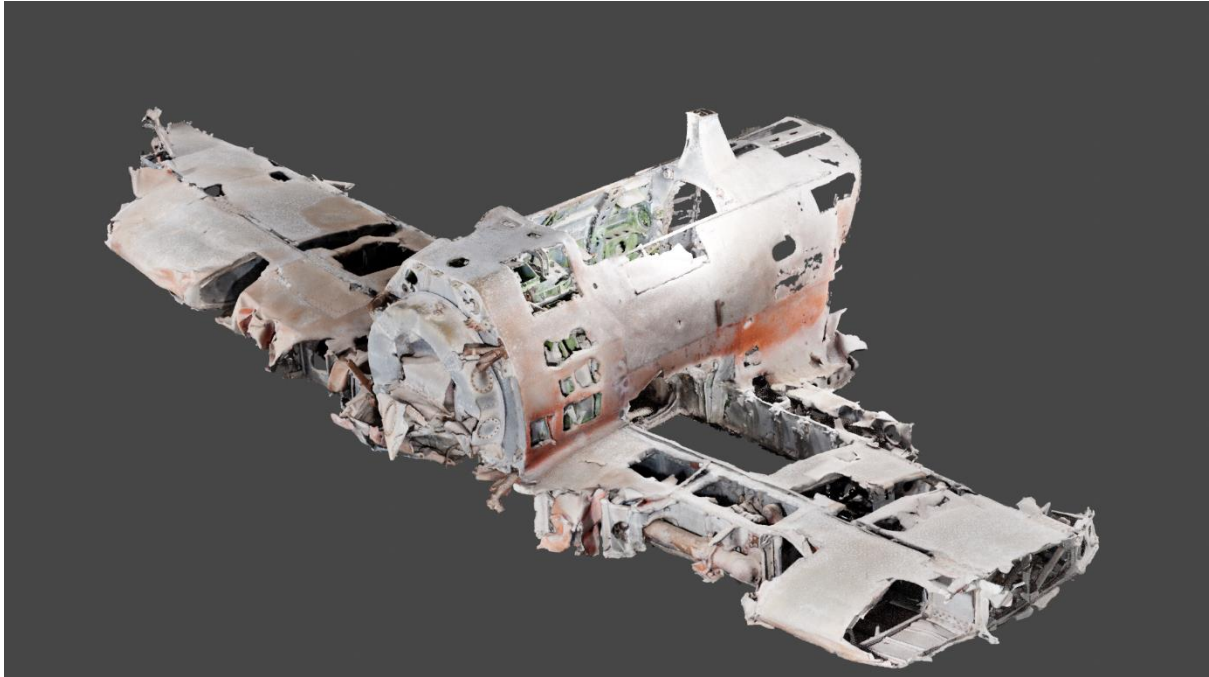


# **Archaeology and Anthropology of World War II Japanese Aircraft in Australia:**

The Case Study of Hajime Toyoshima's Zero



3D-Rendered Toyoshima's Zero (Created by the author)

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**A Thesis Submitted in Partial Fulfilment of the Master of Maritime  
Archaeology**

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**2023**

## **Declaration of Candidate**

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Hiroshi Ishii

March 2023

## **Abstract**

During World War II, the Imperial Japanese Navy (IJN) and Army carried out a series of air raids in northern Australia. The Bombing of Darwin by the IJN on 19 February 1942 was the largest foreign attack in mainland Australia since the colonisation of Australia by the British Empire. One of the IJN Zero fighters flown by a petty officer, Hajime Toyoshima, was forced-landed on Melville Island, north of Darwin. Later, he was captured by an Indigenous man, Matthias Ulungura, and became the first Japanese prisoner of war on Australian soil. This study examines historical records and remains of Toyoshima's Zero and related materials currently displayed in several museums around Darwin to answer the research question of why and how the utilisation of the wreckage of Toyoshima's Zero and related materials has changed over time. Close examination with photogrammetry recording of the wreckage shows characteristics of the early model of Mitsubishi M6A2b Model 21 Type 0 carrier fighter, as well as evidence for utilisation of this wreckage. Further, examinations of related materials indicate debatable authenticities. This study focuses on human interactions between Australians, which includes the Indigenous people, and the IJN technology.

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## List of Abbreviations

AHSNT (Aviation Historical Society of the Northern Territory)

DSLR (digital single-lens reflex)

IJA (Imperial Japanese Army)

IJN (Imperial Japanese Navy)

MAGNT (Museum and Art Gallery of the Northern Territory)

Mobile Fleet (First Mobile Striking Force) (often called the ‘Nagumo Force’)

NT (Northern Territory)

POW (prisoner of war)

RAAA (Royal Australian Artillery Association)

RAAF (Royal Australian Air Force)

RFDS (Royal Flying Doctor Service)

RSSAILA (Returned Sailor’s, Soldier’s and Airmen’s Imperial League of Australia)

US (United States)

USN (United States Navy)

VR (virtual reality)

WWII (World War II)

USAAF (United States Army Air Forces)

# 1. Introduction

## 1.1. Introduction

The Second World War has a significant effect on the current form of Australia. From 1942 to 1945, the Imperial Japanese Navy (IJN) and Army (IJA) conducted a series of air raids in northern Australia (Lewis and Claringbould 2020). It was the first time in post-colonial Australian history that foreign forces attacked actual Australian soil. Literarily, those attacks are fires on Australians' homes, which significantly contrasts the Great War and the Western Front of the Second World War – battles in faraway foreign lands. Those major threats, combined with naval attacks by the Japanese and German navies in Australian waters (Lewis 2010; McCarthy 2009a, 2009b, 2011; Smith 2008), have a undeniable influence on the identity establishment of Australia as an independent nation separated from the former suzerain state of the British Empire.

The first and largest Japanese air raid in Australia was the Bombing of Darwin on 19 February 1942. During the raid, one of the Mitsubishi A6M2b Model 21 Zero (Zeke) fighters flown from an IJN aircraft carrier *Hiryu* by Petty Officer Hajime Toyoshima was forced to land on the north-central part of Melville Island. Toyoshima survived the landing and left the nearly intact the Zero. He tried to communicate with Indigenous people, but he was eventually captured by them and later handed over to the Australian Army and became the first prisoner of war (POW) in Australia (Alford 2011:38–39). Despite his attempt to hide his Zero, the Royal Australian Air Force (RAAF) located the aircraft on 7 March 1942 and examined the wreck twice during the war (Wilby 2016:11).

What remains of Toyoshima's Zero is displayed at the Darwin Aviation Museum. Moreover, the aircraft propeller and a statue of an Indigenous man who captured Toyoshima are in the Patakijiyali Museum on Bathurst Island. Further, related materials from this event are displayed at two facilities around Darwin. The aircraft is the physical remains of the war between Australia and Japan, and the wreckage and related materials are significant mementos for Australian, Indigenous and Japanese history. Therefore, this study focuses on how Australians and Indigenous have utilised the wreckage of the Zero and related materials.

## 1.2. Research design

### 1.2.1. Research question

This study will focus on the IJN Mitsubishi A6M2b Zero fighter flown by Petty Officer Hajime Toyoshima and wrecked on Melville Island during the first Darwin Air Raids (Toyoshima's Zero) on 19 February 1942 to understand human behaviour on an enemy aircraft and related materials during and after the war. Why and how have utilisations of the wreckage of Toyoshima's Zero and related materials changed over time?

### 1.2.2. Research aims

To answer this question, this research aims to:

- Examine historical documents and records of Toyoshima's Zero and related materials;
- Record and analyse the current condition of the Zero in the Darwin Aviation Museum to positively identify it as Toyoshima's Zero and to observe any trace of utilisations;

- Observe related materials and displays in three museums and one tourist facility (the Darwin Aviation Museum, the Patakijiyali Museum, the Darwin Military Museum and the Royal Flying Doctor Service [RFDS] Darwin Tourist Facility);
- Interpret collected data to understand human behaviours towards materials related to the war.

### ***1.3. Methodology***

This research relies on two types of data: historical and field data.

#### ***1.3.1. Historical data***

Regarding historical data, this study focuses on secondary and primary sources such as military reports, civilian records and historical pictures to examine the chronological transition of the wreck. However, it is essential to remember that those types of information could be recorded from a subjective and biased point of view rather than an objective perspective, since they could be recorded for years after the event.

#### ***1.3.2. Field data***

Since the Darwin Aviation Museum granted this researcher access to the physical remains of Toyoshima's Zero, manual and digital recordings of the Zero will be utilised. This research applies manual and photography measurements and 3D photogrammetry for digital recording. Further, this study will investigate the displays and exhibitions of Toyoshima's Zero and related materials in three museums and one tourist facility as actual data of their narrative and interpretation to understand the human utilisation of an enemy aircraft related to the war.

### ***1.4. Study area***

This study mainly focuses on the post-wreck and post-depositional periods of Toyoshima's Zero, including current conditions and museum displays. Additionally, the historical context of the Second World War, the Bombing of Darwin and the Mitsubishi A6M Type Zero fighter will be provided here to contextualise Toyoshima's Zero.

### ***1.5. Significance***

There are several Second World War Allied aviation archaeology studies in mainland Australia (Ford 2006; Jung 2001, 2008; Wilkinson 2012). However, only a few archaeological studies about Japanese aircraft in Australia exist (Northern Territory Government Heritage Branch 2010; Wilby 2016, 2017). Therefore, this study contributes to the further archaeological and cultural study of Japanese aircraft in mainland Australia.

Aviation archaeology generally tends to emphasise aviation's military and technological aspects. However, this research mainly focuses on interactions between aviation material and people after the wreckage. Therefore, this research is an effort to expand the realm of aviation archaeology to not only aircraft, airmen and their support facilities but also the afterlife of an aircraft and its second and third life and related materials. In other words, this research is an archaeological and anthropological study of war and aviation.

Additionally, since Toyoshima's Zero landed on Indigenous land, the wreckage has shared cultural heritage between Japanese, Australian and Tiwi people. This research focuses on the transition of such historically shared icons and can provide new insight into a combination of aviation archaeology and modern conflict archaeology.

### ***1.6. Limitations***

From the Australian perspective, archaeology of the effect of Japanese air raids on Australia can be a much more comprehensive range of study areas, which can be categorised into three major categories. The first category is the archaeology of physical damage caused by raids, such as the Allied shipwrecks and aircraft wreck sites (Jung 2001, 2008; Steinberg 2009, 2015) and bomb craters (Jung 2014). Archaeology of war preparation-related airspaces, such as radar stations (Hobbins 2019) and air-raid shelters around Australia, is the second category. The remaining RAAF training efforts fall into this category (Ford 2006; Hobbins 2019). The third category is the archaeology of discarded aircraft (Smith 2004).

However, this study only focuses on Japanese aircraft and Toyoshima's Zero because of time and budget limitations as an independent master thesis project. Additionally, as this is an independent study, accessible equipment and human resources are limited. Further, according to local aviation historian Bob Alford, most wreck sites in the Northern Territory (NT) are in remote private property areas and are protected. Therefore, field surveys were not conducted during this study.

### ***1.7. Chapters outline***

This chapter has introduced the main research question and aims. Further, this study's methodologies, study areas, significance and limitations have been briefly reviewed.

In Chapter 2, the literature review chapter, a brief history of Japan leading to the Bombing of Darwin, an overview of the Bombing of Darwin, the concept of modern conflict and aviation archaeology, and previous studies of the Bombing of Darwin will be explored to provide the context of this research.

In Chapter 3, the methods chapter, desk assessment and field survey methods, which include 3D recording and observations of museums, as well as overviews of those museums, will be explained to provide details of the methodologies this study implements.

In Chapter 4, the results chapter, details of information gathered during the desk survey and field survey, which includes the current condition of Toyoshima's Zero and presentations of related materials in museums, will be provided as results.

In Chapter 5, the discussion chapter, Toyoshima's pistol, the identification and current condition-related human utilisation of the Zero, related materials and their representations in museums, and the interpretation of those data, will be discussed.

In Chapter 6, the conclusion chapter, a summary, significance and limitations of this research, as well as recommendations for future studies, will be delivered.

## 2. Literature review

### 2.1. Introduction

In this chapter, the history of modern Japan until the Bombing of Darwin will be described to place this research into its broader context. Additionally, this chapter will summarise the Bombing of Darwin. Further, later in this chapter, the concept and theory of conflict and aviation archaeology will be explored, and how those theoretical frameworks were applied to previous archaeological studies of the Bombing of Darwin will be examined.

### 2.2. A brief history of modern Japan

During two centuries of the *Sakoku* ('closed country') period, Japan witnessed Russian expansion in the north as well as Western intrusions into China in the mid-nineteenth century (Lockwood 1954:7). Commodore Matthew Perry, who received a mission to force the opening of Japan from the thirteenth US president Millard Fillmore, arrived on the Bay of Uruga in 1853 with black steam warships. This event led to the end of Japanese feudalism, ruled by samurais (Feifer 2006).

After the Japanese Civil War (also known as the Boshin War) in 1867 and Meiji Restoration in 1868 (Jansen 2002:295–332), the newly-born Meiji Japan government rapidly adopted Western technologies, political systems, cultures and customs under the slogans *Bunmei kaika* ('civilisation and enlightenment') and *Fukoku kyohei* ('rich country, strong army') (Jansen 2002:456–494). That radical westernisation of Japan led to the rise of Japanese imperialism. Through the First Sino-Japanese War (1884–1885) and the Russo-Japanese War (1904–1905), imperial Japan expanded its territories in the far east (Jansen 2002:414–455).

### 2.3. Before the Bombing of Darwin

In 1884, 12 Japanese pearl divers arrived in Darwin. The Japanese population rose with the pearl industry in Darwin (Powell 2007:2). German power was a primary concern for Australian national security because of the German colony in New Guinea until the Great War (Powell 2007:1). Since Japan was an ally of the British Empire during the Great War, the IJN actively took German power from the Western Pacific Region after the war.

After the Great War, in 1923, Britain made a defence strategy shift called the 'Singapore strategy', which was a fortification of Singapore against the rising IJN (Powell 2007:4). Any threats for Australia were supposed to be against the Royal Navy at Singapore first due to this strategy (Lewis and Ingram 2013:26). Darwin became the reserves storage depot for navy fuels but not a significant naval base because of the Singapore strategy (Powell 2007:5). The construction of the Darwin military defence, however, started in the mid-1930s. In 1936, four 6 inch guns and two anti-aircraft guns were settled with a small garrison on the coast. Further, in 1940, a boom defence was established at the harbour entrance to protect oil tanks from navy intrusions, such as submarine attacks and torpedo attacks (Lewis and Ingram 2013:28–29).

When Japan attacked the Allies on 8 December 1941 at Malaya and Pearl Harbor, Japan already had been in a long-lasting war against China since 1931, the Mukden Incident (Barnhart 1987:32–33) and the 1937 Marco Polo Bridge Incident (Barnhart 1987:18). From the invasion of Malaya, the Japanese expanded their territory in Southeast Asia from north to

south. On 10 December 1941, newly-built Royal Navy battleships HMS *Prince of Wales* and HMS *Repulse* played a significant role in 'Force Z', a British naval squadron for the far east, and they were sunk by IJN bombing aircraft within two hours. This defeat showed that the Japanese had developed aircraft beyond British expectations and were capable of using their aircraft as effective naval weapons (Charrier 2003:223).

The absence of British forces in Southeast Asia led to an Australian political shift towards the United States (US) as a reliable ally. In the New Year's address of 1942, printed in *The Herald* on 27 December 1941, former Australian prime minister John Curtin stated that:

Without any inhibitions of any kind, I make it clear that Australia looks to America, free of any pangs as to our traditional links or kinship with the United Kingdom ... we shall exert all our energies towards the shaping of a plan, with the United States as its keystone, which will give our country some confidence of being able to hold out until the tide of battle swings against the enemy.

This is the moment described by some as the turning point for Australia, and the time Australia started to disengage from the British Empire (Day 2008:129–130). The lack of naval defence led to the surrender of the Allies in Singapore on 15 February 1942, four days before the Bombing of Darwin (Lewis and Ingram 2013:59; Moremon and Richard 2002:121). Former British prime minister Winston Churchill (1951:81) described the fall of Singapore as 'the worst disaster and largest capitulation in British history'. A renowned Australian author, Thomas Keneally, explains that 'the fall of Singapore ended post-colonial delusion that Australians can have their foreign policy as the United Kingdom has' (National Museum of Australia 2022). Therefore, Australia shifting towards the US as an ally is one of the defining moments in Australian history.

Parallel to the Malayan campaign, Japanese forces continued their advances southwards. On 23 January 1942, Japan captured Kavieng on New Ireland and Rabaul on New Britain Island in the Bismarck Archipelago of (Papua) New Guinea (Moremon and Department of Veterans' Affairs 2005:4–5). On 24 January 1942, Japan captured an airfield in Kendari and, on 3 February 1942, took the airfield of Ambon in the Netherlands East Indies (modern-day Indonesia) (Powell 2007:61). To support its campaigns, the IJN dispatched submarines to Australian waters; one of those – I-124 – sunk during a mine-laying operation for Port Darwin on 20 January 1942 (Lewis 2010; Powell 2007:70). I-124 remains relatively intact on the seabed between Darwin and the Tiwi Islands, and the Australian Government protects it as a heritage site (McCarthy et al. in press).

