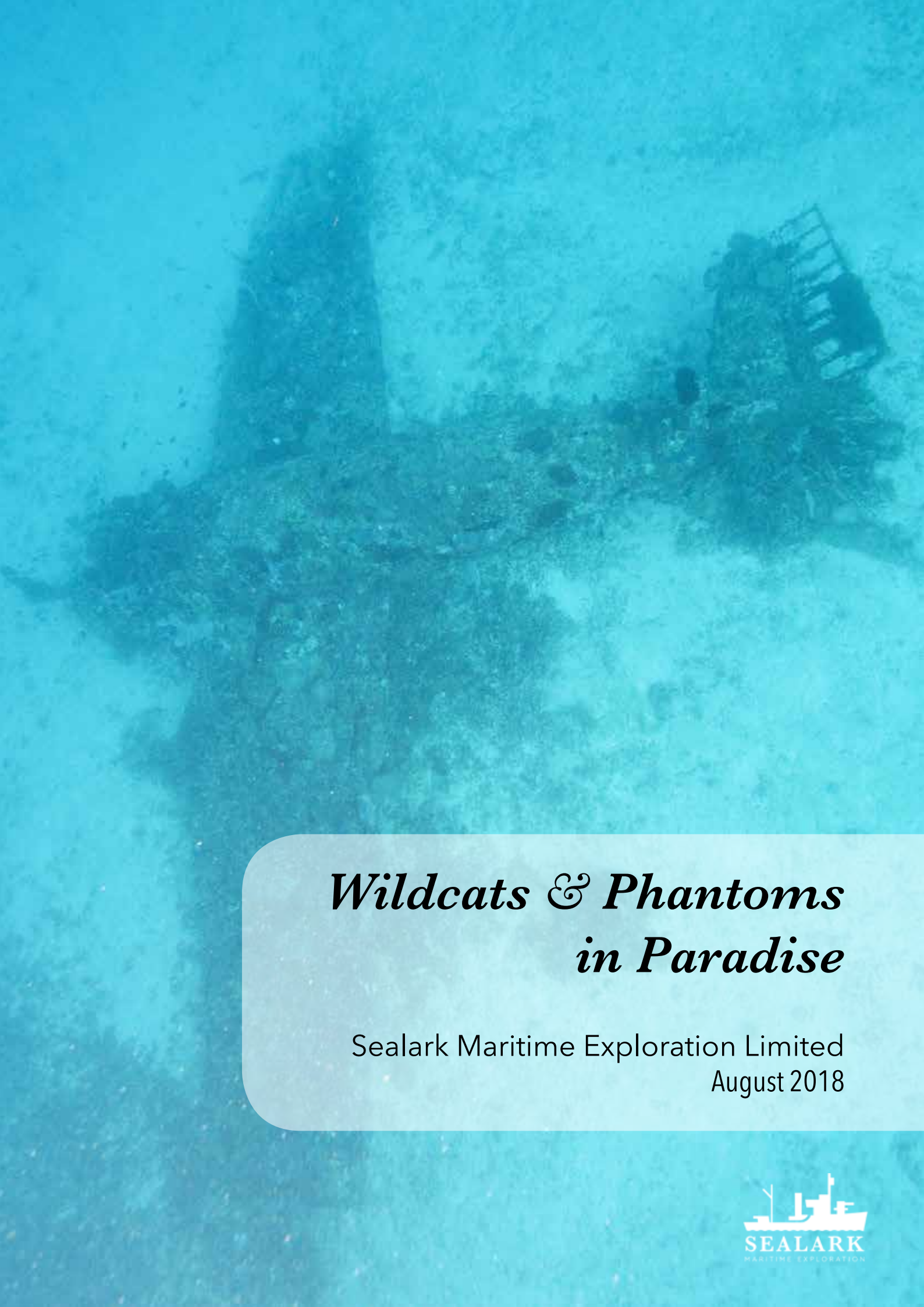

Wildcats & Phantoms in Paradise

Sealark Maritime Exploration Limited

August 2018

SEALARK

MARITIME EXPLORATION

Report of Sealark Expedition 18-1SOL

25 August – 2 September 2018

Prepared by Matt Wray & Ewan Stevenson

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Biography

Matt Wray

An experienced sea captain, Matt brings with him over 30 years of maritime survey experience to his position as Director of Sealark Maritime Exploration. He gained his IHO Cat A Hydrographic Surveyor qualifications whilst serving in the Royal New Zealand Navy (RNZN). He currently manages his Sealark work around annual leave from the RNZN. As a hydrographer he has had an extensive career, starting as a survey specialist sailor, and progressing to the Hydrographer RNZN. He has experienced all aspects of hydrographic surveying in a wide variety of locations, including the tropics and the Solomon Islands.

For exploration, Matt has proven himself in the historical sense in and around Papua New Guinea and the Solomon Islands and in a contemporary sense with the search and locating of the missing fishing vessel *Easy Rider* in 2012. For planning, Matt has years of maritime planning experience at all levels. Matt also has strong liaison qualities with operational experience in East Timor and the Middle East.

Ewan Stevenson

Ewan was born on Guadalcanal Island in the Solomons and grew up there. From an early age he was exploring WWII battlefields in the surrounding seas of Iron Bottom Sound. A fluent Pidgin speaker, Ewan has a lifelong passion for WWII historical research and archaeology of the South Pacific. He has conducted and participated in a number of expeditions to the South Pacific particularly to the Solomon Islands.

Ewan has participated as a volunteer SME on a number of US Defence Department DPAA surveys in the Solomons with Bent Prop Group. Ewan's discoveries include the sites of the USS *Aaron Ward* (DD-483), USS *Seminole* (AT-65), Japanese midget submarines and a number of aircraft sites.

He has travelled extensively through the Solomon's archipelago and has an extensive geographic, historical, hydrographic and cultural knowledge.

Introduction

It our pleasure to share with you the results of a brief expedition conducted by Matt Wray and Ewan Stevenson to Florida Islands Group in the Solomon Islands. The Expedition was a demonstration of our capabilities and efficiencies.

A longer, greater potential, mission had been planned using sonar surveys, but lack of sonar support postponed this particular type of mission. The expedition was redefined, different objectives chosen, and the mission resumed.

Sealark Maritime Expeditions Ltd (SMX) is a non-profit entity that conducts missions to discover, survey and map South Pacific WWII sites. SMX also works to locate MIAs[1], survey UXO[2], and search for significant new WWII sites, primarily underwater. The company also assists indigenous populations to develop WWII heritage in the South Pacific for economic benefit.

This mission was privately funded and conducted on a voluntary basis. In line with SMX protocols, nothing was removed from any wreck site and no wreck site disturbance made.

Objectives

1 "Ground-Truth" a large unidentified plane in Gavutu Harbour from previous sonar data
2 Develop information on a local MIA aircraft loss
3 Survey UXO
4 Obtain archaeological information on two additional MAVIS
5 Survey USS YP-346 & USS *Kanawha* (AO-1) bow gun
6 Meet various entities about the Sealark's potentialities in assisting the Solomon Islands
7 Re-survey 'The Gavutu Wildcat'
8 Survey USS *Serpens* (AK-97) for better images /video (Guad side)
9 Survey USS *Seminole* (AT-65) for better images/video (Guad side)
10 Survey new fighter find off Lunga Point (pending receipt of sonar info)
11 Investigate WWII land sites on Tulagi Island

Figure 1. *With badly damaged bow, the 10,315 ton heavy cruiser USS* Minneapolis *(CA-36) finds refuge in Tulagi Harbour in early December 1942 just after the Battle of Tassafaronga.*
[NARA-II, 80-G-211215]

Warm-up Dives

The heavy cruiser USS *Minneapolis* (CA-36) was severely damaged in Iron Bottom Sound during the Battle of Tassafaronga on the night of 30 November 1942. A deadly 48-knot, 2.7 ton, 9m long Japanese Type 93 Long Lance torpedo slammed into the *Minnie's* bow detonating one thousand pounds of Type 97[3] explosive against the ship's side. A second *Long Lance* blasted a huge hole in No.2 Fireroom. The heavy cruiser was nearly sunk, but managed to limp into Tulagi Harbour the next day. Incredibly, the bow forward of No. 1 triple 8-inch turret was still attached to the ship, but only just.

Once in the shelter of Tulagi Harbour, divers from the USS *Ortolan* (ASR-5) oxy-acetylene cut the mangled wreckage away. The bow flipped, settling upside down on the seafloor in 21 meters of water. This was the only U.S. Navy heavy cruiser bow ever disposed of in the Tulagi area.

Knowing this history and diver's descriptions of the wreckage, Ewan Stevenson of Sealark may have been the first to identify the large, smashed piece of wreckage near Sasape, Tulagi Is, as the bow of the USS *Minneapolis* (CA-36) about 1986. It had been previously referred to as the bow of the USS *Honolulu* (CL-48) or USS *New Orleans* (CA-32). In the case of the Honolulu, this erroneous attribution may have been due to the widely published, dramatic photograph of the ship in Tulagi Harbour with a similar collapsed bow. However, the battle-damaged bow of CL-48 was removed at Espiritu Santo in Vanuatu. The bow from the *New Orleans*[4] was completely severed by a Long Lance in the Tassafaronga battle, and scraped down the side of the ship in the middle of the night, causing much confusion.

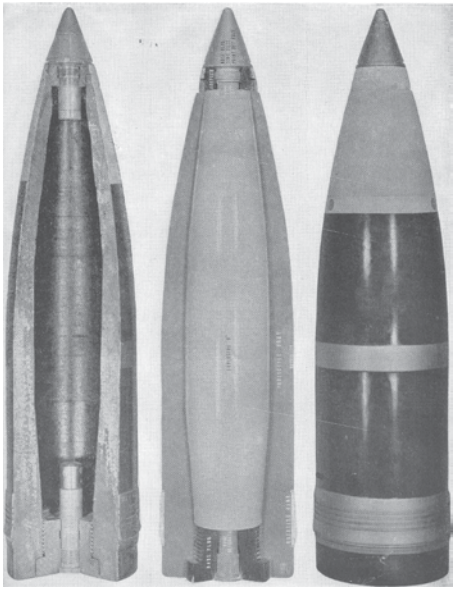
Today, this bow, along with No. 1 triple 8-inch turret, rests in 700m of water in Iron Bottom Sound.

The *Minnie* bow was a perfect warm-up dive. The top (keel) was at 14.4m and the seafloor at 21m. We swam into compartments at the broken end, trying to decipher and understand a very confused, mashed, giant piece of steel built in Philadelphia Navy Yard in 1931. It is surrounded by a mountain of trash, both wartime and modern. The most recognisable section is the flat sheer of the starboard side and empty hawse pipe. Ironically, this piece of wreckage is the only major archaeological evidence of the Minnie, as the rest of it was scrapped in the early 1960s by the Union Metals and Alloys Corporation.

Figure 2. *Matt Wray examines the empty starboard hawse pipe of the bow of the USS* Minneapolis *(CA-36). A presumed, associated 8-ton stockless anchor was found nearby and raised by Don Cook in the early 1980's. Local maritime operator Rege Thomas then salvaged it and used it commercially as a mooring for one of the fuel tanker buoys off Point Cruz, where it is still in use today. The port anchor is still in place but with the right fluke missing.* ***[26 August 2018].***

Figure 3. *Two 8-inch High Capacity shells sit on the rammer trays in a gun turret of the USS* Minneapolis *in October 1943. In the belt of the gunner at the far left are 'Lock Combination Primers' which he will insert to fire the powder bag charges in the breech of the Mk. 12 eight inch calibre rifle. A spare belt hangs on the wall. The primers were 'combination' because they were fired electrically, and if that failed, then by percussion.*
[NARA-II, 80-G-55230].

