

Plane Sailing:

The archaeology of aircraft losses over water in New South Wales, Australia.

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Introduction

New South Wales has the largest concentration of historic shipwreck sites in Australia. With its earliest European settlement, the development of an intensive maritime industry and a rugged extended coastline, the State's waters (including inland rivers) have claimed almost two thousand vessels.

The State became a major bastion of defence during the Second World War, and witnessed the development of an extensive air defence building program, including metropolitan and regional flight training facilities and standing RAAF bases. A legacy of that era is the many historic airfields, some like RAAF Richmond, still in full operational use. These bases witnessed a number of air training and operational accidents, both across the State's remote inland areas, but also into the sea. Combat losses were few due to the areas remoteness from front-line action.

Following the cessation of hostilities, the seas became a favoured dumping ground for non-operational or surplus war machinery, and a number of dedicated dumping grounds, or dumping events, are known. Today, several of these sites have been unintentionally damaged by deep-sea commercial fishing operations.

Post World War II military and civilian aircraft losses make up another element of potential submerged aircraft sites, although they have not been included in this preliminary study of the range of probable sites.

Management of these fragile historic aircraft is complex, and involves discussion on a range of factors such as physical location, difficulties of access and identification, the degraded nature of many of the remains, and existing State and Commonwealth legislative controls.

The author stresses that research on individual crash and dump sites is preliminary in nature and intended only as a guide to the variety and number of possible sites. The total number of aircraft retained as archaeological sites will be determined only through ongoing archival research.

An historical snapshot

The State's most significant aircraft wreck site is arguably that of the Japanese floatplane used to 'spot' fleet dispositions within Sydney harbour prior to the notorious Japanese midget submarine raid of 31 May 1942. This aircraft, a two-seater Yokosuka E.14Y1 "Glen" floatplane, was launched from the carrier submarine, *I-22*, when stationed north-east of Sydney. The still unlocated aircraft capsized when returning from its mission, the crew rescued but the plane scuttled. This incident represents the only Axis aircraft lost in combat in NSW. It, with the still missing third Japanese midget submarine, remain as unique reminders of this infamous raid.

The majority of aircraft losses involved training incidents or operational reconnaissance sortie mishaps. Still others comprise the unknown number of complete and perhaps packaged aircraft and spare parts, dumped at sea following the war (see below).

Several of the aircraft wrecked or abandoned in NSW's waters were built in Australia as part of a massive aircraft building program from 1939. The hastily assembled industry produced some 3,500 aircraft of nine types, under the direction of the Department of Aircraft Production. It comprised the Commonwealth Aircraft Corporation, the Beaufort Division and the de Havilland Aircraft Company. The main production types included Beaufort bombers (and later Beaufighters), Wirraways, Wacket and Tiger Moth trainers, Boomerang's, Mosquito bombers and Mustangsⁱ.

Today, aircraft types thought to be represented in the underwater archaeological record in NSW include some of the most famous names of World War Two – Spitfires, Fairy Battles, Vultee Vengeance dive bombers, Lockheed Hudson's, Catalina's, Beaufort and Beaufighters, a Wirraway, de Havilland Mosquito, Sikorsky Kingfisher, and a Glenn floatplane.

It is important to note that a significant number of American-built aircraft add to the archaeological record. USAF Kittyhawk's were based along the east coast (like the famous 49th Fighter Group), and a percentage of these are expected to have crashed off the coast during training exercises. Significant numbers of land-based crashes are knownⁱⁱ. Similarly units of the Royal New Zealand Airforce operated on the coast and utilised American types. Many of the aircraft losses however, resulted from deliberate dumping from RAN carriers at the end of the war - commonly single seat carrier-borne Corsair fighters. Details of these incidents are hard to locate with records held in international archives, where they were retained at all. Details of large scale dumping incidents in NSW have come largely from oral accounts from participants.

The number of air training losses across the State was substantial, some sixty lives lost from the RAAF Mildura No.2 Operational Training Unit base aloneⁱⁱⁱ. The important part played by training facilities has been identified in a study prepared for the NSW Heritage Office that identified 125 airfield and landing ground sites (Brew, 2001). The Heritage Council of New South Wales has endorsed the listing of the Evans Head and Old Bar, Taree, aerodromes on the NSW State Heritage Register, as of State heritage significance. It is currently assessing several other nominations. Conservation Management Plans have been developed to guide the conservation, use and interpretation of some key airfield sites (Pratten, 1997).

The scale of this activity means that aircraft losses are recorded across the State, some involving remote waterways such as inland Lake Victoria, near the NSW/South Australian border. However, due to ease of access and recovery, the majority of aircraft destroyed on land were located, examined and salvaged during the war. Few archaeological sites survive today, bar remnant remains at impact sites, or relics recovered and in private and other custodianship (eg a propeller, ailerons and machine gun recovered from Mosquito A52-70 lost on 16 April 1945 near Barrington Tops, now on display at the Barrington Tops Guest House).

Accidents that occurred along the NSW coastline have resulted in a probable minimum thirty-five (35) potential offshore archaeological sites. This could well exceed several hundred when the mass dumping of aircraft is taken into consideration, and post 1945 military losses involving RAAF fixed wing and other aircraft. The following incidents are considered a preliminary account of possible aircraft wrecks within the State's waters only:

Records held by the Royal Australian Airforce confirm the following incidents:

Anson	DU-141	Off Nowra (Check Lat Long)	11 April 1943
Beaufort	A9-278	East coast, NSW	27 April 1945
Beaufort	A9-126	Between Moruya and Malacoota (VIC)	2 July 1943
Beaufort	A9-115	Jervis Bay, off	25 May 1943
Beaufort	A9-469	Jervis Bay, off	26 January 1944
Beaufort	A9-260	Jervis Bay, off	4 May 1943
Beaufort	A9-266	Cabbage Tree Creek, Jervis Bay	12 April 1943
Beaufighter	A19-36	Evans Head, south of	10 November 1944
Beaufighter	A19-194	Evans Head, south of	10 November 1944
Fairy Battle	L5683	Terrigal, off	18 January 1941
Fairy Battle	L5700	Terrigal, off	18 January 1941
Lockheed Hudson	A16-198	Tulla Beach, off (Byron Bay?)	6 July 1942
Kingfisher	A48-16	Mona Vale, Sydney, off	22 September 1943
Spitfire	BR471	The Entrance, off	9 October 1942
Vulzee Vengeance	A27-26	offshore from Williamtown airfield	5 October 1943
Commonwealth Wirraway	A20-341	NSW coast, off	1 April 1943
Fairy Firefly	VX 381	Jervis Bay, Hare Bay	27 November 1956
Yokosuka E14Y	"Glen"	35 miles NE of Sydney	30 May 1942

Additional details are being sourced from official and secondary sources for the following losses ^{iv}:

DH37			
Beaufort	A9-105	Bowen Island, Jervis Bay, off	25 September 1942
Beaufort	A9-210	NSW coast, off	3 April 1943
Beaufort	A9-27	Jervis Bay, inside	11 April 1943
Beaufort	A9-268	Jervis Bay, inside	11 April 1943
Beaufort	A9-20	Jervis Bay, off	May? 1943
Beaufort	A9-96	Jervis Bay, inside	10 Jan or Nov 1944
Beaufighter	A19-4	Off Williamtown	Nov 1944?
Beaufighter	A19-166	NSW coast, off	Sept 1945?
Catalina	A24-39	Port Stephens, inside ^v	24 May 1943
Catalina	A24-16	Rathmines, near ^{vi}	10 April 1943
Kingfisher	A48-8	Near Rathmines, Port Stephens	14 January 1943
Spitfire	A58-87	Lake Victoria	~ Jan 1943
Spitfire	A58-241	Lake Victoria	21 December 1943
Mosquito	A52-86	Newcastle, north of	19 September 1945
Vulzee Vengeance	A27-91	Port Stephens, off?	7 April 1944
Commonwealth Wirraway	A20-506	Lake Victoria	23 June 1942

Mass Dumping Sites

Dumping of aircraft at sea was, following the war, a commonplace activity along the east coast of Australia - typically '*over the 100-fathom line*'. Sydney and Greencape were popular spots in NSW, while other significant dumping grounds lay adjacent to Brisbane in Queensland and Rottnest Island in Western Australia. While the activity was widely known, rumours of massed aircraft remains offshore abound, though few confirmed by historical records or actual seabed mapping. This is partly to do with the depth of water involved and the remoteness of potential dump grounds. The potential for near complete aircraft or spares has attracted ongoing interest by aircraft restoration enthusiasts and other groups, with reports of aircraft ranging from Hellcats, Corsairs and Avengers off Sydney for example^{vii}.

Twofold Bay, Greencape dumping events

Specific details of aircraft dumping activity here have not been identified. However, the number of aircraft hook-ups by fishing vessels indicates a greater number of probable submerged sites than the historic account of losses. Eyewitnesses suggest that a significant number of US-built or leased aircraft were dumped at sea in this region. One visitor to the carriers HMS *Venerable* and HMS *Indefatigable* then at Twofold Bay in 1945, was shown hangars full of Corsairs, later believed dumped in the Eden area^{viii}.

Corsair squadron dumped off Newcastle 1946

Eyewitnesses reported an historic event in 1946 when aircraft aboard the Royal Navy aircraft carrier HMS *Glory*, were thrown over the side out of sight of land, after leaving Newcastle for Sydney^{ix}. The dumping occurred prior to the carrier arriving at Terrigal, NSW, where the eyewitness was disembarked. The planes included up to twenty (20) F4U Corsairs in perfect condition, previously stationed at RAAF Williamtown, awaiting the carrier's return from Japan with Allied POW's. The carrier also contained RN *Seafires* that were retained.

Aircraft dumping ground off Bondi, Sydney

The water's surrounding Port Jackson, Sydney, was a favoured disposal ground. Several areas offshore from Bondi were allocated for various ex-military and commercial dumping purposes. Military and other charts denote specific vessel scuttling locations, including explosive disposal areas. Surveys conducted for the ANZCAN (Australia-New Zealand) telecommunication cable route (undated chart) identified an "Aircraft Surplus" designated dump zone in approximately 200 metres of water at about Lat 33° 52' S 151° 39' E^x. It is unclear whether this was the official designated dump site or was established by seabed imaging as part of that survey.

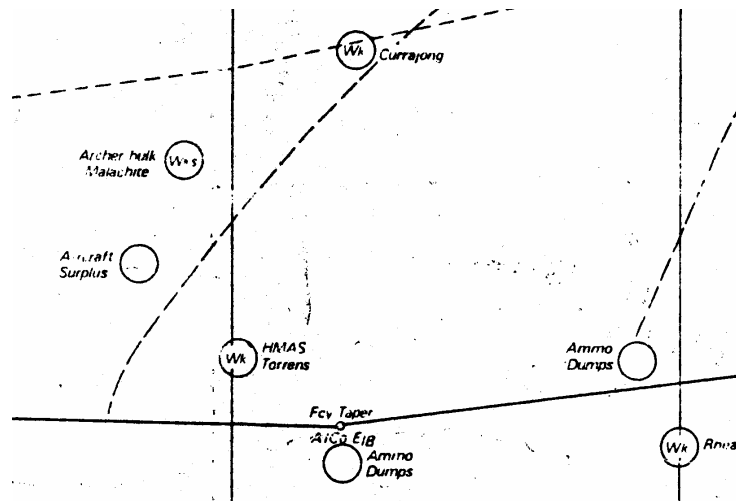


Figure 1: Aircraft surplus dump site off Bondi, Sydney in approximately 200 metres of water. Courtesy: DSTO, Sydney.