#### **2.4. An overview of the Bombing of Darwin**

After the success of the Pearl Harbor attack, the Japanese carriers of the First Mobile Striking Force ('Mobile Fleet'), led by Vice Admiral Chuichi Nagumo, became the most dominant naval force in early 1942. Although the Mobile Fleet is often called the 'Nagumo Force', later historians evaluate Nagumo as a 'largely passive and not terribly innovative' commander (Parshall and Tully 2005:17). Nagumo was fortunate to have talented young officers in his force who were responsible for the successful attacks on Pearl Harbor and Darwin. In particular, Commander Minoru Genda should be noted as a brilliant air officer who integrated the carriers' commanders and played a significant role in the Pearl Harbor attack. He is also credited with providing the main design of the Bombing of Darwin (Lewis and Ingram 2013:50–51).



#### 2.4.1. *Raid 1*

On the morning of 19 February 1942, 188 IJN aircraft – which are a combination of 36 Mitsubishi A6M2 (零式艦上戦闘機二一型) ‘Zero (Zeke)’ fighters, 71 Aichi D3A1 (九九式艦上爆撃機一一型) ‘Val’ dive bombers and 81 Nakajima (九七式艦上攻撃機) ‘Kate’ bombers – attacked Darwin (Lewis and Ingram 2013:286). Those aircraft came from four carriers led by Vice Admiral Chuichi Nagumo – *Hiryu*, *Soryu*, *Kaga* and *Akagi* – 220 miles northwest of Darwin. On that day, Nagumo’s fleet comprised 17 warships totalling 175,000 tons (Lockwood 2013:15).

Before the Japanese force reached Darwin, at 9:05 am, a PBV-5 Catalina from the United States Navy (USN) Patrol Wing 22 was shut down by nine Zeros at northwestern offshore Bathurst Island (Alford 2011:31). An off-service United States Army Air Forces (USAAF) C-53 at the RAAF Advanced Operational Base on Bathurst Island was also attacked by Zeros (Lewis and Ingram 2013:97).

At 9:35 am, Bathurst Island missionary Father John McGrath sent radio messages from his shack in the mission to the coastal station until his evacuation from Japanese machine-gun attacks (Alford 2011:31; Lewis and Ingram 2013:96; Lockwood 2013:28). Nine Zeros left the main force and headed to Darwin directly from the north. The main force flowed inland from northeast Darwin and approached Darwin from the south. Both Japanese forces began to attack Darwin at 9:57 am (Lewis and Ingram 2013:98).

Kates equipped with 800 kg bombs and Vals equipped with 250 kg bombs dropped a total of 82,800 kg of bombs during the first raid (Lewis and Ingram 2013:88). Their primary targets were merchant and navy ships in the harbour and port facilities, such as Stokes Hill Wharf and oil tanks. Some bombs hit the city area and destroyed a post office, possibly because of overshoots (Lewis and Ingram 2013:82–83). Twenty-one ships in the harbour were heavily damaged or sunk during the raid. The exact number is uncertain, but the first raid killed at least 252 people and injured 350 (Alford 2011:34).

The first Japanese aircraft lost was a Val dive bomber from *Kaga* flown by Flyer Petty Officer First Class Takezo Uchikado and Fleet Chief Petty Officer Katsuyoshi Tsuru. This Val crashed near Ironstone Knob (Alford 2011:37). Two bodies were buried on the site and, later the year, moved to the Berrimah War Cemetery, east of Darwin. Currently, they are buried at Cowra War Cemetery in New South Wales. The second Japanese aircraft lost was a Zero fighter from *Hiryu* flown by Flyer Petty Officer Third Class Hajime Toyoshima – it crashed on Melville Island (Alford 2011:38). Details of Toyoshima will be discussed later in this chapter.

#### 2.4.2. *Raid 2*

Over one hour after the first raid, 54 land-based bombers started to bomb Darwin nearly noon. Those are a combination of 27 Mitsubishi G4M1 (一式陸上攻撃機一一型) ‘Betty’ bombers from Kendari in Sulawesi and 27 Mitsubishi G3M1 (九六式陸上攻撃機一一型) ‘Nell’ bombers from Ambon on the Maluku Islands in the Netherlands East Indies. Their main target was the airport. The Nells were equipped with a total of 318 60 kg bombs, and the Bettys were equipped with a total of 212 60 kg bombs and a single 250 kg bomb (Lewis and Ingram 2013:233).

### 2.4.3. Toyoshima

After the first raid, on the way back to the aircraft carrier *Hiryu*, one of Zero fighters – No. 5349, tail number BII-124, flown by Flyer Third Class Hajime Toyoshima – was forced to land on Melville Island because of the propeller he lost. He successfully landed the Zero with gears but badly injured his head (Alford 2011:38–39).

He wandered the island for a few days and encountered Indigenous women. He tried to communicate with them but failed. Eventually, he was captured the next day by a young Aboriginal man, Matthias Ulungura (Ngapitatulawai), and then he was handed over to the Australian Army. Toyoshima became the first Japanese POW on Australian soil (Lockwood 2013:153). He said he was an air gunner from Ambon and his name was Tadao Minami. He died during the infamous Cowra prison breakout in New South Wales on 5 August 1944 (Powell 2007:91).

## 2.5. Archaeology of conflict

Among anthropologists and archaeologists, there are arguments that war is either human nature or not (Ferguson 2018). Archaeologists almost always find signs of conflicts and wars if there is a good amount of research on any ancient society (LeBlanc and Register 2004:7–8). Further, memories of conflicts and wars dominate early human written historical records worldwide (Vencl 1984:117). In his book *War Before Civilisation: The Myth of the Peaceful Savage*, Lawrence Keeley (1996) argues the view of the ‘pacified past’ as ignoring attitudes of violence among archaeologists and anthropologists towards the prehistoric period despite widespread evidence. It depends on the definition of war, but an American political journalist, Norman Cousins, estimated that humans have had more than 14,500 wars between 3600 BC and the current day and lost more than 3.5 billion lives because of those wars (Beer 1981:20).

Early attempts at the archaeology of war can be traced to 1842 England by Edward Fitzgerald, who investigated the landscape of the Battle of Naseby in 1645 during the First English Civil War (Foard 1995:354–357). Around the same period, Richard Brooke (1857) attempted to locate where the Battle of Stoke Field took place during the Wars of the Roses in 1487. Their primary interests, however, were *where* those battles occurred rather than what they could find on those battlefields and what that material remains could provide (Carman 2005:216).

Despite those early attempts, the archaeological study of historic battlefields is relatively new (Carman 2005:215). Battlefield archaeology came into being in the 1980s as a subfield of historical battles on terrestrial and submerged sites (McKinnon et al. 2020:3). Especially intensive works on the Battle of Little Bighorn site, Montana, in the 1980s by Douglas D. Scott and other scholars are noteworthy in that this was the first instance of using metal detectors to locate fired bullets (Carman 2014:812). The development of metal detectors and other geophysical instruments allowed archaeologists to see what remained beneath battlefield soil (Scott and McFeaters 2011:104), leading to the beginning of battlefield archaeology.

The term ‘conflict archaeology’ as an archaeological study of war and conflict has been widely accepted since the dedicated journal was titled (i.e., *Journal of Conflict Archaeology*), and it is in the subtitle of the Fields of Conflict Conference, which is a biennial conference series that was first held at the University of Glasgow in April 2000 (Freeman and Pollard 2001). The term conflict archaeology was suggested after a discussion at the Fourth Fields of Conflict Conference in Leeds in 2006. The discussion was that the term ‘battlefield

archaeology' is too narrow for studies of broader subjects, such as military bases, logistics, POW camps and war graves (Carman 2013:10). Some scholars, however, prefer to use more specialised terms such as 'combat archaeology', 'military archaeology', 'occupation archaeology' and 'Holocaust archaeology' (Carman 2013:10–12; 2014:812–813).

Conflict archaeology communities are generally divided into periods such as prehistoric, historic battlefields and modern conflict. Nationality further divides historic battlefields and modern conflict within conflict archaeology (Carman 2013:2). These divisions, however, result in a narrow and fragmented focus, and they focus too much on specific periods and nationalities (Carman 2013:21). This is a valid criticism of conflict archaeology in general. The field should encourage more comprehensive and multinational approaches, since conflicts tend to occur among at least two states or ideologies due to accumulated pasts.

## **2.6. Modern conflict archaeology**

Among amateur enthusiasts, the material remains of modern conflict have been their primary interest, such as the work of Henry Wills (1985), a British journalist and photographer, titled *Pillboxes: A Study of UK Defences 1940*. The anniversaries of two world wars and the end of the Cold War in the 1990s, however, brought the notion of heritage management and archaeological interest into modern conflict remains (Carman 2013:16–17). There are two significant reasons modern conflict archaeology, which focuses on conflict in the twentieth century and later, is more complex than and separated from prehistorical and historical battlefield archaeology.

The first reason is that technology has changed the characteristics and scales of modern conflicts. Saunders (2012:x) describes 'the nature of modern wars as conflicts of industrialised intensity'. By using science, humanity made tremendous progress in technology in the twentieth century. Such a technological leap caused massive distractions, however, and cost an unprecedented amount of human lives and suffering, especially during the First and Second World Wars. Wars were no longer fought on conventional battlefields but moved to densely populated cities that became targets of strategic bombings and frontlines. This is known as the rising of total war, which led to the inclusion and substantial involvement of civilians in conflicts and battles. This type of escalation then affects the material culture related to such conflicts, which is why modern conflict archaeology sets itself apart from the earlier periods of battlefield archaeology (Schofield et al. 2002:2).

The second reason is that modern conflicts are relatively close to the present compared with prehistorical and historical warfare. The people (and their relatives) who had been a part of and affected by recent modern conflicts are still alive. Therefore, modern conflict archaeology is complicated because it is part of living memories (McKinnon 2015b:2). McKinnon (2015b:2) states further that modern conflict archaeology:

involves recent or existing political and social strife and can involve ethnic and social issues of power struggles and inequality. This makes the investigation, interpretation, and protection of such sites more difficult and sensitive.

Modern conflict archaeology is thus an 'anthropologically informed multidisciplinary endeavour' (Saunders 2012:x).

Schofield addresses two challenges that modern conflict archaeology faces. The first challenge is whether archaeology, as a discipline, is adequate to examine the modern period.

The second challenge is whether archaeology can contribute to well-documented pasts (Schofield 2005:28). In other words, modern conflict archaeology tests the relevance of archaeological methods and theories towards the contemporary past. Further, it provides different views of the recent past, such as ‘making the familiar unfamiliar’ (Buchli and Lucas:2001), as contemporary archaeology described (Schofield 2005:28–34).

### ***2.7. The material culture, memory and meaning of modern conflict***

In his book *Combat Archaeology: Material Culture and Modern Conflict*, John Schofield (2005) uses logical steps called the ‘management cycle’ as a heritage management term to understand modern conflict archaeology. The first step is the identification of the material culture of modern conflict. Then the second step is interpreting why it matters and to whom. Further, the third step is managing how this material culture can be protected (Schofield 2005:9).

Because of the wide variety and quantity of material culture of modern conflict, identifying it could be chaotic. However, Schofield (2005:42–43) attempts to categorise the material culture of modern conflict below the list for accessibility and simplicity with the notion of limitations:

- Landscape – in the sense of impacts upon the landscape and influences over it;
- Buildings;
- Monuments (i.e. places that no longer have a use as buildings; places that have gone out of use);
- Memorials;
- Vehicles, vessels and aircraft;
- Artifacts;
- Voices (oral historical evidence);
- Words (written sources);
- Photographs and film; and
- Artistic expression.

The landscape is the broadest range of terms into which the material culture of modern conflict fits. The cultural landscape of modern conflict is not only areas directly involved in warfare but also areas affected by warfare. Further, those landscapes exist physically and psychologically (Schofield 2005:43–44). For example, in northern Cape York Peninsula in Queensland, there are World War II (WWII) aircraft crash sites that Indigenous people protect. They believe the lost airmen’s spirits belong to their land and are embedded in their cultural landscape (Greer et al. 2002:272–273). These Indigenous people have included WWII-era hardships in their dance expressions until today (McIntyre-Tamwoy 2002:175–176).

The material culture of vehicles, specifically aircraft, will be discussed as part of aviation archaeology later in this chapter. Further, other material cultures, such as artefacts, photographs and words (documents), will be explored and discussed in Chapters 4 and 5.

### ***2.8. Aviation history and two world wars***

Humankind has always been fascinated by the sky and has had dreams of flying freely. There were countless attempts and failures before the Wright brothers first crewed and powered a

flight on 17 December 1903 (Mondey and Taylor 2000:9–14). These newly-developed flying machines quickly found their way into wars. Especially during the Great War, aircraft played essential roles, from reconnaissance to bombings (Mondey and Taylor 2000:20–26). The development of aircraft continued after the Great War. Subsequently, aircraft caused massive battles and distractions during the Second World War, such as strategic bombings of major cities in Europe and Asia and the atomic bombings of Hiroshima and Nagasaki.

After WWII, scattered aircraft remaining in foreign countries were scrapped under the US and the United Kingdom (UK) governments (Lickliter-Mundon 2018:8). In the case of Japan, the majority of IJN and IJA aircraft were systematically disposed of, destroyed and scrapped by the Allies' occupying forces. A small portion of them was taken for technological research and investigation by the Allies. The Occupation Forces 'made certain that there were no Japanese planes in operational existence in the four home islands' (MacArthur 1994:135).

The US and the UK government-funded aviation museums were opened in the 1960s and 1970s, and the aircraft conservation movement started when the Second World War veteran pilots started retiring. Further, private aviation collections and non-profit aircraft galleries started to open to the public in the 1980s and 1990s. Further, vintage aviation collectors and enthusiasts were actively collecting and looting materials from the 1950s to the 1990s (Lickliter-Mundon 2018:8). Even in the twenty-first century, the looting of aircraft wreck sites, such as the case of the Swamp Ghost in 2006 when an Australian salvager attempted to transport USAAF B-17 illegally from Papua New Guinea, is still a problem (Darnton 2007; Veronico 2013).

## ***2.9. Aviation archaeology and its stakeholders***

Aviation archaeology is a relatively new subfield of archaeology, and it is still in a premature state and 'begins by understanding deposition and site formation processes', which is similar to the way in which the nautical (maritime) archaeology developed (Lickliter-Mundon 2018: ii, 7; Ford 2006:10). The concept of investigating aircraft crash sites as archaeological sites appeared in the late 1970s, but the focus was aircraft restoration, sale or both (Ford 2006:9). When amateur investigators reported aircraft wrecks beside Spanish Armada wrecks from the late 1970s to early 1980s, Gould (1983:117) criticised this, as most archaeology conducted on aircraft has remained 'relic-orientated'. Despite the desire to find and identify missing pilots and crews or recover materials from wreck sites, 'until recently, people have not been interested in the archaeological potential of aviation sites' (Ford 2006:10).

Aviation archaeological theories and methodologies, such as site characterisation and site formation processes, developed from the late 1990s to the 2000s, particularly in Australia. At the same time, archaeologists and conservators put effort into conserving aircraft and wreck sites, especially in cases underwater (Fix 2011:989–990). The majority of the interests of aviation enthusiast groups still remains in the restoration of aircraft, however, which is described as the 'Frankenstein fabrication process' by Fix (2011:990–992) because of the combination of modifications of old remaining parts and fabrications of new parts based on often inaccurate information, and the damage on historical accuracy and values of aircraft remains.

The problem with aviation archaeology is that the definition can differ among stakeholders based on their interests and priorities. Lickliter-Mundon (2018:10–11) divides stakeholders involved in developing aviation archaeology into four groups: academia, federal, professional

and enthusiast. Such various descriptions and activities prevent aviation archaeology as an international academic endeavour from joining mainstream archaeology (Fix 2011:998–999).

## ***2.10. Previous archaeological studies of the Darwin Air Raids***

### *2.10.1. Flying boat wrecks in Darwin Harbour*

One of the earliest attempts that focuses on the archaeological investigation of aircraft in Australia is Michael McCarthy's report in 1997 about the possibility of locating, salvaging and conserving one of the four Catalina flying boats ('Black Cats') scuttled off Rottneest Island, Western Australia, during WWII. In his report, McCarthy (1997) argues the archaeological potential of those wrecks. The most significant work in aviation archaeology in Australia and one of the earliest studies on such underwater archaeological remains was undertaken by Silvano Jung in 2001 and is titled 'Wings beneath the sea: The aviation archaeology of Catalina flying boats in Darwin Harbour, Northern Territory'.

In his research, Jung attempts to identify Catalina flying boat wreck sites in East Arm, Darwin, which is approximately 7 km southeast of the City of Darwin. Those wrecks are some combination of three USN Catalinas, sunk during the Bombing of Darwin on 19 February 1942, and four RAAF Catalinas, which were lost in 1945, later the war (Jung 2001:3–4). Jung (2001:1) combines historical and archaeological studies to demonstrate that 'aircraft wrecks can provide as much information about past human behaviour as a shipwreck site'. His research is, therefore, an investigation as well as a demonstration of the relevance of aviation archaeology as a research method.

As a result, Jung identified five of the six surveyed wreck sites – three of the four RAAF Catalinas and two of the three USN Catalinas. One of the USN Catalinas is classified as the PBV-4 model, but it is not possible to positively identify this aircraft because the USN lost two of the PBV-4 type Catalinas (Jung 2001:188–189).

