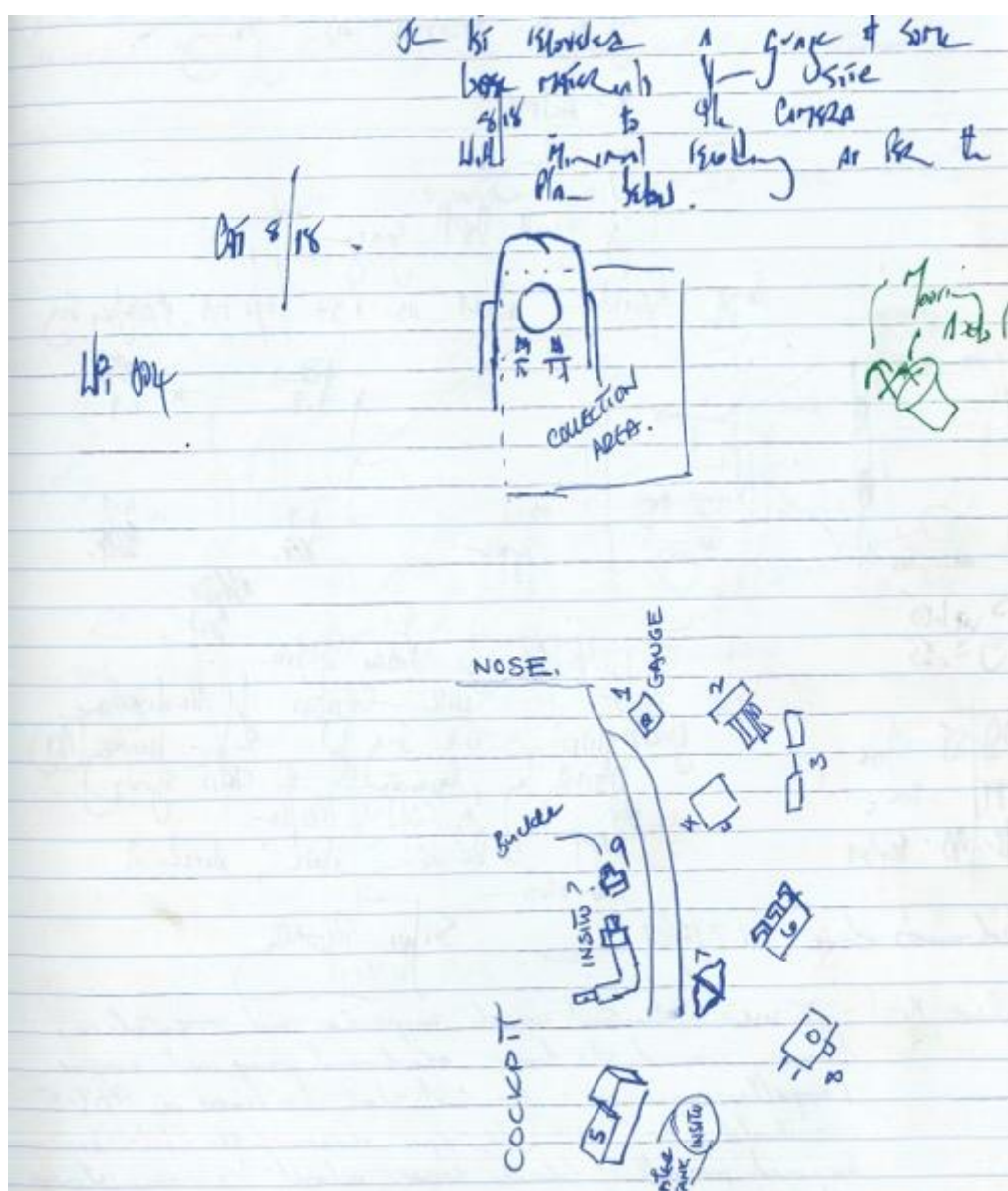
Throughout, Silvano Jung was chief adviser on the Catalina type and an assistant archaeologist, while Geoff Kimpton was diver, equipment manager and boat skipper.

Image: Geoff Kimpton assisting Ed Punchard of Prospero Productions.



Catalina: Site 8.