This is a perennial problem for managers of underwater heritage – do the charted locations on official offshore charts refer to the actual dumping location, or the preferred or 'designated' site. Anecdotal evidence suggests that many of those materials (including vessel hulks), never made it to their denoted scuttling site, but were let go earlier by salvage crews when conveniently out of sight of land. Variations in dumping locations are also suspected due to the advancement of more sophisticated offshore navigational equipment in recent decades.

Located aircraft wreck sites, NSW

The majority of located aircraft wreck sites have been detected accidentally through commercial fishing operations. Often it is only when nets are recovered aboard, that crews realise they have snagged aircraft wreckage. The majority of aircraft hook-ups are thought to involve the mass dumping sites offshore, rather than individual aircraft crash sites.

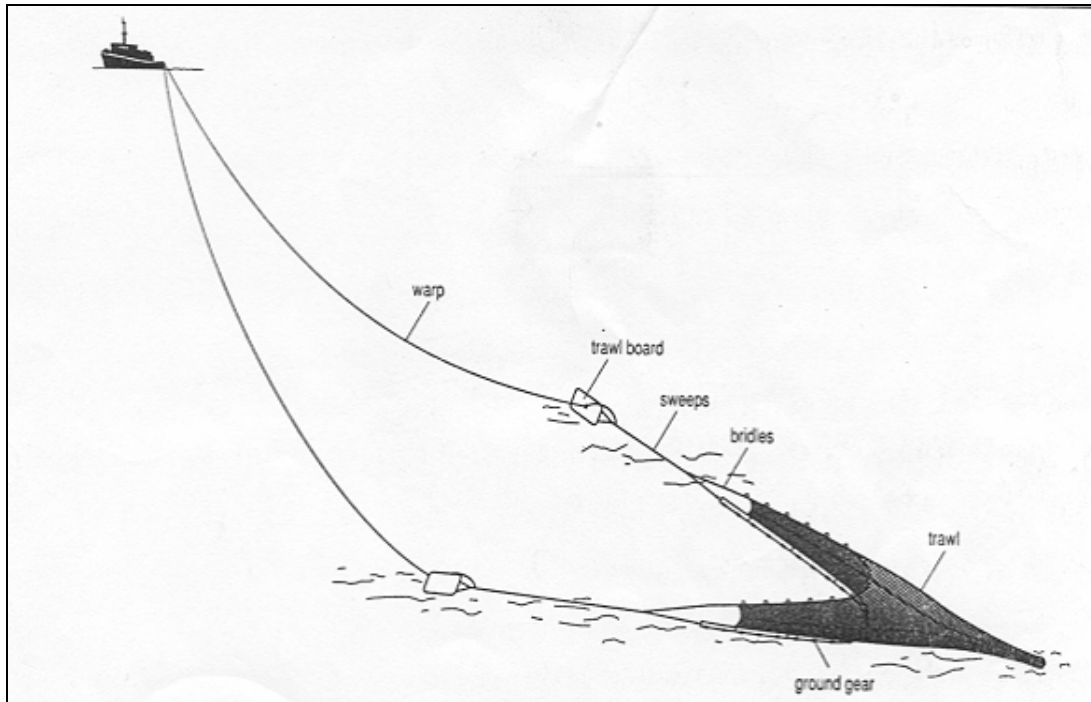


Figure 2: *The demersal net technique commonly used by fishing fleets along the southern NSW coastline. Historic aircraft remains have been detected by trawlers deploying nets with this general arrangement. Source: Australian Fisheries Resources. Commonwealth of Australia. Canberra. 1993. p. 52.*

Due to the depth of most discoveries (over 90 metres of water) and the long 'run' lines of the fishing operations, the exact location of a site is often difficult to plot or re-locate. GPS coordinates can generally be obtained for the run lines themselves, perhaps stretching for 20 kilometres or more. Due to the damage often caused to expensive net and trawling gear, the fragmentary nature of most finds, and operating time constraints, most 'hook-ups' are deliberately let go. Sometimes the remains require separating ashore, when aircraft parts might be reported.



Figure 3: *Aircraft engine recovered off Greencape NSW in 1968. Photograph courtesy of John Mathieson.*

Many trawler operators have accidentally recovered aircraft remains in the Eden, Greentape and Disaster Bay areas. The following discoveries follow a similar pattern:

Engine recovered 1968, Disaster Bay

The trawler *Richard Allen* accidentally recovered a radial engine from within Disaster Bay in 1968^{xi}. The fate of this engine is not known and its identification under review. A preliminary theory suggests it may derive from Beaufort bomber A9-126 that disappeared on 2 July 1943 while on a trip from Nowra to Mallacoota, and last sighted off Moruya (Piper, 1997:17). The Australian Beaufort's were fitted with two Pratt & Whitney twin Wasp air-cooled radial motors, similar in appearance (Russell, 1941:15).

Aircraft wing, 1969, Gabo Island

The trawler *Allenwood* recovered an aircraft wing near Gabo Island in about 1969^{xii}. The wing section disintegrated shortly after being recovered and a machine gun, removed from the section donated to the Eden Killer Whale Museum (later de-accessioned)^{xiii}.

Corsair wing, 1978, Greentape

Sections of a wing, later identified as from a Corsair, were recovered in 1978 from 40-50 fathoms (73-92 metres)^{xiv}. Other trawlers made similar discoveries about this time and from similar depths, eg *Kanimbla*^{xv}. The parts were generally discarded.



Figure 4: *Aircraft wing recovered off Greentape NSW in 2000.*
Photograph courtesy of Donald Kerr.

Corsair wing, Disaster Bay, 2000

The trawler *Consolato* fouled an aircraft wing in deep water off Disaster Bay in January 2000^{xvi}. The section of starboard wing from a fighter aircraft was located south-east of Greentape in about 51 fathoms of water (93 metres). The recovered wing was brought back to the Eden town wharf but disappeared before it could be fully examined. Merimbula-based journalist, Donald Kerr, photographed the wing section and provided the NSW Heritage Office with copies. The author has identified it as probably belonging to a F4U Corsair. Identifying details include the triple gun ports and folding bracket for the retractable gull wings. Although heavily degraded, the wing section measured approximately 1.80 metres in length and 1.30 metres in maximum width. A perspex port on the leading edge inside the gun positions might have been for a gun camera.