In 2008, an unknown object was found during a side-scan sonar survey due to a liquid nitrogen plant project in East Arm, Darwin. Later, this object was confirmed by the Heritage Branch, Northern Territory Government, as the last missing USN PBV-4 Catalina. Since the wreck was a forgotten site, it is probably an undisturbed, and the best-preserved, Catalina wreck in Australia (Jung 2013:52–65).

### *2.10.2. Shipwrecks in Darwin Harbour*

In his paper in 2009, David Steinberg explores salvage efforts that were performed both during and after the war on Allied ships that were sunk during the Bombing of Darwin. He mainly focuses on salvage operations conducted from 1959 to 1961 by the Japanese Fujita Salvage Company. Steinberg (2009:11) argues that Ryugo Fujita, the company's owner, operated salvages as 'making amends for the war' and 'unofficial reparation' even though it was profitable as a result.

After the raid in 1942, there were both government and commercial companies, such as Carl Atkinson before Fujita, performing salvage operations. Most of the wrecks remained, however, as shipping hazards and obstacles to developing the harbour until 1959. Steinberg mentions the view that the local government in 1959 only saw wrecks as shipping hazards and not as war memorials. After their successful operations in Japan, Palau and the Philippines,

the Fujita Salvage Company team arrived in Darwin in July 1959 as 120 crew aboard three ships and with a tugboat (Steinberg 2009:12–14).

During their operation, they refloated *British Motorist* and entirely salvaged the Royal Australian Navy lugger *Maive*. Further, they partially salvaged *Meigs*, *Mauna Loa*, *Zealandia*, *Kelat*, *Peary* and *Neptuna*. A total of 12,250 tons of scrap was collected. Fujita stated that those salvages were the most challenging and inefficient he had ever had because of tides and poor visibility. They lost their best diver, Sanzo Hayashi, underwater during one of the operations (Steinberg 2009:15). Despite those conditions and no commercial profitability, Fujita salvaged US Clemson Class Destroyer *Peary* without charge as a ‘gesture of goodwill’ and compensation for war damage caused by Japan (Steinberg 2009:17).

Although it was only 14 years after the war’s end, there was little hostility to Japanese salvors recorded. It could be because Japanese pearl divers had already returned to Darwin, and the local community had respect for their dangerous salvage operations (Steinberg 2009:16). It might be because the vast majority of civilians were evacuated from Darwin when the raid happened, and they did not directly see the effects of the war. Salvors donated 50 brass crucifixes made from scrap to the local United Church as a gesture of peace (Steinberg 2009:16).

There are still ship floors and some cargo remains left on the seabed of the harbour. Those remains still have archaeological value to provide regarding their role in the war, the effects of the bombing and the following salvage operations. Fujita’s salvages themselves also have archaeological value, since they can provide ‘significant insight into both maritime related behaviours and broader social and cultural processes’ (Steinberg 2009:17).

In 2015, Steinberg published a study on Fujita’s salvages. The son of Ryugo Fujita, Senichiro Fujita, who also participated in salvage operations, visited Darwin in 2010 and donated photographs, film and written records about the operations to the Northern Territory Library. Further, Steinberg interviewed Fujita and recorded his oral history. That information gives more details about Fujita’s salvation (Steinberg 2015). New information about Ryugo Fujita’s grave in Japan, which displays a propeller blade from the United States Army Transport *Meigs* shipwreck, illustrates the strong connection between Ryugo Fujita and those wrecks.

## **2.11. Conclusion**

At the beginning of this chapter, the history of modern Japan was summarised to explain the reason behind Japanese aggression in the first half of the twentieth century. Second, the situation between Australia and Japan before the Bombing of Darwin was explored to grasp why the IJN attacked Darwin in the first place. Further, an overview of the Bombing of Darwin was provided to give the scale of the event and the context.

The latter half of this chapter explained the concept of conflict archaeology. Further, the latter half of the chapter also explored the characteristics of modern conflict archaeology (the material culture, memory and meaning of modern conflict), why it is separate from other periods, its challenges and its theoretical framework. Additionally, the concept and characteristics of aviation archaeology were summarised. Last, two previous archaeological works about the Bombing of Darwin, which will be explored in this research later, were provided to examine the potential of aviation archaeology and modern conflict archaeology.

## 3. Methods

### 3.1. Introduction

This chapter will discuss all methods that were used to obtain data during this research. First, methods of desk assessment will be explained. Next, the methods and all the details of the field survey, including the 3D recording method of the aircraft and overviews of the museums, will be explained. Last, the limitations of this survey will be discussed.

### 3.2. Desk assessment

Before the field survey in Darwin, desk-based research was conducted to gather all available written historical records, photographs and films to understand interactions between people and the Zero. As many primary sources as possible were collected during surveys to achieve historical accuracy, but secondary source records were also collected so that the broader contexts of utilisations of the wreck and related materials could be examined. The types of primary sources obtained during surveys are historical photographs, films and archived official documents and reports, which can be found in publicly accessible online databases, such as the Australian War Memorial collection and records held in the National Archives of Australia. Types of secondary sources are published books, websites and newspapers. Further, the Heritage Branch, Northern Territory Government, and a local historian, Bob Alford, kindly provided unpublished reports.

These data were analysed according to time, stakeholders, utilised parts, approaches and motivation to understand human behaviours and interactions between people and the aircraft remains. Those factors correspond to five questions: When did it happen? Who did it? What was the part utilised for? How did they use it? Why did they do it?

The gathered information was used to facilitate the field survey later. Three museums – which are the Darwin Aviation Museum, the Darwin Military Museum and the Patakijiyali Museum on Bathurst Island – and one facility – the RFDS Darwin Tourist Facility – were selected for field surveys for further investigation due to their collections of Toyoshima's Zero-related materials. Since all the examined materials are displayed in publicly accessible areas, permission for observation was not requested except for the recording of the Zero at the Darwin Aviation Museum.

### 3.3. Primary sources of the Zero

During the desk assessment, a copy of the type zero carrier-based fighter manual (零式艦上戦闘機取扱説明書) was obtained. The Imperial Japanese Navy Aviation Bureau (海軍航空本部) created 2,000 of these manuals in October 1944 to train pilots and mechanics, and these manuals were classified documents during the war. This manual includes detailed descriptions of each part of the Zero, cautionary points for maintenance and flight, and differentiations between the Zero and other models, such as Models 21, 32, 53 and 63 (Hara 2001:3).

Further, during the survey, two post-war Japanese books about the Zero, written by Jiro Horikoshi (堀越二郎), a lead designer of the Zero, were examined. One of the books is *Zero-Sen: The Record of Its Origin and Glory* (零戦：その誕生と栄光の記録) (1984), first



published in 1970. Another book is *Heritage of Zero-Sen: The True Face of the Masterpiece, Described by a Lead Designer* (零戦の遺産：設計主務者が綴る名機の素顔) (2003), which is a collection of Horikoshi's essays that were written for a military magazine, *Maru* (丸), from February 1963 to July 1964.

The manual itself is historical evidence for the IJN war effort but is also a valuable resource for the technical representation of the Zero. Similarly, Horikoshi's books represent the origin and development of the Zero and its characteristics through the eyes of the creator, even though the books were written for the public more than a decade after the war. This research considers those written documents primary sources for the analysis and model identification of the remains of the Zero because of their origins and that they have been referenced as much as possible in the literature.

### **3.4. Field survey**

From 1 to 5 December 2021, the field survey of this research was conducted in Darwin. Before the survey in Darwin, the on-site survey at the Patakijiyali museum was cancelled to mitigate the risk of spreading the new Covid-19 variant to the immunologically vulnerable, remote Indigenous community on the island. Also, photographs of related materials and their displays at the museum were captured by Wendy Van Duivenvoorde and Daryl Wesley during their archaeological project with the Tiwi Islands community; these photographs were provided to this researcher before this survey. Therefore, the Aviation Museum, the Military Museum and the RFDS Tourist Facility were visited during this research.

### **3.5. The Darwin Aviation Museum**

The Darwin Aviation Museum is located approximately 7 km northeast of the City of Darwin, next to the Darwin International Airport. The museum is run by the Aviation Historical Society of the Northern Territory (AHSNT). The society was established after Cyclone Tracy (which devastated the Darwin area in December 1974) by aviation enthusiasts who felt the need to preserve the Second World War aircraft wrecks in the region. The original museum was opened in 1988, and the old navy victualling building on Gardens Hill Crescent, The Gardens, NT, is still used today as their workshop and archive. The current new museum was opened in 1990 with a display of a fully refurbished United States Air Force Boeing B-52G Stratofortress bomber. The museum currently exhibits 19 aircraft, 21 engines and 38 displays (Darwin Aviation Museum 2017a) (see Figure 3.1).

Figure removed due to copyright restriction.

Figure 3.1. Boeing B-52G Stratofortress bomber at the Darwin Aviation Museum (Photograph: Darwin Aviation Museum 2017b).

### ***3.6. Examination of the Zero***

The photographic examination and 3D recording of the remains of the Zero, which are exhibited in the aviation museum, were planned to analyse the identification, current condition and traces of past utilisation of the aircraft. Permission to survey the remains of the Zero was granted by the committee of the AHSNT in May 2021. The survey at the museum was performed on 2 and 3 December 2021, and the 3D recording of the Zero was the primary purpose of this visit. Aside from this primary objective, a visual inspection and manual recording of the remains of the Zero and photographic recordings of other related materials and their presentations in the museum were performed.

### ***3.7. 3D recording of the Zero***

3D recordings and modellings of cultural heritages and archaeological sites are technologies that have recently been rapidly and widely adopted among researchers, especially maritime archaeologists (McCarthy et al. 2019:1–2). These technologies are applied to recordings of aircraft wrecks as well as restored aircraft (Lickliter-Mundon 2018:36).

There are three primary reasons behind the popularity of 3D recording technologies. The first reason is that inexpensive but powerful computer, highly automated software and developed image and remote sensor technologies, such as digital cameras and drones, have become more available to schoolers in the past decade. The second reason is that if the recording equipment is implemented correctly, the accuracy and resolution of the data are significantly higher than manually recorded data. The last reason is that 3D data are more convenient to analyse and process in other forms, such as 2D images, 3D printings, 3D reconstructions and virtual reality (VR) experiments (McCarthy et al. in press).

### ***3.8. Photogrammetry***

Among 3D recording techniques, Structure from Motion, also known as photogrammetry, is the most popular technique, especially in underwater archaeology (McCarthy et al. 2019). The

history of photogrammetry starts just after the invention of photography by Niépce and Daguerre in 1839. In 1851, Aimé Laussedat, a French military engineer and cartographer, invented the camera that allowed measurements to be made from images (Konecny 2014:143). He is considered the father of photogrammetry (Burtch 2008:5). Since this technology had developed to record and analyse terrains, the precise digital recording of 3D objects and surfaces by photogrammetry is a somewhat new technique, but it is rapidly replacing or improving the conventional manual recording and laser scanning of culture heritages (McCarthy 2014:175).

The modern 3D photography technique follows four steps. The first step is taking a series of images that capture the primary target and overlap each other by more than 60 per cent (Van Damme 2015). The next step is loading those images into the software and automatically analysing the features of individual images and matching them to each other. The third step is the software mapping of those matched feature points in three dimensions. The last step is that the software reanalyses images and creates a much denser model on top of matched feature points (McCarthy 2014:177).

For this research, photogrammetry was chosen as a 3D recording technique for three reasons. The first reason is that photogrammetry requires neither any contact nor the destruction of recording objects, since it only requires photo shooting. The second reason is that photogrammetry can produce enough accurate and high-resolution data for this research. Further, the last reason is that photogrammetry only requires low-cost equipment and one operator to record.

Since photogrammetry is image-based technology, transparent, reflective or smooth featureless objects are difficult or impossible to record with this technique without any modifications. During this survey, some reflections on metal surfaces were expected, since the object is a metal aircraft, even though the remaining part is rusted and deteriorated due to prolonged exposure to the tropical field. Therefore, a combination of linear polarising filters and a high-brightness portable ring strobe flashlight was applied to a digital single-lens reflex (DSLR) camera to mitigate reflections of metals. This method was introduced by a Swedish specialist, Håkan Thorén (2018), at the Vasa Museum to record Vasa conserved with polyethylene glycol.

The core physics of this method has three steps (see Figure 3.2). First, a linear polarising filter in front of a light resource (ring flashlight) only allows certain directional light waves to reach the object's surface. Second, the object's surface reflects all directional light waves to the second linear polarising filter in front of a lens positioned perpendicularly to the first filter on the original light resource. Last, this second filter only allows certain directional light waves to reach a lens (camera). Consequently, this method allows the capture of images of bright but not shiny surfaces of reflecting materials, similar to how polarised sunglasses allow the wearer to look at water from a shiny surface and how 3D movies work with polarised glasses.

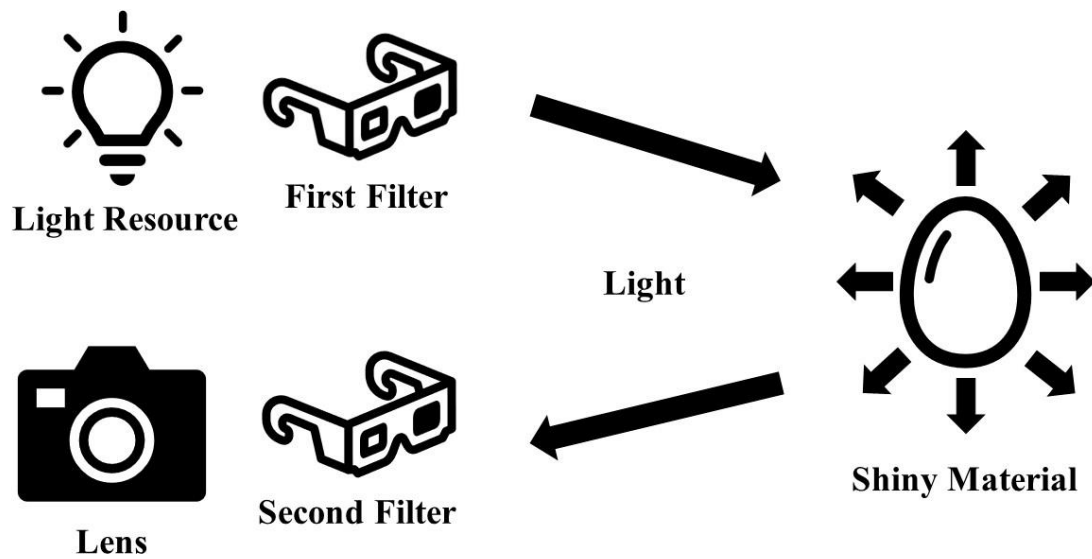


Figure 3.2. The core physics of the linear polarising filters method (Created by the author).

During the 3D survey, a Nikon D5600 was used as the DSLR camera, with a polarising filter attached to the Nikon AF-P DX Nikkor 10-20mm f/4.5-5.6G VR wide-angle lens. Further, a Godox AR400 was used as a ring strobe flashlight, with a 3D-printed polarising filter mount manufactured by Scan Space NZ (see Figure 3.3). A GoPro HERO 9 and a monopod were also used as a backup. A one-metre ruler with every 10 cm marked was also recorded beside the wreck for scale. A total of 1,401 JPEG images of the fuselage section and 107 JPEG images of the wingtip part were taken during the recording. Those images were processed by Agisoft Metashape Standard Edition Version 1.8.4.



Figure 3.3. Camera configuration for the linear polarising filters method (Photograph: Author, 2022).

### ***3.9. Examination of related materials***

Related materials with Toyoshima's Zero and its museum displays were observed and photographed during the field survey. This survey aims to record how museums represent those materials and analyse why museums do this. Overviews of two museums, one facility and related materials will be summarised here.

#### ***3.9.1. The Darwin Military Museum***

The Darwin Military Museum is located in East Point, NT, approximately 7 km south-southeast of Darwin. The museum is run by the NT branch of the Royal Australian Artillery Association (RAAA) (Australian Charities and Not-for-profits Commission [ACNC] 2022). Lieutenant Colonel Jack Haydon and members of the RAAA established the museum in the mid-1960s at the East Point Fortifications, which includes a concrete command post bunker and two 9.2-inch guns (Darwin Military Museum 2021). Their primary exhibition is the Defence of Darwin Experience, which is the main focus of this research, and is owned by the Northern Territory Government and run by the RAAA under the Operation Agreement (ACNC 2022). Hajime Toyoshima's pistol is exhibited in this museum.

#### ***3.9.2. The Royal Flying Doctor Service Darwin Tourist Facility***

The RFDS Darwin Tourist Facility is located at the end of Stokes Hill Wharf, less than 1 km southeast of the City of Darwin. This facility was established in 2016 and is operated by the

RFDS in partnership with Tourism NT. An Australian Presbyterian minister, John Flynn, founded the Aerial Medical Service in 1927 (which became the Flying Doctor Service in 1942 and the RFDS in 1955) and operated an aerial ambulance from Cloncurry, Queensland (RFDS n.d.). The facility features two themed exhibitions: the RFDS and the Bombing of Darwin Harbour. The facility displays a life-sized model of Toyoshima's Zero and a holographic panel of Hajime Toyoshima, portrayed by an actor, as related materials of the Zero.