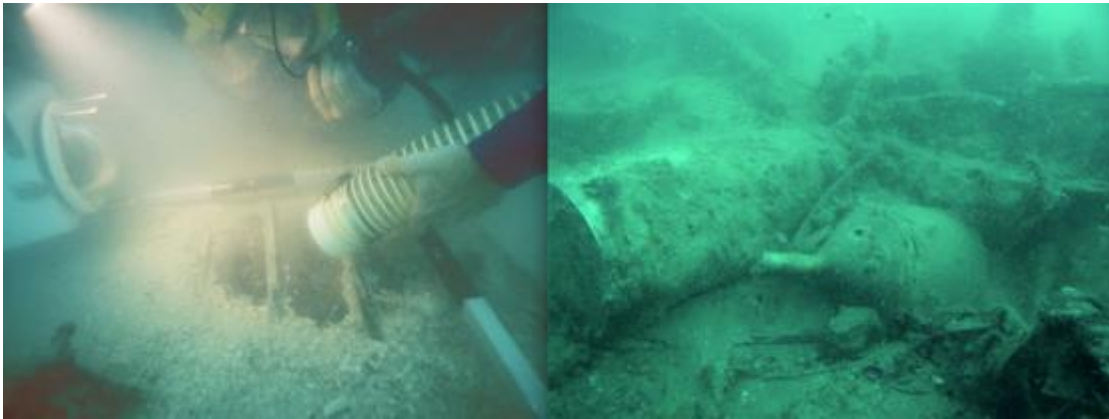
This aircraft was a 'fairly complete Catalina with propeller and both wings. Navigator and tail gunner's compartments show evidence of personal belongings e.g. shoes, cutlery.' As the site sketch shows, the area chosen for surface collection centred on the cockpit area behind the pilot and co-pilot seats, covering the nose and the starboard side, appearing as a two-metre square on the site sketch. Nine objects including gauges, a water tanks and a buckle appear drawn to a larger scale in the daybook image below the site sketch. The aircraft's mooring anchor lies nearby, being a later addition to the sketch.



Catalina Y 59

Attention then turned to the then unidentified Site #26. After setting two metre range poles in the space immediately aft of the co-pilot seat, a pre-disturbance survey and surface recovery commenced. This was followed by an excavation of an internal one-metre square placed inside the range poles.

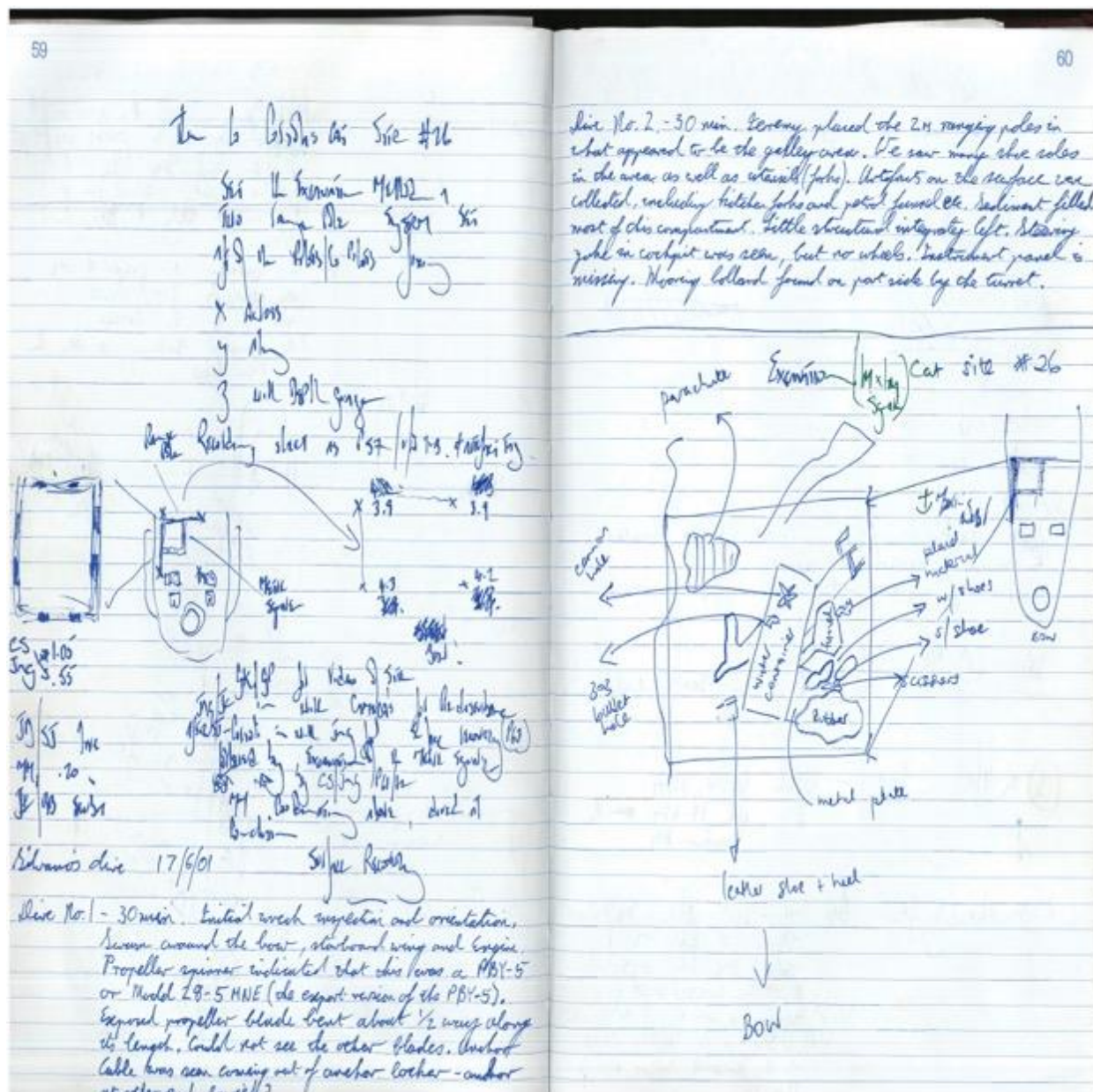
Image: A montage showing water dredging within the 1 metre square; a water container, funnel and other objects. The divers are wearing full-face masks, with communications.



