

*“Lest we forget”*: An overview of Australia’s response to the recovery and identification of unrecovered historic military remains.

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## ABSTRACT

The Australian Defence Force (ADF) is responsible for the recovery and identification of its historic casualties. With over 30,000 still unrecovered from past conflicts including World War One (WW1) and World War Two (WWII), the Australian Army and Royal Australian Air Force have teams that research, recover, identify and oversee the burial (or reburial) of the remains of soldiers and airmen who continue to be found each year. The Royal Australian Navy is also responsible for its unrecovered casualties. Collectively the priorities of the various services within the ADF are the respectful recovery and treatment of the dead, thorough forensic identification efforts, resolution for families and honouring the ADF's proud history of service and sacrifice. What is unique about the approach of the ADF is that the respective services retain responsibility for their historic losses, while a joint approach is taken on policies and in the utilisation of the pool of forensic specialists. Section One describes the process undertaken by the Australian Army in the recovery, identification and burial or repatriation of soldiers through its specialised unit Unrecovered War Casualties - Army (UWC-A). Section Two describes the role of the Royal Australian Air Force in the recovery of aircraft and service personnel through their specialised unit Historic Unrecovered War Casualties – Air Force (HUWC-AF). An overview of the operations of each service and case studies is presented for each section.

## KEYWORDS

Australian Defence Force (ADF), Unrecovered War Casualties – Army (UWC-A), Historic Unrecovered War Casualties – Air Force (HUWC-AF), World War One (WWI), World War Two (WWII), [forensic](#), human remains

## 1 INTRODUCTION

The approach by the Australian Defence Force (ADF) towards the recovery of its historical unrecovered war casualties differs from other similar organisations in that the respective services retain responsibility for their historic losses. The Australian Army investigates notifications of possible Australian soldiers and the Royal Australian Air Force (RAAF) is tasked with locating lost aircraft and their crew and it is these contributions that are our focus here. The Royal Australian Navy (RAN), not discussed here, has a significantly lower caseload owing to the maritime nature of most losses and therefore limited representation in the historical recovery workspace. Regardless of the service, the collective priorities of the various staff within the various services of the ADF are: (i) the respectful recovery and treatment of the dead, (ii) thorough forensic identification efforts, (iii) resolution for families and (iv) honouring the ADF's proud history of service and sacrifice.

In the first section we discuss (1) the origins of the Australian Army's specialised unit Unrecovered War Casualties -Army (UWC-A) and the process for responding to notifications of human remains believed to be Australian Soldiers; (2) the roles of the various specialists and investigators within UWC-A; (3) repatriation and ceremonial aspects of this work; and (4) finish with several case examples that illustrate the diversity of UWC-A's work. In Section two, we discuss (1) the role and (2) the origins of the RAAF's specialised unit Historical Unrecovered War Casualties -Airforce (HUWC-AF); (3) details of recovery efforts as well as (4) their investigation process; and close with (5) several case examples that illustrate the work of HUWC-AF.

## 2. UNRECOVERED WAR CASUALTIES- ARMY (UWC-A)

### 2.1 Origins and approaches

During the period 2000-2010 there was a significant expansion in public interest in Defence's responsibilities for recovering and identifying its missing. For example, groups such as "Operation Aussies Home," which sought to bring resolution to the last six soldiers whose remains lay in Vietnam, and the public lobbying to undertake exploratory excavations of an alleged First World War mass grave at Fromelles, France garnered significant public support and generated unprecedented media interest. Further, a concentration of recovered Second World War (WWII) remains in Port Moresby, Papua New Guinea, required dedicated effort by forensic and historical experts with the Australian Army History Unit (AAHU). While the role

of the AAHU is broad and complex<sup>1</sup>, the unit was additionally detailed to investigate relevant human remains cases. In early 2010 after successfully locating, recovering and repatriating the remains of all the hitherto missing Australian service personnel from Vietnam [1], the staff at the AAHU and other stakeholders recognised that a specialist and formalised structure for accounting for missing Australian service personnel was required.

In July 2010, the Australian Army formally established Unrecovered War Casualties – Army (UWC-A) [2]. Based at the Australian Army headquarters in Canberra, Australia, the unit is dedicated to the investigation of all notifications of the discovery of human remains believed to be those of Australian soldiers lost during past conflicts. The UWC-A team has a small permanent public service staff of a manager and two case managers – one for Europe and one for the Asia-Pacific region. These case managers report to the unit manager and oversee investigations and operations in their respective regions. The team is completed by posted Australian Army Reserve (part-time) members with civilian backgrounds as professional investigators and forensic specialists from across Australia. Other forensic specialists are also drawn from the Royal Australian Air Force (RAAF) and Royal Australian Navy (RAN), as well as civilian specialists from various academic institutions. Many of the civilian forensic specialists originally engaged to build the scientific capability of the team were recruited as specialist reservists. As the team grew and commenced activities, the breadth of Australia's losses across regions and conflicts highlighted the scale of the challenge ahead.

The Australian Army's unrecovered casualties represent approximately 25,000 of the ADF's total of over 87,000 for the First World War (WWI), WWII, and the Korean Conflict [3]. All six previously missing casualties from the Vietnam War have been successfully found, recovered and identified. Areas of greatest concentrations of outstanding Australian losses include France, Belgium and Turkey (WW1); Papua New Guinea, Singapore, Malaysia, Indonesia and Timor Leste (WWII) and along the Demilitarised Zone of the Korean Conflict (1951-53).

One of the most important principles in the ADF's approach to its work is to act in accordance with legal and policy frameworks. Among these, respecting the laws of the host nation and the rights of landowners where UWC-A might wish to operate is of primary importance. The legal frameworks vary greatly across the world [2], as do the needs and desires of land holders who support UWC-A's work. For example, in Papua New Guinea (PNG), UWC-A works closely

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<sup>1</sup> The reader is encouraged to explore the various roles and function of the Australian Army History Unit here: <https://www.army.gov.au/our-heritage/history>.

with the National Museum and Art Gallery who provide advice on artefact custody as well as local customs. However, a complex web of regional, tribal and cultural positions must be considered in addition to local laws. This has manifested in negotiations on repatriation of remains, which, having lain in a village for some time are culturally now considered to be “family”. Similarly, UWC-A contends with the difference between scientific knowledge and local lore, whereby locals often present a “known” burial location, which is found to be empty upon excavation. “Truth” is open to multiple interpretations, and local folklore must be sensitively handled where local legends about burials do not yield remains.