### *3.9.3. The Patakijiyali Museum*

The Patakijiyali Museum is located in Wurrumiyanga on Bathurst Island, which is approximately 80 km south-southeast of the City of Darwin. Anne Gardiner, a nun from the Daughters of Our Lady of the Sacred Heart, founded the museum in the early 2000s to preserve Tiwi history, language and culture (Tiwi Land Council n.d.). Sister Anne Gardiner handed the museum to Tiwi people in 2017 (O'Toole and La Cana 2017). The museum exhibits a propeller from Toyoshima's Zero and a bronze statue of Matthias Ulungura, who captured Toyoshima.

### **3.10. Limitations**

Due to time and budget constraints, only the Darwin region was surveyed despite some related materials of the Zero being found in other locations during the desk assessment. For example, in the Australian War Memorial database, there is a piece of plate from Toyoshima's Zero (Australian War Memorial n.d.-a) and Toyoshima's *Senninbari* ('thousand stitch belt') (Australian War Memorial n.d.-b).

The Heritage Branch, Northern Territory Government, report says some parts from Toyoshima's Zero were used to rebuild another Mitsubishi A6M2 Zero at the Australian War Memorial in the late 1970s, and it is currently displayed there (Wilby 2016:19–20). Further, the report claims the existence of a magneto (a mechanism that ignites an engine electrically) from the Zero as well as Hajime Toyoshima's pilot's uniform at the RAAF Point Cook Museum (Wilby 2016:20). This information was not confirmed, however, during this research.

This researcher did not conduct interviews with local people for two reasons. The first reason was to mitigate the risk of Covid-19 spreading among participants. The second reason was that there is some concern about the 'observer effect', which states that participants change their behaviours and opinions based on an observer (Sykes 1978). This was of particular concern considering the author is a Japanese archaeological and anthropological researcher who studies war-related memories caused by the Japanese.

## 4. Results

### 4.1. Introduction

In this chapter, desk assessment results and field survey results will be explained. Desk assessment results include historical records of Toyoshima's Zero during and after the war and the historical background of the Zero. Field survey results include 3D models of the Zero, the current condition of the Zero and related materials of the Zero and their representations in museums.

### 4.2. Hajime Toyoshima on Melville Island

Inarguably, the person who utilised material from the wrecked Zero was the pilot, Hajime Toyoshima, who successfully managed to force-land the aircraft on Melville Island. Regardless of there being enough fuel, the 22-year-old Japanese pilot did not attempt to discard the aircraft but instead distanced himself from the wreckage as much as possible to hide the Zero. When he encountered a group of Indigenous women and children some days after the crash, he did not threaten them even though he had a pistol. Instead, he tried communicating with them and even offered his watch to a young boy. Despite his attempt at communicating, the Indigenous women and children left him alone that evening (Piper 1995:58). Later, one of the Indigenous women, Missus Aloysius, wrote a letter to her friend about her encounter.

I was the first one to see the Japanee man ... My friends were out looking for honey nest. I was minding all the babies. The babies were all playing and when one boy saw the Japanee he yelled. Then that Japanee came to me and he salute me. I got properly big fright, all right. I ran away from that Japanee man. He picked up a baby and went into the bush with him. I found my friends and we went looking for that Japanee man and we found him with that baby in his arms. One of my friends went to him and took her baby away from him. He asked if the baby belonged to her, and he put his hand in his pocket and took out a watch and gave it to a boy. We asked him where are all his friends but he didn't answer. That night we hide in the bush and that Japanee man he sleepest alone. Next day our men come back and Matthias and Louis find that Japanee man and take him to the mission station. (Lockwood 2013:95)

The day after the first encounter, Matthias Ulungra (Ngapiatilawai), a 21-year-old Tiwi man, captured Toyoshima and is credited for capturing the first Japanese POW on Australian soil (Riseman 2018:138). Matthias described that event:

I was returning to the camp but found the women had left the place. That's funny. Then suddenly I heard a noise and I saw this strange man. He had a big overall (flying suit) and inside these I could see a big lump that told me it was a revolver. 'Japanee', I said to my friends, so we moved out into the thick bush around the camp and waited for him to come up. I crept up behind a tree and when he passed I put the handle of a tomahawk in his back and I say 'Hands up!' That Japanee man was amazed when he saw so many native people. He put his hands up. We took his clothing, everything except his underpants, and I've got his revolver, also a map. (Lockwood 2013:96)

In an Australian documentary directed by John Burnett, *No Bugles No Drums*, a Tiwi local, Richard Miller, described that moment:

After this crash, that Japanese fella [came] out of the plane and start wandering around in the bush. He didn't know there were Aborigines peoples just camping there, nearby. So, wandering around and walked through bushes, he finally came out of the camp ... And all of a sudden, all these men and women start running, and they left that one little boy laying on blanket beside the tree. So he [Toyoshima] went and pick him up and carried him around ... and this fella, his name is Matthias

Ulungura, he had the little tomahawk. So he went and hide behind the tree. So, the Japanese fella came by and then passed him and Matthias then came behind him with the little tomahawk, he pointed at his back and say 'stick 'em up'. So he stood like this with that baby and he [Matthias] grab that boy, little boy, off him, and then he took the pistol. (Burnett 1990)

Without any resistance, Toyoshima was captured, and his flying suit, his Belgian .32 inch (8.1 mm) automatic pistol and his map were taken by Tiwi men. While he was taken to the Australian Army on Bathurst Island, he requested via gestures that his map be returned or destroyed, but the request was denied. Toyoshima and his belongings were handed to Australian Army Sergeant Les Powell (Piper 1995:58) (see Figure 4.1).

In his letter to Brother John Pye of the Bathurst Island mission – who worked for Tiwi communities and wrote a book, *The Tiwi Islands* (1977) – Sergeant Les Powell raised the issue of Toyoshima's disarming. Powell told his side of the story, which is different in some details from that of Matthias. This letter was written around 1990 (Bellamy 1995:63):

This [bring Toyoshima] they [Tiwi men] refused to do unless I came down to the beach with my rifle as the Jap had a gun. I went down and hid behind a tree or palm, they then brought him across as he got out of the canoe I stepped out and told him to put his hands up, he did after bowing I told one of the natives to take his pistol (a .32 automatic) and hand it to me he then became a POW. No shots were fired and the pistol was fully loaded ...

We stripped the prisoner of his flying overalls and treated his wounds leaving his underclothes on, I then took him outside and had Elimore take a photo with my camera. I have read that the natives had done the above, not so. I think they thought we had found the camera on him, so they included it in their story ...

Moore suggested on consultation with me, we decided to give the credit to the natives so we could ask Darwin for tobacco and food as we would have to rely on them in the case of a Japanese landing. (My first mistake.) (Bellamy 1995:67–68)

The matter of who captured Toyoshima and disarmed him will be discussed further in Chapter 5.



Figure removed due to copyright restriction.

Figure 4.1. Hajime Toyoshima and Sergeant Les Powell, who is holding Toyoshima's pistol, on 27 February 1942 (Photograph: Australian War Memorial).

### ***4.3. The Royal Australian Air Force's investigations of the Zero in 1942 and 1943***

The RAAF investigated the site twice during the war.

#### ***4.3.1. Investigation in 1942***

Despite Toyoshima's temptation to hide his identity and the existence of his wrecked Zero, Tiwi people traced his movements and found the wreck site. In early March 1942, a team of RAAF led by Indigenous men visited the site (see Figure 4.2). This was the first time in WWII that the Allies captured a fully intact Zero (Piper 1995:60). Squadron Leader Sergeant Allan Beatty, one of the No. 13 Squadron (RAAF) from Darwin, led the investigation team and wrote his report on 7 March 1942. In his report, he included the following details of the Zero (National Archives of Australia 1942):

- The airscrew and airscrew shaft are missing, and they could not locate those;
- Dimensions of the Zero;
- Trim tabs and landing flaps mechanisms;
- Tail wheel, landing hook and brakes mechanisms;
- Fuel capacity and no bulletproofing on tanks;
- Inflatable rubber boat fitted in the fuselage;
- Markings on the Zero;
- Armaments are two 7.7 mm guns through airscrews synchronised off the engine and two 20 mm cannons, one in each wing mainplane;
- Radio system and 12 volt battery;
- The 14-cylinder radial air-cooled engine is estimated to be 900–1000 horsepower (supercharged). There is a USA branded (Eclipse Bendix) generator;
- Instruments and its panel, which was removed but left due to a shortage of workforce.
- No armour plate installation and no safety glass on the hood;
- Three-quarters of the fuel that was left in the starboard tank was brought back to sample;
- Equipment of an oxygen-providing system, fire extinguish cylinder, hydraulic fluid reservoir, anti-icer container and possible compressed oxygen cylinder.

Since it was impossible to carry the whole Zero with their manpower, the RAAF intelligence team partially dismantled the Zero, including all armaments, the engine, the rear fuselage and instruments. Those parts of the Zero were later manhandled to the coast and then shipped to Darwin for further inspections (Piper 1995:60). Around 1983, the team leader – Sergeant Allan Beatty – described his 'finding the empty oil tank of the fighter with a single hole and some metal about the size of a .303 bullet inside', which might be the cause of the Zero's malfunction and wrecking (National Archives of Australia 1942). Beatty kept 'the small drogue from the pilot's parachute' from the site as a souvenir until 1993, the year in which he donated it to the Darwin Aviation Museum (Piper 1995:63).

The history of the Zero will be discussed in the following section of this chapter. Further, how the Allies would know about the Zero's technology at this time of the war will be discussed further in Chapter 5.

Figure removed due to copyright restriction.

Figure 4.2. Toyoshima's Zero, force-landed on 27 February 1942 (Photograph: Australian War Memorial).

#### *4.3.2. Investigation in 1943*

On 29 March 1943, one of the B-25s from the No. 18 (Netherlands East Indies) Squadron (RAAF) – a Netherlands East Indies squadron supplemented with RAAF crews (Australian War Memorial n.d.-c) – flew over Melville Island and spotted a crashed Zero at the coordinates 11° 42' 30" S, 130° 33' E (see Appendix 1).

The investigation team, including Flying Officer O'Connor and six airmen from the Repair and Salvage Unit, arrived at Bathurst Island Mission on 18 April 1943 and started the search on 19 April. On 24 April, the team located the site and identified it as the previously salvaged Zero from March 1942. Photographs of the Zero were taken from several positions. They described the remains of the Zero as being in 'remarkably good condition' and observed the anti-corrosive paint on the wreck as being very effective (see Appendix 1). The team salvaged several plates and the main examination plate, which was left out by the previous salvage. Further, the team recorded the position and size of the bright red roundel on the tip of the wing and salvaged it to show the colour of the roundel (see Appendix 1).

#### **4.4. Rediscovery of the Zero**

In September 1960, during the development of a road on Melville Island, the Zero was rediscovered. The director of the Welfare Branch, Northern Territory Administration, Harry Christian Giese, recognised the Zero as the first Japanese aircraft shot down on Australian soil and advised that it be secured until future usage in a museum or facility. Eventually, the Zero was stored in a secure area at Snake Bay, Melville Island (National Archives of Australia 1971).

In September 1962, the Honour Secretary of the Returned Sailor's, Soldier's and Airmen's Imperial League of Australia (RSSAILA) Darwin Sub Branch, R. Chin, sent a letter to the Administrator of the Northern Territory. In this letter, RSSAILA members were concerned about a newspaper report suggesting removing Toyoshima's Zero from the NT to the National Museum of Australia in Canberra. RSSAILA members proposed that the Zero be retained in Darwin for a future museum as a war relic and tourist attraction. They also suggested that if the Zero is not secure, the second or another Japanese aircraft shot down in the NT could be made available. The then-current administrator of the Northern Territory, Roger Nott, agreed with the RSSAILA's suggestions and replied that the Zero would remain in the custody of the Director of Welfare at the Snake Bay settlement until the establishment of a Northern Territory museum (National Archives of Australia 1971).

On September 1969, the President of the RAAA (NT), Lieutenant Colonel Jack Haydon, wrote a letter to the Administrator of the Northern Territory to ask for the ownership of the wreck and to be the custodian of the war relic. And he claimed that RAAA would be 'suitable guardians of such a treasure' (National Archives of Australia 1971). The then-current administrator, R.L. Dean, agreed with the RAAA's claim to bring the Zero to Darwin and exhibit it as a war relic at the RAAA's museum, which is now the Darwin Military Museum (National Archives of Australia 1971). In October 1969, however, the people in Snake Bay refused the claim and wished to keep the Zero in Snake Bay. The Director of Welfare, Harry Christian Giese, reported that the Zero would remain in Snake Bay for a future Snake Bay museum, and a suitable part of the Zero would be provided to the RAAA for their museum. Although the remains of the Zero were heavily disturbed by souvenir hunters, keeping the Zero in safe storage under cover would be arranged. The protection arrangement had not yet been implemented, and the council refused to provide a suitable section of the Zero (National Archives of Australia 1971).

As discussed in Chapter 3, after Cyclone Tracy in December 1974, the AHSNT was formed by aviation enthusiasts to salvage WWII aircraft remains across the NT. Recovering Toyoshima's Zero was one of AHSNT's projects. In late October 1977, after lengthy negotiations, the Milikapiti Council agreed to lend the Zero to AHSNT under a formal agreement. The remaining aircraft were shipped to Darwin and secured in an AHSNT facility (*The Canberra Times* 1983).

#### **4.5. Historical background of the Zero**

The Mitsubishi A6M is a single-seat monoplane used by the IJN from 1940 to 1945. This plane is officially called *Reishiki Kanjou Sentouki* (零式艦上戦闘機) by the IJN, which in English translates to 'type zero carrier-based fighter'. This fighter, often called *Zero-Sen* or *Rei-Sen* in Japanese and codenamed 'Zeke' later by the Allies, was officially commissioned by IJN in 1940, the Japanese imperial year 2600. The name 'type zero' came from the last

two digits of this Japanese imperial year. Jiro Horikoshi, who was the chief designer of Mitsubishi, and his team designed the Zero. Horikoshi previously designed the Mitsubishi 1MF10 Experimental 7-Shi carrier-based fighter (七試艦上戦闘機) in 1933 and the Experimental 9-Shi single-seat fighter (九試単座戦闘機), later commissioned as the Mitsubishi A5M Type 96 carrier-based fighter (九六式艦上戦闘機) by the IJN in 1936 (Yoshida 2019:67). A total of 10,425 Zeros were produced: 3,880 by Mitsubishi Heavy Industries and 6,544 by Nakajima Aircraft Company (currently Subaru Corporation) (Horikoshi 2003:115).

The Zero has the characteristics of an escort fighter capable of remarkable long-range flights to protect other attack aircraft and an interceptor fighter with extraordinary manoeuvrability, which is achieved by high speed and climbing power. Those characteristics contradicted each other and were unthinkable performance requirements for not only regular land-based fighters but also carrier-based fighters and reflected the oppressive situation Japan faced when the IJN ordered a new generation of carrier-based fighter development from Mitsubishi in 1937 (Horikoshi 1984:Introduction).

Several models of the Zero were developed alongside the war. Generally, models of Zero can be categorised into three eras: early, middle and late. There are also other experimental models and modified variants of the Zero. The first digit of the model number indicates the airframe changes, and the second digit indicates the engine changes (Horikoshi 1984:Chapter 5). For instance, Models 11 and 21 share the same engines but not airframes.

The early era and development of the Zero started as Mitsubishi M6A1, the Experimental 12-Shi carrier-based fighter, with fights on feedback from the frontlines of the early Second Sino-Japanese War. The Mitsubishi M6A2 Model 11 Zero was commissioned by the IJN in 1940, and it was equipped with the Nakajima Sakae Model 12 engine. Model 11 Zeros were deployed in late July 1940 to the Chinese frontlines and held air superiority in Chinese airspace (Horikoshi 2003:132–140). Model 11 was initially named M6A2, but after the introduction of Model 21 in December 1940, it became M6A2a (Akimoto 2012:36).

M6A2b Model 21, the model of Toyoshima's Zero, was modified to fold the tip of its wings 90 degrees further upwards than those of Model 11, to utilise a lift and hangars of aircraft carriers. This model was used the most broadly and shocked the world in the early period of the war. The majority of about 500 Zeros manufactured before the Pacific War were this model. Later, Mitsubishi manufactured about 300 more of this model, and Nakajima manufactured a total of about 2,880 of this model (Horikoshi 2003:140–141).

The middle-era Zeros began with Mitsubishi M6A3 Model 32 on June 1941. This model is equipped with a Sakae Model 21 engine with a two-speed supercharger to improve its performance at high altitudes. Further, the tips of its wings were cut to increase speed but decrease range. Consequently, this model has rectangular-shaped wingtips. Because of this silhouette of wings, the Allies misidentified it as different aircraft and gave a different code as Hamp. The Guadalcanal campaign, however, started when this model was tested, and air units in the Rabaul region desperately needed longer-range fighters. Therefore, the Mitsubishi M6A3 Model 22 and its variant M6A3a Model 22-Kou with different armaments were introduced. The M6A3 Model 22 is equipped with an additional 45-litre fuel tank inside each wing, and the foldable wingtips returned (Horikoshi 2003:141–143).