Figure 4*. The U.S. Navy 8"/55 caliber High Capacity (HC) projectile. They were designed primarily for shore bombardment and contained the most high explosive of all the 8-inch rounds. They were the first rounds fired at Guadalcanal by the U.S. Navy during WWII and came in two varieties- the Mk 24 and 25. A bursting 8-inch HC shell threw steel sherds for a radius of 120 yards in every direction for a distance of 40 yards along its line of flight. The ogive of the shell is painted yellow to indicate 'Explosive D' filling, the white band under this indicates 'tracer', and the main body is painted dark green to indicate a HC round. The distinct 'band' in the centre is the Bourrelet, made of copper and unpainted. The wider band at the bottom is the driving band, also copper and unpainted. HC shells were sometimes called 'Bombardment Projectiles'.*



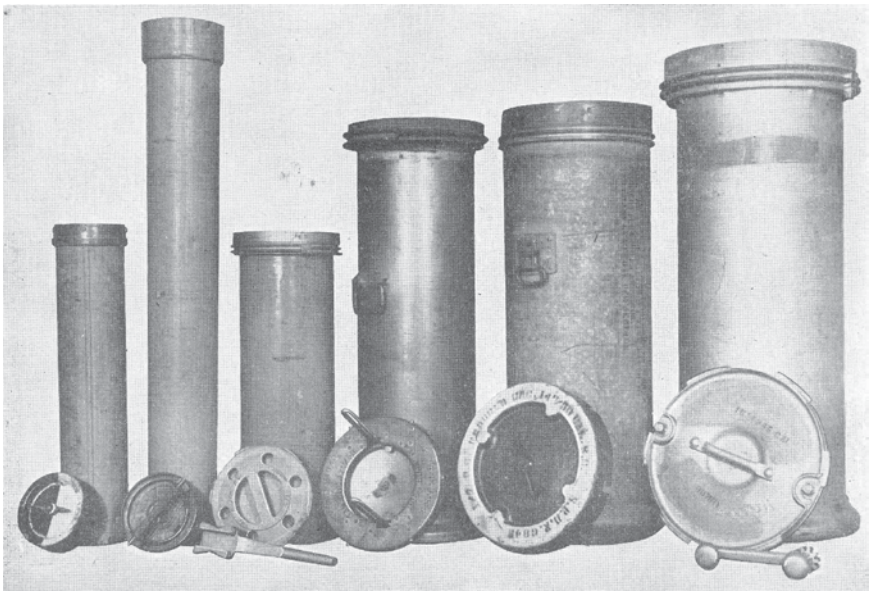


Figure 5. *U.S. Navy powder tanks for bag charges during WWII. They were made of thin galvanised or aluminium sheet metal which corroded through quickly if left in the elements. The tank for the 8"/55 is third from the left.*

A UXO Preliminary Survey is Conducted

Based on diver's reports and historical research collected in the Sealark Database, an investigation was carried out into one of many UXO underwater dumps reported in the Floridas area. On 26 August 2018, the dump was successfully located, surveyed, and found to contain in excess of a 60 live 8-inch U.S. Naval Projectiles. Some shells appear to be High Capacity Mk 24 high-explosive[5] rounds. We found two groups of projectiles in 24m of water. Nearby were the associated sheet metal tanks for the 8"/55 powder bags. Many of the tanks (about 80cm long and 20cm in diameter) had corroded so that the unbleached silk bags dissolved, spilling the propellant grains to form a large nitro-cellulose pool on the seafloor! There were thousands upon thousands of the standard U.S. Navy seven-perforated grains in a thick layer. Each grain measured 28mm long with a diameter of 12mm. Both video and still images were obtained, depth measurements taken, and the area mapped. A test was conducted on the propellant and it was found to be still effective.

Figure 6 and 7. Matt Wray carefully adjusts his buoyancy whilst inspecting 8-inch U.S. Navy projectiles. Delicate coral flowers adorn the dangerous substrate.

Figure 8 and 9. Left: The different coloured marine growth on the nose of this projectile indicates it's fuzed, and likely a HE Mk. 24 HC round. Right: The photographer's hand holding a sample of smokeless propellant grains.

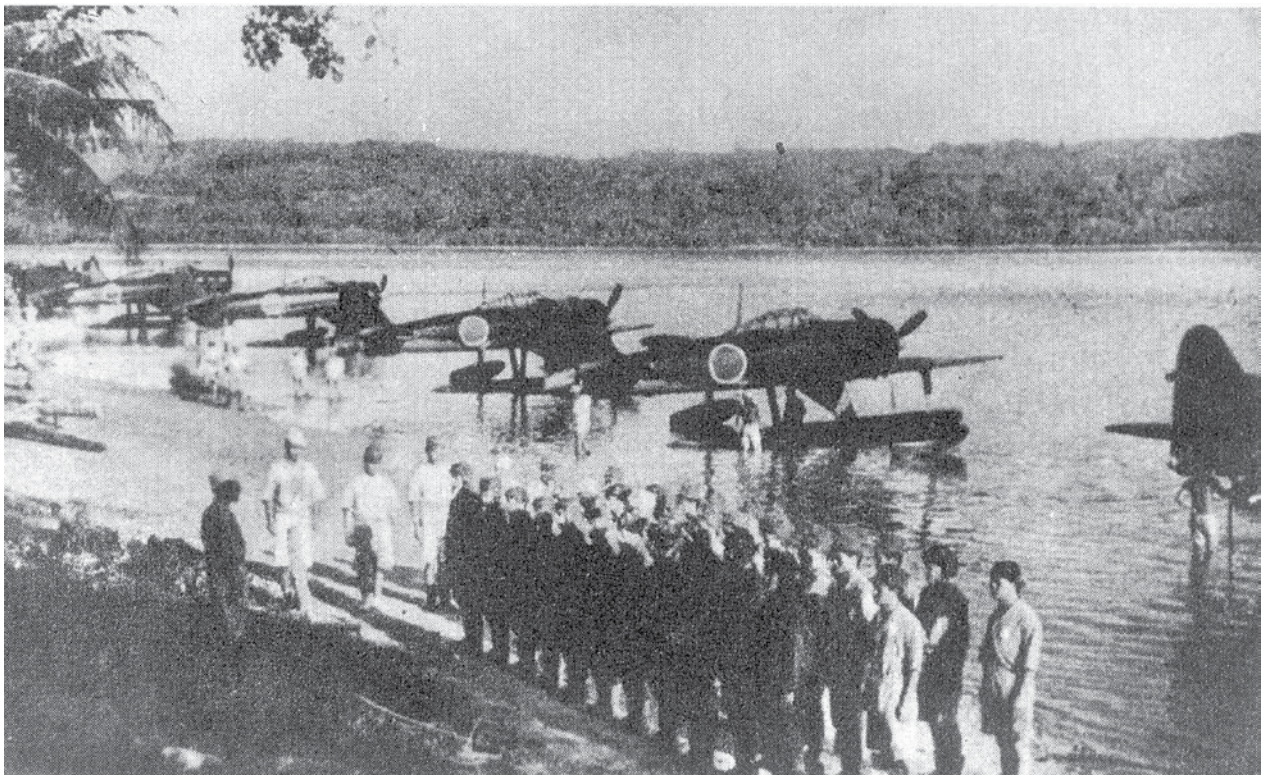


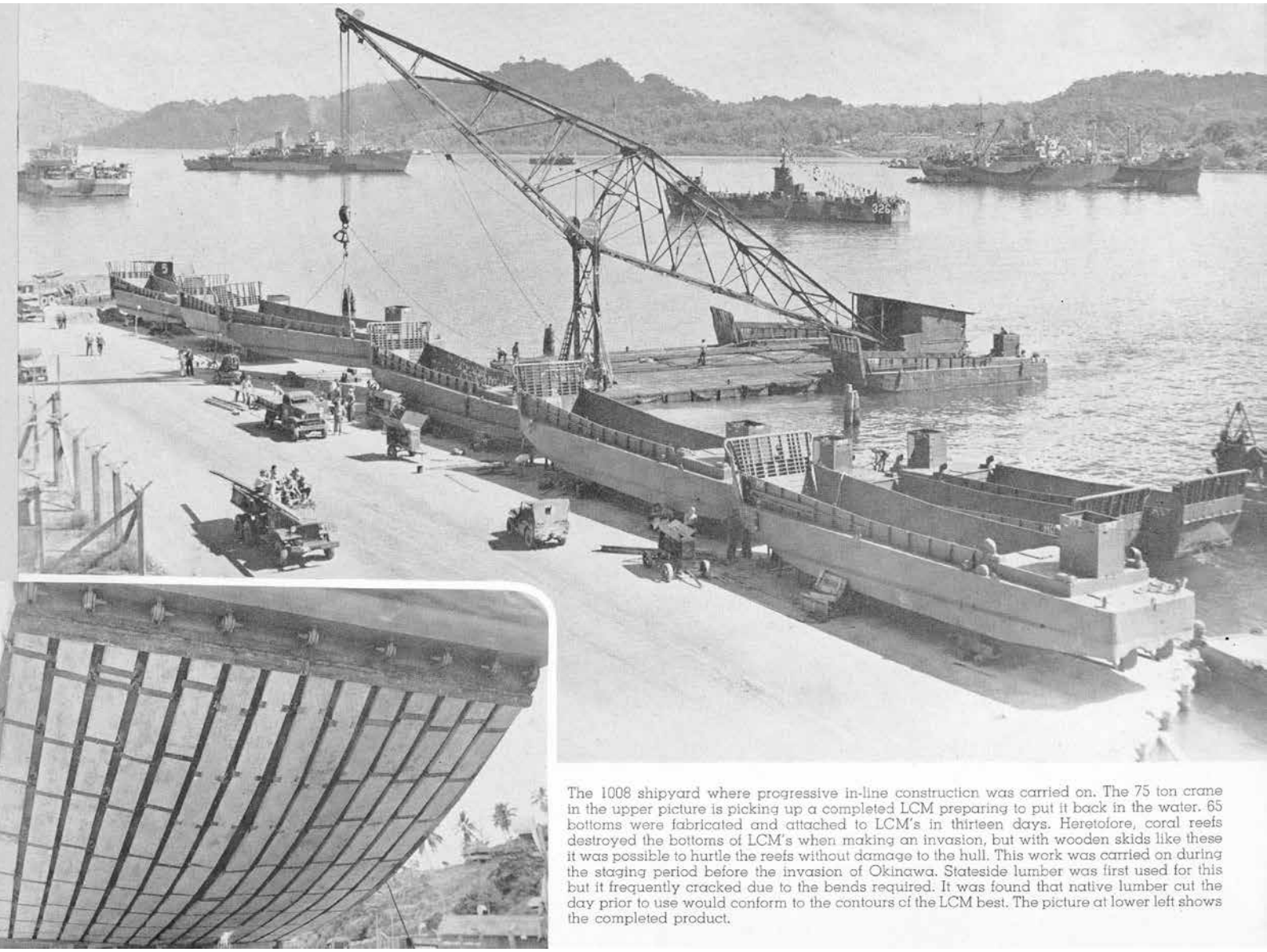
Figure 10. The Hama Unit parades on the beach in the morning sun at Halavo Bay in July 1942 with six RUFEs in the background. The unit was under the command of Lt. Cdr. Riichiro Sato, who might be one of the inspecting figures at the left. Little did these men know that they had just a few weeks of life remaining.

A Wreckage Identification is Made

Adjacent to the discarded USN 8-inch ammo, an aircraft wing lies on the trash-strewn coral rubble slope at 18m. A pontoon float on a slender support emanates off the wing. It is highly damaged by corrosion, but we identified the wing as the port wing of a Nakajima A6M2-N Type 2 Seaplane Model 11, known to Allied intelligence as the 'RUFE' or floatplane version of the Zero fighter. Although in poor condition, it's historic nonetheless, as its rare archaeological evidence of the Hama Unit of the Yokohama Kokutai which was based in the area. Eight sleek RUFEs were captured/destroyed in the area by the Americans on 7 August 1942. Half a dozen were on the beach at Halavo Bay and a couple were on the ramp at Tanambogo Island for servicing. They had deployed to the area on 5 July 1942 and fought with B-17E Flying Fortresses of the 11th Bomb Group over Tulagi and Guadalcanal. From its disposition and location on Tulagi Island coast, the wing appears to have been from one of the eight RUFEs and recovered by the Americans for intelligence purposes and then been discarded. Whilst over 10,000 ZEKE fighters were built by Mitsubishi during WWII, only 327 RUFES were built by Nakajima.

Figure 11. The port wing and float of a RUFE. Modern rope trash is draped over it. [26 August 2018]

Figure 12. This view in early 1945 shows LCM-3 landing craft on the foreshore of Tulagi Island and looks Northwest up the harbour. The landing craft were being modified by U.S. Naval Construction Battalion Detachment 1008 (CBD 1008), of "The Seabees". They would soon be hoisted on to the davits of the transports in the background and travel 5000 km to participate in the Invasion of Okinawa in April 1945.