In a similar manner to PNG, when operating in Europe, respecting local laws, customs and landowners is vital in all UWC-A work. Although considering the rights of the deceased to hopefully be recovered and identified, UWC-A also recognises the importance of the right of the living to peacefully go about their business without unnecessary interruption. UWC-A has been fortunate in places such as Belgium and France to be granted access to survey and excavate, ensuring reasonable remediation is made and costs associated with interruption are covered. UWC-A also works with local laws which might require the appointment of a locally accredited archaeologist, as is the requirement in Belgium. Building synergies between the desired outcomes of UWC-A staff and local stakeholders has been key to successful, legal recovery efforts.

The notification of cases and potential cases often follows one of several typical paths. Incidentally found remains are often discovered during construction and road works, archaeological projects or farming activities, and during specific investigations. Local informants will often directly engage Australian diplomatic staff or make contact with UWC-A. Alternatively, the ADF or motivated public interest groups may undertake research which points to a possible burial location. The weight and specificity of the evidence, impact on local landowners, as well as the resources required for recovery efforts, are all taken into consideration prior to approval of fieldwork.

Critical to progressing any such excavations is a thorough historical analysis of battlefield circumstances, numbers of losses and close recoveries. UWC-A will only conduct field work where a soldier or soldiers remain missing, the general location of their death or burial can be proved by robust evidence and it is clear they have not been formerly recovered and may rest in a Commonwealth War Grave Commission (CWGC) cemetery in an unidentified grave. This work falls to the investigators.

## 2.2 Specialist and investigatory roles

The investigators within UWC-A are part-time Australian Army members with extensive experience in government investigations and/or military history, usually gained through their civilian employment or previous military service. UWC-A also works closely with military historians and private researchers across the span of its responsibilities and partners within research institutions. The Unit works collaboratively with a variety of domestic and international partners including the Australian War Memorial (AWM), CWGC, Office of Australian War Graves (OAWG) and military counterparts in the United States, United Kingdom, Canada, Malaysia, New Zealand, Greece and Korea - amongst others.

UWC-A attempts to identify all discovered Australian soldier remains through best practice investigative and forensic methodologies. Where investigations do not quickly result in identification the soldier may be buried as an “Unknown Australian Soldier” in the nearest practicable CWGC cemetery to where their remains were recovered. Despite this, all unsolved investigations involving the recovery of Australian soldiers remain active, with regular case reviews designed to consider new avenues of inquiry and advances in technology and methodology which may progress identification.

All investigative and forensic activity into the location and identification of Australian soldiers, apart from specialist geophysical survey and laboratory DNA testing, is undertaken by the members of the unit. Forensic activity is completed by a multidisciplinary group of specialists, who operate across a range of activities [3]. UWC-A specialists are drawn from among the most senior relevant scientists in Australia, typically qualified with a relevant Masters or PhD with extensive experience in their respective fields.

### 2.2.1 Archaeology

A significant component of any field investigation conducted by UWC-A is the involvement of archaeologists during the planning and excavation phases. The primary roles of archaeologists involved in any investigation are to determine the specific location and the likely extent of any site to be investigated. They also manage any excavation conducted to ensure that identified remains and associated features and artefacts are exposed and recorded following best archaeological practice ensuring no information is lost [4].

If a case involves a proposition regarding the potential burial location of a missing Australian soldier or soldiers, UWC-A may oversee geophysical (non-invasive) surveys to determine if the historical evidence can be confirmed or refuted by subsoil features. Magnetometry,

resistivity, ground penetrating radar (GPR), aerial imagery and LIDAR are aligned with archaeological best practice and only skilled specialists are engaged.

Despite the best technological approaches, often archaeological investigation, is the only method which can confidently confirm or refute evidence which indicates that missing soldiers may be buried in a particular battlefield location. Over time UWC-A have necessarily conducted a number of exploratory excavations, such as an excavation at Messines, Belgium in 2018 [5], where comprehensive historical evidence and two geophysical surveys identified a specific location that may have contained over 75 missing Australians. Despite this evidence, no remains were found on this occasion, and the investigation is ongoing.

In any controlled excavation the project archaeologist maintains a record of all relevant site conditions, recording information on soil condition and other environmental factors which may influence preservation [6] on site and which may prove useful to subsequent analysis of recovered remains, or discussions regarding the absence of such material. They also record spatial data, such as site plans and depth information for specific features, and any other information that will assist in both determining identification and to demonstrate that the site had been investigated thoroughly. All information is presented in a formal report upon the completion of the activity, to provide an accessible written record to assist further investigation or review.

The archaeologist also plays a substantive role in the identification and interpretation of artefacts associated with war casualty sites. In many cases, particularly those of WW1 servicemen, this material is the initial evidence utilised in identifying the nationality and directing the investigation beyond that point. Any association between remains and identified artefact material is critical to ensure that association is both definitive and maintained throughout the subsequent recovery process. While specific identification information (e.g., identity discs) may not be present, information may be encountered which can be used in narrowing the field of candidates to determine identity. Examples of this may include unit insignia from uniforms, minting dates for coins which may narrow embarkation dates, or serial numbers on equipment which may be associated with specific production batches and distributed to units at specific times. In several cases such information has proven critical in the determining the identity of Australian service personnel.

### 2.2.3 Biological Anthropology

The biological anthropologists employed by UWC-A have diverse backgrounds and offer a broad range of expertise based on their profession and experience. These include (civilian) academic professionals trained in bioarchaeology and biological anthropology sourced from various tertiary institutions both nationally and internationally, with extensive field experience in archaeological settings. Others are qualified forensic anthropologists, actively serving within police and other Government agencies across Australia [7], with considerable experience in crime scene investigation.

Given the often fragile nature of recovered remains, UWC-A bioanthropological specialists have developed processes that require extensive recording of all remains and artefacts, including measurements of long bone dimensions *in-situ* prior to lifting. This process minimises the amount of subsequent analysis required in the mortuary phase and also optimises all contextual information and possible identifying information that can be gained. Within the mortuary facility other biological anthropologists oversee the workflow, including (a) drying and stabilising the remains, recording (including dental) and collecting quantitative data, (b) sampling of remains for subsequent DNA (i.e., bone and or tooth) and isotope analysis (i.e., tooth); and (c) cleaning and photographing all artefacts collected with the remains.