The Mitsubishi M6A5 Model 52 represents the later-era Zero model, which began to be manufactured in August 1943. Model 52 had a newer mechanism with individual exhaust pipes from each engine cylinder, named ‘rocket exhaust pipes’. Further, wingtips were shortened again with a round shape but without a folding mechanism. Model 52 and its variants are the most produced model of the Zero (Horikoshi 2003:143–149).

Last, experimental models such as M6A6c Model 53-Hei, M6A7 Model 63 and M6A8c Model 64 were developed towards the war’s end. Further, there were several modified Zeros – M6A5d-S Model 52-Yasen (night combat fighter), which is equipped with two machine guns behind the cockpit, and Nakajima A6M2-N Type 2 single-crew floatplane, which is based on Model 11 – and two types of training aircraft – A6M2-K Model 11 and A6M5-K Model 22 (Horikoshi 2003:149–154).

The reason behind numerous variants and modifications of the Zeros is the delays in developing newer generations of fighters (Horikoshi 2003:132), such as the Mitsubishi J2M Raiden (雷電) interceptor fighter and a direct successor of the Zero, the Mitsubishi A7M Reppū (烈風), which were both designed by Jiro Horikoshi as well. From the beginning until the end of the Pacific War, the IJN had to rely on Zeros, and Zeros were their main fighters (Horikoshi 2003:119).

Despite the early invincible reputation of the Zero, it started to struggle in fights from the Solomon Islands campaign in the latter half of 1942 due to the Allies’ new strategy against the Zeros, which was called ‘Thach Weave’. Around the same time, the Allies deployed newly-developed fighter aircraft, such as the Lockheed P-38 Lightning and Vought F4U Corsair, equipped with much more powerful engines than those of the Zeros (Horikoshi 1984:Chapter 7). In September 1943, the Allies deployed the Grumman F6F Hellcat, which was an improved fighter, to defeat the Zeros. The combination of the Allies’ strategic and technological advancements and Japan’s loss of experienced pilots led to the obsolescence and inferiority of the Zeros in the Pacific (Horikoshi 1984:Chapter 8). Allies’ strategies against the Zeros and how the analysis of captured Zeros affected the development of the Allies’ fighters will be discussed in Chapter 5.

Despite Japan’s efforts in modifying the Zeros numerous times to revitalise them, on 21 October 1944, the IJN implemented kamikaze attacks for the first time with Zeros. Since then, Zeros were heavily utilised for these desperate and hopeless suicide attacks until the surrender of Japan (Horikoshi 1984:Chapter 8). British aviation historian William Green summarises Zero as follows:

To the Japanese the Zero-Sen was everything that Spitfire was to the British nation. It symbolised Japan’s conduct of the war, for as its fortune fared so fared the Japanese nation. The Zero fighter marked the beginning of a new epoch in naval aviation: it was the first shipboard fighter capable of besting its land-based opponents. It created a myth – the myth of Japanese invincibility in the air, and one to which the Japanese themselves fell victim as a result of the almost total destruction of Allied air power in the early days of the Pacific war. (Green 1975:64)

Horikoshi (1984:Foreword) describes the Zero as follows:

Zero fighters were aircraft with Japanese blood, designed with unique thinking and philosophy, and not only caught the world’s technological trend but also considered the Japanese situation in the globe at the time.

As Green and Horikoshi described, the Zero truly represented the Japanese to the Allies, from the surprising beginning to the tragic end.

**4.6. 3D models of the Zero**

All 1,401 images were successfully aligned with Agisoft Metashape, and a high-quality 3D scanned model of the remains of Toyoshima’s Zero was created. Further, the 3D model of the Zero with one-metre scale bars was rendered with the 3D software Blender for analysis and display purposes (see Figure 4.3). Individual screenshots are in Appendix 2. Additionally, a 3D model of the wingtip with a part of the port wing was made with 107 images. Details of this port wing part will be discussed later in this chapter.

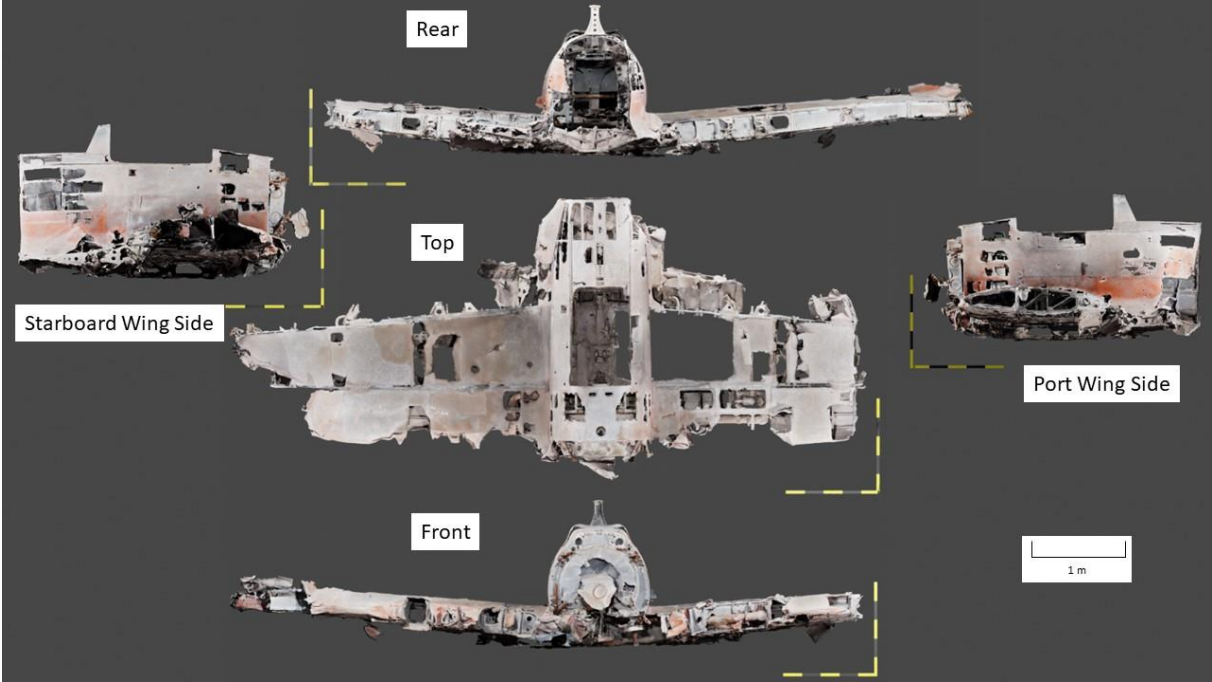


Figure 4.3. 3D-rendered orthographic view of the Zero (Created by the author, November 2022).

**4.7. The current condition of the Zero**

Measurements of the remaining parts of the Zero were recorded. The result is in Table 4.1. Further, the remaining parts of the Zero were marked on assembling drawings of Model 21 from IJN’s type zero carrier-based fighter manual (see Figures 4.4, 4.9 and 4.12). This Zero is examined in this chapter with the assumption that this Zero is a Mitsubishi M6A2b Model 21, but the actual model identification of this Zero will be discussed in Chapter 5.

**Table 4.1.** Measurements of the remaining parts of the Zero.

Part	Width (m)	Length (m)	Height (Thickness) (m)
Total	6.54	2.69	1.51
Forward fuselage	1.08	2.55	1.51
Oil tank	0.84	0.14	0.65
Starboard wing	1.48	3.87	0.27
Port wing	1.81	2.68	0.33

<b>Part</b>	<b>Width (m)</b>	<b>Length (m)</b>	<b>Height (Thickness) (m)</b>
Port wingtip	1.13	2.31	0.14

#### 4.7.1. *The fuselage*

In the fuselage, the entire front fuselage remains from flame 0 to flame 7. Flame 7 is a joint section between the front fuselage and the rear fuselage for the Zeros (see Figure 4.4). The fuselage's surface shows the primer's red colour, especially on the lower half. A 145-litre main fuel tank, a couple of front machine-gun mounts, machine-gun magazines and cartridge ejecting tubes remain in the front fuselage (see Figure 4.5).

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Figure 4.4. The remaining portion of the fuselage of the Zero (marked in orange) (From Hara 2001:62; modified by the author).





Figure 4.5. View of the main fuel tank (left), a front machine-gun mount (middle), cartridge ejecting tube (right) and machine-gun magazine (bottom) from the port side (Photograph: Author, 2 December 2021).

On the port side of the front fuselage, two retractable entry steps to the cockpit with switch buttons are still attached (see Figure 4.6). Further, possible graffiti, 'QR' or 'O, R', white in colour, is on the surface of the port side of the front fuselage (see Figure 4.7). On the starboard side of the front fuselage, possible graffiti, 'HERE', is observed (see Figure 4.8). Those graffiti had not been reported before. The meaning of intact retractable entry steps and graffiti will be discussed in Chapter 5.

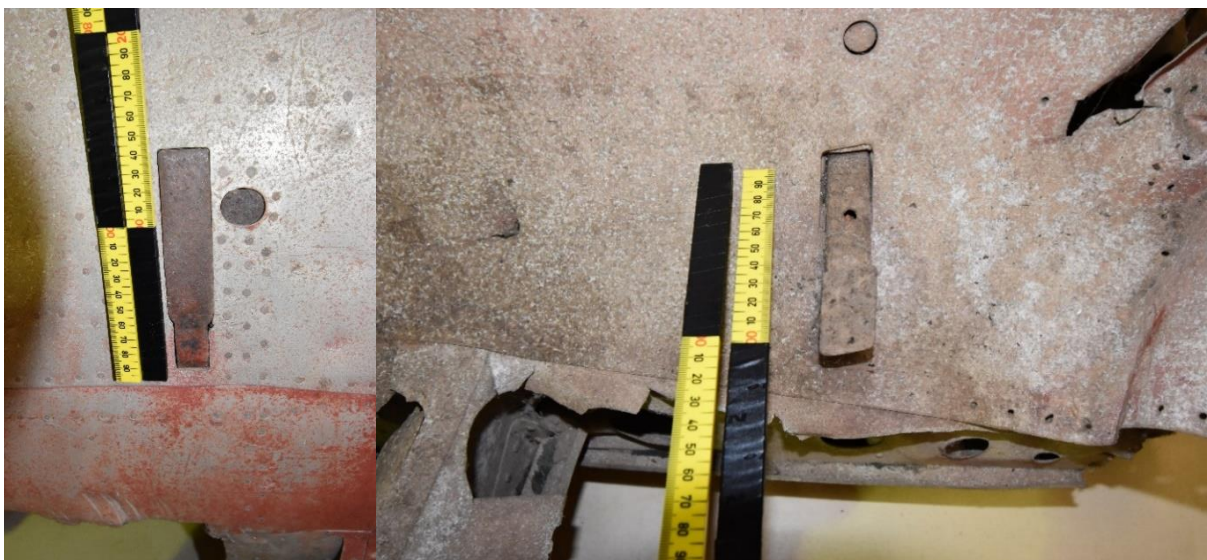


Figure 4.6. View of retractable entry steps to the cockpit with switch buttons on the port side of the front fuselage (Photograph: Author, 2 December 2021).

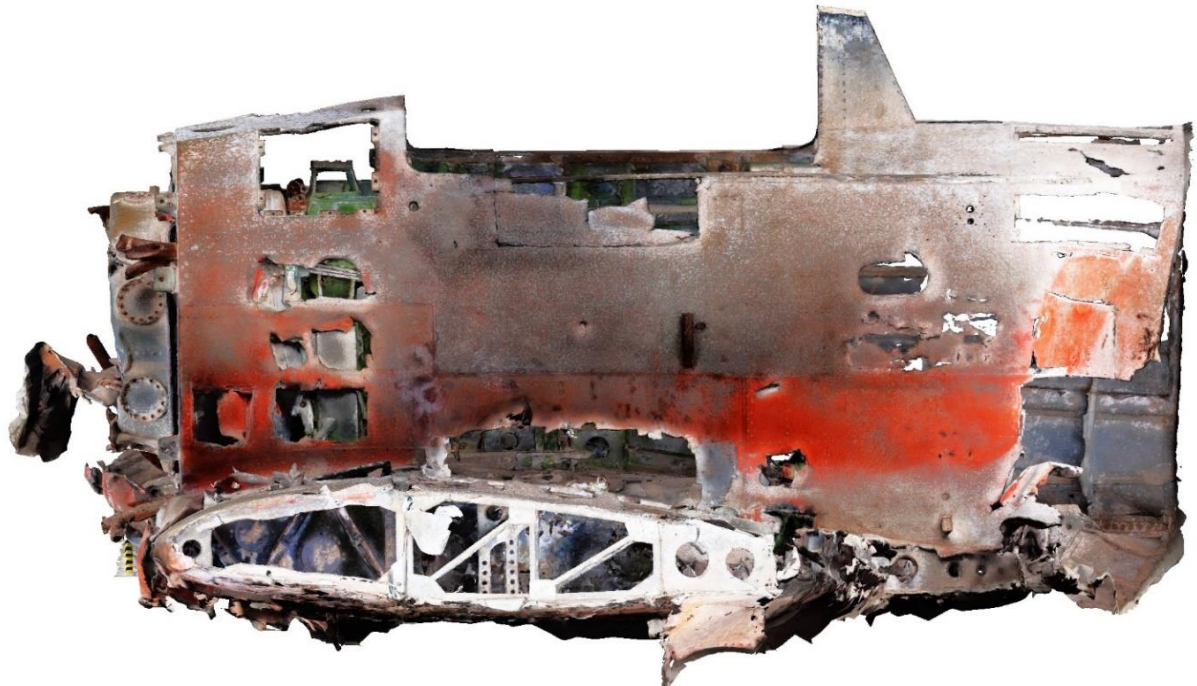


Figure 4.7. High-contrast and high-shadow 3D image of the port side of the front fuselage (Created by the author, November 2022).



Figure 4.8. High-contrast and high-shadow 3D image of the starboard side of the front fuselage (Created by the author, November 2022).

#### *4.7.2. The port wing*

About half of the port wing, from rib 1 to rib 13 remains in the port wing, but a wing tank section between the front and rear spar from rib 1 to rib 7 is missing (see Figure 4.9). A small

portion of a flap is still attached to the wing. Further, the wingtip and several ribs, which are from rib 19 to rib 28, remain. A landing leg and retracting mechanism remain intact in the wing, but a tyre, wheel and leg cover are missing. A 20 mm cannon is also missing.

Figure removed due to copyright restriction.

Figure 4.9. The remaining portions of the port wing are marked in orange (the front is the bottom of the figure) (From Hara 2001:65; modified by the author).

The bottom side of the wingtip shows folding and locking mechanisms (see Figures 4.10 and 4.11). This is an important indication of the model identification of this Zero, which will be further discussed in Chapter 5. This piece of the wing shows the iconic Japanese aircraft symbol of the red circle *Hinomaru* in the middle and a small spot of possible original grey paint of the aircraft near the folding joint.



Figure 4.10. The 3D-rendered image of the bottom of the wingtip and part of the port wing (Created by the author, November 2022).

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Figure 4.11. Wingtip folding and locking mechanisms (From Hara 2001:277; modified by the author).

#### *4.7.3. The starboard wing*

In the starboard wing, about 60 per cent of the wing, from rib 1 to rib 20, remains (see Figure 4.12). A small portion of a flap is also attached to the wing. Since those sections are still covered with skins, there could be a retracting landing mechanism and a wing tank still in the wing, but a 20 mm cannon is missing. A fresh air ventilation tube to the cockpit is exposed near the fuselage in the wing (see Figures 4.13 and 4.14).

Figure removed due to copyright restriction.

Figure 4.12. The remaining portion of the starboard wing is marked in orange (the drawing is mirrored from the original, and the front is the bottom of the figure) (From Hara 2001:65, modified by the author).



Figure 4.13. A fresh air ventilation tube to the cockpit in the starboard wing (the front is on the right of the figure) (Photograph: Author, 2 December 2021).

Figure removed due to copyright restriction.

Figure 4.14. The mechanism of the fresh air ventilation tube to the cockpit, facing towards the starboard side (left) and towards the rear (right) (From Hara 2001:163).

#### *4.7.4. The engine oil tank and the mount*

The ripped oil tank and the remaining portions of the engine mount are still attached to the firewall, which is also flame 0 of the front fuselage (see Figure 4.15). The shape of the oil tank is essential to model identification of the Zero (see Figure 4.16). Further, the remaining parts of the engine mount directly indicate a salvage effort. Those topics will be further discussed in Chapter 5.



Figure 4.15. The view of the oil tank and remaining portions of the engine mount from the front (Photograph: Author, 2 December 2021).

Figure removed due to copyright restriction.

Figure 4.16. The drawing plan of an oil tank and an engine mount (From Hara 2001:169).

#### 4.7.5. The cockpit

Major components and instruments in the cockpit, such as cockpit panels, levers, a pilot seat and a control stick, are missing, but a seat adjustment lever (see Figure 4.17), the stem portion of the rudder bar adjustment mechanism (see Figure 4.18) and many brackets for instruments

remain inside the cockpit (see Figure 4.19). Further, the port side of the cockpit floor, where a wing tank was partially located, is missing.



Figure 4.17. The inside cockpit view from the starboard side. The stem portion of the rudder bar adjustment mechanism is in the middle (Photograph: Author, 2 December 2021).





Figure 4.18. The inside cockpit view from the port side. A seat adjustment lever is in the middle (Photograph: Author, 2 December 2021).