The 1008 shipyard where progressive in-line construction was carried on. The 75 ton crane in the upper picture is picking up a completed LCM preparing to put it back in the water. 65 bottoms were fabricated and attached to LCM's in thirteen days. Heretofore, coral reefs destroyed the bottoms of LCM's when making an invasion, but with wooden skids like these it was possible to hurtle the reefs without damage to the hull. This work was carried on during the staging period before the invasion of Okinawa. Stateside lumber was first used for this but it frequently cracked due to the bends required. It was found that native lumber cut the day prior to use would conform to the contours of the LCM best. The picture at lower left shows the completed product.

Landing Craft, Mechanized, Mark 3 (LCM-3)

A second dive was conducted to gather additional information on the UXO. At the end of this dive, a brief examination of a sunken, all-steel, landing craft was made. It's on a steep slope; bow down, at an angle of about 40°. The landing craft is heavily damaged by corrosion, but still recognisable. From studying photographs of the site, the landing craft is identified as a LCM-3. The LCM-3 was the standard LCM used during WWII and was 50-feet in length. Thousands were produced during the war and there are at least 50 known LCM-3 sites in the Florida Islands with the actual number probably twice that.

Figure 13. Plan view of the LCM-3 landing craft with the stern at the top of the photo. Modern trash, including a tire, is accumulating as new cargo inside the barge.

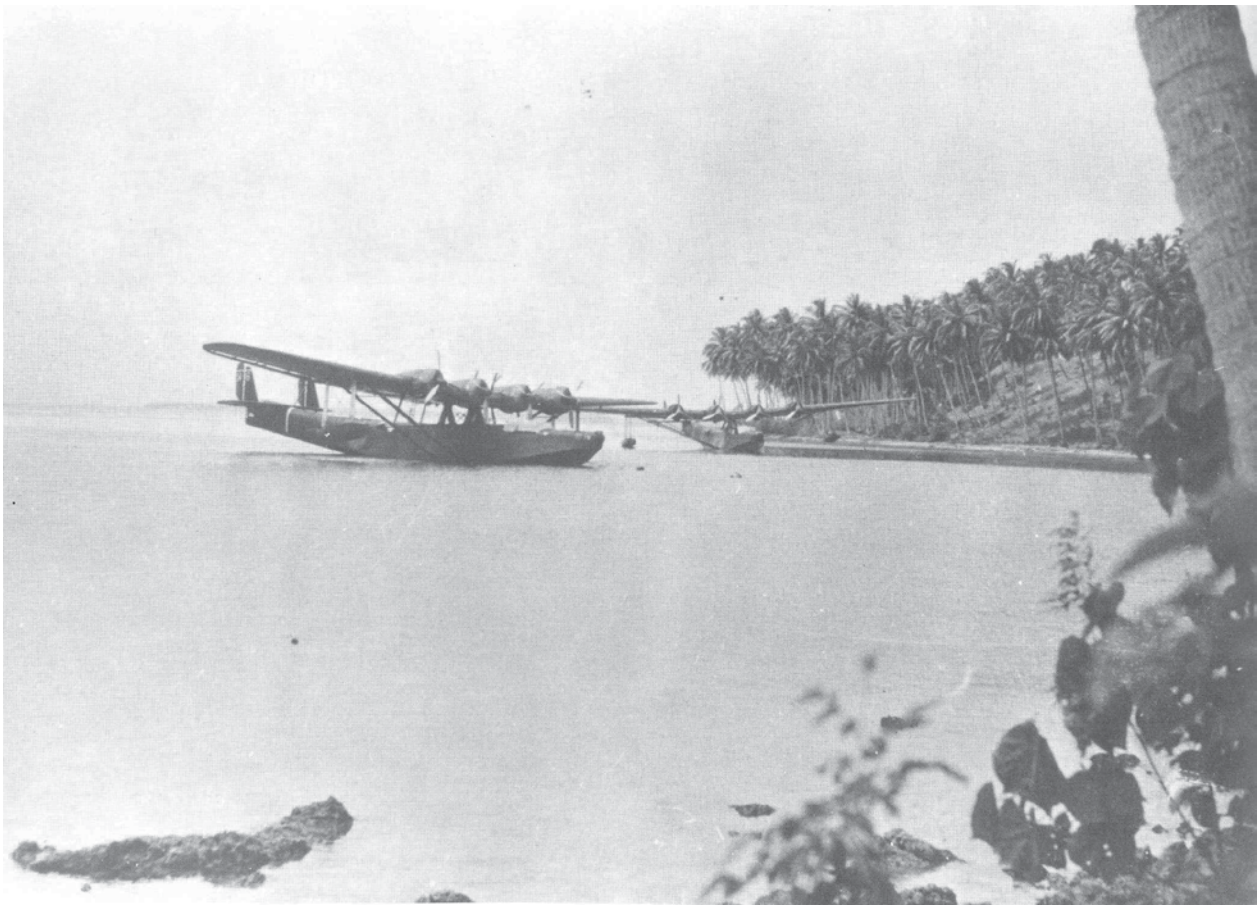


Figure 14. A pair of Kawanishi H6K MAVIS flying boats of the Toko Kokutai reside in a tranquil South Pacific base in February 1943.

MAVIS Mania

On the second day of operations, another two warm-up dives were conducted on two Japanese Kawanishi H6K Type 97 flying boats, better known as MAVIS's. Only 215 units of this giant flying boat were built by Kawanishi Kokuku Kabushiki Kaisha at their Naruo plant, making it a rare aircraft. None exist in museums today. The warm-up dives were deeper and allowed for practise with underwater camera systems and archaeological techniques. Seven massive MAVIS are located in the Tanambogo- Gavutu area. A heavily damaged one (M11) has always been known in the shallows at the Western end of Gavutu wharf, but is still commonly miss-identified as a PBY-5 Catalina. In the early 1980s, local NFD[6] staff discovered a deep MAVIS in Mavis Bay (aka the DEEP MAVIS M4) at 42m. Three MAVIS (M1, M6 and M13) were discovered on the Archaehistoria Expedition in January 1999. It was during this mission that Ewan Stevenson referred to targets as M1, M2, M3, etc, based on the original mooring numbers on a wartime Japanese map. Not all moorings were found to have MAVIS, so some numbers are not used. The following year, local dive operator, Franck Bouley, acting on information provided by the expedition, found the most intact H6K in shallow water against Tanambogo Is (FRANCK'S MAVIS). A decade would pass before a seventh MAVIS was found. Ewan Stevenson, acting as voluntary historical consultant

aboard the HMNZS *Resolution* (A14) in *Operation Calypso* directed additional sonar survey in the vicinity of Mavis Bay in November 2011. The *Resolution* was on a hydrographic and fisheries mission to the Solomon Islands. The advice paid-off nicely. Although the hydrographic ship was too large to access the confines of Mavis Bay, the Commanding Officer, Lt. Cdr. Matt Wray, used the portable side scan from the ship's RHIB in a brief sonar search, obtaining an image of previously unknown wreckage on a coral-rubble studded seafloor. It would have been easier to curtail searching in that confined bay, but determination resulted in the find. The image showed large structure with straight edges. It wasn't fully clear at the time whether the sonar image was another MAVIS or not, but the location and nature of the sonar image was pretty convincing to Ewan Stevenson that it was a seventh MAVIS. Final confirmation came three years later on 27 November 2014, when Matt Wray, Jeremy Hedley, Dave Moran and Ewan Stevenson dove the contact and a magnificent MAVIS was revealed. A poignant sight was an access ladder between the fuselage and upper wing still in place. This H6K was dubbed the 'OMEGA MAVIS' for reasons that shall remain rather classified for the moment.

The two deeper warm-up dives were conducted on MAVIS M1 and M6. MAVIS M1 is perhaps the worst conditioned of the H6K in Mavis Bay and thus named the MUNTED MAVIS. It appears to have had a huge conflagration onboard when strafed 7 August 1942. The entire cockpit roof and fuselage has been consumed by fire. It may be due to being heavily fuelled in preparation for a reconnaissance mission that very morning. This MAVIS sits on a very clean sandy seafloor and is not dived often. The bow 7.7mm Type 92 machine gun was found latched back in stowed position. It is believed the video and still pictures we took may be the first ever of this site. An accurate GPS was taken. The second dive of the day was on the PHALLIC MAVIS (M6). This H6K was named by legendary mixed-gas diver Kevin Denlay, as when found, the nose and cockpit was broken and pointed upwards at a dramatic angle. A surprising discovery was the forward fuselage had now collapsed back to the seafloor. It was a disappointing finding and apparently only recently occurred, as Mr. Bob Norton dived the site a year ago and the upwards orientation of the cockpit and nose was still evident. A possible agent of this recent damage was staring at us when back on the boat after the dive. A large live aboard dive vessel was anchored a few meters away, *on or very near* the DEEP MAVIS (M4) site. It is very obvious that a designated live aboard anchoring spot is urgently required to prevent severe anchor and chain damage to these very fragile aircraft sites. The seafloor of confined Mavis Bay is covered with FIVE of the historic 1942-built Japanese flying boats. With 40 meter wing spans, they take up a large proportion of the seafloor in the area. One needs specific knowledge to know where to safely anchor without causing damage.

A third dive later in the afternoon was made to try and locate a new wreck site. This was based on existing sonar data and ROV[7] footage showing a LCM-3 with a cargo of what looked like a jeep. A drop was made precisely on a GPS mark but there was no wreck found at 39m on the bottom. A search ensued by various parties. This was one of those crazy, confused, narked dives at 40m in very poor visibility trying to locate a lump of rusty steel on the bottom. It was dark on the seafloor with visibility about a 1.5m at times. It was challenging and thrilling and later produced a lot of laughs via the confused communication at the bottom of the sea. The LCM-3 was not seen. About a week or so after we departed, Bob Norton and Yvie gave it another go and were successful; not only did they find the LCM-3, but also an additional truck and jeep nearby. It is evidently a dumping site in about 40m of water to the West of Sasape on Tulagi Island.

TABLE 1

Discovery of MAVIS near Tulagi

MAVIS	Name	Date Discovered	Location	Note
M1	Munted Mavis	Jan 1999	Off West end Tanambogo Is	Discovered by Archaehistoria Expedition
M4	Deep Mavis	c. 1984	Mavis Bay	Accidently found by NFD employee Don Cook; the deepest Mavis
M5	Franck's Mavis	2000	Mavis Bay	Found by Franck Bouley; info from Archae-historia
M6	Phallic Mavis	Jan 1999	Mavis Bay	Discovered by Archaehistoria Expedition
M7	Omega Mavis	4 Nov 2011	Mavis Bay	Found by RNZN & Lt. Cdr. Matt Wray
M11	The Gavutu Wharf Mavis	always known	Off West end Gavutu Wharf	Broken into sections prob. by US wartime salvage
M13	Shallow Mavis	Jan 1999	Off SE end of Gavutu Is	Discovered by Archaehistoria Expedition; debris field on reef

Figure 15 and 16. *The nose and Mitsubishi Kensei Engine No. 4 of the MUNTED MAVIS. A hatch cover originally slid over the front gunner's aperture. When Ewan Stevenson first dove the site in January 1999, a full magazine pan for the gunner's 7.7mm Type 92 MG sat on the gunner's seat. "It was an amazing sight. It looked like the gunner had left a few minutes before and absent-minded forgotten it on the seat…" recounted Ewan. On this latest dive, nearly two decades later, the magazine had disappeared. Ewan continued, "It's a shame. I guess it was too tempting for someone to disturb or souvenir, but it reinforces that these sites when first found should be recorded in detail, so these interesting aspects might be preserved so others can share the experience of seeing these poignant aspects…". [27 August 2018].*

Figure 17 and 18. *The cockpit of the PHALLIC MAVIS. The MAVIS could carry up to about 13 tons of aviation gasoline. Many were probably fully fuelled on the morning of 7 August 1942, but due to the bad weather at the time, were "grounded". They lacked self-sealing fuel cells. When the Wildcats of U.S. Navy Fighting Squadron 71 (VF-71) swooped on them at 0610 hours, it took only a few 50-cal projectiles (particularly incendiaries) from the strafing F4F-4s to ignite them into intense conflagrations. The Yokohama Kokutai MAVIS pilots and crews were all killed in fierce ground combat on adjacent Tanambogo Island with U.S. Marines of Companies I, K and M of the 3rd Battalion, 2nd Marines. Their remains still lie buried on the island today. [27 August 2018].*

The First Major Target Proves Elusive

We began earnest efforts on 28 August 2018 to close down a reported large aircraft site on the seafloor near Gavutu Is. Information indicated a large aircraft lying in 52 meters of water. However, the accuracy of the position was not the best. In the 2014 Archaehistoria/ Sealark mission, a determined attempt was made to locate the site and a couple of days were expended using single beam sonar and a fruitless visual search by Dave Moran and Ewan Stevenson on 1 December 2014. Four years later, we were back, expending more time and money on it. Would we be successful this time? Where exactly was this site? What was it? Why was it so difficult?