Biological anthropologists are additionally trained to record the deposition of remains *in situ*. The process, termed field anthropology [8, 9], combines archaeological, osteological and taphonomic observations to understand and interpret the manner of interment. The methodology identifies each element of the skeleton and the relationship of these to one another in order to understand how the elements of a human body (skeleton) moved as the body decomposed. The ultimate aim of such an analysis is to reconstruct (or reconceptualise) the original position of the individual, to assist in understanding the original context (coffined, shrouded, inhumed) in which the individual was interred and any other relevant post-burial alterations. In this sense it is particularly useful for identifying whether the burial represents the primary disposition of the individual or whether the remains had been moved.

### 2.2.3 DNA

To further facilitate the identification of human remains, UWC-A employs DNA methods to investigate the likely biogeographic origin of the deceased and to identify familial relationships with living descendants of those identified as Australian casualties. The unit employs ADF forensic biology specialists to provide DNA expertise and to inform UWC-A investigations. External service providers are engaged to undertake DNA laboratory analysis of samples from



human remains, Family Reference DNA Samples (FRS) and staff elimination (quality assurance) DNA samples.

The skeletal/dental sample targeted for DNA analysis is dependent on what remains are available and the extent of degradation. Typically, a tooth (intact molars or canines) and hard, compact bone (from a femur or tibia) are preferentially selected for sampling and DNA extraction using a bone demineralisation protocol, with specialist testing contracted to commercial or government laboratories. UWC-A target DNA lineage markers, which are inherited largely unchanged over multiple generations. Maternally inherited mitochondrial DNA (mtDNA) and paternally inherited Y chromosome sequences will therefore be the same in all family members from the same maternal and paternal lineage, respectively. These sequences can then be used to infer biogeographic ancestry (BGA) and/or be compared to FRS profiles, or analysed at the same regions to identify familial relationships. BGA assessment of remains recovered from the Asia Pacific area can assist UWC-A to differentiate between Japanese and Australian soldiers, who fought and fell in close proximity across the Asia Pacific region during WW2. This is particularly useful where tectonic degradation does not allow for anthropological discrimination. Remains recovered from Europe are more frequently suitable for Y chromosome analysis, however, remains recovered from the Asia Pacific arena are often severely degraded and only suitable for mtDNA analysis. Suitable family members are identified through genealogical research and contacted by UWC-A to request FRS' in the form of buccal swabs.

A UWC-A biologist evaluates DNA results within the context of each case and prepares a report outlining their conclusions and any recommendations for further testing (and at times data sharing with international counterpart agencies). DNA information is used for casualty identification purposes only and treated in the strictest of confidence. The results are peer reviewed by a separate UWC-A biologist after which the report is disseminated to the relevant investigators and, if relevant, to a subsequent Identification Board.

#### 2.2.4 Genealogy

Given the historical nature of the cases handled by UWC-A, tracing appropriate individuals to obtain FRS for DNA comparison presents significant challenges. For WWI cases in particular, living family members may be three or four generations removed from the soldier and be unaware of a family connection. Through specialist genealogists, UWC-A ensures that every

effort is made to target individuals for FRS who can either provide a definitive DNA match or exclusion.

Starting with a short list provided by an investigator, the genealogist searches publicly available records to create a family tree for each soldier. These include births, deaths and marriage records, newspaper articles and notices, wills, school records, cemetery records, electoral rolls, court records, business records, probate records and other genealogy databases. Military records are predominantly accessed through the Australian War Memorial and the National Archives of Australia (NAA). The goal is to compile a comprehensive paternal and maternal pedigree chart, searching for close but diverse candidates. When no appropriate family members can be found on an immediate family line, the search widens to alternative pedigree lines and trees can thus often grow to hundreds of people over many generations.

Genealogy can sometimes uncover long-forgotten family secrets, such as illegitimacy, adoptions, abandoned spouses, criminal records or bigamy. For the purpose of DNA comparison, it is vital to understand how these issues may decide who is an appropriate family member to target for a reference sample. A common “secret” is the baby of an unmarried daughter being raised as the youngest child of the grandparents. Or the unknown paternity of children born to wives of servicemen who were serving overseas at the time of conception. Depending on the circumstance, this may exclude this individual, or their descendants, as appropriate DNA donors. For this reason, specialist genealogists also review family trees submitted by the family members of a casualty, which may not accurately reflect genetic lines.

Once pedigree charts are completed, the genealogist identifies those living individuals most appropriate for a FRS and searches for contact details. These reports are submitted to UWC-A investigators, along with an explanation of the donor’s relationship to the soldier (i.e., grandnephew, 1<sup>st</sup> cousin twice removed). This can be helpful as the potential donor is sometimes unaware of their connection to the soldier.

Over the last decade, UWC-A has compiled genealogy research for more than 2000 soldiers from a variety of conflicts. The task of utilising the family reference trees generated by this research, to identify an appropriate family member for a FRS for a missing soldier falls to the case investigator, however, locating and contacting these potential family members is often assisted by special military interest groups such as the Fromelles Association of Australia<sup>2</sup>.

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<sup>2</sup> The reader is encouraged to explore the various roles and function of the Fromelles Association of Australia here: <https://fromelles.info>.

Many successful identifications have resulted, and a valuable database also exists to inform future investigations.

#### 2.2.5 Odontology

The odontologist's primary responsibility is to record and preserve dental remains, but additionally they may assist an archaeologist and/or biological anthropologist in excavating, removing, recording and supporting other members of the team.

The value of odontology to contribute to the process of identification relates to the resistance of teeth to environmental degradation after death, and the ability to compare antemortem and postmortem dental records in pursuit of identity. During a 2009 recovery of two Australian airmen missing in action (MIA) in Vietnam from 1965, dental records were crucial to identification. Apart from comparison with written records, comparison of a single dental radiograph taken in 1964 with a radiograph taken in the field during the recovery contributed to a positive identification for one of the soldiers. The soldier also had an identity disc which was severely degraded and unreadable, but a field radiograph of the rusting disc clearly showed his name, service number and religion.

Odontologists have also examined military dental records from the Korean conflict. These have been compared extensively with dental records of unknown soldiers, in order to seek potential matches and eliminate possible candidates. Another example of odontology work is the 2016 exhumation of 24 servicemen and eight dependants from Terendak War Cemetery in Malaysia, where many military antemortem dental records were available and were used to confirm identity. These activities demonstrate an adaptation of the Disaster Victim Identification (DVI) process.

In WWI and WWII investigations, the detail in Australian dental records is often lacking or the records have simply been lost with the passage of time. In these instances, dental identification is usually not possible, however, there are still important contributions the odontologist can provide. Knowledge of dental anatomy can assist in resolution of comingled remains. Age estimation by assessing the development or deterioration of dental structures can also assist in narrowing a pool of potential candidates and expertise in selection of a suitable tooth for biological testing can contribute to a successful DNA profile.