Figure removed due to copyright restriction.

Figure 4.19. The locations of landing instruments in the cockpit (left) and the mechanism of the seat adjustment (right) (From Hara 2001:120, 161).

#### ***4.8. Related materials of the Zero and their representations in museums***

##### ***4.8.1. The Darwin Aviation Museum***

The Darwin Aviation Museum is the most specific material-oriented museum of all other museums surveyed for this research. Of course, the museum focuses on aviation-related relics and actual aircraft, as its name suggests. Indeed, the Boeing B-52 Stratofortress, the largest aircraft in the museum, which is located in the centre of the hangar (see Figure 3.1), is the museum's main attraction. In front of the passenger boarding stairs to the B-52 cockpit, however, the exhibition of the Zero is located. Therefore, it is hard for visitors to observe the B-52 cockpit without noticing the remaining parts of the Zero. From the top of the passenger boarding stairs, visitors have the best 3D scale size of the Zero and an overview of the exhibition (see Figure 4.20).



Figure 4.20. Overview of the exhibition of Toyoshima's Zero from the top of the passenger boarding stairs next to the B-52 cockpit (Photograph: Author, 2 December 2021).

The exhibition of the Zero has remained in the same condition since the heritage assessment report in 2016, with only a few modifications: the placement of a removable plank fence in front and an acrylic display shelf and the inclusion of a diorama of the Darwin Harbour on the side. Several related materials and display panels surround the remains of the Zero. In front of the Zero is a display panel titled 'Petty Officer Hajime Toyoshima', which shows historical images of Toyoshima and the Zero, several quoted testimonies describing the capture of Toyoshima, his fate and a brief summary of this Zero (see Figure 4.21).

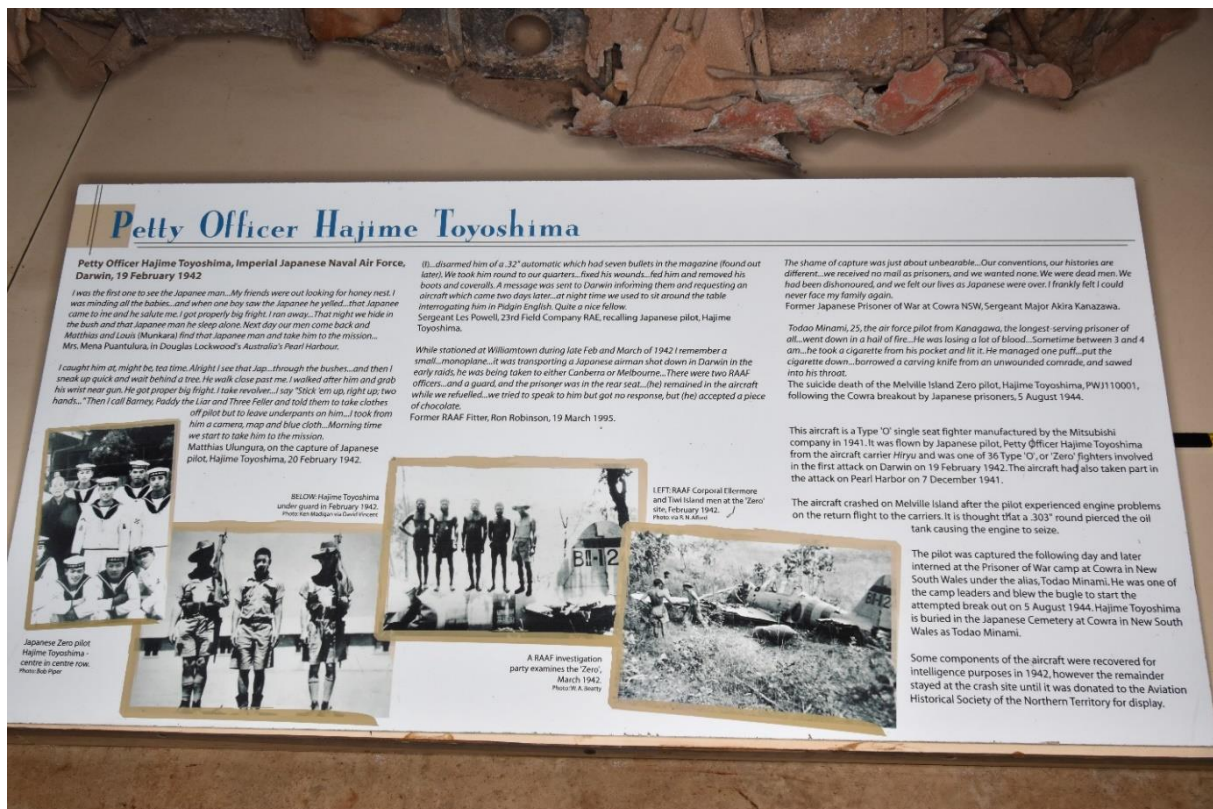


Figure 4.21. The display panel 'Petty Officer Hajime Toyoshima' in front of the Zero (Photograph: Author, 2 December 2021).

On the wall behind the starboard wing of the Zero, an expressive painting of the Bombing of Darwin, *Bomb Over Darwin* by James Baines, is displayed. Next to the painting and behind the Zero is a small panel of the Zero with reconstructed colour and physical representation from the port side. Further, on the wall behind the port wing of the Zero, there is a wingtip with a part of the port wing. The larger historical picture of the Zero wreckage at Melville Island in 1942 is also on the port wing side's wall for comparison.

A drop tank of Toyoshima's Zero is in front of the port wing on the floor. Another drop tank (which is located on the floor between the port wing and the wall behind the Zero) and a Nakajima Sakae 12 engine (which is on the floor in front of the starboard wing), however, are both from another aircraft lost at Fog Bay on 23 August 1942 (Wilby 2016:15). Since Japan lost four Zeros that day, those parts are from one of them, and it is a Nakajima-built Zero (Lewis and Claringbould 2020:75).

#### 4.8.2. The Darwin Military Museum

The Darwin Military Museum combines an indoor exhibition in the main building, which is called the Defence of Darwin Experience, and half outdoor and half indoor exhibitions in the East Point Fortifications. The Defence of Darwin Experience is a well-founded and thoughtfully designed new facility compared with the roughly categorised and accumulated collections of materials related to wars in Australia, which had been involved in half outdoor and half indoor exhibitions. Since the facility serves as the only entrance to the entire museum as well, visitors would be exposed to the Defence of Darwin Experience first and learn about the Bombing of Darwin. Visitors would only take one to two hours to see the entire exhibition, whose design is similar to that of the Museum and Art Gallery of the Northern

Territory (MAGNT), since the RAAA operates it on behalf of MAGNT. One of the facility's main attractions is a theatre room located at the end of the facility where the pistol from Toyoshima is located (see Figure 4.22).



Figure 4.22. One section of the Defence of Darwin Experience. The entrance to the theatre room (closed red door) is on the left, and an interactive digital map and touch screens are on the table in the middle (Photograph: Author, 4 December 2021).

In the theatre, artefacts and relics related to the Bombing of Darwin – such as bomb fragments, a life jacket and a lifebuoy from sunken ships, and a gavel and a bible recovered from Darwin Courthouse – are exhibited in several glass display cases (see Figure 4.23). The air-raid siren rings every 20 minutes in the facility, signalling the beginning of the 13-minute show, and then the door closes. The theatre room becomes dark when the show starts, and the entire grass display in front of the audience turns into an ultra widescreen. The show starts with a scene rendered by computer graphics depicting the preparation for the attack by Japanese aircraft carriers and an army of Japanese aircraft flying to Darwin. Next, ordinary peaceful lives in Darwin are turned to total chaos and devastation by the bombings. The show ends with a speech by John Curtin, the prime minister of Australia during WWII. The show is an incredibly immersive experience, with loud explosive noises, and strobe lighting and flashes.



Figure 4.23. The view inside the theatre room (Photograph: Author, 4 December 2021).

Toyoshima's pistol is displayed on a wall in the theatre room next to the doorway (see Figure 4.24). Additionally, there are the description panels of Toyoshima and Matthias that summarise who they were, as well as the event, along with their pictures. The description of the pistol in the display claims the following:

#### Nambu pistol and holster

This Japanese Type 14, 8mm Nambu pistol is reputed to have belonged to Hajime Toyoshima, pilot of the Japanese Zero wrecked on Melville Island on 19 February 1942. The weapon was confiscated from Toyoshima when he was captured by Tiwi Islander Matthias Ulungura on 21 February, and it remained at the Bathurst Island Mission for the next 60 years. During this time the firearm was modified to fire .22 calibre ammunition. The leather shell-type holster is unique to this firearm.

Donated by Alan Sprigg, 2001

On loan from the Museum and Art Gallery of the Northern Territory

This information contradicts other information in this chapter. The authenticity of this pistol will be discussed in Chapter 5. There are other materials in the display case; however, they are not directly related to Toyoshima's Zero.



Figure 4.24. The display of Toyoshima's pistol (Photograph: Author, 4 December 2021).

#### *4.8.3. The Royal Flying Doctor Service Darwin Tourist Facility*

Although the RFDS Darwin Tourist Facility has two different themed exhibitions – the RFDS and the Bombing of Darwin Harbour – during this research, a direct connection between RFDS and the Bombing of Darwin cannot be found; however, Stokes Hill Wharf, where the facility is located, was heavily attacked by Japanese aircraft during the Bombing of Darwin. The wall painting, which is a tribute to personnel who lost their lives at the wharf and was made by the Darwin Port Corporation, is in front of the facility (see Figure 4.25). Further, the VR experience in the facility is the re-created event of the attack through workers' eyes on the day at Stokes Hill Wharf.



Figure 4.25. The wall painting that is a tribute to personnel who lost their lives at the wharf, by the Darwin Port Corporation (Photograph: Author, 4 December 2021).

There are no related artefacts in the facility; however, a life-sized replica of Toyoshima's Zero (see Figure 4.26) and a transparent projection panel of Hajime Toyoshima (see Figure 4.27) are displayed in this facility. The replica is elaborately crafted and specifically represents Toyoshima's Zero (because of the tail code 'BII-124'), which flew over Darwin during the raid. The replica is hung from the ceiling in the exhibition's centre and provides the Zero's scale size. Beneath the Zero, there is an interactive screen that also creates heavy bombing noise on the floor and an ultra widescreen showing the re-created event.

The interactive transparent projection panel of Toyoshima (with Toyoshima portrayed by an actor) is facing another panel of John Curtin (who is also portrayed by an actor) (see Figure 4.27). The panel corresponds with a touchscreen and answers questions in English, such as who Toyoshima is, why the Japanese attacked Darwin and what happened to him after the air raid. The panel of John Curtin, in front of Toyoshima, tells his part of history in a similar manner.

This exhibition relies heavily on new technology-based attractions and wall display panels to describe the event, which is compared with other museums that heavily emphasise artefacts. The interpretations of this exhibition will be discussed in Chapter 5.



Figure 4.26. The life-sized replica of Toyoshima’s Zero in the Royal Flying Doctor Service Darwin Tourist Facility (Photograph: Author, 4 December 2021).



Figure 4.27. Interactive transparent projection panels of John Curtin (left) and Hajime Toyoshima (right) (Photograph: Author, 4 December 2021).

4.8.4. *The Patakijiyali Museum*

Toyoshima’s Zero-related exhibitions are displayed indoors and outdoors at the Patakijiyali Museum. In the museum, there is a theatre space showing hand-drawn animations about



WWII events that occurred in the Tiwi Islands. On both sides of the walls of the space, display panels titled 'The Forgotten Stories' are exhibited. One of the panels specifically describes the capture of Toyoshima in Matthias Ullungura's own words:

February 1942

We all been camp along-a Melville Island side and gone that morning everyone. We stop along Crewrue. That place we stop now. I caught him at, might be, tea time. Alright I see that Jap and I been sitting down my camp now.

I facing Darwin and I see white face and black dress. I see him through the bushes and I go first. I told the other men to run away and then I sneak up quick and wait behind a tree. He walked close past me. I walked after him and grab his wrist near gun. He get proper big fright. I take revolver from his right side near his knee. Then I walk backwards pointing gun, I say 'Stick 'em up, right up, two hands, no more holding hands on head'.

I point revolver more close. Then I call Barney, Paddy the Liar and Three Fellow and told them to take clothes off pilot but to leave underpants of him and singlet. Boots I made him take off alright. He point to sore foot. I took from him a camera, map and blue cloth. He signed to burn map and blue cloth. I think might be he does not want anyone to see it. I put it on log he kept looking at it. So I put it up a tree. I made him sit down in camp.

...

Morning time I give him boots. I told other men. We start to take him to the mission. I make him walk behind Three Feller and young Tiger with stick. Big Barney walk behind him with big stick. I walk side with revolver and knife. I took bullets out and make Jap show me how to work gun. Then I fire gun near his feet, he jump. We cross creek, we all drink, Jap he drink too. We walk and come out end of Melville Island – at Pari opposite Bathurst Island Mission.

Matthis's descriptions of Toyoshima's pistol and camera contradict Sergeant Les Powell's descriptions. This issue will be further discussed in Chapter 5.

Outside the museum building, there is a bronze statue of Matthias Ullungura, and a three-blade propeller from Toyoshima's Zero is exhibited in front of a radio shack from which Father John McGrath sent a warning of the raid on 19 February 1942 before the attack (see Figure 4.28). Details of the propeller will be discussed in Chapter 5. Two plaques are embedded in the statue's foundation. One of the plaques indicates that this monument is 'dedicated to Matthias Ampiyartilawayi Ullungura and Tiwi Islanders for their contribution to the defence of Northern Australia During WW II' and was unveiled by Adam Giles, Chief Minister of the Northern Territory, and Gary Higgins, Minister for Arts and Museums, on 24 June 2016.

Another plaque indicates that it is 'dedicated to the memory of the Tiwi Islands people for their efforts during the Second World War', which includes 'Matthias Ullungura and Louie Munkara for their capture of the enemy on Australian soil'. It continues, 'I am grateful to Adam and the other Tiwi Islanders for rescuing me and other Indonesian soldiers on 12 August 1942'. This plaque came from the original monument by Julius Tahija in 1993 before the current monument was settled in 2016. Julius Tahija was a sergeant in the Royal Netherlands East Indies Army (Koninklijk Nederlands Indisch Leger) and became an Indonesian politician after the war. He conducted one of the Allied operations in the Tanimbar Islands, Netherlands East Indies, which is located about 400 km north of the Tiwi Islands. He ambushed the Japanese who were landing on a beach and killed over 80 of them. He escaped the island on a Buginese schooner, boarded with 27 people, including civilians,

and reached the Tiwi Islands. He was later awarded the Netherlands' Military Order of William (Militär-Wilhelms-Orden) (Gardner 1997:15–16). The reason Julius's monument was erected before the government monument will be discussed in Chapter 5.



Figure 4.28. A bronze statue of Matthias Ullungura (left) and a three-blade propeller (right) outside the Patakijiyali Museum (Photograph: Wendy Van Duivenvoorde, 27 May 2021).

## 5. Discussion

### 5.1. Introduction

In this chapter, Toyoshima's pistol, the identification of the Zero, the current condition of the Zero, related materials and their representations in museums, social value changes, and re-creating the past with mediums will be discussed.

### 5.2. Toyoshima's pistol

Although Matthias Ulungura described Toyoshima's pistol as a 'revolver', Piper (1995:58) and Alford (1991:20–21) describe Toyoshima's pistol as a .32 Belgian automatic pistol with seven rounds fully loaded in its magazine. This description of the .32 Belgian automatic pistol probably comes from Australian Army Sergeant Lew Powell's testimony. Since Powell was military personnel, it is unlikely that he misidentified the calibre and characteristics of the pistol and would not have gained any benefits from a false description. It is easy to identify the model of Toyoshima's pistol as the FN Model 1910 based on Powell's specific description.

#### 5.2.1. FN Model 1910

The FN Model 1910 is a .32 calibre semiautomatic pistol designed by American firearm designer John Browning and manufactured by a Belgium company Fabrique Nationale (FN). The Model 1910 was introduced to the market in 1912 after the smaller pocket pistol Model 1906 and the original 'Pistolet Browning' FN M1900. One of the FN Model 1910s was used by Gavrilo Princip, a radical nationalist, for the assassination of Archduke Franz Ferdinand of Austria on 28 June 1914, which led to the beginning of World War I (Gorenstein 2022:Chapter 10).

How Toyoshima obtained the FN Model 1910 is unknown, since information about the IJN's distributions and rules of small firearms for the personal protection of their pilots could not be found during this study. Western semiautomatic pistols were, however, popular personal firearms among IJA officers and were sold to them often (see Figure 5.1). From the end of World War I in 1918 to the Marco Polo Bridge Incident in 1937, which prevented Japan from importing weapons due to international law, a large number of Western pistols were exported to Japan from the West. More than 266,000 pistols were imported to Japan even in just five years, from the start of 1925 to the end of 1929 (Sugiura 2018:60–73). Even though Japan faced a shortage of pistols after 1937, there should have been enough FN Model 1910 pistols that Toyoshima could obtain personally or through the navy.