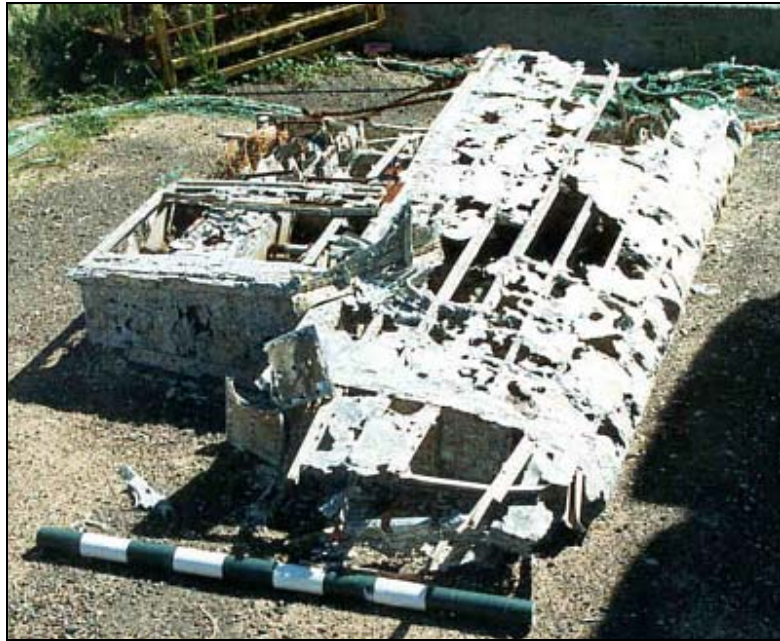


Figure 5: *Another view of the wing recovered off Greencape NSW in 2000. Photograph courtesy of Donald Kerr.*



Figure 6: *Aircraft remains located at Bittangabee Bay, near Greencape in 2001. Photograph forwarded by Donald Kerr.*

Aircraft wing, 2001, Bittangabee

Portions of an aircraft wing? were photographed by a Pambula resident in the tidal zone of Bittangabee Bay near Greencape in March 2001. The fragmentary remains appear to derive from the leading edge of an aircraft wing although they have not been formally identified. The section is 1.45 metres in length, 0.90 meters in width with a maximum section (height) of 0.45 metres. Of aluminium, the section includes some iron? circular fittings and black synthetic material that could be insulation ^{xvii}.

Catalina, Port Stephens, 1943

Mr Wayne Sampey led a search in 2000 for the wreck of RAAF Catalina A24-39 that crashed into Port Stephens on 24 May 1943. While other Catalina's crashed into Port Stephens and were recovered (eg A24-384), this aircraft was thought to have only been partially salvaged (tail section and wings), with some fuselage left^{xviii} (despite reports that it crashed in only five metres of water near Winda Wopper). Mr Sampey detected what might be aircraft remains buried up to three meters depth in sand off Jimmy's Beach. The Heritage Office tasked the Department of Land and Water Conservation's (DL&WC) coastal survey vessel over the approximate area in 2001 while conducting sidescan sonar imaging of the Port Stephens seabed. No conclusive (exposed) aircraft remains were detected^{xix}.

Lord Howe Island

The history of the island is inexorably linked to the period of the flying boat service. The image of these graceful craft landing on the island lagoon is a familiar one, and the services close ties to the aircraft base at Rose Bay, Sydney. Tourists to the island regularly view historic movietone and other films related to this fascinating period in island tourism through the weekly screenings at the Town Hall.

Islander Post-Master, Peter Phillipps, is an authority on historic aircraft associations with Lord Howe Island and has compiled a book detailing that history (Phillipps, 2002). Flying boat charters began successfully on 9 December 1947 and finally concluded in September 1974 aboard *Beachcomber*.

The use of flying boats resulted in some notable incidents that have left a permanent record within the environment. These include fragmentary remains of RAAF Catalina A24-381 of Number 11 Squadron, Rathmines, NSW. The aircraft clipped North Peak on Malabar Hill at night on 28 September 1948, after detecting a serious fuel leak. The Catalina exploded in flames, crashing on land, near the Old Settlement, with only two survivors being rescued by local residents from a crew of nine. The impact site is linked by an interpretative walking trail from near Neds Beach and fragments of the wreckage are retained within the fields and slope.

Catalina VH-EAX, 1949, Lord Howe Island

Another incident involved Trans Oceanic Airways (TOA) Catalina VH-EAX that was driven ashore in a gale on 23 June 1949. The remains from this aircraft were partly salvaged. One wing was transported to Neds Beach and used as fill to stabilise erosion under the present-day shelter near to the main beach access. What happened to the remainder of the airframe is unknown (Phillipps 2002 per com), although the potential exists for parts of the fuselage to have been dumped at sea around the island. The study of Catalina wreck sites pursued vigorously by Jung (2000, 1996), and the Western Australian Maritime Museum through its Broome Harbour aircraft Survey in 2001.

Short Sandringham, Lord Howe Island, 1963

The other significant reminder of this important era is the wreck of the ANSETT Airways Short Sandringham flying boat, *Pacific Chieftain* (VH-BRE). This aircraft was also driven ashore within the lagoon on 3 July 1963 and severely damaged the following day (Phillipps 2002, and 1999). Beyond repair, the aircraft was partially salvaged for useable parts, towed to sea, holed with hand axes and sunk off the North Passage. The archaeological remains of this aircraft have not been searched for or detected. It is considered that they would be located in deep water.

Several eyewitnesses to the scuttling are still resident on the island and transit photographs available that could assist the approximate sinking site being relocated.

A position for the target area was recorded with the now obsolete Sat Nav navigational system when island resident, Mr Roy 'Snow' Wilson was interred at sea near the aircraft site in March 1987 (from his vessel *Lulawai* - *Signal Newsletter*, Vol 3: No73). The remains of this aircraft are important as a physical record of the period of flying boat travel and early island tourism.