Many of UWC-A's WWII recoveries are from the South West Pacific Theatre, where Australian soldiers fought against the Japanese. Of importance in these investigations, odontologists can provide opinions on likely origin based on dental anatomical features, which

are indicative of ancestry, or differences in techniques and materials used in restorative dentistry of the period [10]. This information can be used in conjunction with other evidence to determine whether an investigation is pursued or referred to another national authority.

#### 2.2.6 Scenes of Crime Examiners and Investigators

UWC-A utilises various recording technologies to capture field activities and site information. The primary medium is standard digital photography. In PNG this is completed by trained Scenes of Crime Examiners (SOCE) from the Australian Defence Force Investigative Services (ADFIS), who are qualified in crime scene recording and photography. During mortuary activities in France, specialists or the investigators will complete the photography requirements of the task, depending on the capability within the team.

UWC-A also utilises time lapse photography from stationary cameras as well as unmanned aerial vehicles (UAV) for aerial photography to record an overview of the entire field site and local landmarks relationships. In recent field investigation activities, three-dimensional (3D) recording of the site has been employed, which was subsequently utilised for briefings and to inform planning of future field activities.

#### 2.2.7 Medical Support

Typically, UWC-A conducts WW1 recovery activities in developed countries, with well-established local hospital facilities. In contrast, UWC-A activities in the Asia Pacific region are often conducted at isolated battlefield sites, with little or no access to local medical facilities. In PNG this is often the case, where travel may involve personnel movement on foot, extensive four-wheel driving, including river crossings and negotiating difficult terrain, as well as occasional open “banana” boat travel across ocean or rivers (Figure 1). In locations such as the Kokoda Track, local travel may involve access to remote inland battlefield sites by foot, helicopter or basic bush airstrips, utilising short-take-off and landing light aircraft (Figure 2).



Figure 1: (left) UWC-A field team walking through thick vegetation in coastal area in PNG (circa 2015). (right) An example of the many hazards associated with UWC-A field work in PNG: (left) One of the associated hazards of road transport– one of the team vehicles bogged in a coastal field activity (circa 2017); Source: Dermot Oakley and Donna MacGregor, © All rights reserved. Photograph used with the permission of ADF (2021).



Figure 2: (left) UWC-A team moving from helicopter drop point to recovery site by foot up the steep incline of the Kokoda trek, PNG [11] (circa 2011); (right) UWC-A field team traversing one of the many foot bridges along the Kokoda Trek in PNG to access a site of interest [11] (circa 2011). Source: Andrew Bernie © All rights reserved. Photograph used with the permission of ADF (2021).

Since 2013 isolated locations and varied local means of travel have necessitated the inclusion of an integral Australian Defence Force Medical Technician (MT) in the PNG UWC-A team. Primarily the MT is responsible for provision of pre-hospital and primary health care, in addition to other non-clinical tasks, and possesses paramedic qualifications. When and where appropriate and required the MT is able to provide medical care to both defence and civilian team members.

The MTs support of UWC-A PNG activities requires the carriage of a comprehensive pre-hospital and primary health care medical kit. Included in the medical kit are prehospital parenteral drugs, intravenous fluids, as well as primary health care oral and topical medications, all of which require approval and authority to carry. Initial approval is obtained/granted by the MT parent unit, and then further approval is sought via Australian and PNG Departments of Health to import and export the medications. Each UWC-A PNG activity requires an extensive and approved health support plan. Team briefs are delivered to provide situational awareness of local and international evacuation procedures as well as education on various local health, occupational, and environmental threats.

#### 2.2.8 Security

In PNG, all UWC-A field teams include members of the Papua New Guinea Defence Force (PNGDF) who often possess investigative and/or military police skills. This partnering allows

cross training between members of the team in scene examination, customs and language. Further, PNGDF personnel support team security, both personal and site safety, when in remote areas. In European countries, team security is managed within the team, as threat levels are usually more benign than in some areas in South East Asia, although site security and protection from looting is also a concern in European situations.

### 2.3 Identification, Repatriation, and Ceremony

The Australian Army has established Identification Boards to assess cases where the possible identification of a missing soldier can be established. It remains a Defence Force responsibility and decision to confirm the identification of a recovered casualty, notify families and oversee commemorative authorities. The standards of evidence are deliberately high and identification is never confirmed without confident robust policy and independent decision making. To convene the board, a brief of evidence is compiled by an investigator, reviewed by the relevant case manager and the investigations manager. If the review determines sufficient evidence exists, then UWC-A will convene a board typically consisting of the manager UWC-A and two independent officers of suitable rank. Whilst cases involving recent recoveries often rely largely upon DNA evidence, all forms of evidence that may contribute to a finding are considered [12]. In the case of recently recovered remains, if an identification is upheld, then planning for the future ceremonial burial will commence. If identification is not established, the investigation continues. All unsolved investigations involving recovered Australian soldiers remain active, with regular case reviews designed to consider new avenues of inquiry and advances in technology, which may progress identification.

Identification aside, when the remains of an Australian soldier are located, the responsibility for their burial falls to the Australian Army, the OAWG and the CWGC. Each set of remains, whether identified or not, is afforded the same solemn and dignified ceremonial burial process. From the beginnings of the Imperial War Graves Commission (IWGC) in 1917, it was decided that all war dead would be commemorated consistently, regardless of rank or background. They would be buried near to where they fell, and rather than a cross, a standard headstone would be used to mark the graves of the dead [13].

Changes to repatriation laws and community expectations in Australia in 1966 meant families of Australians killed in overseas conflicts could have their loved ones brought home at the government's expense, but the legislative change was not retrospective for those who had

already lost their lives. As a result, the vast majority of Australian soldiers recovered from conflicts prior to 1966 are buried in the nearest appropriate cemetery to where they fell.

Planning for a funeral begins once a date is decided upon for the funeral. A representative of UWC-A, normally the case manager for that region i.e. Asia Pacific or Europe, will make arrangements for the attendance of family, dignitaries and other guests and importantly, coordinate the burial. Much of the planning takes place in Australia, with the assistance of ADF staff in the host country.