The depth and orientation of each corner (from 3.9 -4.3 metres) are evident in the site plan on page 59 of the daybook below. The excavation itself proceeded down to 30cm in the sediment. A parachute, water

container with bullet holes, shoe soles, a funnel, utensils, including forks, one marked Y-59 were some of the items recovered from the square. These appear marked on the sketch opposite. The aircraft's mooring anchor was also seen nearby.

Image: Sketch of the June excavation at Y-59. Bow to the bottom.



Though Jung was able to recognize the PBY Catalina types and to tentatively link their instruments, engine type, modifications or other features to each of the three services (USAF-RAAF-MLD), the fork conclusively identified the wreck excavated as PBY Catalina Y-59, flown by the MLD.

Image: Silvano Jung examining the remains of a graduated bottle (Baby's milk or water measurer), forks and a pair of scissors.



As one of the veterans who were on Y-59 during the raid was also in Broome for the filming and was able to poignantly discuss his aircraft, its loss and the fork, this wreck understandably captured the interest of the documentary team. Partly as a result of these developments plans were made for a return to the site when conditions allowed.

An opportunity arose in the following August and in this phase much of the time was spent in underwater re-enactments, further interviews and work to-camera for the 'Shipwreck Detectives' documentary.

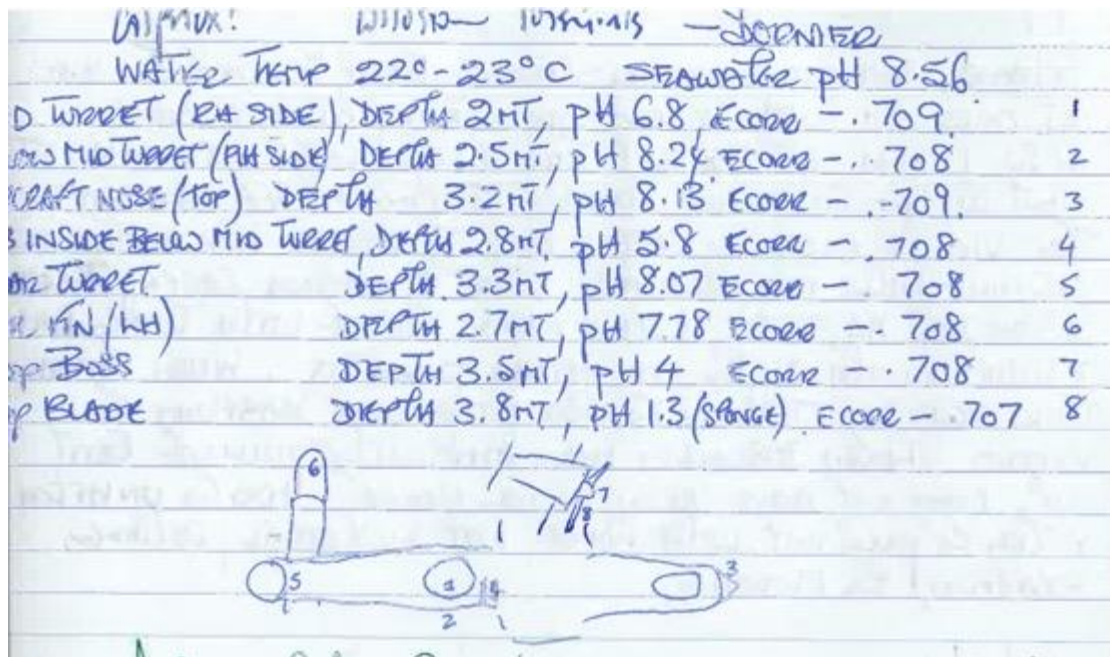
Image: The Prospero team filming on the Museum's workboat



Corrosion measurements and other site works were also conducted 'off camera' and ashore liaison continued with other stakeholders and a link

established with regional managers with a view to having the sites recognized within a proposed Roebuck Bay Marine Park.³⁴

Image: An example of Jon Carpenter's corrosion measurements with locations marked on a site sketch. These were transferred from his underwater record to the daybook.