Fairy Firefly, Jervis Bay, 1956

The only commonly dived aircraft wreck site in NSW is that of a Fairy Firefly that crashed into Hare Bay within Jervis Bay, whilst undergoing navigational training on 27 November 1956. The aircraft, VX 381, collided with Firefly WD 887 which was never found. Based at HMAS Albatross, the crew of the missing aircraft were not recovered, those aboard VX 381 survived^{xx}. Carrier borne anti-submarine torpedo bombers, Firefly's first flew in 1941 and 107 were received by the Royal Australian Navy, flown from both the carriers HMAS *Sydney* and HM *Vengeance* during the 1950's^{xxi}. This particular aircraft, VX 381, was located in 1983 in just thirteen metres of water, although very difficult to detect due to its low relief. Sitting on a silty bottom, the NSW Heritage Office obtained GPS coordinates for the wreck following a successful magnetometer survey in 1995. NAVY personnel stationed at HMAS Creswell propose an additional survey in 2002 (Lewis, 2002:9). Unfortunately divers have recovered many of the cockpit instruments over the years.

Aircraft wing, 1996, Sydney

A large section of aircraft wing with undercarriage struts was trawled up off Sydney in 1996 and deposited at the Foxtel Wharf, Pyrmont, near the temporary casino site^{xxii}. Currently be identified, the remains appear to be that of a single seater fighter recovered by the trawler *Arakiwa*. The current location of the remains is unknown, nor the exact recovery area or depth.

Significant concentrations of aircraft crash sites.

Jervis Bay lies adjacent to the naval training facility at Nowra (HMAS Albatross), and was a favoured low flying/torpedo attack training area. A significant number of aircraft were lost both within the bay and immediate offshore areas during World War Two. Anecdotal reports suggest that up to fourteen Beaufort bombers may have crashed there, although research to date suggests nine losses as more likely. Several trawler operators have recovered aircraft remains

Jervis Bay Bombing Range – Beaufort bomber losses

A significant number of twin-engined Beaufort Bombers crashed during World war Two torpedo and strafing exercises between the Heads of Jervis Bay, south of Sydney.

The RAAF seconded a number of vessels for torpedo recovery tasks and general support roles. Dick Grant served aboard one of these 'crash boats', *08-14* in Jervis Bay during the war. The vessel was a trawler known as *Tasma* and skippered by Bill Britton. The general operational flights would take the Beaufort's low over Jervis Bay on dummy torpedo runs and out through the Heads. The torpedoes generally did not carry warheads and would theoretically rise after their run and be collected. Mr Grant recalled perhaps as many as fourteen losses in a fortnight, and a theory that the aircraft were allegedly sabotaged on the South Australian production line. A story circulated that a Axis sympathiser who altered a critical cog used in the operation of the ailerons. This cog then stripped when the pilot pulled up heavily from a torpedo run, causing the aircraft to spear into the water. Generally the aircraft had sunk before the crash boats could get to them. The general wreckage trail included two engines, remains of the head, with the tail section ahead of this, thrown over by the impact. They only saved one bloke, a wireless operator called Pedro who climbed out of the aft cockpit.

Mr Smart recalled an interesting story where two ex World War One torpedoes stored at Spectacle Island, were fitted to a Beaufort with active warheads.

The bomber came down low and launched its weapons, one running as planned through the heads and out to sea, the other turning and striking Point Perpendicular and almost the crash boat! The impact was enormous and caused him to have Industrial Deafness (picked up many years later). He noted this event especially because the crew filled the boat to the gunwales with fish stunned by the concussion, and later sold the catch to the Jervis Bay Hotel for a significant profit!

Mr Smart was involved in the recovery of the Vought Sikorsky flying boat that crashed into nearby Sussex Inlet (colourfully known to the crews as "Sausage Singlet"). He believed that most of the crashed aircraft around Jervis Bay were recovered from their underwater environment, probably as a result of formal salvage contracts generated as part of the Commonwealth Disposals Commission work. This was actioned partly because the sites were a threat to commercial fishing operations and the dense concentration between the Jervis Bay Heads.

Scallop dredges and net fishers have detected sections of several aircraft. Unconfirmed reports suggest that trawlers have deliberately swept wreckage out of the bay to remove the threat of accidental hook-up.

Propeller from Beaufort A9-101, Huskisson

A propeller mounted at the Lady Denman Maritime Museum at Huskisson, Jervis Bay, was recovered by the trawler *Josphine Jean* in 1985^{xxiii}. The propeller came up in nets from a water depth of approximately 96 fathoms (175 metres), some thirty miles south east of Cape St George (Jervis Bay). Original crew of Beaufort A9-101 identified it as having been lost from that aircraft after it touched the sea in August 1943. The Hamilton standard bracket type was unveiled as a memorial to RAAF Beaufort crews lost during World War Two.

Famous Beaufort mid air collision, 1943

Another notable incident occurred in 1943 when three Beauforts collided mid-air during a training exercise within the bay. The dramatic crash of two aircraft with heavy losses of life was famously captured on Fox Movietone News film. This event occurred on 14 April 1943 with the aircraft from RAAF Station Nowra. When completing a high speed low level run and a "Prince of Wales Break-up", Beaufort A9-268 clipped the tail section of A9-27, with both aircraft crashing, taking eight lives.

Beaufort A9-27 was located and the crew's bodies removed, along with the port engine and screw on 17 April 1943. Damage was noted to the port wing (severed), substantial damage to the nose, and tail section missing (Wolfe, 1989:25).