Several days before the burial, key participants travel to the location where the burial is to take place. CWGC, having already identified an appropriate cemetery, will begin preparation of the grave site. While this is occurring, the Ceremonial Team, usually an Australian Army contingent or Australia's Federation Guard (AFG) commences rehearsals for the burial service. If the Ceremonial Team is an Australian Army contingent it may be formed from the legacy units or unit of the recovered soldier. The Army contingent or AFG will provide a burial party, a firing party and in some instances, where the soldier might lay in state, a catafalque party. This last occurred in November 2018 when two Unknown Australian Soldiers recovered from an area near Tyne Cot in Belgium, lay in state during the Last Post Ceremony at the Menin Gate Memorial in Ypres, Belgium prior to burial (Figure 3).



Figure 3: A Catafalque Party stands guard over two unidentified Australian soldiers at Menin Gate in November 2018 [14]. Source: Alan Cooper © All rights reserved. Photograph used with the permission of ADF (2021).

If the remains are successfully identified, the case officer will liaise with surviving relatives, who, in most cases will attend the funeral. The ceremony is also open to members of the public and always attracts a large number of people who simply want to attend to pay their respects to the fallen soldier(s).

While rehearsals continue, the remains are placed in a coffin and conveyed to a local funeral director. Here the coffin is prepared by Army members, draping the Australian National Flag over the coffin and then adding other ceremonial items, usually a floral wreath, bayonet, and the one item of the Australian uniform that is universally recognised around the world, the slouch hat. Depending on the wishes of the family, the soldier may then be conveyed to a specified place, usually a chapel, so that family members can spend time with the soldiers' coffin prior to being taken to the cemetery.

At the cemetery the burial party will carry the soldier on their shoulders to their final resting place where (Figure 4), on completion of the funeral service, the coffin is lowered into the grave. A flag box containing the flag from the coffin will be presented to the most appropriate surviving relative. Figure 4 illustrates the burial process with the burial of two Australian soldiers in November 2018, whose remains were previously located in 2015 near Bullecourt, France. These soldiers, initially unknown, were identified as Lance Corporal James Rolls and Private Hedley MacBeth, 24<sup>th</sup> Battalion, Australian Imperial Force, utilising historical research, coupled with the application of specialist disciplines detailed earlier in this paper [15]. The investigation was able to afford closure for relatives but most importantly and identified two soldiers who were previously lost to the fog of war for over 100 years. After the ceremony, CWGC staff fill the grave and reconstitute the cemetery to reopen to the public.



Figure 4: The funeral service of LCPL Rolls and PTE MacBeth at Queant Rd Cemetery, France in 2018 [15], illustrating the Burial Party carrying the coffin to the grave site. Source: Alan Cooper © All rights reserved. Photograph used with the permission of ADF (2021).

## 2.4. Illustrative Case Studies

The following case studies have been selected to illustrate the depth and breadth of UWC-A activities in a range of countries, conditions and historical contexts.

### 2.4.1 Fromelles, France



The attack at Fromelles fought on 19-20 July 1916, was the worst single day of WWI for the Australian Army, with many of the almost 2,000 killed buried by the Imperial German Army in an unmarked collective grave. In 2006 a historical documentary and aerial photographic evidence, submitted by members of the public [16], indicated the location of possible unmarked graves near the town of Fromelles, France. A joint project, the 'Fromelles Project', was established by the Australian Department of Defence and United Kingdom Ministry of Defence, with the contract managed by the CWGC<sup>3</sup>. In 2007, Glasgow University Archaeological Research Division (GUARD), using remote sensing methods, located eight pits adjacent to Pheasant Wood near Fromelles. This was followed in 2008 by test excavations by GUARD to locate skeletal remains. The team consisted of forensic anthropologists, archaeologists and a historian. The ground surface was scraped by excavator to expose eight pits and skeletal remains were found in five of the burial pits. Preservation of bones and artefacts varied. These remains were not removed at this time but were recorded *in situ* and the site reconstituted.

The graves were fully excavated in 2009 by Oxford Archaeology, under contract management by the CWGC on behalf of the Australian and British governments [17]. The team included forensic anthropologists, archaeologists, crime scene recorders and a radiographer. A temporary mortuary was set up on site. The excavation occurred over 5 months with 250 Australian and British soldiers exhumed and examined, with samples taken for DNA analysis.

In addition to UK specialists, an Australian forensic anthropologist was tasked to be an observer and advisor during the excavations and analysis. This contribution was to provide, from an Australian perspective, quality assurance across all aspects of the archaeological excavation and recovery of the human remains and their bio-anthropological analysis. The forensic anthropologist also collaborated with UK counterparts in assessing the methodology and practices, including the assessment of biological profiles.

In 2012, UWC-A assumed responsibility for Australian management of the Fromelles project. A standing Data Analysis Team (DAT) was continued, and tasked with managing historical archival research, archaeological evidence, biological data (including DNA), and military records. Information (and expertise) from the DAT is cross-referenced with information from existing CWGC sites. The DAT collate and review data, present their findings and make provisional recommendations on identity to an Identification Board. The board, consisting of

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<sup>3</sup> The reader is referred to [16] Loe et al. (2014) for a fully comprehensive account of the project from conception through to outcomes as of 2014.

an Australian and a UK Government official (until 2014), made determinations on evidence derived from a range of sources.

At the time of writing this paper (March 2021), 166 Australian soldiers have been identified by name, with 84 still unidentified. In 2010, all 250 Australian and British Soldiers were interred with full military honours in individual graves at the new Fromelles (Pheasant Wood) Military Cemetery.

#### 2.4.2 Bullecourt, France

The following case study illustrates continuing smaller scale efforts in Europe. Moreover, the investigation into the identification of the remains of two WWI Australian soldiers discovered on the side of a disused railway embankment at Bullecourt in 2015, provides a useful example of the steps and processes undertaken by UWC-A investigators and forensic specialists over the course of an investigation.

In May 2015 the CWGC in France was advised that locals had discovered the remains of two WWI soldiers on the former Bullecourt battlefield. CWGC recovered the remains and associated artefacts, and on determining they were likely Australian contacted UWC-A. A case officer oversaw the investigation which included determining the location of the find in the context of the battlefield, identifying participating Australian units, soldiers killed at Bullecourt with No Known Grave (NKG), dispositions and movements from unit war diaries and unit histories, biographical details from soldier's personal files held by the NAA and extracts from Red Cross reports held by the AWM.

The Bullecourt battle, although relatively compact, was complex. Two major battles were fought in April and May 1917. While there were British troops on the left flank of the battle, the area in which the remains were located was an Australian area of operation. The first battle, which commenced on 11 April 1917, resulted in severe losses with over 3,300 casualties. Some 1,170 Australians were taken prisoner, with a further 653 Australian soldiers posted as missing. The second battle commenced on 3 May 1917. Once again, losses were heavy, with a total of 7,482 casualties and 1,492 soldiers recorded as missing.