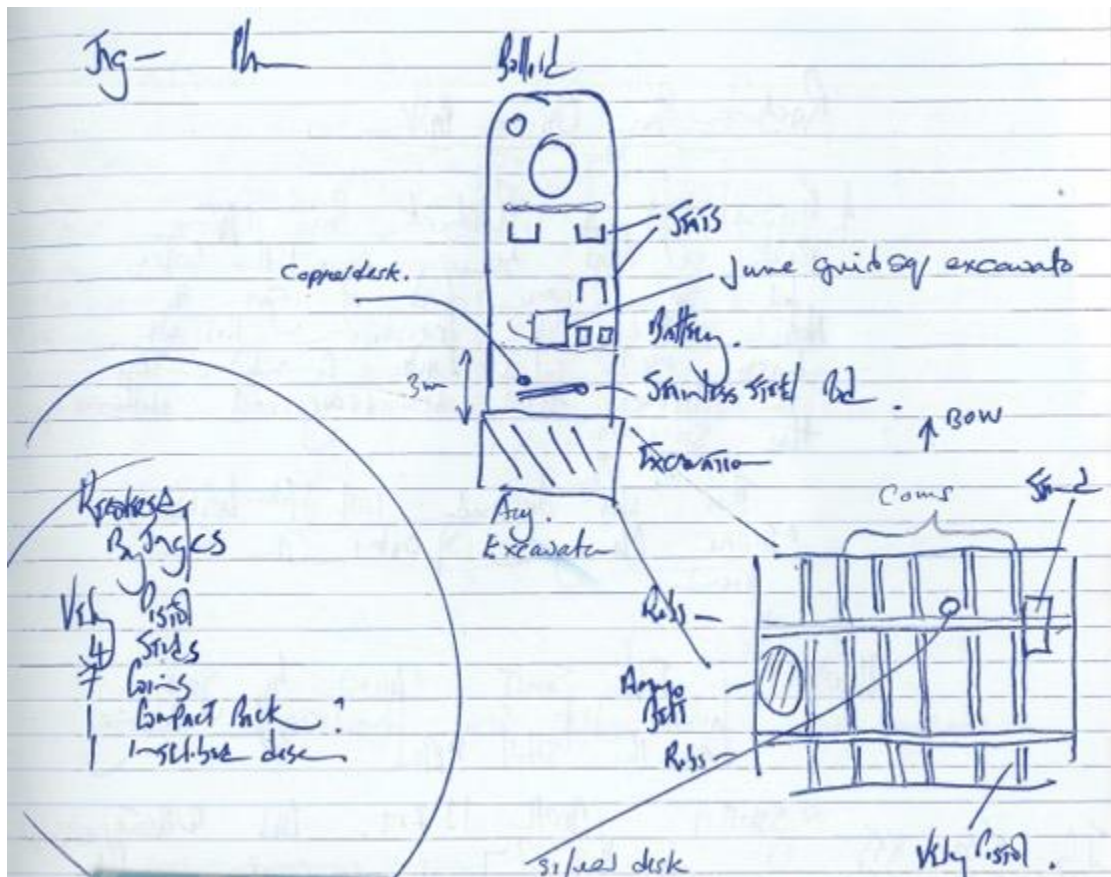


In extending the excavation of Y-59 aft of the area examined in the June fieldwork other objects included a Very pistol, coins, a woman's make-up compact and an inscribed disc were located. These appear in the site sketch below. Again taken from the underwater record this record was sketched to the white board in the briefing room, partly for filming and partly to explain the location of the finds.

The upper sketch is of the aircraft with the forward gunner's position seen ahead of the pilot and co-pilot 'seats', with the navigators seen aft to the right. The June grid square excavation is marked with the battery banks alongside. Three metres aft is the area chosen for excavation. This area is drawn to larger scale bottom right, with the artefacts listed in the circle bottom left. As is evident from the handwriting and styles in the earlier sketches there were a number of contributors to the record.

Image: Sketch of the August excavation at Y-59. Bow to the top.

³⁴ This did not proceed.



Of these finds and of the two excavations Jung wrote

... Thirty-five artefacts were excavated [in June and August]. Objects such as radio components were found, as well as other accoutrements necessary for a fighting machine, i.e. bullets etc.... two eating utensils were recovered... both bore the aircraft's serial number. Y-59... there were also other artefacts found that belonged to the civilian refugees and crew. The level of organic preservation at the wreck site was good. Rubber and clothing material survive... A number of shoe soles were uncovered; some may have belonged to women on the aircraft. The rubber sole shoe of BAC 14 is remarkably well preserved with a distinct tread pattern clearly visible.