#### 5.2.2. Hamada Type pistol

There is some possibility that Powell misidentified Toyoshima's pistol as an FN Model 1910 instead of a Hamada Type pistol based on their similarity (see Figure 5.1). The Hamada Type pistol is a 7.65 mm (.32 ACP) calibre semiautomatic pistol designed by Bunji Hamada (濱田文次) in late 1941. The Hamada Type pistol's appearance resembles that of the FN Model 1910, but the firing mechanism resembles that of the Ortgies semiautomatic pistol from Germany (Sugiura 2018:101–109). The Hamada Type pistol holds nine rounds in its

magazine, so it does not match Powell’s description of Toyoshima’s pistol as having seven rounds.

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Figure 5.1. An advertisement of the FN Model 1910 in a military uniform catalogue printed by Osaka Kaikosha in 1937 (left). The comparison between the FN Model 1910 (middle) and the Type 14 pistol (right) (From Sugiura 2018:64, 100).

### 5.2.3. *Nambu pistol in the Darwin Military Museum*

For two reasons, the Japanese pistol displayed as Toyoshima’s at the Darwin Military Museum is not technically a Nambu pistol (see Figure 5.2). The first reason is that the Japanese had never called it the Nambu pistol, but it was called the Type 14 pistol before and during the war. The second reason is that Kijirō Nambu (南部麒次郎), who designed the actual Nambu pistols in 1904, did not design the Type 14 pistol, but it seems as if IJA Captain Tomonori Yoshida (吉田智準) designed the Type 14 pistol in 1924 (Sugiura 2018:33–53). Therefore, the Nambu Type 14 pistol is the wrong name and is a common misconception.

The manufacturing year and month for a Type 14 pistol were engraved near its grip. In the case of the pistol in the Darwin Military Museum, the manufacturing year and month can be read as ‘昭 18.4’, which means ‘April 1943’ (*Shōwa* 18) (see Figure 5.2), and it is more than a year after the capture of Toyoshima. There is a record that a Mitsubishi Ki-46 Type 100 Command Reconnaissance Aircraft (一〇〇式司令部偵察機) – the Allied codename Dinah – flown by IJA Lieutenants Saburo Shinohara and Hideo Ura was crashed north of the Bathurst Island Mission on 17 August 1943. Their bodies were buried near the crash site (Lewis and Claringbould 2020:112). The pistol currently exhibited as Toyoshima’s at the Darwin Military Museum would have belonged to either Shinohara or Ura.

Even though the manufacturing year of the Type 14 pistol in the museum is earlier than Toyoshima’s capture, the unique character of the Japanese pistol is too far from a .32 Belgian automatic pistol, as Powell described. Further, the Type 14 pistol uses unique 8 mm Nambu rounds and holds eight rounds in its magazine, which also does not match Powell’s descriptions. The reason behind the Type 14 pistol in the museum was modified to fire .32

rounds would be that 8 mm Nambu rounds were impossible to obtain in the Tiwi Islands. Since the modified pistol is physical evidence representing the relationship between the war and the Tiwi people, it has significant social value in Australian history and a shared modern conflict heritage. Nevertheless, it is questionable that the pistol would be in the exhibition in the first place if it is unrelated to Toyoshima.



Figure 5.2. A close-up of the Type 14 pistol, which is exhibited at the Darwin Military Museum as Toyoshima's pistol (Photograph: Author, 4 December 2021).

#### *5.2.4. Matthias's description*

Matthias would have described Toyoshima's pistol as a 'revolver' for two reasons. First, he had been influenced by Western cowboy movies. The phrase 'Stick 'em up' that Matthias used when he captured Toyoshima came from Hollywood actor John Wayne (Davidson 2015). Revolvers are often depicted in those Western movies. Second, there may not have been a distinction between revolvers and semiautomatic pistols in the Tiwi language. Therefore, Matthias could have mentioned a revolver but intended to describe a pistol or handgun in general.

#### *5.2.5. Why does the pistol matter?*

Toyoshima's pistol is the direct physical evidence for his surrender. Since Toyoshima is the first Japanese POW captured on Australian soil, who disarmed him became a historical matter later, and his pistol is the symbol of the event. That is why Powell took a picture of Toyoshima with his pistol on his side when Toyoshima was handed to him (see Figure 4.1). Since the social value of the event increased over time, Powell attempted to reclaim the credit for the disarming of Toyoshima 50 years after the event.

### **5.3. Identification of the Zero**

As explained in Chapter 4, the Zero has many models and variants. The model identification of the Zero currently displayed at the Darwin Aviation Museum will be discussed here. Further, the positive identification of this Zero as flown by Hajime Toyoshima will be discussed.

#### *5.3.1. Oil and fuel tank*

The most apparent indication that the Zero displayed at the Darwin Aviation Museum is an early model, such as Model 11 or 21, is the round-shaped oil tank in front of the aircraft (see Figures 4.15 and 4.16). Later models of the Zero, such as Models 32, 22 and 52, are equipped with inverted t-shaped oil tanks (see Figure 5.3). The inverted t-shape oil tank is attached to the firewall with two metal belts on flame 1 instead of flame 0. This flame shift also was an influence on the modified shape the fuel tank had behind the firewall in later models (Miyazaki 2019:60–67). Therefore, the round-shaped fuel tank behind the firewall of this Zero in the Darwin Aviation Museum is also an indication of the early model of the Zero (see Figure 4.5).

Figure removed due to copyright restriction.

Figure 5.3. Inverted t-shaped oil tanks for Model 32 (From Hara 2001:341)

#### *5.3.2. Wingtip*

A significant characteristic that differentiates Models 21 and 22 from other models, such as Models 11, 32 and 52, is the wingtip folding mechanisms (see Figure 4.11). The wingtip from the port wing displayed in the Darwin Aviation Museum shows folding and locking mechanisms (see Figure 4.10). If the wingtip belongs to the front fuselage of the Zero as the same aircraft, it is a significant indication that this Zero is either Model 21 or 22.

### 5.3.3. Gunsight mount

Based on the oil tank and the wingtip, the Zero displayed at the Darwin Aviation Museum is identified as a Mitsubishi A6M2 Model 21. Further, this Zero is identified as an earlier type of Model 21 based on the shape of the top front part of the cockpit, where a gunsight was mounted (see Figure 5.4). The curve on the left side of the gunsight mount is replaced by a punch hole instead in the later type of Model 21 (see Figure 5.5). A Japanese aviation enthusiast, Kenji Miyazaki, claims that this change happened sometime between the end of October 1941 and the beginning of February 1942, and it seems to be an improvement against vibration (Miyazaki 2019:132–133). Nevertheless, there is no evidence to prove his claim, since the indication of this change could not be found in any manuals or blueprints during this research.



Figure 5.4. The top, front part of the cockpit, where a gunsight was mounted (Photograph: Author, 2 December 2021).

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Figure 5.5. The shapes of the gunsight mount of Model 21. The early type (right) and the later type (left) (From Miyazaki 2019:133).

#### *5.3.4. Positive identification of the Zero*

From the data plate salvaged by the RAAF investigation team in 1943, Toyoshima's Zero is known as the A6M2 manufacture number 5349, manufactured by the Mitsubishi Heavy Industries company, Nagoya Aircraft, on 4 October 1941 (Wilby 2016:7). As discussed above, the characteristics of the Zero displayed in the Darwin Aviation Museum are quite similar to those of Toyoshima's Zero. Further, the RAAF investigation team salvaged the parts of Toyoshima's Zero in 1942 – such as the engine, rear fuselage and all armaments – that are missing from the Zero in the museum. Therefore, the Zero in the museum is positively identified as the Zero flown by Hajime Toyoshima on 19 February 1942.

### **5.4. The current condition of the Zero**

#### *5.4.1. Engine mount*

The remaining parts of the engine mount on the Zero (see Figure 4.15) are physical evidence for the salvage operation by the RAAF salvage team at the end of February 1942 (see Figure 5.6). Even though Toyoshima's Zero is one of the earliest intact Zeros that the Allies captured and had the strategic potential to assist them, it is not credited as much as the Akutan Zero, which was captured several months after Toyoshima's Zero.



Figure removed due to copyright restriction.

Figure 5.6. The RAAF salvage team removed the engine of Toyoshima's Zero in 1942 (From Rorrison 1992:236).

One of the Zeros that participated in the Japanese campaign against the Aleutian Islands, Alaska, a US territory, in June 1942, is known as the Akutan Zero, based on its importance. On 4 June 1942, the IJN aircraft attacked the USN base of Dutch Harbor on Amaknak Island in the Fox Islands, Alaska. One of the Zeros, from the aircraft carrier *Ryujo* (龍鳳), flown by Petty Officer Tadayoshi Koga, was force-landed on Akutan Island, 40 km east of Dutch Harbor. Koga's Zero was flipped into a bog; Koga was killed during the landing (Rearden 1990:71–80). On 9 July 1942, five weeks after Koga's crash, the USN found this fully intact Zero and successfully retrieved it. The aircraft was shipped to Naval Air Station North Island, San Diego, California, and rebuilt there in secret (Rearden 1990:81–89). Koga's Zero flew again by the end of September. The aircraft was flown extensively and even engaged in dogfights against US fighters for analysis. As a result, Koga's Zero exposed its weaknesses to the Allies (Rearden 1990:91–100).

There are some possible reasons that the RAAF only partially retrieved Toyoshima's Zero, even though it had strategic values, as did the Akutan Zero. First, they might have faced logistics challenges, since the wreck site on Melville Island was too remote and they could not gain enough support from Darwin, especially in the aftermath of the bombings and when the possibility of other attacks from Japan still existed. Second, there would have been communication issues between Australians and Americans. The Allied would not have been a single staunch entity, since it was the early period of the war. Third, the RAAF might have underestimated the capability of Japanese aircraft due to their lack of combat experience against them. Last, the RAAF would misidentify the Zero's strength as being the engine they

recovered from the wreck site. The Zero's incredible long range and manoeuvrability come from its lightweight airframe but not from its engine. The reason the RAAF salvage operation was conducted the way it was might be a combination of all or some of these reasons. The RAAF, however, were aware of the Zero's strategic values, and the remaining parts of the engine mount on the Zero are visible evidence for their efforts.

#### *5.4.2. Port wing tank and cockpit*

The loss on the port side of the floor in the cockpit and part of the port wing from rib 1 to rib 13, where a wing tank was located, might result from intensive attempts to salvage the cockpit interiors over time. Since most humans are right handed, a person who wants to peer over or climb inside the cockpit would likely approach from the port side and step on those areas. Because of this, retractable entry steps to the cockpit of the Zero (see Figure 4.6) are located on the port side of the fuselage. Further, it might be natural for humans to attempt to climb inside an aircraft if they interact with it. In the case of scuba divers on submerged aircraft wreck sites at Chuuk Lagoon, they tend to interact with the cockpits of aircraft (Edney and Boyd 2021).

How much cockpit interiors and equipment were taken by investigation teams in 1942 and 1943 and later by souvenir hunters is challenging to estimate. All detachable parts in the cockpit are missing and would have been removed by those salvagers rather than be due to deterioration.

#### *5.4.3. Graffiti*

As described in Chapter 4, graffiti with white paint was observed on both the port and starboard sides of the front fuselage. The small-scale graffiti of 'QR.' or 'O, R' on the port side could be the initials of someone's name. This type of graffiti is reported on the submerged Kawanishi H8K Type 2 flying boat, the Allied codename Emily, in Saipan, Commonwealth of the Northern Mariana Islands, a US territory (McKinnon 2015a:21). The large graffiti of 'HERE' on the starboard side could be part of the famous graffiti 'KILROY WAS HERE' or 'FOO WAS HERE'. This type of graffiti is observed on the underwater wreck site of the Martin PBM-5 Mariner flying boat, Lake Washington in Seattle, Washington (Lickliter-Mundon 2018:335).

'KILROY WAS HERE' is a peering cartoon image with graffiti commonly drawn by American soldiers during WWII. The graffiti appeared everywhere American soldiers went, even on the South Pacific Islands (O'Gorman 1994:19). According to an article in *The New York Times* on 12 January 1947, Kilroy originated from a ship inspector, James J. Kilroy, at Bethlehem Steel Company, Fore River Ship Yard, Quincy, Massachusetts. He marked 'KILROY WAS HERE' on every inner bottom and tank he had inspected to show his work to his supervisor (*The New York Times* 1947). Some argue that Kilroy originated from the 'FOO WAS HERE' graffiti associated with the First Australian Imperial Force during WWI and with the RAAF during WWII (Digger History n.d.).

Since only the graffiti of 'HERE' is visible on the Zero, identifying the original graffiti is challenging. Further, it is impossible to date when the graffiti was painted, either during the war or post-war, since there is no record of those graffiti in historical pictures of the Zero.

## ***5.5. Related materials and their representations***

### *5.5.1. The Darwin Aviation Museum*

The exhibition of the Zero in the Darwin Aviation Museum tries to reconstruct how the Zero would have flown and wrecked during the war. The display panel in front of the Zero further contextualises this aircraft by connecting it with the story of the pilot, Hajime Toyoshima, although it would be easier to dehumanise him as an enemy pilot. This attempt would be part of this museum's efforts to tell human stories through aviation culture and history.

### *5.5.2. The Darwin Military Museum*

The Defence of Darwin Experience in the museum focuses on the sense of the bombing by re-creating the visuals and sounds. Artefacts in their exhibition provide a sense of reality and effectively tell stories of people, despite the credibility of the Japanese pistol, which is questionable, as discussed above. The sophisticated design of the exhibit is also suitable for a tourist destination. It is worth noting that the RAAA (NT), which runs the museum, showed their interest in Toyoshima's Zero in 1969, much earlier than any museum or facility that this research examined.

### *5.5.3. The Royal Flying Doctor Service Darwin Tourist Facility*

Since this is a tourist facility rather than a museum, it focuses on entertaining and educating tourists. The facility re-created Toyoshima, his Zero and the event of the bombings without any legitimacy or messages but as tourist attractions with modern technologies. For example, there is no specific reason that the reconstruction of Toyoshima's Zero needs to be in this facility but to entertain tourists. Further, the exhibition of Toyoshima is ethically questionable (see Figure 4.27). Since John Curtin was the prime minister at the time, his political opinions and situations in the exhibition being portrayed by an actor would be acceptable. Hajime Toyoshima, however, was a young pilot who never exposed his true identity in Australia, which is the opposite of what the actor portraying Toyoshima does. He was a victim of the war and is still a part of living memories. Whether the RFDS asked Toyoshima's family in Japan for permission to make this exhibition a tourist attraction was not confirmed during this study. If a North Korean or Vietnamese tourist facility created an exhibition of young Australian pilots who lost their lives in the war in front of Kim Il-sung or Ho Chi Minh's exhibition, presumedly, their Australian families would not be pleased.

### *5.5.4. Propeller on Bathurst Island*

This requires further research, but after a brief picture inspection, a curator of the Darwin Aviation Museum, Ken Lai, suggested that the propeller near the Patakijiyali Museum, claimed to be from Toyoshima's Zero, is unlikely to have originated from his Zero for two reasons. First, the propeller reduction gear and the propeller shaft, which appeared in the propeller on Bathurst Island, are still intact on the wreckage of Toyoshima's Zero in the historical picture (see Figure 4.2). The propeller reduction gear of Toyoshima's Zero is still covered with a metal housing and surrounded by the cowling in the picture. Second, the propeller should be bent backwards, since Toyoshima's Zero was force-landed. The propeller on Bathurst Island, however, is bent forwards. It is challenging to identify whether the propeller on Bathurst Island originated from either the Japanese or the Allies because Sumitomo Metal Industries was licenced by American company Hamilton Standard in 1934,

and the company started to manufacture hydromatic propellers in 1938 for Zeros (Yoshida 2019:76–78) (see Figure 5.7).

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Figure 5.7. The mechanism of Hamilton Standard’s hydromatic propellers (Photograph: Fey 2020).

#### 5.5.5. *Statue of Matthias Ulungura*

As described in the exhibition in Patakijiyali Museum, Matthias Ulungura mentioned Toyoshima’s pistol as being a revolver. Despite this fact, the statue of Matthias Ulungura on Bathurst Island holds the FN Model 1910 pistol (see Figure 5.8), which Lew Powell’s description influenced. Why is this? To answer this question, an analysis of this statute’s stakeholders and their purpose is required.

A bronze statue is a Western tradition and could be an ethnocentric monument on Indigenous land. As a plaque on the statue indicates, the Northern Territory Government built this statue in 2016 to commemorate the contributions of Matthias and the Tiwi people during WWII. It is, however, questionable that the Tiwi people needed or requested this statue, since they already have their oral history and dance representing this part of history (Davidson 2015). It is more likely that the statue is the government’s way to indicate they care about the Tiwi people and their shared past.

Another plaque on the statue indicates that Julius Tahija, an Indonesian and foreigner, could build the last monument in 1993, more than two decades earlier than the current government-built statue. Why did the government build this statue in 2016, 74 years after the event, instead of right after the war or at least while Matthias was alive? The reason would reflect the relationship shift between the government and the Tiwi people and, more broadly,

Indigenous communities. In other words, the government could no longer ignore or deny the contributions of Matthias and the Tiwi people during WWII.



Figure 5.8. The FN Model 1910 pistol on the statue of Matthias Ulungura (Photograph: Wendy Van Duivenvoorde, 27 May 2021).