These figures totalled some 2,145 soldiers missing on the Bullecourt battlefield. CWGC records showed that some 600 soldiers were recovered from the location by War Grave units at the end of the War and buried as unknown soldiers, leaving some 1,600 soldiers unaccounted for, with the majority killed on open ground. Records and Red Cross reports indicated that many men were killed by artillery fire. At the time of the respective battles, much of the ground

initially captured by the Australians was not held rendering the recovery of many casualties impossible.

A database for the entire 2,145 soldiers listed as missing in action (MIA), with biographical details and reports of their fate recorded was established in partnership with external researchers. This included attempts to identify any soldiers known to have fallen or been buried in the vicinity of the recovery due to the number of candidates and the paucity of accurate records this was a formidable task.

In March 2016 a UWC-A field team travelled to France to undertake a site inspection and forensic examination of the artefacts and the remains. The team comprised the case manager – Europe, the investigative case officer, an anthropologist and an odontologist. The location of the find at Bullecourt was examined and the associated artefacts and the remains were carefully examined at the CWGC Beaurains mortuary. The anthropologist was able to determine the age-at-death, build and height of the two soldiers, while an examination of dental remains also provided an age range. Biological samples were selected from each soldier for DNA extraction, which were returned to Australia for processing. The nature of the recovery indicated the soldiers were recovered from where they were killed, possibly in a dug-out, and were not formally buried.

Associated artefacts included Australian badges and issued equipment supporting the likelihood that the two soldiers were Australian. One item was a wooden knife sheath with the name ‘M. Rice’ inscribed on it. This proved a good example of where artefacts found with remains may not explicitly indicate a soldiers’ identity. It was determined that Private Murray Rice, 21<sup>st</sup> Battalion Australian Imperial Force (AIF) had been seriously wounded during battle, but had survived the war and later returned to Australia, clearly without his knife.

The remains of two soldiers were located on the southern side of the railway embankment, which provided a degree of protection from the enemy to the front, although it was still subject to some fire from enemy artillery. Contemporary accounts indicated a number of soldiers had been killed along the embankment, either in the open, or when resting or sheltering in dug-outs for protection. Twenty-three soldiers were specifically recorded as having been killed in this manner, often buried under debris and earth and not being recovered. Further refinement resulted in the identification of nine soldiers last seen sheltering in dugouts which were hit by enemy artillery, with their remains unlikely to have been recovered.

Following this refinement, a list of potential candidates was passed to a UWC-A genealogist. Families were researched, suitable family members were located in order to request FRS for comparison to the DNA profiles obtained from the remains. The investigative case officer contacted each of the respective family members, explaining the circumstances of the request, and seeking agreement to provide a FRS. In all cases the family members agreed to provide FRS. DNA FRS profiles were examined by a UWC-A forensic biologist and compared with the profiles obtained from the soldiers. The forensic biologist determined that two of the nine DNA FRS profiles were consistent with the two recovered soldiers, with the remaining seven being exclusions.

As the initial FRS for the two 'consistent' profiles were mitochondrial DNA, it was determined a further Y-STR FRS would be sought from the candidate soldiers' families. Y-STR FRS results provided a match with the same two candidates, and the identity of the two soldiers was confirmed as Lance Corporal James Rolls and Private Hedley MacBeth, 24<sup>th</sup> Battalion AIF.

Corroboration of the DNA outcomes included documentary evidence, such as the soldiers' service papers, unit war diaries and written histories. Further, the soldiers' Red Cross files reported the two were last seen together in the dugout at the railway embankment, when a high explosive shell landed on them. Their remains were not able to be recovered at the time.

A comprehensive report detailed the investigation and evidence was then finalised and presented to a formal Army Identification Board. This included the gathered historical, anthropological, odontological and DNA findings. The Identification Board formally endorsed the identification of the two soldiers. Army provided formal advice of the outcome to the families and the CWGC, and a formal burial service was scheduled for 12 November 2018 at Queant Road Cemetery, close to the Bullecourt battlefield (see Figure 4). Amongst the 85 24<sup>th</sup> Battalion men who fell on the same day as Lance Corporal Rolls and Private MacBeth, seven lie here also. Sadly, 75 remain missing and are commemorated on the Villers-Bretonneux Memorial.

The ceremony took a fitting place as part of the closing of the Australian Government's '100 Years of ANZAC' commemoration activities. Ten members of the Rolls and MacBeth families attended the service, which was officiated by the then Governor General Sir Peter Cosgrove and the Minister for Veterans Affairs, the Honourable Darren Chester MP. As part of the commemoration, the Governor General remarked, 'Two Diggers, dead but not alone. And so,

season after season, year after year, they rested and waited. If there were ever brothers in arms it was them. Together in life, together in death’.

#### 2.4.3 The Battle of Buna-Gona, Papua New Guinea

The Battle of Buna-Gona [18, 19], was one of the last battles of the Kokoda Campaign in 1942, in The Allied Papuan Campaign of WWII [20]. This battle was a significant part of the determined effort to stop the Japanese approach to and feared invasion of Australia. The battle itself saw 967 killed in action, with a further 228 subsequently dying from wounds sustained in the battle. To date, 66 soldiers are still missing, presumed dead [21]. As such, the Buna-Gona battlefield area has received a significant amount of attention by UWC-A. Knowledge of the battle itself, as well as the physical environment has informed UWC-A’s approach to locating MIA’s in what is a very challenging environment. This study showcases the painstaking work, enormous effort and proactive approaches that can go into the search for unrecovered war casualties.

Grave recovery teams visited the Buna-Gona region three months after the battle. All they had to guide them to field burials were the six figure grid references based on eye-witnesses information. This created major difficulties as the grid references denote a 100 x 100-yard square (i.e., approximately 8,361m<sup>2</sup>) – a huge area within which to find a single body. Further, eyewitness reports usually consisted of generalised descriptions of burial sites. For example, ‘50 yards north of the western most gun’ or ‘in crater, centre of runway’ (there were 60 such craters). Such descriptions made subsequent retrieval of casualties problematic even shortly after the battle.

Given the size of the battle space and uncertainty regarding original burial locations, a considerable amount of effort went into converting WWII maps and locational information into a modern day geo-referenced map of the site. Using this updated map, in addition to recent LIDAR sweeps of the region, descriptions and locational data (including field notes and WWII aerial photography) of field burials were incorporated into the new mapping system. By combining these multiple layers of information (past and present), UWC-A was able to create a more accurate understanding of the area. Battlefield archaeology of this type assisted in interpreting the battle space and increased the chance of locating unrecovered battlefield burials by being able to prioritize search sub-areas.