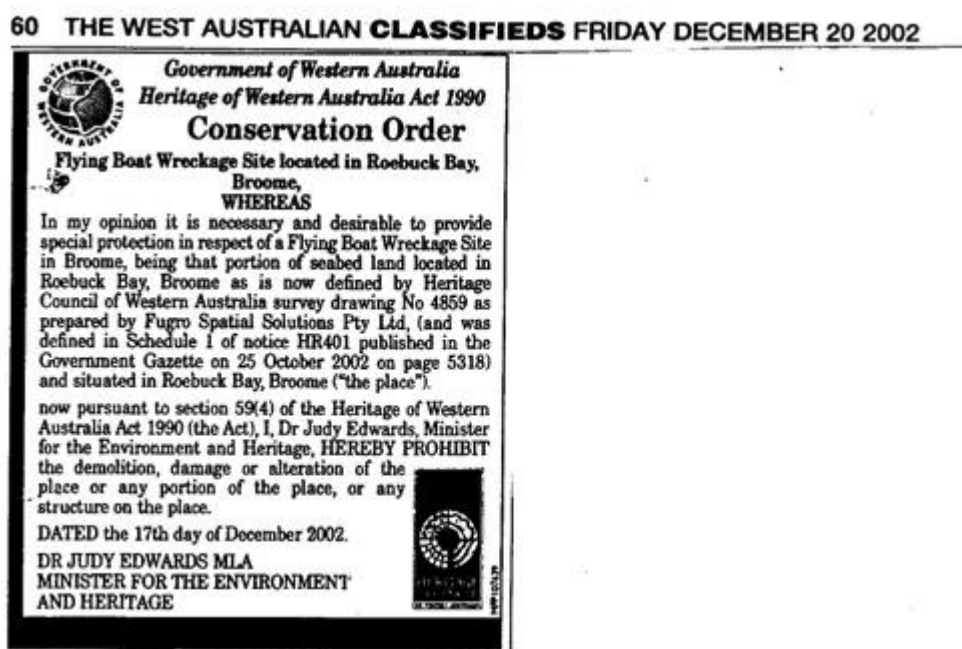
Shoe upper sections have not survived, but the tapering sole towards the heel of BAC 16 points to a non-military design. Other artefacts too may have belonged to women:

BAC 29 milk (cosmetic) jar and BAC 35, which is a cosmetic compact case... BAC 40, 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 prove/establish his business identity in Australia.'³⁵

Soon after return to the Museum in Fremantle a submission was made, resulting in the sites being protected under a Conservation Order issued under the *Heritage Of Western Australia Act 1990*.³⁶

Image: The conservation order.



In addition to the extensive nomination to the Heritage Council, technical reports on the history and excavation phases (by Silvano Jung) and on the oral history programs (By Corioli Souter) were produced and published in the AIMA Bulletin.³⁷ These were augmented with the

³⁵ Jung, S., 2004, *Artefacts from Broome's WWII flying boat wreck sites*: 63-80.

³⁶ McCarthy, M., Green, J., Jung, S. and Souter, C., 2002. The Broome Flying Boats. Papers relating to the nomination of a suite of flying boat wrecks at Broome to the Register of Heritage Places under the *Heritage Of Western Australia Act 1990*.

³⁷ Jung, S., 2007a, *Working Backwards: Broome's World War II flying boat wreck sites reconstructed from archaeological non-disturbance surveys, 2003 fieldwork season*. Bulletin of the Australasian Institute for Maritime Archaeology. Volume 31:32-44.

Jung, S., 2007b, *A defabrication method for recording submerged aircraft: observations on sunken flying boat wrecks in Roebuck Bay, Broome, Western Australia*. Bulletin of the Australasian Institute for Maritime Archaeology. Volume 31:26-31.

Department's web-based public products, (history, the aviation archaeology, daybooks etc.) all sponsored and produced by Jon Davison who was also a web development specialist.³⁸ In 2008 Jung completed a 654 page Ph.D. entitled *Australia's Undersea Aerial Armada: the aviation archaeology of World War II flying boats lying in Roebuck Bay, Broome, Western Australia*. It is a comprehensive and groundbreaking analysis. Covering all aspects of the raid, its antecedents, and aftermath, previous aircraft service histories, their arrival and destruction, the passenger and crew histories, site formation processes during and after the battle, previous research, side scan sonar images, oral histories, the archaeological process, artefact lists and analyses Jung's is the definitive work on the Broome Flying Boats. A benchmark in aviation archaeology, it is available in the Department's records and in electronic form on the web.³⁹ In rounding out the records from this phase, work has commenced inserting searchable Metadata on images housed on Department's server.

Future work

Fourteen sites have been found, of which ten are aircraft and four unidentified debris fields. Seven of the eight Catalinas had been located, together with two Dorniers and one Short Empire. This leaves three Dorniers, one Short Empire and one Catalina unaccounted for. In examining this discrepancy, Jung was led back to the oral histories Souter conducted with naval veteran Claude Choules, leader of post-war attempts to clear some of the wrecks in readiness for a post-war flying boat facility. This, and personal communications with other salvors at the time led him to conclude:

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... at least two wrecks were salvaged in 1943... Choules was adamant that the salvaged sections were dumped in the 100-fathom (182m)

Jung, S., 2009. *Site formation process (wing inversion) at Catalina flying boat wreck sites lying in Roebuck Bay, Broome, WA*. Bulletin of the Australasian Institute for Maritime Archaeology. Volume 33:19-31.

³⁸ Davison, J. and McCarthy, M., 2002. The Broome Aircraft wrecks. In Treasures from the Deep Website. <http://museum.wa.gov.au/research/research-areas/maritime-archaeology/treasures-from-the-deep/broken-wings>.