In the lead-up to the mission, "office" work had been conducted on the positioning. GPS locations compared; data from 2014 re-examined, overlays done on Google Earth, and a new GPS location derived. This was the first position to check on 28 August 2018. We sounded out the co-ordinates and a raised mound was seen on the sonar. It looked too large and uniform to be wreckage, but there were small projections off the seafloor, so a dive was conducted. The visibility was good, but on the bottom all that could be seen was a silty mound. A circular search by Bob Norton and Matt Wray was made via a cave reel line, and they found a coral rock shelf, which evidentially was a source for some confusing sonar images.

The whole day had been devoted to working the 52m "contact", but after the unsuccessful dive to the depths of Gavutu Harbour, we now needed time to re-evaluate so decided to spend the rest of the day doing something more productive.

It would work out very fortunate. We decided to attempt to gain better archaeological information on the Gavutu Wildcat. After lunch we dive it. And oh so nice – the conditions were the best we had seen on the wreck- which lies at a depth of 44.4m. The visibility was about 15 meters. The site was discovered at 0945 hours, 4 November 2011, during HMNZS *Resolution* (A14) hydrographic surveys in the area. Lt. Cdr. Matt Wray was in command, and Ewan Stevenson

Figure 19. *Perhaps the most famous Wildcat in history – white '77' flown by 1st Lt. James Elms "Jim" "Zeke" Swett of the Fighting Falcons, VMF-221, on 7 April 1943. The big, old U.S. Navy fleet oiler USS Kanawha (AO-1) escorted by USS Taylor (DD-468) is being bombed just outside Tulagi Harbour entrance.* ***[Courtesy of Stan Stokes].***

Figure 20. *The Gavutu Wildcat. The heat-treated, Chrome Molybdenum steel engine mounts have given way and the Pratt and Whitney Model R-1830-86 radial engine has fallen forward. The combined archaeological evidence indicates this Grumman F4F-4 Wildcat is that of ace-in-a day 1st Lt. James E. Swett's of VMF-221. Part of that evidence is hidden below the sand…Ewan Stevenson predicts the three-bladed Curtiss Electric Model C5315S propeller will not be 'feathered', and all the hollow steel blades will be perfectly straight…in line with Swett's account. This might explain why no propeller blade is protruding above the sand. Swett related his engine seized due to battle damage on 7 April 1943, "I…managed to get over the bay at Tulagi before the engine froze up. That old propeller blade was sticking straight up right in front of me like the middle finger of the right hand." So, Swett made a dead-stick water landing and there should be a prop blade straight up buried in the front of that engine.* ***[28 August 2018].***

Figure 21*. A pair of tall-fin Batfish* Platax tiera *patrol the tail assembly of The Gavutu Wildcat. The doped fabric on the elevators has long since rotted away, leaving ribs and the all-metal trim tabs, Part No. 11396. The rudder cap, Part No. 11384, is missing.* ***[28 August 2018].***

Figure 23 and 24. The port wing tip 27 November 2014 and 28 August 2018, confirming missing pitot tube. The wing tip cap, Part No. 10864, is also missing but was so when originally first dived by Ewan Stevenson on 9 November 2011.

had been seconded to the ship as a voluntary historical consultant. AHSO[8] Julie Butler was online operator facing the sonar screen on the port side of the bridge when she said, "Ug! That looks like a plane!". We all crowded around the screen and clear as day there was an image of a small aircraft. Although it wasn't a detailed sonar image, Ewan confidently proclaimed it a 'Wildcat', which later that day was proved accurate when a ROV inspected the site and revealed a very intact Grumman Wildcat. On 9 November 2011, Ewan Stevenson conducted the first SCUBA dive on the site, along with divers from Shell Harbour Scuba Centre, Australia. Ewan dubbed the plane "The Gavutu Wildcat" because he liked the name 'Gavutu', although the site itself is closer to Tanambogo Island.

On this most recent dive, it was noticed significant corrosion advancement in the last seven years. In particular, on left side of the aft fuselage, large holes have appeared where 24ST[9] aluminium alloy plating has peeled off. When first dived in 2011, a beautifully intact and prominent pitot tube was on the port wing tip. At the time, it was thought particularly vulnerable to human damage, and on this latest dive, the inevitable was confirmed- the pitot[10] tube was missing, and lying in the sand underneath. It's reasonable to presume a careless diver or anchoring event was the cause. Video and photographs were taken. Considering the rapid development in corrosion damage, it is obvious a galvanic corrosion control method needs to be applied in situ, to delay the deterioration of this very historic site. Anodic protection has been applied to shipwreck sites in Australian waters with dramatic success.

There are archaeological indications that the Gavutu Wildcat is that of 22 year old Zeke Swett's. On the 7 April 1943, during combat this day, he claimed shooting down eight enemy aircraft, (he was credited with seven), thus becoming an 'ace in a day'. He was nearly a 'double ace' in a day! Furthermore, it was his first aerial combat. It ended when he was forced to ditch nearby Tulagi. The artist Stan Stokes has diligently depicted the "friendly" AA gunfire damage in port wing, which 1st Lt. Swett recounted, and this is one of the archaeological pieces of evidence.

Historic Tulagi Island

After diving during the day, treks were made to explore the various historic sites on Tulagi Island in the evenings. With the cooling South-east trade wind blowing, the walks were very pleasant and local people friendly. There is a huge amount to discover on the island. Tulagi was the seat of the British Protectorate Government from 1896, so there are numerous rare colonial sites on the island. There are hundreds of sites from the WWII period, including Japanese and American fortifications, gun mounts, installations, fox holes, relics, abandoned machinery and more. During the battle for Tulagi Island, many Japanese troops, mostly Special Naval Landing Forces from the 3rd Kure Rikusentai were entombed in their fighting holes and caves by explosive blasting by the 1st U.S. Marine Raiders Battalion.

One site we walked to was landing Beach BLUE. The U.S. 1st Marine Raider Battalion landed here at 0800, 7 August 1942, to begin the First Offensive by U.S. Forces in WWII. As the Raiders were attached to the 1st Marine Division, and they conducted the main landings on Guadalcanal, that division usually gets the accolades of initiating the First Offensive of WWII. In actual fact, the first offensive U.S. landing occurred 20 minutes earlier by Company B, 2nd Marines of the 2nd U.S. Marine Division. They landed in a bay to secure a headland near Haleta village on adjacent Florida Island. Their attack was to cover the landing by the Raiders.

Despite the Tulagi Island's richness in heritage sites dating from pre-war colonial times, none have ever been archaeologically surveyed or properly mapped.

Figure 25 and 26. *Beach BLUE on Tulagi's South coast. The wartime photo (left) was likely taken by young photographer Pvt. Edward G. Sexton from 1st MarDiv D-2 (Intelligence Section) assigned to Raiders for the Tulagi landings. The main action was expected on Guadalcanal, so the junior photographer was assigned to the Tulagi side. The photo was shows the reinforcing 2nd Battalion of the 5th Marines (Combat Team Two) landing about 0830 hours. The Raiders would wheel to the right (East) after landing, and encountered the first opposition on Hill 208 on the promontory in the background. A few 3rd Kure Rikusentai riflemen and machine gunners had dug into the hill. Some 560 five-inch shells that the light cruiser USS San Juan (CL-54) had thrown at the hill a few minutes before had failed to neutralise them.* ***[29 August 2018].***

Sealark Maritime Exploration works to Improves Local Communities

The impact of WWII on the Solomon Islands was significant, and many other wrecks remain hidden in the maritime environment off the coast of the Solomon Islands, waiting to be found. Such discoveries not only provide peace for the families of those who served, but also can be managed from an environmental perspective in order to preserve the pristine waters. The most benefit is to the Solomon Islanders, as such discoveries provide a much needed income flow, through the provision of unique dive sites, unlike those found in other parts of the world. The dive tourist makes up over 90% of the tourism market in the Solomon Islands, and with such specific tourism dependence, Sealark Maritime Exploration provides an especially important and highly relevant service to the development of tourism within this island nation.

Sealark's goal is focused on discovery not profit, and a variety of methods are used to discover, survey and map the undiscovered historical maritime wrecks from WWII. In doing so, Sealark is especially pleased to be able to provide direct economic benefit to communities within the local villages, by drawing in tourists. Sealark's discovery and mapping of WWII heritage sites in remote regions has created instantaneous and advantageous benefits to local communities, by enhancing the desirability of remote locations as unique and special dive sites. Ewan Stevenson, one of the Directors of Sealark Maritime Exploration, was born and raised in the Solomons, and so Sealark has a special affinity for this remote island nation, including the preservation of both its environment and the economic independence of villages. Sealark achieves this

Figure 27. Ewan Stevenson (left) and Matt Wray (right) with Chiefs and members of Boroni Village, Sandfly Island. The Chiefs to the right of Ewan are Stephen Tau and Vincent Usi (green shirt). ***[29 August 2018].***

though consultation and engagement with local communities in the development and implementation of new WWII heritage sites in their areas.

Forever on the lookout for new adventures, dive tourists are eager to be one of the first to dive on any new discovery. As a result of this, tourism dollars are immediately injected into an area where previously there might have been no source of income. As well as providing avenues of income, Sealark also works to promote the heritage value of local WWII sites by providing location details, historical information and education on the discovery to the village chiefs in the nearby area. Tragically, in recent times objects from numerous WWII sites have been scrapped for cash, but Sealark attempts to reduce the occurrence of this through providing education around their discoveries and the necessity of preserving these sites, of which one benefit is continuous income from dive tourists.

According to local custom, all waters, reefs, fish, shellfish, coral reefs and WWII heritage sites are owned by the nearby villages, who have jurisdiction and territory ownership over these resources. Tourists visiting the area and such sites pay nominal access fees and thereby inject valuable cash directly into the local community. This payment goes directly to the village. There has to be an 'attraction' in the locality for tourists to visit. As most tourists are divers, if there is an underwater attraction in the area, the importance of a WWII underwater attraction cannot be overestimated for bringing divers to the location.

Discovery of a New Wildcat Fighter Site

We re-newed our pursuit of the phantom plane of Gavutu Harbour on Wednesday 29 August 2018. We would go back to the original GPS mark and conduct sonar work around that. We would also turn our focus to the Western part of the Floridas archipelago. First thing in the morning we shot over to the Phantom plane site at Gavutu in Bob Norton's powerful dive boat Cobra. We did further sounding around and found some 'structure'. That was positive! We would come back to that! The seafloor topography was confusing here. There is wreckage contamination, reefs, our target, mounds, and deep water. We would make a run in a certain direction and find something but on a different bearing see nothing at all. Our target seemed dispersed and small. What was going on? It didn't match the existing data we had. Add in the imprecise location information, interpretation of previous information, and you have a classic FUBAR. A real 'challenge' as they say… we had already expended half a day on a deep dive for no results.

We turned to the West and sped past Sandfly Passage. The weather was excellent. Bright clear morning and calm seas. The lush dark green jungle carpet on steep hills meeting the translucent deep blue sea. The ominous steaming jungle was softened by pale grass 'meadows' in patches on the steep hills. The rare, undeveloped, natural state of dozens of islands adds to the scenic beauty of the area. We spent the morning working hard, meeting various village chiefs in the West, and obtained excellent information on a MIA aircraft in the area.