Other Significant Losses, unlocated

Dehavilland 37, Crowdy Bay, 1932

A rare aircraft type crashed into the sea at Crowdy Head on 25 March 1932. Piloted by Pat Hall with Harry Purvis and John Kingsford Smith aboard (nephew of Sir Charles Kingsford Smith), the plane clipped a wave. The trio had been flying from Sydney to Port Macquarie to earn some money running Easter weekend joy flights and 'barnstorming'. The crash occurred about one kilometer out in the middle of Crowdy Bay and the crew made it ashore after a long swim. It is likely that the wreckage washed into the surf zone as some parts were allegedly recovered, while another

account suggests aircraft wreckage was seen ashore at this time north of Abbey Creek (Linton, 1998:189-194). The DH 37, VH-UAA, was reputedly the only example of its type to come to Australia (1924), and the first commercial aircraft to be registered in Australia (31 August 1930).

Japanese Yokosuka E14Y1 'Glen', off Sydney, 1942

Arguably the most historic aircraft loss in New South Wales, the capsizing of this aircraft on 30 May 1942, is closely associated with the Japanese midget submarine raid at Sydney on 31 May 1942. Piloted by Flying Warrant Officer Susumo Ito and with Iwasaki as navigator, the two-seater single wing aircraft was carried aboard the submarine *I-21*.

Of the five 108 metre long *I-15* class (Type B1) submarines in the Eastern (Sydney) Attack Group (Hervieux, 1978 a & b), three carried midget submarines, *I-22*, *I-24* and *I-27*. *I-21* and *I-29* carried single float planes in a hangar forward of the conning tower. *I-29* had earlier fatally damaged its plane during a flight over Sydney on 23 May 1942 (Jenkins, 1992:18).

Ito launched his dark green aircraft from *I-21* (built 1939 at Kobe) approximately 35 nautical miles north east of Sydney (Clarke, 1966:71). After completing his reconnaissance survey for the impending raid (at one stage just 30 meters above the water adjacent to the heavy cruiser USS *Chicago* and the Harbour Bridge), Ito attempted to relocate the mother submarine offshore. The early morning darkness caused difficulties as he crossed seaward over North Head at 5am. Failing to find the submarine, the plane returned to Sydney, took bearings from the Macquarie Lighthouse on South Head and continued north east. A short radio message led to the submarine signalling its position. However, the *Glen* overturned as it landed beside *I-21*. Safely rescued with their vital information, the Japanese were faced with a dilemma – the sun was soon to rise but the upside-down floatplane refused to sink because of its still buoyant floats. It took the combined efforts of sailors with a hammer and small arms, to sufficiently pierce the floats. The aircraft was reported to have “*sunk*” (Jenkins, 1992:37).

The final resting place of this historic aircraft has attracted interest over the years. A concerted effort to locate the wreck site was made during the 1990's by a team led by Mr Phil Dulhunty. Then President of the Seaplane Pilots Association of Australia, Mr Dulhunty was responding to reports by spearfisherman, George Davies, who reported seeing aircraft remains near shore at Pelican Point, Norah Head (Davies, 1993). First sighted in the 1950's, the wreckage was located in a sand gutter and variously exposed or covered until at least the 1970's (Dulhunty, 1994). It consisted of a mass of cables and wires, while others allegedly reported a radial engine nearby.

The presence of these relics has never been confirmed, nor their similarity to *Glen* floatplane construction. The association was made because the reported wreckage lay inshore from the approximate meeting place of the floatplane with its submarine carrier, some 35 miles north east of Sydney. The theory required the floatplane to have remained partially buoyant and to have drifted some 20-30 miles inshore to wreck. This is contrary to Ito's report that the plane was seen to visibly sink, probably in water depths up to 200 meters (Jenkins, 1992: 37). With only the floats keeping the plane on the surface, their eventual holing would have more likely led to the flooded plane dropping vertically through the water column.

The 'Glen' was powered by a single 340hp Hitachi Tempu 12, 9-cylinder radial air-cooled engine, with a wing span of 11 metres (32 feet, 9 inches) and fuselage length

of 8.54 metres (28-feet). The fuselage was constructed from welded steel tube covered in sheet metal forward and fabric aft. The wings were composed of light metal spars, wooden ribs and fabric covered. A total of 126 aircraft were built (Green, 1962:138ff).

Thematic Surveys of Aircraft Crash Sites

The US National Parks Service initiated a significant study at Pearl Harbour in 1986, which attempted to determine the range and likely presence of Japanese aircraft lost during the famous 1941 attack. This was a major shift in the archaeological management of fragile aircraft remains underwater, until then traditionally focussing on one-off aircraft discoveries. The study assessed the complete range of official and eyewitness accounts of the 29 total reported crash events and suggested the likelihood of remains surviving underwater. Some thirteen potential sites were identified and became the focus of remote sensing surveys – *Project SeaMark* in 1988 (Lenihan, Ch 2, 3). No confirmed aircraft sightings were made but it was an important attempt to systematically examine a range of similar artefacts types and assess their significance in terms of the wider historical event. The work was important in the continued management of the waters around Pearl Harbour.

1993 saw the implementation of an archaeological management program for historic ship and aircraft wreck sites by the US Naval Historical Centre (NHC). Over 14,000 US historic aircraft losses worldwide have been identified to date (Coble, 2002: 34).

Since that time, similar area assessment projects have been undertaken of known groupings of aircraft involved in a significant events or episodes (eg Catalina wrecks at Darwin (Jung; various); Broome aircraft wrecks – Western Australian Maritime Museum – see this site). Association of aircraft wreck sites related to a particular theme or event are increasingly examined in terms of the archaeological landscape in which they lie (Anderton, 2001).

Management Constraints

Historic aircraft remains have been accidentally discovered in NSW's waters since the 1960's. Most of this activity has occurred through offshore fishing operations. A handful of sites have seen visitation by recreational scuba divers (eg Firefly at Jervis Bay), while dedicated searches for historic aircraft remains have been limited (Catalina at Port Stephens, Yokosuka 'Glen' floatplane, Norah Head).

Historic aircraft remains in NSW are generally located in deep water beyond the range of recreational diving. Therefore, the resource has not been subject to significant pressures from intentional human disturbance. Similarly, due to the scanty wartime records of actual crash sites, limited technologies for determining exact crash coordinates, and the large water areas involved, few sites generate dedicated search attempts.