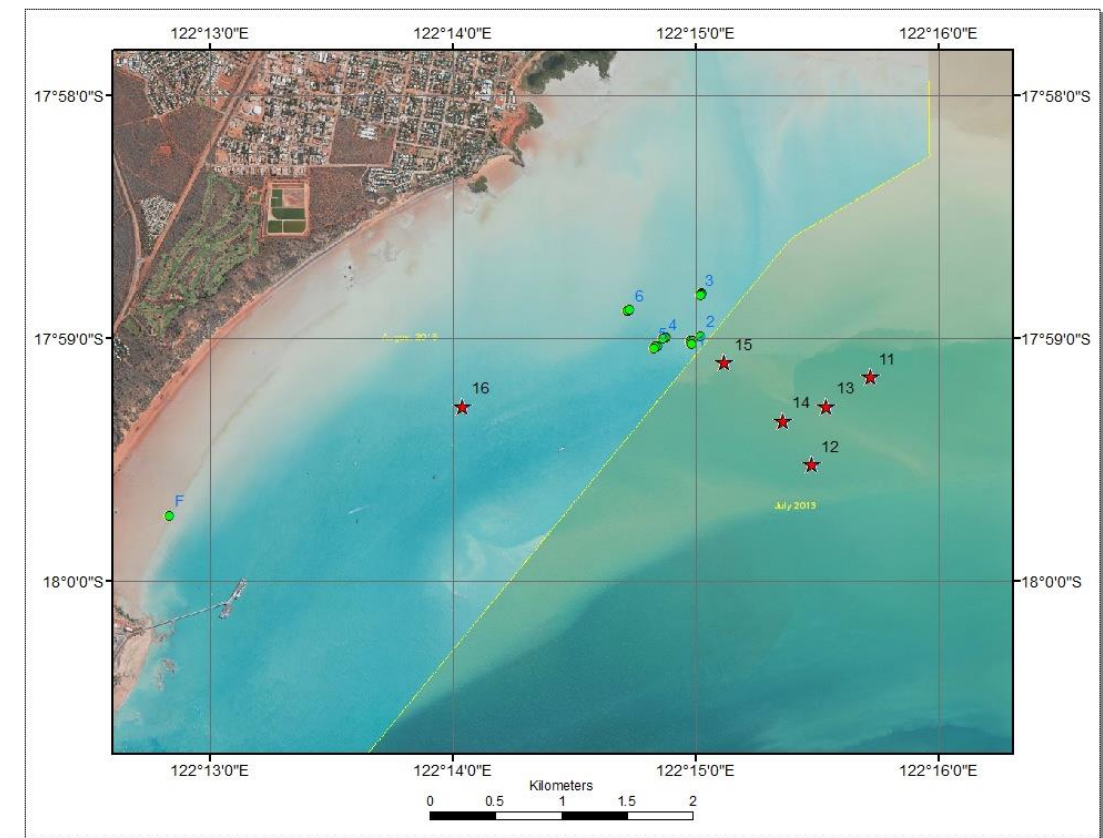
³⁹ Jung, S., 2008, *Australia's great aerial armada: the Aviation Archaeology of World War II Catalina, Dornier and Short Empire flying boats in Roebuck Bay, Broome Western Australia*. Thesis—(PhD), Charles Darwin University, Darwin.

(https://espace.cdu.edu.au/eserv/cdu:9264/Thesis_CDU_9264_Jung_S.pdf)

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.⁴⁰

While Choules did not satisfactorily differentiate between the 'drying' and the 'deep water' wrecks in describing his work to Souter, a feasible explanation for the four debris fields and the missing aircraft appears. In the process of his examination of this evidence, Jung has pointed towards a future search and research direction.

*Image: Jeremy Green's distillation of the sites found.*⁴¹



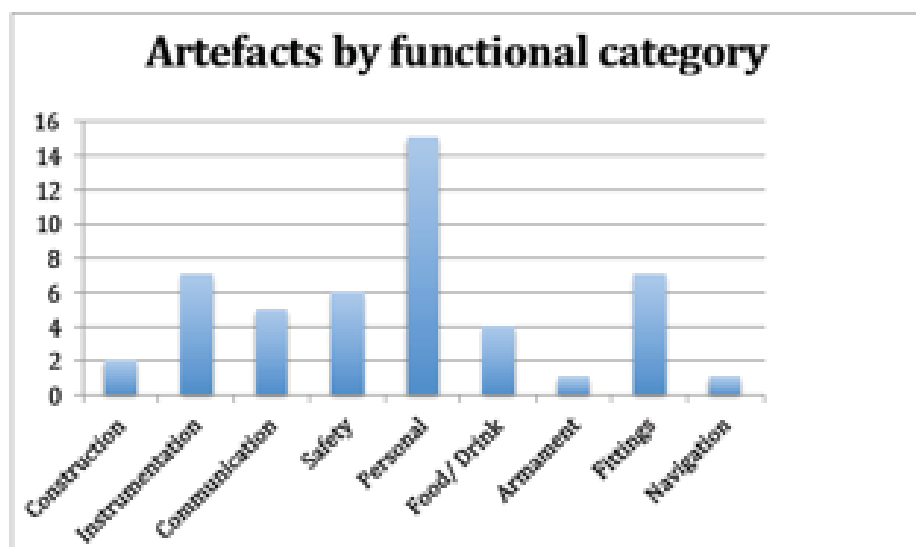
Jung also produced an account of all the known artefacts recovered entitled *Artefacts from Broome's World War Two flying boat wreck sites: a survey of data collected 1979-2001*. Published in the AIMA bulletin, and

⁴⁰ Ibid. p. 283.