Figure 28. A view Eastwards, across Tasou Bay to Tapuru on Bokonimbeti (Sandfly or Olevugha) Island. ***[29 August 2018]***

In the afternoon, we went for an exploratory dive for a possible aircraft at a place called Tapuru, on Bokonimbeti Island. On the boat, we made a plan. Bob would drop Matt and Ewan up-current and we would swim the bay, trying to cover from reef point to the next. Ewan said, "let's descend to 24 meters, keep well off the bottom, but keep it in visual range so that we can cover a good area and conserve our air…" The warm tropical water, the bright sunshine, clear skies, and profusion of aqua colours of the coral reef, pretty red flowering flame tree ashore, white sand beaches, obviously clear water, made an idyllic scene and a very relaxed, enjoyable atmosphere. In the least, this dive would be pleasant even without finding anything aluminium. Ewan relates the dive in his words:

We were looking for a plane, but weren't precisely sure of its location. This was not a known dive site. This was very likely going to be another fruitless dive. How deep did it go here? I wondered what currents we would encounter. Was there a gentle underwater slope or a cliff under the surface? Would this be The Florida Islands Tiger Shark Convention Centre? The day was bright and beautiful. Calm and clear. I know from experience that in the clear waters of the Solomons, anything less than 24m (sometimes more) can be seen from the surface and would be precisely known by nearby villagers. We descended down and the conditions were perfect. I kept going to 30m. Matt was wondering what I was doing.. I searched down the slope perhaps 45-50m below. It was coral sand with scattered small rubble. You can really visually cover quite a bit of ground. This depth was good, taking advantage of the conditions and underwater topography.

Matt and I swam along towards the Northeast, scanning the seafloor. After about seven minutes of gentle swimming (to conserve gas), I thought I better start turning in and get shallower... I saw a dark circular lump sitting on the sand...was it a radial engine? It was an odd shape... no, it WAS a rock. The rock was about 2m in diameter. A dark, monotone, lump contrasting with the bleach-white coral sand. I was a bit bored, so swam towards the rock anyway... a small Eagle ray swam off to the right, flapping slowly away, I pointed towards it, indicating it to Matt. I half-heartedly studied the rock, dreaming it was a Pratt & Whitney...

I looked up slope, and there was the dark outline of a WHOLE PLANE sitting on the white-rubble sand. I nearly choked on my regulator! WOW! WOW!!! I turned back to look at Matt, vigorously pointing, but he had seen it well before me. He was really perplexed- why was I pointing a stingray when there was a whole plane sitting in front of face! Apparently, according to Matt, my eyes were wide as saucers at this point! The thrill of discovery was just pure happiness! I descended down to the plane and Matt came down and we "high-fived". The site was really beautiful in the clear water. A big hump-head parrot fish floated around, and two small dog-tooth tunas swam past. What a site! I instantly recognized an American Wildcat fighter upside down. It was very complete and undamaged. What made it so special was the water was so clear. You could see everything at once. The visibility was about 20 meters. Bob Norton had kindly loaned me his GoPro video camera for this dive. I now pulled that out of my pocket to find it flooded. What a blow! On every dive, I hardly ever see the wreck I am diving on. My brain (no doubt muddled by nitrogen narcosis) is focused on technical details with the photography or video and operating that gear. I am adjusting the camera gear, orientating it, and really busy with it. Then there is safely keeping track of the dive itself… dive time, deco time, gas contents, how much time remaining, maintaining your location, safety issues, what other divers around you are doing… I hardly ever just dive and enjoy the sight. Now I had no camera gear! Wow! This really was something new! It made the dive extra special. I just swam around an intact Grumman Wildcat, still in original position since WWII, and just simply enjoyed observing it. A rare, purely enjoyable, moment for me.

I did a thorough visual check of the sand adjacent the cockpit on the port side, near a small (30cm high) triangular opening into the cockpit space. Fortunately, I found no human remains. That corroborated the local folklore that the the pilot survived this plane 'crash'.

It was just magnificent to swim slowly around and take it all in. I was looking for interesting unique features and

comparing it to the other eight Wildcats I had surveyed in the Solomons...

Matt got though his air contents pretty fast (I was struggling to control my gas consumption too) and departed. After a couple extra precious minutes alone on site, I made my way up the nearby coral reef which was very nice. I relaxed at 18m depth, gradually working shallower and decompressing, looking at the myriad of complexity in the pretty reef when an unexpected jolt on my shoulder... it was Bob Norton! Gosh, he was quick in coming down! Our boat/dive/hotel operator! Matt had excitedly announced the news "There's a plane down there!" on the boat. He shook my hand excitedly in congratulations, and he was just dying to see the plane; I would have to guide him back down. My air contents were dwindling. I went down a little, pointing the way and swam out into the blue, but maintained my depth. The water was so clear there really wasn't any trouble for Bob finding the aircraft again... I turned back without seeing the plane again, but got closer enough for Bob to find the site and he shot down. He wasn't expecting us to find an aircraft so he had no shirt on and no dive timer! He wasn't long down there and he joined back up with me during my decompression. Soon we were back on the boat in the tropical warm sun on a flat, deep azure sea, talking excitedly about the find. What a great day! There sure was some luck involved in the find. If I hadn't turned shorewards to investigate the "rock", if Bob hadn't dropped us in the right position, if I hadn't gone deeper… it is likely we would have missed the plane altogether…

The plane rests on a slope, nose down. The pitot tube on the port wing tip (a position feature of the F4F-4 version) is beautifully intact and only 50mm or so off the sandy seafloor. The oil coolers (a feature of the F4F-4 version) are prominent because they are on top of the upturned wings. The tail hook, fully retracted, is there. The life raft bay is open on the starboard side of the rear fuselage (in the 'turtle back') and lift raft missing. This indicates the pilot probably got out of the cockpit on the right side… The wheels are very intact, retracted, and tires still appear inflated. The tire on the tail wheel is missing. There appears to be battle damage in the port rear fuselage side. The most apparent damage is the starboard horizontal stabilizer, which has collapsed to the seafloor. A small 30cm high triangular opening under the port wing is the only hole into the cockpit which is flat against the sand. The cockpit enclosure is open (retracted). There are

Figure 29. This was how we first saw the Wildcat at Tapuru. As we got closer we realized it was upside down. [30 August 2018].

Figure 30. Seventy-six years of nature paints on its colour and insignia on the Grumman product. Tens of thousands of organisms have made the Sealark Wildcat their new home. Comparison to the Gavutu Wildcat shows how the local environment has an immense impact on the site preservation and status. All the species require different factors to live and survive. At the Tapuru site, there is a gentle current and clear water so sunlight gets through, and negligible sedimentation. Coralline growths require sunlight to prosper, so even at 40m there is sufficient for them to colonise the Sealark Wildcat. At the Gavutu Wildcat site, there is little current, the sea is murky, and there is sedimentation. At the wing root in the fuselage can be seen the retracted wheel. Again, the heat-treated, Chrome Molybdenum steel engine mounts have given way and the Pratt and Whitney Model R-1830-86 engine has fallen forward, however, two propeller blades are propping it up. Note the 'kinked' prop blade… typical of how these Curtiss hollow steel blades bend. Aluminium blades bend in a curved radius. The exhaust stubs from the exhaust manifold, Part No. 11490, protrude upwards. The manifold was made of 'Corrosion and Heat Resistant steel', later marketed as 'Stainless steel'. ***[30 August 2018].***

Figure 31 and 32. Matt Wray acts as safety diver whilst Yvie deploys a SMB to obtain a precise GPS mark for the site. Behind Matt's left foot is the isolated rock which attracted Ewan's attention and led him to swim towards the upturned Wildcat. In the right photo, the single piece 26" x 6" Bendix aluminium alloy-casted wheel is in good condition; the B. F. Goodrich Rayon heavy duty tyre appears still inflated (85 PSI spec. tyre pressure). The square object to the left of the wheel is the intercooler. The rectangular hole to the right on the wheel is the fuselage window. The same window is on the other side and intact. The window was to ostensibly allow the pilot a view under the aircraft, but in practise found to be impracticable so was deleted from later models of the Wildcat. ***[30 August 2018].***

Figure 33 and 34. The collapsed starboard horizontal stabilizer is the most obvious damage on site. The starboard elevator, Part No. 11375, is missing completely, as is the rudder trim tab, Part No. 11392. The B.F. Goodrich 6-ply Heavy Duty 10" pneumatic tyre is missing from the Bendix Tail wheel assembly, Part No. 55612, its place being taken by a Black Feather Star Colobometra perspinosa. The feather star has found the perfect position to filter feed from the ambient current. The right photo shows the underside of the port wing. The oval fairing is for the 10-inch oil cooler, which kept the oil at about 65°C. To the right of the oil cooler air intake is the wing fold line. ***[30 August 2018].***

Figure 35 and 36. Left: Matt Wray studies the tail area. The pitot tube (airspeed measurement device) is amazingly prominent. It is completely covered in growth, yet curiously appears to be the correct colour as per the Grumman Engineering Aircraft Corporation Maintenance Instruction for the F4F-4 airplane, Note 18 on p. 228 "Paint Pitot tube, non-specular red, in accordance with E.A.L. process spec. #1647". It is not known for sure, but it appears the marine growth on the pitot tube may have assimilated the red pigment out of the paint. As often found on Wildcat sites in the Solomons, the wing tip cap, Part No. 10864, is missing. Right: This rear view shows the amount of space under the wings. The starboard wing is entirely just off the seafloor. Chrome Molybdenum steel arresting hook is fully retracted into the tail cone, Part No. 11074. ***[30 August 2018].***

Figure 37 and 38. Left. A Golden Damsel Amblyglyphidodon aureus swims towards a triangular hole in the port side of the rear fuselage. At the apex of the triangle is the lift tube hole, but the rest of the aperture could be battle damage. Right. A close-up of the small 30cm triangular hole into the cockpit. Directly above this is a square hole where the cap for the emergency fuel tank is located. The streamline protective flap is missing. Some of the broken plexiglas of the retracted cockpit enclosure can be seen. ***[30 August 2018].***

folds in the wing (another feature of the F4F-4). A propeller blade is sharply bent, characteristic of hollow steel Curtiss Electric Model C5315S propellors. So, this is a Grumman F4F-4[11] Wildcat and the condition of the plane tells us it was a controlled water landing under power. The shallowest point on the site is the Bendix tail wheel at 36.5m. The deepest point is the pitot tube on port wing at 41.1m. The starboard wing is raised off the seafloor. The cockpit sill is sealed to the seafloor on that side by coral rubble.

The successful discovery of the Wildcat happily forced an alteration of our program. Some objectives were scrubbed, as we now had to return to the site to record and survey in detail. There are now three very intact known Grumman Wildcat underwater sites in the Floridas. Fortunately, we had one day left in our programme.

Whose Wildcat is it?

Historical research so far has found at least nine Wildcat aircraft expended in the Florida Islands area as per Table Two below.

TABLE 2

Grumman F4F-4 Wildcats expended in Florida Islands Area

Date	Pilot	Sqd	BuNo. /Side No.	Location	Note
7 August 1942	Mach. Julius A. "Joe" Achten	VF-6	5228 / F-11	offshore Tulagi	Rescued by Higgins landing boat
24 August 1942	2nd Lt. Robert R. "Rapid Robert" Read	VMF-223	5158	two miles off Floridas	Ditched; pilot survived
2 October 1942	Maj. Robert Galer, CO	VMF-224	02118	Nggela Pile	Ditched; pilot survived
11 November 1942	2nd Lt. Edward K. Petersen	VMF-112	03427	Nggela Sule	Land site; pilot parachuted
7 April 1943	1st Lt. James E. "Zeke" "Jim" Swett	VMF-221	12084 or 12036 / white 77	offshore Gavutu	Ditched; likely "The Gavutu Wildcat"
7 April 1943	1st Lt. Edward A. "Red" Walsh	VMF-221	12013	Tulagi Harbour	Ditched; likely "The Raiders Wildcat"
7 April 1943	1st Lt. G.W. Roberts	VMF-221	03529	Iron Bottom Sound	Parachuted; plane crashed sea
7 April 1943	2nd Lt. P.P. Pittman	VMF-221	11890 / white 78	shot down over Tulagi	Likely parachuted
7 April 1943	1st Lt. Wallace H. Hallmeyer	VMF-221	02143	close to Florida Is	Ditched; "The Sealark Wildcat"?

Figure 39. U.S. Marine pilots 2nd Lt. Donald L. Balch, 1st Lt. Howard K. Winfield and 1st Lt. Wallace H. Hallmeyer standing by Lt. Winfield's Grumman F4F-4 Wildcat on Fighter II (Kukum) Airfield, Guadalcanal. The photo was taken a couple of weeks after 1st Lt. Wallace Hallmeyer ditched his aircraft in the Florida Islands. Artwork was rare on U.S. Marine aircraft. Photograph by T. Sgt. William G. Brunk on 21 April 1943.
[NARA-II, 127-GW-54595].