Lately there has been renewed interest in examining sites thought locatable. A recent NSW proposal is that of a Wirraway lost in far-western Lake Victoria (*Sun Herald* newspaper, 3 March 2002). Today, searches must adhere to the legislative framework established to control disturbance to the nation's rare and fragile archaeological resource.

The Commonwealth Government makes it a priority that all *military* aircraft remains (however fragmentary) are reported to the Department of Defence. While aircraft continue to be the property of the Commonwealth (for Australian operated craft), notification is required to initiate identification of the aircraft, investigation of any human

remains, contact of next-of-kin, and to allow opportunities for formal re-burial (Wilson, pers.com 27 August 2001). The Commonwealth acknowledges the role of State-based legislation governing management of heritage sites.

Currently, the Commonwealth *Historic Shipwrecks Act* 1976, that protects offshore shipwreck sites, does not specifically protect historic aircraft remains in water. A review of the Act is being considered to expand its cover over a range of archaeological site types located underwater in waters within Commonwealth jurisdiction. Recovery of aircraft remains offshore, whether deliberate or accidental, therefore does not constitute a breach of this legislation. The reporting requirements of the Department of Defence still remain in force however.

The situation for aircraft remains on land and in waters covered by NSW State jurisdiction is more developed. Under the NSW *Heritage Act* 1977, aircraft remains and associated relics are protected from deliberate interference by its relics provisions (Section 139). This Act requires prior approval of disturbance activities by the Heritage Council of New South Wales, through the granting of an *Excavation Permit*. Such endorsements require an established research methodology, specialist archaeological supervision and appropriate conservation and interpretation support. Activities are guided by a thorough *Archaeological Assessment* Report that establishes the extent of a site, its research potential and significance levels, while a complimentary *Conservation Management Plan* (CMP) would direct appropriate activities at a site. Where a field search is non-disturbance in nature, no prior approval is required under the Act.

Local government controls also need to be addressed (including listings on a Council Local Environmental Plan or heritage schedule (Environmental Planning and Assessment Act, 1979), together with requirements of other State government authorities such as the Waterways Authority, Department of Land & Water Conservation, Murray-Darling Basic Commission, etc. Approvals of relevant Aboriginal bodies, such as local Aboriginal Land Councils, must also be sought where remains might be associated with Aboriginal land holdings and cultural sites.

All government bodies and other groups have to comply with assessments generated through development applications. Heritage components of major *Environmental Impact Studies* (EIS's) covering major infrastructure projects such as marina developments, pipeline installation, port expansions and seabed dredging programs, must address underwater and terrestrial heritage sites and mitigate against their disturbance or loss. The Commonwealth must also adhere to these requirements in terms of Commonwealth owned land (eg Naval reserves).

Current initiatives such as UNESCO's *Convention on The Protection of the Underwater Cultural Heritage*, identify that all underwater archaeological sites are an important part of the world's heritage and must be protected. That document confirms the need for all interactions with heritage sites to be carefully managed so that the sites, and the irreplaceable archaeological information that they contain, are properly maintained and preserved. In United Kingdom waters, the many thousand historic aircraft crash sites (estimates up to 11,000), are protected from illegal disturbance by the *Protection of Military Remains Act*, 1986. The United States, under international maritime law, identifies that the right, title or ownership of US Federal property worldwide is continued unless officially declared abandoned or disposed of by an Act of Congress (Coble, 2002: 34). Management of these sites therefore attracts Federal involvement.

The location, identification and repatriation of human remains from aircraft crash sites have long been a motivator for the search for past crash sites. Historically, a structured

archaeological program has not guided the removal of human remains. This lack of scientific rigour has increasingly being addressed through the development of dedicated forensic archaeologists, in association with defence recovery teams (Holland and Mann, 1996).

Physical fabric

Historic aircraft located in saline or freshwater environments have generally significantly deteriorated. This deterioration is a complex process but is governed in part by the depth at which an aircraft sank, the type of bottom terrain upon which it came to rest (eg reef, on sand, in mud). In shallow water sites, the presence of wave or surge action has a detrimental effect on fabric survival, and increased water temperature and oxygen levels in the water column exacerbate corrosion processes.

This natural deterioration process is furthered by the nature of the crash event itself. The majority of NSW aircraft losses resulted in high-speed water impacts, where the fuselage, wings and engines could suffer extreme stresses or break-up. The resulting wreck site could be spread over a considerable area of seafloor. The physical condition of most aircraft wreck sites at sea has been identified as a major reason why many cultural resources managers have not adequately addressed their local historic aircraft resource (see Holyoak, 2001:260). Holyoak notes however that crash sites themselves retain important historical information and associations, and important physical evidence, that may not have survived elsewhere (eg a specific aircraft type, an association with a unique event or technological advancement). This can be especially so with internal components such as then state-of-the art technologies.

The nature of many crash events favoured the continued collapse of historic fabric on the seafloor or lake bottom. Only a few sites involved 'belly landings' in NSW, where the aircraft retained overall integrity (eg Firefly at Jervis Bay). This has resulted in few aircraft sites being discovered intact in NSW. However, the many specific aircraft dumping events post-war would have resulted in a very different picture. The majority of these aircraft could be considered to be largely intact, or at least in relatively close association (eg wings and fuselage). Only detailed remote sensing surveys of deepwater areas off the NSW coast will confirm the survival of such sites. The coast of these surveys means that they are rarely undertaken, except as part of major development projects such as offshore pipeline or telecommunication routes.

The majority of aircraft discovered in NSW waters are known only from hook-ups in fishing nets. The nature of that activity means that the collected fragments are highly damaged, portions lost during ascent to the surface, and the original aircraft wreck site generally scattered over a far wider area. Conservation of the remaining portions, often unidentifiable, is problematic due to a lack of support funding, research or display potential. Conservation of aircraft sites is a difficult activity in any event due to the manufactured 'thinness' of component parts, the often aluminium or alloy metals, and loss of structural mass through in-water corrosion processes. While generally considered a difficult and expensive conservation problem, advances in materials conservation for submerged sites means that stabilisation or recovered sites is becoming increasingly viable (Holyoak, 2001:263).