⁴¹ An explanation appears on the server in the folder 'Sites found (plan and key)' See Footnote 1 Item 4.

appearing in his thesis, this work references all the known artefacts recovered from the flying boat wrecks over those years. A catalogue of the WA Museum's collection augments Jung's analyses. Produced by Carly Sims, a university internee supervised by Ross Anderson, the catalogue contains artefact descriptions, provenance, images to scale, analyses and suggestions for further work.⁴²

Image: Carly Sim's Analysis.



Other future research directions will also centre on '*The Archaeology of the Refugee*' i.e. what people take with them as they flee conflict in abrupt and frightening circumstance.⁴³

Echoes of this resonate in the latest publication to emerge from the 1942 air raid, the 2012 commemorative booklet. Published by the WA Museum under the auspices of the Embassy of the Kingdom of the Netherlands and simply entitled *Broome 3 March 1942-3 March 2012*, it also focuses on the people involved and again it had Jung one of its key authors.⁴⁴

⁴² Western Australian Museum, Broome Aircraft Artefact Database (c. 2016) <http://www.museum.wa.gov.au/maritime-archaeologydb/category/ancod-wrecks/broome-aircraft-wreck>.

⁴³ Shefi, D., (In Prep.) *Portable but meaningful – the archaeology of the refugee. An examination of the artefact assemblage associated with the 1942 air raid in Broome, Western Australia*. Department of Maritime Archaeology, Western Australian Museum.

⁴⁴ Embassy of the Kingdom of the Netherlands, 2013. *Broome 3 March 1942-3 March 2012*. WA Museum, Welshpool.

Image: Toys recovered from the aircraft, with preliminary artefact numbers. They are housed in the Broome Historical Society museum.



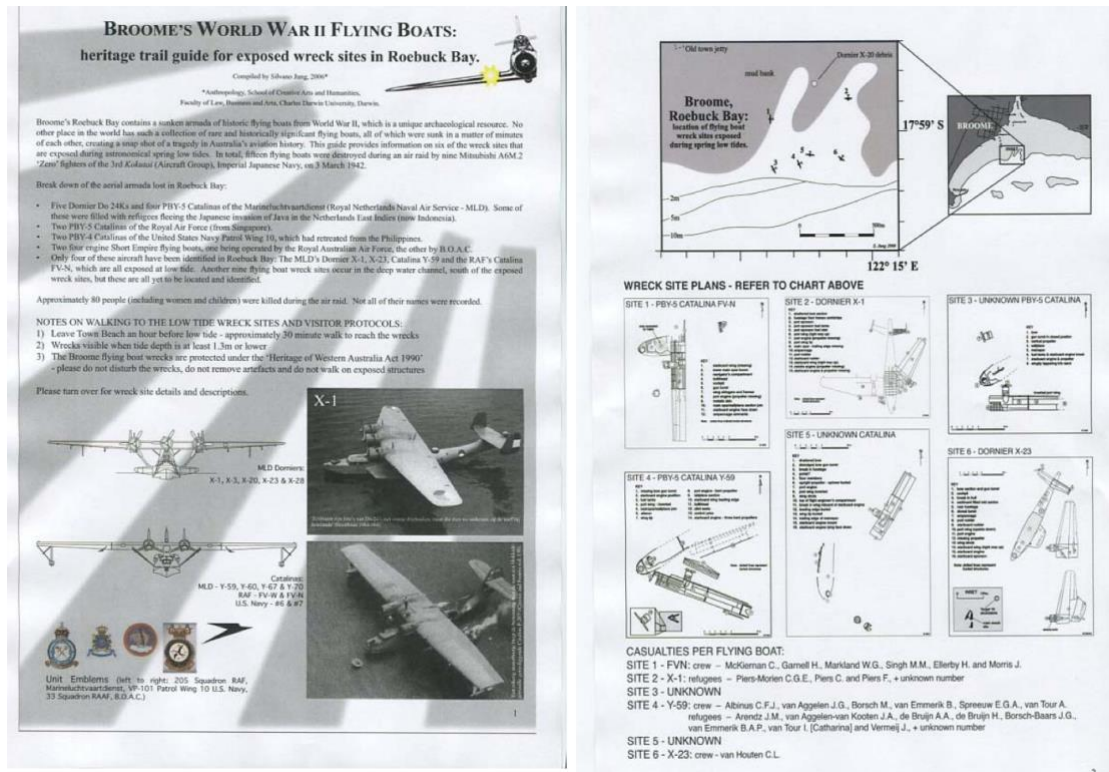
Work will recommence in the Broome area after 2018 as applications for search and research programs involving an international field headed by Jeremy Green are considered. Other than resurveying the bay for known and as-yet-unfound sites, a primary target is a USAAF B-24 liberator bomber. Downed during the Japanese raid, it was lost outside the bay with all bar one of those on board. Another wreck is an RAAF Beaufighter A19-163 lost with its crew in 1944. Together with a bomber lost on takeoff from Truscott Airbase during the war, it was recently located and extensively mapped by avocation aircraft enthusiast James (Jim) Miles and his team.