It is very possible there are more Wildcats lost in the Floridas as our research is based on limited access to historical records. All these Wildcat archaeological sites still exist today. There has been no post war salvage of any Wildcat from the sea in the Solomon Islands, and no record can be found of any Wildcat salvage in the Floridas area during the war either. As most of these aircraft made semi-controlled water landings, the sites are going to be in good condition. The deeper the site, the better the site condition.

We could not find any identifying Bureau of Aeronautics number (BuNo.) or squadron side numbers on the Tapuru Wildcat. The Grumman manufacturing plate is located on the bulkhead behind the pilot and was not accessible. The BuNo. is stencilled in black paint one inch high on the vertical stabilizer. The plane's 'side number' used for quick identification on the airfield and in the air is painted on the rear fuselage in large white painted figures. The 76 years of marine growth had completely obliterated these painted numbers. The only means available to identify the plane at this point is by historical analysis.

Working with what we have found so far, reveals the following. The only Navy Wildcat of the nine lost in the area was from VF-6, the "Shooting Stars". Machinist Julius Achten, USN, tangled with a Zero fighter on the day of the initial landings and came off second best and became the first Wildcat to land in the vicinity of Tulagi. He was picked up by one of the small landing craft there.

Second Lieutenant Read reported ditching two miles offshore the Floridas; clearly his Wildcat is not at Tapuru.

A U.S. Marine Squadron commander was forced to ditch his Wildcat at the Eastern end of the Floridas on the 2 October 1942. Major Robert Edward "Bob" Galer, 05253, USMC formed VMF-224 "The Fighting Wildcats" at Ewa in Hawaii and took his fighting squadron into Guadalcanal on 30 August 1942, becoming the second fighting squadron of the Cactus Air Force. After aerial combat on 2 October 1942, he was forced to ditch in the Floridas. He had just received the Navy Cross from the Commander of the U.S. Pacific Fleet, Admiral Chester Nimitz in a presentation the day before at Henderson Field. The ditching was his second water landing in two weeks. Major Galer ended up a double ace, claiming 13 kills in total, all during the Guadalcanal Campaign. On 24 March 1943, backj in the States, President Franklin D. Roosevelt pinned a Medal of Honor on his chest. He stayed in the military post-war, retiring in July 1957 as a Brigadier General. He was the 6th ranking U.S. Marine ace of WWII. Due to disparity in location, the "Sealark Wildcat" is not Major Galer's.

Second Lieutenant Petersen, VMF-112, parachuted over Florida Island on 11 November 1942 and survived whilst his Wildcat crashed into the jungle on Nggela Sule, opposite Gavutu. This "Wolfpack" F4F-4 appears to be the only Wildcat land site in the area.

Most of the Wildcats lost in the Florida Islands were from U.S. Marine Fighting Squadron Two Twenty One (VMF-221), the "Fighting Falcons". They were all expended as a result of a single combat on 7 April 1943, when one of the largest air strikes the Japanese ever launched during WWII, hit Allied shipping in the Tulagi – Guadalcanal area. Wildcats from two U.S. Marine Squadrons in addition to USAAF P-39 Airacobras, P-40 Warhawks and P-38 Lightnings were vectored to intercept the raid. Two Fighting Falcons, Swett and Walsh, both ditched in or near Tulagi Harbour during the battle. Tapuru is 18km from Tulagi Harbour. The F4F-4 at Tapuru is therefore not Swett's or Walsh's.

1st Lt. G.W. Roberts was shot down by Zeroes before he reached the VAL dive-bombers. He parachuted safely whilst his mount smashed into the sea. The plane at Tapuru on the other hand has been gently landed in the ocean and is not consistent with Robert's high-velocity crash.

Details of 2nd Lt. P.P. Pittman's shoot down are sketchy, but according to meticulous researcher and author Richard L. Dunn in his 2007 book, *X Attack of I-Operation*, he "was shot down over Tulagi and was rescued with shrapnel wounds in his legs". He appears to have parachuted. He ended up in the hospital on Tulagi until evacuated on 19 April 1943. Based on this information, the Grumman at Tapuru is not Pittman's plane.

The local folklore we learned about the plane at Tapuru was that the pilot survived the landing on the sea quite well, and was paddled back to Tulagi

by local Melanesians. In the big aerial battle of late afternoon, 7 April 1943, one Fighting Falcon ditched due to battle damage, and was paddled back to Tulagi by islanders. He was 1st Lt. Wallace H. Hallmeyer. Author Richard Dunn briefly recorded his participation in the combat, "…Hallmeyer…claimed two Zeroes in a diving attack before being shot up and ditching close to Florida Island." The Squadron War Diary also recorded Hallmeyer's experience:

> *Lieutenant Hallmeyer returned [to the squadron at Fighter II airfield] at 1000 [on the 9 April]. He had been picked up by natives who fed him and kept him over night and took him to Tulagi the next day. When Payne [his wingman] was jumped by the Zeroes, Hallmeyer was way behind because of fuel pressure. He was able to climb above and make a pass getting 2 Zeroes.*

Hallmeyer would have ditched around 15:30 hours. By the time he evacuated the sinking plane, gained his lifeboat, reached the nearby shore (150 meters away), met up with local natives, taken back to their village for care, and rested, it would easily have been evening. It was therefore not logical to the islanders to set off in the darkness by canoe to take the pilot the 25km ride back to the American base at Tulagi. That could wait until the following day.

In summary, Hallmeyer did not ditch near Tulagi, but near "Florida". Although the Tapuru plane is near Olevugha (Sandfly) island, "Florida" is the next closest main island. His distance away from Tulagi was within a days canoe ride- that matches the Tapuru location. Hallmeyer returned to Tulagi by native canoe. That corroborates the local folklore. Hallmeyer water landed. That matches the condition of the Tapuru Grumman. Hallmeyer survived. The pilot of the Sealark Wildcat survived. Our money is on the pilot of Sealark Wildcat being 1st Lt. Wallace H. Hallmeyer. If this is accepted, then the Wildcat at Tapuru is a Fighting Falcon.

Figure 40. Squadron Insignia of VMF-221

The Importance of Archaeology

From the brief historical analysis above it looks like the Sealark Wildcat is First Lieutenant Hallmeyer's plane, however, additional confirmation might be obtained from archaeology. The F4F-4 Wildcat recorded expended by Hallmeyer is listed as BuNo. 02143. The Grumman Aircraft Engineering Corporation serial was 3196. This later serial is referred to as the Constructor's Number (c/n) or Manufacturer's Serial Number (MSN). Locating any of these numbers on the plane would be very strong evidence the plane is Hallmeyer's. The Bureau of Aeronautics numbers are stencilled on the plane in black paint on the vertical stabilizer and sometimes on other locations such as ammo cans, flaps, landing gear, instrument panel, cooling flaps or cowling panels. It may be a possible these numbers can be found under the marine growth on the plane but this process requires extremely detailed examination of the plane and very careful, controlled, removal of marine organisms by specialists. Haphazard scrapping off the marine growth with a diver's knife is one way to destroy the soft painted serial thereby eliminating any chance of identifying the plane. The BuNo. is assigned after the aircraft is test flown and accepted by the U.S. Navy.

The Constructors Numbers are assigned to the aircraft whilst in production at the Grumman Plant No. 1 at Bethpage, Long Island, New York. This number is sometimes found on all sorts of assemblies and parts of the aircraft as it's built. The number is sometimes found completely enclosed inside an aircraft component. It may be quickly scribbled onto the plane in crayon, chalk or pencil. You might not find a BuNo., but do find the c/n. The knowledge of a standard location where these numbers were consistently scribbled has not been developed yet. Locating such a number, if it's still there, inside the aircraft, inside a wing, or inside the horizontal stabilizer for example at 40m depth underwater is going to be problematic.

There is one location where both numbers are known to occur. This is on the Grumman Aircraft Engineering Corporation manufacturer's plate. This is located on the port side bulkhead behind the pilot, but in all Wildcats examined underwater in recent years, this has been found missing. This plate has been searched for on Wildcats that have only recently been discovered, and not previously dived, so it's not missing due to souveniring. It's possible there is some galvanic corrosion process going on and fastenings dissolve, and then the plates fall off and get lost. Alternatively, the plate is corroding into oblivion.

Although illegal, divers in the Solomons continue to souvenir, and by doing so, diminish the possibility that archaeological analysis could identify a historic aircraft. Most divers have no idea of conservation processing required to stabilise aluminium parts exposed to atmospheric oxygen and when the terrible smell of dying marine organisms' sets up, the rapidly corroding, stinking, salvaged part is quickly discarded in the trash. Divers are also not good at storing and preserving souvenirs. Parts get forgotten and lost; parts fall on the floor and get broken and thrown out. If the manufacturing plate is removed, that may be the only way a plane could have been identified.

Inexperienced divers often like to excitedly open ammunition boxes and remove 50-cal ammunition. Again, on reaching the atmosphere, such ammunition bleeds awful corrosion juice and the item is not attractive. Consider the archaeological loss this immature activity might cause. First Lieutenant Hallmeyer claimed shooting down two Zeroes. Fully loaded, the F4F-4 carried 240 rounds per each of its six 50-cal M2 Browning HMGs. If we trust Hallmeyer's claim, we would expect to find something less than the 240 rounds in each ammo box. If for instance, we found the ammo boxes full, and a serial number matches Hallmeyer's plane, what possibilities might we consider then?

One archaeological study might be partially effective underwater and that is a detailed examination for battle damage. Hallmeyer was shot down. A close study over the plane's surfaces might reveal more holes consistent with combat damage, although this is admittedly going to be difficult considering the amount of marine growth.

First Lieutenant Hallmeyer complained of low fuel pressure. Archaeological examination might confirm some mechanical issue with the fuel system. The fuel pump maybe found defective or there is damage in a fuel line, blocked fuel filter, or another issue with the fuel system.

The cockpit instruments sometimes "freeze" at the moment of 'crash' and can reveal information. The position of throttle and propeller cockpit control levers, or the ammunition rounds counter, tabs settings, electrical switches positions, all combine to tell the story of the plane.

Personal items are often found in aircraft which identify the pilot. A lost jewellery ring, a lost watch, dog tags, personal writing on a navigation plotting board, clothing, etc, with personal identifications can turn out to be the crucial evidence.

One of the great things with archaeology is that there is often "surprises"… something unexpected is found that adds something new to knowledge. A find on the Sealark Wildcat might tell us something new about Grumman manufacture, the pilot, or the demise of the aircraft…

In summary, archaeological results of the following would collectively help confirm the Wildcat at Tapuru as 1st Lt. Hallmeyer's:

1. Finding number 02143 or 3196 on the plane
2. Less than full ammo load
3. Defect in the fuel system
4. Combat damage

It is obvious underwater archaeology is difficult. Perhaps the only way to obtain definite archaeological results would be to recover the whole plane in careful, gentle salvage, but then you have a complex, expensive conservation problem on your hands if you want to preserve it.

On 30 August 2018, we returned to "The Sealark Wildcat" at Tapuru to record the new find in images, video, precise GPS and other archaeological information. Another beautiful weather day. After a nice lunch at Raiders Hotel, we went back to Gavutu Harbour. Had the phantom plane vanished during the night? Was there a Bermuda triangle in Gavutu Harbour?

We got back on the original GPS mark and found structure on the sounder. The dive boat, Cobra,was twisted around and around on various sonar runs. Everyone had good ideas. It was inconclusive. It was small. It was indefinite. Was it a rock? Do we want to risk another deep dive for nothing? Due to the depth (nitrogen loading), once you dive that deep, that's half a day gone and there was no chance for another dive today. Matt came up with an idea. We would secure a "live" GoPro camera to a drop line and drop it on the target. Would it work? It was a long shot…if the camera randomly faced the wrong way (quite likely), or conditions murky, we would see nothing. If the drop was not accurate, the camera would not be in range either. We fitted the GoPro to a short handle and angled the camera slightly downwards. We thoroughly secured it to the drop line with plastic cable ties about 2.2m above the lead drop-weight. We worked well as an all-Kiwi team. Innovation. Adjust. Try it!