Salvage, recovery and restoration of aircraft

Public fascination with historic, particularly military, aircraft has generated an independent industry of aircraft salvage, repair and display. International aircraft recoveries from the sea and land continue to be the focus of individuals, aircraft restoration enthusiast groups, local museums and others. Sometimes these projects are undertaken illegally without appropriate government or other approval (eg a Hellcat

recovered off the New Jersey coast and ensuing litigation case, Coble, 2002:35). In many Pacific countries, this activity is either endorsed by Government authorities or not properly managed, raising questions about appropriate archaeological documentation procedures, restoration policies or suitable expertise. In many cases, the historic aircraft are removed from their historical context and removed to another country for 'restoration' (eg Zero fighter recovered from Matupi Island, Rabaul, and transported to California in 1971 – Foster, 1994:128). Rebuilding an aircraft type to flying or static condition might involve the collation of parts from a number of crash sites, spares through auction houses, and newly made components. The authenticity of a particular 'restoration' project can often be highly questionable. In UK waters, Holyoak laments that "*amateur excavation of sites has severely depleted what is archaeologically and historically a valuable resource*" (Holyoak, 2001:253).

This is not to underrate the very valuable work done by such groups in preserving extant aircraft, maintaining specialist skills, and promoting military history and aviation generally to the public. However, the rebuilding, repair and maintenance of aircraft often raises issues of appropriate replacement, the recording of work undertaken, and issues of 'restoration' as opposed to 'conservation'. Salvage of archaeological sites solely for suitable parts raises significant ethical issues. Guiding documents like the Australian ICOMOS *Burra Charter* provide important frameworks by which to assess the appropriateness of such projects. Recovery of aircraft components without adequate recording or conservation, expressly for sale for commercial reasons, is seen as a major threat to the archaeological resource (Holyoak, 2001:263; Coble, 2002:35).

Many cultural resource managers now advocate a public education approach to historic aircraft remains. Such policies aim to raise awareness of the importance of the resource, and to develop cooperative systems to manage the sites. Education focuses on the irreplaceable nature of the archaeological resource, issues of context and preserving historic fabric, loss of site information through improper disturbance, and interpretation opportunities. Recovery of crash sites for public interpretation purposes can still be an endorsed activity, subject to appropriate permit controls, professional guidance, suitable funding support, and adherence to standard heritage practices.

Historic aircraft crash sites are more commonly seen as another component of a countries' archaeological resource, that deserves the standard protection and management commonly directed towards any other built heritage item.

Conclusion

Many historic aircraft have added to the underwater archaeological record of NSW. Those sites, many as yet unlocated, form a significant component of that heritage. While some plane wrecks have been severely damaged by fishing nets and other accidental events, many opportunities await for the location and documentation of new sites. It is very important that the State's heritage-based organisations maintain a close dialogue with fishermen, divers and other users of the sea. The reporting of new sites remains a priority so that they can be effectively assessed and managed.

Many of the potential wreck sites involved heavy loss of life. The archaeological remains are sometimes therefore a grave and demand appropriate respect. At a minimum, they serve as a marker to an earlier historic event. In terms of technological and archaeological potential, aircraft remains are a source of information on specific types and then current technologies. Aircraft wreck sites are therefore very important to preserve as a source of historical and technological information.

With increasing search and survey technologies, many of those sites previously too deep for study, are now becoming accessible. This will heighten the responsibility of heritage agencies, like the NSW Heritage Office, in managing these fragile sites into the future.

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- ⁱⁱ For example the crash of four USAFF P-40 Warhawk (Kittyhawk’s) around Eden during a training flight on 28 March 1942. Fragments of some of these crashed aircraft have been located (Mathieson, pers.com).
- ⁱⁱⁱ Sourced from brochure, *RAAF No.2 Operational Training Unit Air Museum. Mildura Airport, Mildura NSW*. Produced by the Museum and the RSL
- ^{iv} Sourced primarily from Peter Dunn’s *Military Aircraft Crashes in Australia During World War Two* web site: <http://home.st.net.au>. The author acknowledges the breadth of information contained in this site.
- ^v Crashed at Broken Bay according to Vincent: 108.
- ^{vi} Crashed at Broken Bay according to Vincent: 108.
- ^{vii} For example, see Web site: <http://barnstormers.com/retr0001.html>. A call for sponsorship by Underwater Observation Services to search and recover aircraft believed to lie off Sydney . Thanks to Dr Richard Smith for this information.
- ^{viii} Mr Collins, pers.com.2002.
- ^{ix} Mr Stan Howard, pers.com. 16 August 2001. Mr Howard has some 16mm movie film of the aircraft he took aboard (not viewed by author).
- ^x Copy provide by Mr Angus McInnes, D.S.T.O (NAVY), 12 August 2002).
- ^{xi} Mr John Lennon was skipper of the *Richard Allen* at the time. Mr John Mathieson, pers.com. 2002 and photo kindly supplied.
- ^{xii} Mr David Barton was skipper of the fishing trawler *Allenwood* at the time. Mr John Mathieson, pers.com. 2002.

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- xiii Mr David and Patsie Barton, pers.com 6 August 2002.
- xiv Reported by Mr Geoff Collins to Donald Kerr, Merimbula.
- xv Notes provided to the NSW Heritage Office by Donald Kerr, 9 August 2001.
- xvi Mr Greg Clarke was skipper of the fishing trawler *Consolato* at the time. *Eden Magnet*, 20 January 2000; *Eden Magnet*, 23 August 2001; Joint radio Interview with Mr Greg Clarke and Mr Tim Smith, ABC Radio Bega, August 2001.
- xvii The section of wing was photographed by Mr Donald Kerr on 11 August 2001.
- xviii Mr Wayne Sampey, pers.com 2001.
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