Finally, in the context of its Outreach obligations and in a 'museum-without-walls' milieu, any future work at Broome needs also attend to unfinished business from the 1990s era. Due to the collapse of the agreement to provide funds to mark the sites above and below water, interpretive material still needs be provided on the shore overlooking the bay. Awaiting the time the project might be resurrected and funded by Broome-based tourist and heritage-oriented interests, a preparatory interpretive pamphlet has been prepared in anticipation by Silvano Jung.⁴⁵

⁴⁵ Jung, S. 2006. *Broome's World War II Flying Boats: Heritage trail guide for exposed wreck sites in Roebuck Bay*. Private Publication. This appears in his Thesis as an appendix.

NOTE: It is now evident that to be effective and to be effectively maintained over time, interpretive materials need be instigated, developed and installed by local authorities with the backing of local stakeholders.

Image: Silvano Jung's Interpretive material



While there is some discussion about the appropriateness of plinths and plaques featuring on heritage sites, Jung's work could conceivably form the basis for a permanent sign at an appropriate place overlooking the Bay.⁴⁶

⁴⁶ While it was originally mooted that interpretive plinths would also appear on the wrecks themselves, there is a modern school of thought (to which the author now subscribes) that views interpretive on-site data as intrusive to many (a form of visual pollution), that in the electronic age can be easily conveyed by other means. The advent of the 'smart-phone' with the ability to stream data about sites, even while moored above them has also caused a re-think.

APPENDIX 1

From Roach, J.A., 1996. Appendix: sunken warships and military aircraft, Underwater archaeology and the *Titanic*: The legal considerations, in Jarvis, A., et al, 1996. *Proceedings, IXth International Congress of Maritime Museums*. National Maritime Museum, UK.

Warships, naval auxiliaries, and other vessels owned or operated by a State and used at the time they sank only on government non-commercial service, are State vessels. Aircraft used in military, customs and police services are State aircraft. International law recognises that State vessels and aircraft, and their associated artefacts, whether or not sunken, are entitled to sovereign immunity.

In addition, such shipwrecks and sunken aircraft are historical artefacts of special importance and entitled to special protection...

The practice of States confirms the well-established rule of international law that title to such vessels and aircraft is lost only by capture or surrender during battle (before sinking), by international agreement, or by an express act of abandonment of government property... Likewise, title to such vessels and aircraft is not lost by the mere passage of time.

A coastal State does not acquire any right of ownership to a sunken state vessel or aircraft by reason of its being located on or embedded in land or the sea-bed over which it exercises sovereignty or jurisdiction. Access to such vessels and aircraft and their associated artefacts located on or embedded in the sea-bed of foreign archipelagic waters, territorial seas or contiguous zones, is subject to coastal State control in accordance with international law. It is the policy of most Governments to honour requests from sovereign States to respect, or to authorise visits to, such sunken vessels and aircraft.

... Except for opposing belligerents while hostilities continue, no person or State may salvage or attempt to salvage sunken state vessels or aircraft, of their associated artefacts, wherever located, without the express permission of the sovereign flag State, whether or not a war grave.

Once hostilities have ended, sunken state vessels and aircraft containing crew remains are also entitled to special respect as war graves and must not be disturbed without the explicit permission of the sovereign.

The flag State is entitled to use all lawful means to prevent unauthorised disturbance of the wreck or crash site (including the debris field) or salvage of the wreck.

Disturbance of any shipwreck or crash site is necessarily a destructive process. In virtually every instance, once recovery activities are undertaken, the site cannot be restored or replicated. Any recovery effort which disturbs the site denies other properly authorised persons the opportunity for scientific discovery and study.

Accepted principles of marine archaeology, naval history and environmental protection require thoughtful research design, careful site surveys, minimal site disturbance consistent with research requirements, adequate financial resources, preparation of professional reports, and a comprehensive conservation plan before artefacts should be permitted to be recovered and treated. These principles apply particularly to sunken state vessels and aircraft.

These rules do not affect the rights of a territorial sovereign to engage in legitimate operations, such as removal of navigational obstructions, prevention of damage to the marine environment, or other actions not prohibited by international law, ordinarily following notice to and in cooperation with the State owning the vessel or aircraft or otherwise entitled to assert the sovereign immunity of the wreck.