We manoeuvred onto the mark and the "live" GoPro rocketed to the seafloor. In a couple of minutes, we swung around and pulled up the GoPro. The moment of truth… would this work? We quickly recovered the GoPro and reviewed the footage… you could see the seafloor just fine, some wild, quick evolutions in the video due to the swinging drop line, then suddenly fleeting images of a wing section, and a fuselage piece with blisters… HURRAY! Finally! We got

Figure 40. *The salvaged, upside down, remains of Lt. (jg) Jarlath J. "Jiggs" Lyons PBY-5 Catalina at Halavo Bay, Florida Islands.*

aircraft wreckage! Jubilation all round the boat and "high-fives". What a relief! There was something there after all! The GoPro arrangement had worked well on the very first attempt! The Phantom was no more, or so we thought…

We excitedly and quickly geared up to dive. This time! Bob, Yvie and Ewan would dive. Ewan, with all camera gear, and lights to record this historic dive. The boat was swung around and slowed to re-position for a new drop to the site for the diving… once in place, all divers followed the line down; at the bottom at 52.3m, an expanse of flat, feature-less silt seafloor. Oh no! No wreckage, nothing! What a disaster. It was hopeless for Ewan to swim around searching in that depth with bulky camera gear, so intrepid Bob Norton disappeared by himself on the end of the cave line once again, searching…the others stayed on the drop line, waiting and hoping for a positive "thumbs-up" from Bob. There was no good news. Bob did an amazing effort in the deep water, swimming out 40 meters in a radius; he did find the "House under the Sea" wreckage again but nothing else. Dejectedly we decom-pressed and "depressed" (!) clinging onto the line. This was the last day. No more diving scheduled. Packing to be done. Dismantle the dive gear. Organis-ing the return to Guadalcanal. Everyone talking about going home. We had failed to unravel the Phantom Gavutu plane. All we had was two milliseconds of fleeting, poor, shaky video of some aluminium structure. It looked like Japanese MAVIS wreckage but also American Catalina flying boat. We weren't sure. We didn't know. The phantom had won again.

Back at Raiders Hotel, as the boat was pulling up to the dock, Ewan asks Bob, "What about one more try first thing in the morning? Before breakfast, real early?" "Yes, OK" is Bob's quick reply. It was back on. We weren't giving up. Good on Bob Norton! He wasn't letting it go either! That evening around dinner, we reviewed the footage. The blister window sure looked like a PBY Catalina's…

The Phantom Plane is Revealed

By the next morning, 31 August 2018, Matt and Ewan had come to the same conclusion about the wreckage. The blister fuselage section had square "cut" ends; a light in the wing leading edge had been clinically dismantled… this site looked like a 'dump' site, the wreckage being salvaged for parts. It was likely not an original crash site. It was disappointing, but final confirmation would come from a dive.

The weather was turning. It was early but the wind was already building. The South-east trade wind was back. We were running out of time. We raced over to Gavutu, and again did a GoPro video line drop to confirm site before diving. The team was operating very smoothly.

The GoPro effort worked even better this time with better images of the wreckage. The drop was spot-on! We now deployed the diver's drop line and Bob and Ewan dived. Ewan relates the dive:

> *I had all my camera gear with me. Just swimming on the surface with all the extra bulk to the drop-line buoy was a struggle. With one hand holding camera, the other holding the down line, I needed a third hand to pinch my nose to equalize ear pressure as I descended… it was early morning and cloudy, the water looked dark and ruffled. I descended down the line, and the underwater visibility was good. At about 38m, I could suddenly see all the wreckage and Bob far below. It was an amazing sight and I excitedly hurried my descent to get down to it. There was three distinct wreckage parts, right at the edge of a reef. No wonder the sonar images were confusing. The wreckage blended with the coral reef outcrops. Sonar beams must have been bouncing everywhere between the wreckage and the coral. The coral reef then rose behind the wreckage to a mound. For safety, we usually move the drop line closer to the wreckage, but the drop line was spot on! It was about two meters from the blisters section. Great! No need to expend precious air contents moving it. The three parts were almost touching each other and were a blisters fuselage section, a wing piece and a cockpit/nose. I recognised it quickly as PBY-5 Catalina, and concluded on the spot that it was related to 'The House under the Sea' wreckage, which I had also been fortunate enough to be first to SCUBA dive in 2011. This was more of the dumping of VP-44 Catalina Side Number "44-P-8". The visibility was marvellous at about 20m which made the dive enjoyable. Bob swam around taking depth measurements for me. The depths recorded as 47.5–50m on the seafloor adjacent the wreckage. At that depth, the dive bottom time was very limited, so I hurriedly shot stills and video. The site was like a museum of Catalina parts. It was quite fun to swim around. All the sections are empty shells. I saw no equipment in the cockpit or blisters section. Just aluminium plating and framing. The cockpit is the most interesting piece, partially due to a forest of peculiar, white single-strand coral growing on it. It makes an interesting sight. Success! With much relief I departed the site and began the air decompression profile back to normal human habitat.*

On the 24 March 1943, in an exuberant display on departing the Halavo Seaplane Base after a tour of 'Dumbo' duty, 1st Lt. Jarlath J. "Jiggs" Lyons buzzed the establishment but when climbing out at a steep angle, both engines suddenly cut out. He managed to flick the big flying boat, (PBY-5, BuNo. 08136) around, but at the last minute hit the ocean badly, cart-wheeling the plane. Due to the extensive damage, the plane was subsequently written-off.

On our last day (in the Floridas) of an intense expedition, it was very satisfying to finally resolve this site. What an effort! What a cost!. It had taken three expeditions and seven years. Ewan named the site "The Catalina Garden". A lot of lessons learned.

***Figure 41 and 42**. The Catalina Garden. Left: The Blisters fuselage section, a piece of port wing (upside down), and the nose. The pieces are roughly orientated South to North. The edge of the reef is at the lower right. Right: Bob Norton diligently records depth readings and arrangement of the Catalina Garden. The white marine growth on the upright cockpit/nose section is quite a sight. The rectangular opening in the roof of the cockpit at the mid-right is the characteristic Consolidated emergency escape hatch allowing the radioman and navigator to flee from the compartment behind the cockpit. It is reasonable to assume this is more of Catalina 44-P-8, in which case, more wing, engines and tail may remain to be found. [31 August 2018].*

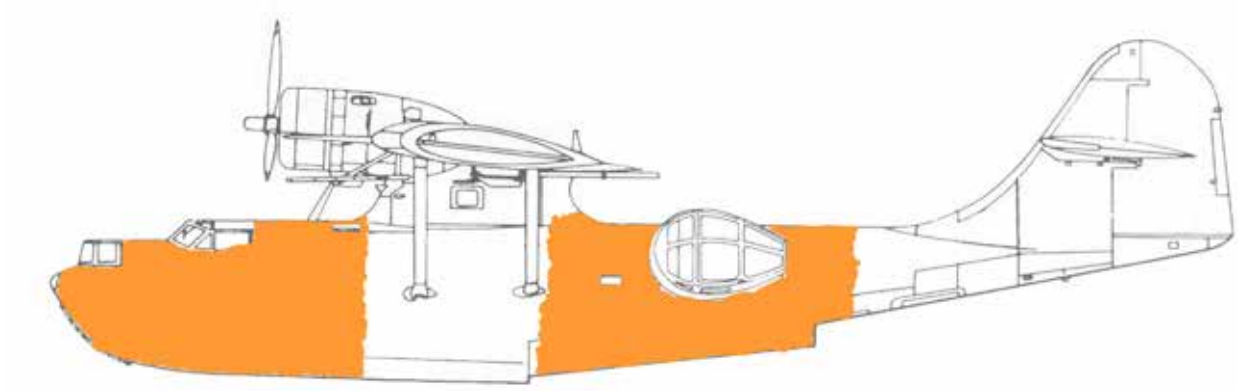


***Figure 43**. Profile of a Catalina highlighting the sections discovered. The mid-section was found previously in 2011 and named "The House under the Sea". The plane has been cut into sections to facilitate disposal.*

Tulagi Island, Raiders Hotel, Bob and Yvie Norton and their staff had been fantastic. We all wanted another month to keep discovering things, but reluctantly re-crossed Iron Bottom Sound to Guadalcanal for the last day of diving. This would be on two U.S. Navy ships.

The USS *Serpens* was a U.S. Navy cargo ship of the EC2-S-C1[12] type or more commonly known as a Liberty ship. Thousands of these large freighters were mass-built in just a few days during WWII in an impressive feat of U.S. production might. The *Serpens* was loading 2500 tons of Mk. 54 depth bombs under lights on the night of 29 January 1945 off Lunga Point when the ship's cargo exploded at 2318 hours. The huge blast rocked the island and jagged chunks of broken steel rained down all over the place, miles from the ship. Facilities ashore were damaged, vessels nearby were damaged, and pretty much the entire crew of 250 men, mostly U.S. Coastguardsmen, were killed in an instant. It was one of the greatest disasters of the Pacific War, yet remains largely unknown today. The ship's skipper survived – he was at an officer's party ashore at the time. Even less known is that the bow of the ship still exists, archaeological evidence of the tragic and historic event. It rests upside down in 38 meters of water. On Saturday 1 September 2018, we conducted a dive to gather archaeological evidence of the *Serpens* bow. The water was murky and conditions not great. The bow is smothered in black coral growth. Still images and video was obtained. Some interesting evidence of the huge explosion was recorded and the exact point of separation of the bow was determined. Both Matt Wray and Ewan Stevenson have conducted previous sonar searches for the remaining ¾ of the ship (including bridge, engine, shaft, propeller, and rudder), but not a vestige has been found so far.

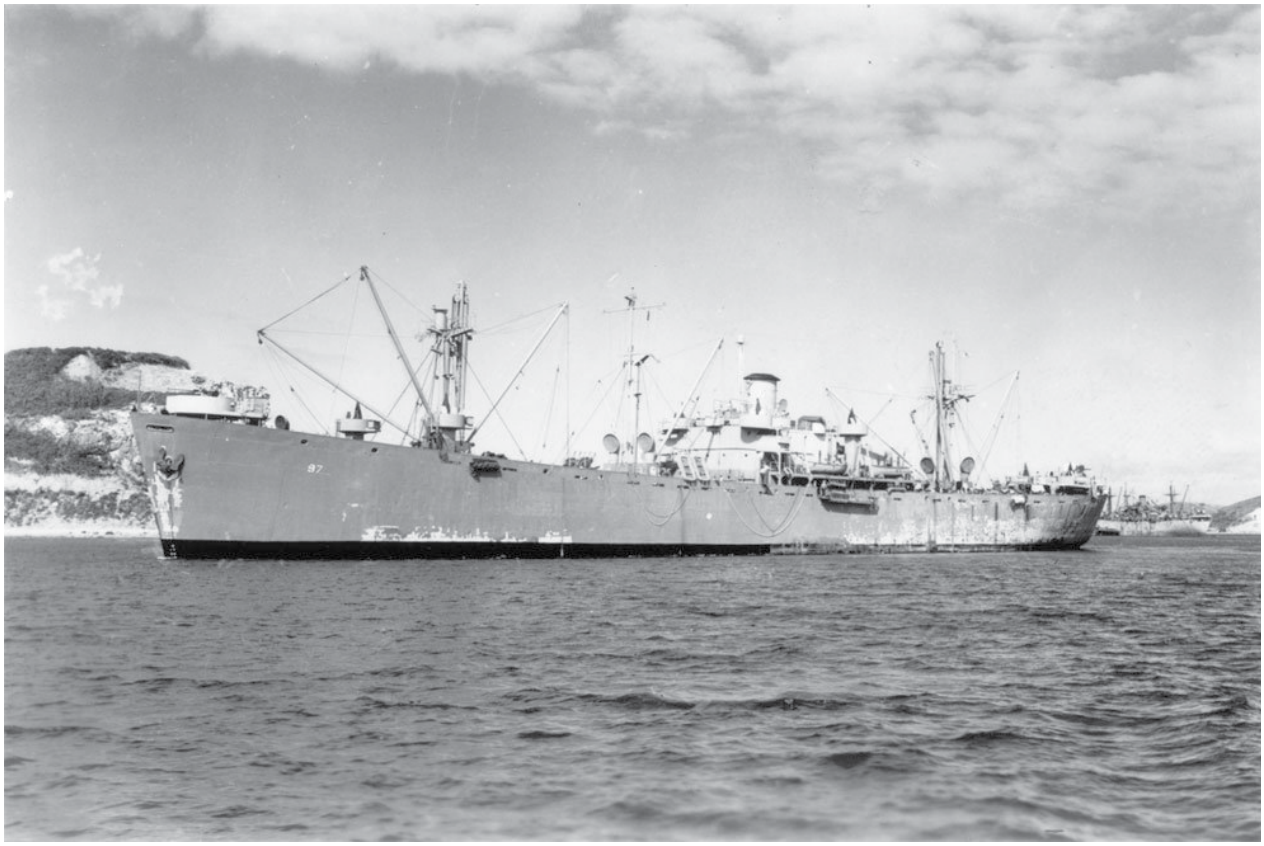


Figure 44. *The 7176 ton USS* Serpens *(AK-97) was built in a few days by California Shipbuilding Corporation, "Calship", Terminal Island, Los Angeles and destroyed in an instant off Guadalcanal. The ship was completed in April 1943 as the Benjamin N. Cardozo.*