### ***5.6. Social value changes***

From this research, historical sequences of Toyoshima's Zero and related materials are observed. First, Toyoshima utilised materials from his Zero for his survival after its wreckage. Later, the RAAF investigation teams salvaged materials from the site for their war efforts during the war. The wreckage was forgotten from the end of the war until the rediscovery in 1960. In 1962 and 1970, two military veterans' organisations showed interest in the wreckage, but the aircraft remained on the island. In 1977, the AHSNT secured the wreckage in Darwin with an agreement with the Tiwi Council.

These sequences suggest that the social values of Toyoshima's Zero and related materials have changed over time. Those changes are similar to the case of the USS *Arizona* in Pearl Harbor, Hawaii. During the war, the wreckage of the USS *Arizona* was utilised for Americans' war efforts. After the war, the wreckage was heavily salvaged for relic collecting until the wreckage became a war memorial by the 1960s (Delgado 1992).

### ***5.7. Re-creating the past with mediums***

All museums surveyed during this research try to re-create the event by utilising Toyoshima's Zero and related materials to some degree. In other words, those materials work as mediums

to connect visitors and the past event – the Bombing of Darwin. In the case of the Darwin Aviation Museum, Toyoshima's Zero is a medium to re-create past events. The pistol in the Darwin Military Museum and the propeller at Patakijiyali Museum are mediums to provide legitimacy and authenticity to museums despite the questionable credibility of those artefacts. Further, the creation of related materials, which are fabricated mediums, occurred in the cases of the RFDS Darwin Tourist Facility and the Patakijiyali Museum (i.e., the statue of Matthias Ulungura). These cases show that mediums are significant in experiencing a past event and are also used for tourist attractions.

## **6. Conclusion**

### ***6.1. Readdressing the research question and aims***

This study attempted to answer the main research question: Why and how have utilisations of the wreckage of Toyoshima's Zero and related materials changed over time? Four research aims were addressed to answer this research question.

#### *6.1.1. Examine historical documents and records of Toyoshima's Zero and related materials*

Through analysis of historical documents, value shifts towards Toyoshima's Zero over time were observed. The aircraft had value as an enemy aircraft during the war. After the war, it was forgotten until its rediscovery. After its rediscovery, several stakeholders were interested in obtaining the aircraft as a war relic and tourist attraction.

#### *6.1.2. Record and analyse the current condition of the Zero in the Darwin Aviation Museum to positively identify it as Toyoshima's Zero and to observe any trace of utilisations*

With the recording and analysis of the Zero in the Darwin Aviation Museum, this study successfully identified the model of the Zero as an early Model 21 flown by Toyoshima; this study also examined traces of salvage attempts and graffiti.

#### *6.1.3. Observe related materials and displays in three museums and one tourist facility*

With the observation of museum displays, this research found the credibility of artefacts claimed to be Toyoshima's pistol and the propeller from his Zero questionable. Overall, the survey concluded that all three museums attempted to re-create the event by utilising artefacts to some degree. In the case of the RFDS Darwin Tourist Facility, all the materials were fabricated to achieve the same purpose.

#### *6.1.4. Interpret collected data to understand human behaviours towards materials related to the war*

As explained above, the social value of Toyoshima's Zero and related materials has changed over time. Historical records and the current condition of the Zero reflect these shifts. Moreover, museums utilise Toyoshima's Zero and related materials as mediums to connect visitors with the re-created past event.

### ***6.2. Significance and limitations***

#### *6.2.1. Significance*

This study questioned the credibility of Toyoshima-related artefacts displayed in museums, such as the pistol and propeller, without physical contact. These cases proved that the modern conflict archaeological approach of making the familiar unfamiliar is an appropriate and valuable method. Further, this research closely examined Toyoshima's Zero and discovered several traces of interactions between people and this aircraft, such as indications of salvage attempts and graffiti. This case shows that even recovered aircraft are valuable sources for aviation archaeology to use to understand the relationship between humans and aviation materials.

### *6.2.2. Limitations*

This research set Toyoshima's Zero and its related materials as stationary points to observe interactions between humans and materials related to the conflict. The Bombing of Darwin is, however, a much broader event, and its effect and physical remains are immense. Toyoshima's Zero and related materials are limited points of view of this event, and many perspectives are required to understand the relationship between people and the event. Moreover, on a much broader scale, the Bombing of Darwin is only a tiny fraction of air operations conducted by the IJN and IJA during the war. Therefore, this research only focused on a narrower scale of how Australians dealt with the Second World War and its effects.

### *6.3. Recommendations for future research*

Since the 3D models of Toyoshima's Zero that were made with photogrammetry were successfully created during this research, building an entire 3D database of the remaining Zeros worldwide is now possible. With this database, a comparative analysis of the development and modification of the Zero will be achievable. These data would provide insights into untold Japanese war efforts. Further, traces of Japanese aircraft utilisation can provide unrecorded information on how the Allies treated Japanese aircraft.

This research did not deeply analyse the relationship between the Indigenous population and the war. Some Indigenous cultural practices, such as the Tiwi dance (Puruntatameri et al. 2011) and songs (Campbell 2013:109), were created in response to the Japanese air raid. Such unique Indigenous cultural practices related to the war deserve more modern conflict and aviation archaeological and ethnological attention and research.



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## **Appendix 1**

### **Evans and Pender 1943 Telephone reports of sighting of crashed Zero (From Bob Alford collection)**

INTELLIGENCE REPORT

*Copy of original - held on  
intel file*

SERIAL....3.....  
FROM Intelligence Officer..... AT 52 O.B.U. DARWIN DATE 29-3-1943..  
REFERENCE Telephone report of sighting of crashed ZERO.....  
SOURCE..... GRADING.....  
SUBJECT... Investigation of site on MELVILLE ISLAND.....

BRIEF:

Under instructions from Air Intelligence Section NORTH WESTERN AREA H.Q. I.O. was conveyed by Lt. of No. 18 Squadron over MELVILLE ISLAND to position reported as  $11^{\circ} 32' S 130^{\circ} 49' E$ . The aircraft was over the spot at 0445/29/3 but no trace could be found. Search was then made by Captain of the aircraft who located the wreckage and aircraft was brought down to within 800 ft of the site, and oblique shots taken of the wreckage. Photographs were also taken of the approaches to determine the best method of approach of any land party. Captain of the aircraft circled the site to fix bearings, and on completion of flight furnished the following. All references are magnetic bearings from the position of the wreck to landmarks:-

To BATHURST ISLAND MISSION E.Y.C. -  $255^{\circ}$   
To HARROLD POINT -  $020^{\circ}$

To WESTERN MOST point of N.W.I. in CLARENCE STRAIT -  $155^{\circ}$   
This positions the site of the crash at  $11^{\circ} 42' 30" S, 130^{\circ} 33' E$ .

Observation of the country round about the small clearing, which appears to be natural, and rough, precludes any possibility of landing any type of aircraft in the clearing, and further that it will not be possible to make a direct approach after landing on MELVILLE ISLAND in any direction whatsoever. There are a number of tidal creeks which wind about, also small gullies which contain water at the present time. The locality is mainly flattish country with small rises nearby but sufficiently broken to make slow progress the lot of a land party. No tracks were visible in the vicinity, nor any signs of natives. Motor transport would be impracticable, presupposing that it would be feasible to land a vehicle on the island. The suggestion is put forward for consideration that a reliable native be obtained from the Mission on BATHURST ISLAND, and a small party be despatched in the first instance to visit the crash and make a thorough inspection to decide if anything can be brought away at once, and also to decide what should be salvaged.

From the visual observation today, the opinion has been formed by the I.O. that the wreckage is not recent, it presented a somewhat bleached appearance, but in contradistinction the red roundels mentioned in the telephoned report does not appear to have faded. No signs of burning after crash are visible, the main portion discernible being the main plane surmounted by portion of fuselage, which is broken off at trailing edge. The balance of the fuselage was not visible. About 4 to 5 foot in front is an object shaped somewhat like an elongated egg, with what appeared to be a dent towards the broader end, but not shaped similarly to any belly tank seen in photographs by I.O.

The portion upon which the roundel is painted seems to be a portion of wing lying some ten yards to the rear of the mainplane, and at right angles thereto. Other small portions of wreckage are visible but remain unidentified.

Photographer at his request was instructed to have prints sent direct to Air Intelligence Section at the earliest.

.....  
(A.J.EVANS) (P/O)  
INTELLIGENCE OFFICER

DISTRIBUTION: (To be shown in every instance)

- AIR BOARD (D of I) 1 copy
- N.W.Area (Air Intell. Section) 1 copy
- .....
- File 1 copy
- .....
- F/O Jeffery No. 5 F/S (for information)
- .....
- .....

D.P.W.18/42

28/4/43

SERIAL No. 3 I.O.'s REPORT 52 O.B.U. DARWIN 29 MARCH 43

*Copy of original held on I.O. file*

## INVESTIGATION OF CRASHED ZEKE - MELVILLE ISLAND

Acting on instructions from Air Intelligence Section, North Western Area H.Q. Intelligence Officer proceeded by lugger 'Francis' to Bathurst Island Mission. The party included F/O O'Connor and 6 airmen from R.S.U., who were investigating salvage possibilities of crashed ZEKE reported in position 11 deg 42' 30" S 130 deg 33' E on Melville Island. This position was located by an aircraft from 18 Squadron and reported by I.O. at 52 O.B.U. Darwin on 29th March 1943.

The party arrived on Bathurst Island Mission on 18th April 1943, and arrangements were made for natives to act as carriers and guides.

The party left Bathurst Island Mission on the morning of 19th April 1943 on a course of 120 deg. for the mouth of Charlie Williams Creek, on Melville Island. The boat proceeded up this creek for 4 miles where a landing was made, and a camp established half a mile east of landing.

A search was commenced at 0800 on 20th April, on a bearing of approximately 15 deg from camp site for a distance of 7 miles. Search was divided into 3 search parties approx. half a mile apart. Further searches were made during next two days to a distance of 10 miles from camp site. No trace of crashed ZEKE was found.

With the object of verifying whether reported ZEKE was one which had crashed on Feb. 1942, I.O. with two fitters from R.S.U. proceeded to site of an old crash which was located at 1630 hours on 24th April 1943.

On reaching this site it was found that this ZEKE was the actual aircraft which had crashed during Feb. 1942. The engine and fuselage were salvaged by R.A.A.F. in March 1942. Comparison of site and position of ZEKE with photos supplied, confirmed the fact that this was the aircraft for which our party was searching. Position of ZEKE was on a bearing of approx. 255 N., 14 miles to Bathurst Island Mission Station. Photographs of crashed ZEKE were taken from several positions.

The remains of the ZEKE were in remarkably good condition. Very little rust was observed. The anti corrosive paint used is evidently very effective, wing tips showing red roundels were found. The red paint of the roundel was still very bright. A piece of this red roundel was brought back to show colour. Measurements were taken of roundel which was 2ft 11" in diameter and 2ft 11" from wingtip to edge of roundel. The wings and body were silver grey in colour. A number of plates were salvaged from plane. The main examination plate was found on the ground near the plane evidently having been torn from it by previous salvage party.

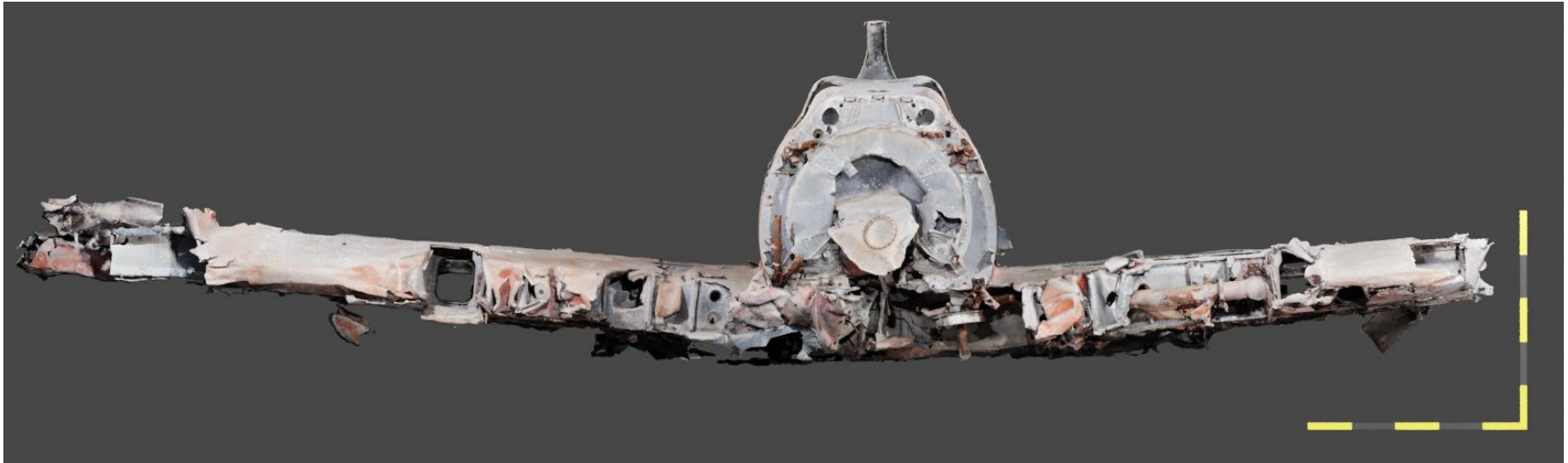
The party arrived back at Darwin at 1900 hrs. on 27th April 1943.

(C.D. Pender, F/O Intelligence Officer  
No. 5 Fighter Sector)

## **Appendix 2**

### **High-resolution images of 3D rendered model of Toyoshima's Zero**

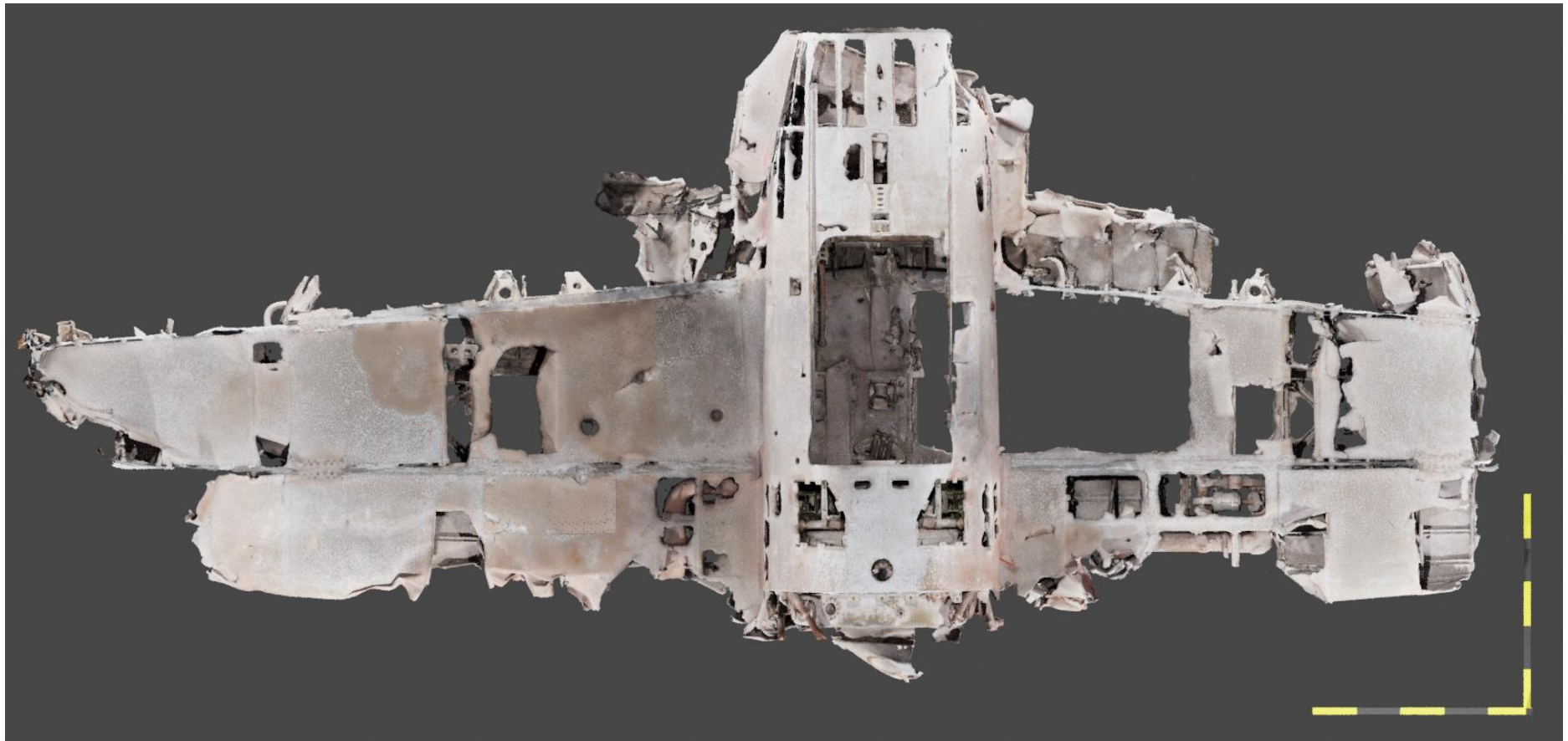
**From front**



**From rear**



**From top**



From port wing side





From starboard side