The first field season was completed in 2019 and resulted in the investigation of an area over 1000 m<sup>2</sup> in extent. Five prioritised sites, totally 300 m<sup>2</sup>, were excavated. The initial two-week

season enabled us to discount a significant number of sites, thus increasing our likelihood of success and the recovery of some, if not the majority, of 66 MIAs on the north coast of PNG in the future.

#### 2.4.4 Terendak, Malaysia

Having looked at UWC-A activities with respect to WWI and WWII, we will now consider the largest peacetime recovery of Army personnel and their dependents in the context of the Vietnam War. This particular case study showcases the skills and the capacity of the unit to manage and successfully complete large-scale recovery operations as well as successfully partner with other defence forces in the Asia-Pacific region.

In May 2016 the Office of Australian War Graves (OAWG), Department of Veterans Affairs (DVA), requested UWC-A recover 24 Australian servicemen and eight dependants from the Terendak Military Cemetery, Malacca, Malaysia, and one Australian serviceman interred in the Kranji War Cemetery, Singapore. The servicemen had died during activities associated with the Vietnam War.

ADF personnel included a team leader, case manager, two archaeologists, a forensic anthropologist and odontologist, in addition to a civilian bioarchaeologist. Logistical and post-recovery procedures were conducted in partnership with the Malaysian Armed Forces (MAF) and DVI teams, who utilised the opportunity to conduct a full field DVI exercise, named “Operation Reunites” [22].

Procedures from exhumation to identification and subsequent coffining were standardised. Only individuals for which families had accepted an offer of repatriation were recovered. The recovery procedure included the use of a mechanical excavator down to the top of each coffin (supervised by an archaeologist), subsequent manual excavation by a field team member, *in situ* recording of exposed remains, removal of the remains and any associated material, transport to the field morgue followed by a complete DVI workup. After the Reconciliation Board, each individual was placed in a zinc lined wooden coffin (which was hermetically sealed prior to the wooden coffin lid being secured) in order to meet Australian Quarantine and Inspections Service (AQIS) requirements.

A number of issues were identified and resolved during the exercise. One included the offsetting of grave markers relative to burials. A ground penetrating radar survey identified the direction of offset which allowed the team to avoid graves not targeted for exhumation. A lack of space between burial rows, and the uneven distribution of exhumed and non-excavated

graves, provided logistical problems for the mechanical excavator. The depth of the graves of servicemen (c. 1.7-1.9m) and dependents (c. 1.0-1.35m) varied. At least one grave contained sharp objects that were a risk to the field team. Decomposition of the coffins and subsequent soil infilling of the coffin space made manual excavation in deep, cramped burial pits challenging. Further, extreme temperatures, tropical downpours and humidity added to the logistical issues. Typical soil pH levels were neutral to alkaline, ranging from 7.4 to 8.9. Preservation of remains was varied, with embalming and subsequent plastic wrapping of some servicemen enhancing preservation.

In the context of the loss of MH370 and MH17 in 2014, the MAF exercised their DVI capability as part of “Operation Reunites”. This involved a portable temporary mortuary equipped with all necessary elements of a full DVI operation, including lighting, air conditioning, examination tables, radiographic equipment, personal protective equipment, waste disposal, provisioning, transport, communications and security. MAF staffed the mortuary with radiological, pathological and odontological capabilities and all remains were subjected to the procedures involved in all five phases of a DVI operation. This included formal presentations to a Reconciliation Board which included members of the UWC-A team.

Upon completion of the field component of the exercise, the coffins were then transported to the Royal Malaysian Air Force base at Subang where they were transferred to two RAAF C-17s for the return to Australia. A nationally televised ceremony at Richmond Air Force base on 4 Jun 2016 [23] was conducted prior to each of the individuals transported to the specific cemetery chosen by the families for individual burial services.

### 3 HISTORICAL UNRECOVERED WAR CASUALTIES – AIR FORCE (HUWC-AF)

#### 3.1 RAAF Crew Missing in Action – The Search Goes On

The Royal Australian Air Force (RAAF) is committed to the recovery, identification and burial of its men and women who died while serving during WW2 and the Korean War. Historical Unrecovered War Casualties – Air Force (HUWC-AF) is the RAAF unit tasked with the investigation and recovery of MIA cases from WWII and subsequent past conflicts and works cooperatively with UWC-A to ensure information sharing in recovery and identification of remains. While somewhat similar in approach in many ways, including the fact that these are not conducted as an accident or criminal scene investigation, investigations of missing service

personnel is a different task to investigating missing soldiers. The location and identification of the specific aircraft determines the complexity of recovery and identification of remains.

The unit focuses on field activities for reconnaissance and recoveries, utilising in most cases, specialists including archaeologists, forensic odontologists and biological anthropologists, who analyse each crash site in a systematic matter to maximise the chance of finding remains or personal effects. Post-fieldwork analysis of recovered objects by specialists including biologists and radiometric dating laboratories is utilised to extract further information that cannot be determined in the field.

The early recovery operations of what would be HUWC-AF commenced with Wing Commander Keith Rundle, who was one of the prime searchers in 1946, and who undertook the investigations and recoveries as required until his retirement in 1966. Air Force Headquarters then coordinated the function and a small Aircraft Wrecks and Recoveries capability formed in 1998. This subsequently transferred to the newly formed History and Heritage Branch – Air Force in 2016 and was re-named Historical Unrecovered War Casualties – Air Force.

Circa 1990 a forensic capability was established in Air Force to provide specialist support to recovery operations and undertake identifications. Initially established with odontologists and pathologists, an anthropologist was added to the group in 2000. Since then and following the recovery of the two missing aircrew from Vietnam, archaeologists positions have been established. The team was first used in 1994 on the recovery of the nine crew of Catalina A24-45, located on Buru Island, Indonesia. These RAAF personnel are a joint specialist capability supporting the recovery and identification of human remains.

All RAAF aircrew from the Vietnam conflict have been accounted for, and investigations into MIAs from the Korean conflict are ongoing within the constraints of the geopolitical situation in that region. In addition to its MIA investigation role, HUWC-AF fulfils the role of a Member Government Service Authority in CWGC identification cases, and for conducting investigations and documenting results of burials, commemorations and headstones.