Figure 45 and 46. *Left: In the murky depths off Lunga Point, Matt Wray examines the shattered starboard hawse pipe of the upside down bow of the USS* Serpens*. The* Serpens *is one of the largest MIA cases in the Solomons with 196 missing. It appears the blast from the explosion vented through the hawse pipe as this is severely cracked in this high-strength area, and peeled it outwards. Right: More evidence of a tremendous blast. This wrinkle in the starboard hull extends vertically from the keel to the bulwark and forms a massive 'buckle' in the hull plating.* ***[1 September 2018].***

Figure 48 and 49. *These maybe the first images ever taken of the USS* Seminole *archaeological site. Left: Dive operator Troy Shelley with the 3-inch/50-cal bow gun. Right: The fleet tug had a substantial tripod mast on the aft deck which is now home to juvenile yellow snappers.* ***[1 September 2018].***

Figure 47. A rare victim for the Imperial Japanese Navy – a U.S. Navy fleet tug. The USS Seminole *was the only U.S. Navy tug sunk by enemy gunfire during WWII in a very one-sided battle.*

After a surface interval in the warm sunshine on the dive boat from Tulagi Dive Company run by Troy Shelley from Honiara, we conducted a dive on the fleet tug USS *Seminole* (AT-65). This site was one of nostalgia for Ewan, as along with Brian Bailey and William Evo, he discovered the site in July 1994 and were the first SCUBA divers on it. It was believed by Ewan that no still images and very little video had ever been shot on this site, so that was the dive objective. In addition, Ewan wanted to check the condition of the wreck. He had last dived it in January 1999, nearly two decades ago. The site is at the mouth of the Ngalimbiu River, and as expected, the dive was murky. Vegetation debris was trapped about the wreck. The wreck lies on it's starboard side with main gun pointing upwards (to port). Video and still images were shot but not with great results due to the difficult conditions. It was our last dive of the expedition.

TABLE 3

SCUBA dives by Ewan Stevenson (Matt Wray similar)

Dive No.	Day	Date	Dive Time (minutes)	Max. Depth (metres)	Site
1	Sun	26 Aug	45	26.6	USS *Minneapolis* (CA-36) bow & RUFE wing
2	Sun	26 Aug	49	26.7	8-inch ammo & LCM-3
3	Mon	27 Aug	39	38.2	Munted Mavis (M1)
4	Mon	27 Aug	46	32.6	Phallic Mavis (M6)
5	Mon	27 Aug	38	40.7	LCM-3 with jeep cargo.
6	Tues	28 Aug	58	53.2	Large plane Gavutu Hbr. On GE mark.
7	Tues	28 Aug	44	44.3	The Gavutu Wildcat
8	Wed	29 Aug	53	41.0	The Sealark Wildcat. New discovery!
9	Thurs	30 Aug	42	41.4	The Sealark Wildcat. To record in photos/video
10	Thurs	30 Aug	41	52.3	The RES124 mark. Unsuccessful.
11	Fri	31 Aug	58	50.6	Catalina in three parts. New discovery!
12	Sat	1 Sept	41	37.7	USS *Serpens* (AK-97)
13	Sat	1 Sept	21	33.2	USS *Seminole* (AT-65). Initial drop.
14	Sat	1 Sept	40	34.1	USS *Seminole* (AT-65). Nailed it!

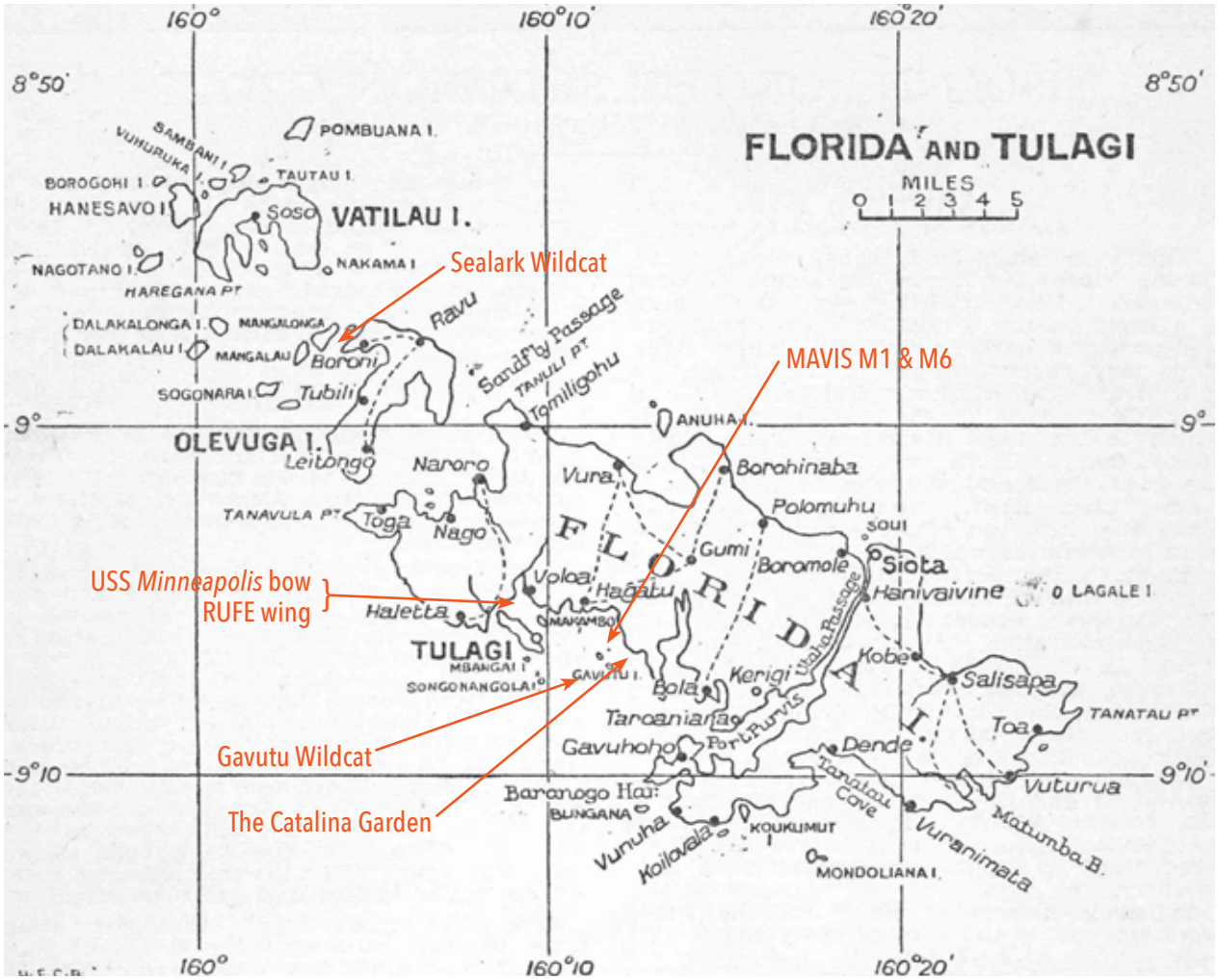


Figure 50. A 1944 map of the Florida Islands showing sites surveyed and discovered by Sealark Maritime Exploration Ltd in one week of Mission 18-1SOL.

Conclusion

Kiwis have an international reputation for getting the job done. This was an all-Kiwi team that assembled at Tulagi. In seven days, we found and surveyed a UXO site, the bow of the USS *Minneapolis*, a Wildcat, a Landing Craft, identified a Japanese float Zero wing, surveyed two MAVIS flying boats, discovered a new Wildcat site AND a new Catalina flying boat site, gained some excellent information on a MIA aircraft site, three further aircraft sites, and obtained additional archaeological data on the Guadalcanal wrecks of the USS *Serpens* and USS *Seminole*.

Regrettably, a couple of things didn't eventuate- relocating/surveying the bow gun from the USS *Kanawha* (which has been removed from the ship) and conducting the first archaeological survey of the remains of USS YP-346. In addition, we also hoped to archaeologically survey a previous fighter aircraft underwater find off Guadalcanal in 2016, (possibly a MIA site), but location information was not received in time.

Combining decades of historical research, background knowledge, previous expedition data, seamanship, proprietary UXO information, hydrographical knowledge, diving expertise and proven methodologies produced these results. These results in a very short timeframe speak for themselves of the capabilities of Sealark Maritime Exploration Ltd.

Recommendations

- A follow-up expedition to develop the MIA information
- A detailed survey of the other underwater UXO sites in the Tulagi area
- Raiders Hotel at Tulagi is an excellent base to work from. In general, any part of the Floridas Group is accessible in an hour or less by Bob Norton's boat, making daily excursions feasible.

Acknowledgements

Sealark Maritime Exploration gratefully acknowledges the contributions and generous sharing of knowledge from previous expeditions to the Florida Islands area:

- January 1999 Archaehistoria Expedition
- November 2011 RNZN Operation Calypso
- November 2014 Archaehistoria-Sealark Expedition
- February 2015 JPAC Mission 15-1BP
- April 2015 SPC Geosciences HI572 Tulaghi Harbour Training Survey
- November 2015 HMA Bill Grau work
- June 2018 Bent Prop Group 'Project Recover' Mission

The following made significant contributions and provided invaluable support:

Bob Norton and Yvie Ripo of Raiders Hotel, Belinda Botha of Dive Munda, Dorothy Wickham, Hamish McDonald, Paul Ryan, Fred Douglas, Troy Shelley of Dive Tulagi, Annabelle Hender, Emma and Heidi McAlpine, Ron Tyson, James C. Sawruk, Peter Flahavin, Richard L. Dunn, Gene Leslie, Timothy A. Duskin, Joyce Sake, Stephen Tau, Vincent Usi, Marriam Goa, Ben Mema, Ben Vulo, Benjamin Gora, George Harrison, Jonathon Parapara, Fiona Teama, Freda Unusi, Stan Stokes, Dr. Robert Thompson, Ryan Tira, Anthony Valenti.

Footnotes

1 MIA = Missing In Action

2 UXO = Un-Exploded Ordnance

3 Type 97 explosive is comprised of TNT (60%) and HND (40%).

4 The myth the bow wreckage at Tulagi was from the New Orleans was perpetuated by the Lonely Planet Travel Guide to the Solomon Islands, 3rd edition, published in August 1997. See map page 123, which indicates 'US Cruiser *New Orleans*' on the reef WEST of Sasape in upper Tulagi Harbour. On the following page, the statement "The sunken New Zealand minesweeper *Moa* lies 20m [actually 33-42m] down on the seabed between Sasape and Makambo Island. About 600m north-west is the wreck of the New Orleans, a US cruiser".

5 The explosive used is 'Type D' or Ammonium Picrate. It is much more insensitive to shock than TNT and will stand impact on armour plate without being deflagrated.

6 NFD = National Fisheries Developments Ltd

7 ROV = Remotely Operated underwater Vehicle

8 AHSO = Able rate Hydrographic Systems Operator

9 24ST = Aluminium Alloy No. 24, S = wrought form, T= heat treated for maximum temper

10 Pitot tube = Air speed measurement device

11 F4F-4 = Fighter, 4th type, Grumman, 4th version. (Grumman Model G-36B).

12 EC2-S-C1 = E for Emergency, C for Cargo, 2 for waterline length of 400-450 feet, S for steam machinery & single screw of the C1 ship design.

Tulagi area abounds in pre-war colonial sites, WWII wrecks & aircraft, abandoned WWII bases, UXO & MIA sites.

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