## 3.2 History of RAAF MIA Investigations and Recoveries

### 3.2.1 Second World War

As the Allies advanced in all theatres in the latter stages of WWII, missing personnel in the South West Pacific Area of operations (SWPA) were being found or accounted for through the actions of Graves Registration and Enquiries Units, and Prisoner of War and



Internee Units. In Europe, Africa and the Far East, the RAAF, through the Directorate of Personnel Services, Casualty Section, participated in searches for missing personnel in the Royal Air Force and Dominion Air Forces *Missing Research and Enquiry Service* (MRES) teams. In the SWPA area, however, the RAAF identified by October 1945 that additional search capabilities would be required to address the nature of missing Air Force personnel lost in aircraft dispersed over wide and remote areas, characteristic of losses in that theatre. In response, specialist RAAF Searcher teams began their work in 1946, accompanying Navy and Australian Military Force (AMF) forces and acting independently when necessary; these searcher teams operated in the field for two years.

After the cessation of Searcher team activities and into the 1950s, the Casualty Section in Melbourne actively responded to reports of WWII aircraft crashes in Australia and the SWPA. This dedicated search effort during and soon after WWII reduced the number of missing personnel by half.

### 3.2.2 Post-Second World War conflicts

The Korean War resulted in 18 airmen remaining officially missing, with the majority of these aircraft crashes occurring in North Korea. One Australian pilot has been subsequently identified in 1955, by comparison of dental and physical characteristics from Allied remains repatriated from North Korea after the war in Operation Glory. While the ongoing tension on the Korean Peninsula has prevented investigations to resolve those outstanding cases, Air Force and Army continue to work with the US Defense POW/MIA Accounting Agency (DPAA) on the task of identifying those unaccounted for. The Vietnam War resulted in one missing aircraft and crew, with the remains of the two airmen of Canberra bomber A84-231 (Magpie 91) recovered in 2009. Since that time, no RAAF personnel have been lost on operations.

### 3.2.3 Today

More than 11,000 RAAF personnel lost their lives in WWII. Today, 8,010 are buried in 67 countries while the remaining 3,125, who have no known grave are recorded on 13 memorials around the world. The 18 missing RAAF airmen from the Korean War are commemorated at the United Nations Memorial Cemetery at Busan in South Korea.

### 3.3 Recoveries

In the past 70 years, 72 RAAF from 26 aircraft losses have been recovered and buried in military cemeteries. Additionally, on these aircraft were 22 Australian Army personnel and 18

Netherlands East Indies personnel. Another nine aircraft have been located and positively identified; whilst recoveries are not possible this has accounted for 66 RAAF, two Army and one Navy personnel. Of these, 30 aircrew have been accounted for from three missing Catalina aircraft located and identified in the last five years. Two Allied aircraft were also found in Australia: one American Liberator with eight on board, south west of Rockhampton in 1994 and a Dutch Dakota with 20 on board, north of Cairns in the Mossman area in 1989.

There are 49 graves in 14 countries presently marked as *An Unknown Australian Airman*; new information currently being reviewed may lead to identification of four of these graves.

### 3.4 Investigations

The Defence Casualty Manual and the Air Force History and Heritage [24] Manual contain the policy for investigation of historic crash sites and recovery of missing personnel. To that end, RAAF continues to investigate credible reports of missing aircraft located on land and in the water and conducts recoveries of crew where feasible and safe to do so. HUWC-AF works with partner organisations in other countries to research and sometimes conduct field operations.

WWII crash investigation requirements are different to contemporary aircraft crashes as there are no forensic issues to be dealt with. WWII crashes were considered by an appointed Board or Court of Enquiry and a determination of death was issued for the missing airmen. This was necessary for compensation/pensions and support to the bereaved. Accident investigation may have been conducted if there was sufficient evidence at the time; Allied countries had similar processes. The cause of the crash was not always known and sometimes may never be known, as the amount and/or deterioration of wreckage through deformation and/or fire, often combined with a lack of witnesses, mean the cause of historic aircraft crashes in many cases cannot be determined with any certainty. Additionally, the lack of unique parts surviving an aircraft crash means sometimes even identification of WWII aircraft is difficult.

Given the number of over-water losses in the SWPA theatre, and the mountainous or jungle terrain where many were lost over land, recoveries conducted for aircraft wrecks identified in the SWPA have been challenging (Figure 5). Additionally, the RAAF fully understands new leads may not be forthcoming for many ongoing MIA cases, and those will never be resolved. This is highlighted by a RAAF Dragon Rapide missing west of Sydney on the southern edge of the Blue Mountains in 1943; it continues to elude searchers even when close to major population centres.



Figure 5: RAAF Dakota A65-61 crash site: the aircraft was lost 18 September 1945 and found in 1970 on Mt Carstenz, West Papua at 14 000 feet. A series of operations completed recovery of the remains in 2005. Source: Craig Eager © All rights reserved. Photograph used with the permission of ADF (2021).

### 3.4.1 Conduct of Investigations

Initially, the identification of the aircraft determines the missing personnel who might be recovered and/or identified. Each crash site is different, providing unique challenges in identification, however aircraft components that are complete, unique, or have serial numbers are the primary evidence used to identify aircraft wrecks. While determining the cause of the crash is not the goal of HUWC-AF when WWII aircraft crash sites are found, analysis of a WWII crash site is used to determine the most probable areas to search for crew remains and personal effects.

As described above, RAAF uses various specialists to support recovery and identification of personnel, including archaeologists, biological anthropologists, DNA specialists and odontologists, who are a shared resource for the UWC organisations in Army and Air Force. For the majority of cases personal effects and dental records have been able to be used in the field to identify remains found at crash sites, however, biological anthropologists and DNA specialists were recently used to assess osseous material found at a crash site following completion of the field investigations.

## 3.5 Case Studies

### 3.5.1 Beaufighter A19-97

Identification of Bristol Hercules aircraft engines at a crash site near Ganai, New Britain (PNG), in 2000 led to a formal investigation, as it was determined they were likely associated with a lost RAAF Beaufighter aircraft, in all likelihood A19-97, which went missing on operations in the area on 12 October 1943. A recovery mission was conducted in October 2000 and the

remains of the crew, Flight Lieutenant Derrick Robert Stone (Pilot) and Flying Officer Edward Burford Morriss-Hadwell (Navigator) of No 30 Squadron, were recovered and positively identified by analysis conducted by RAAF Specialist Reserve dental, medical and biological anthropological specialists. The remains of these airmen were interred with full military honours in November 2000 at the Rabaul (Bita Paka) War Cemetery.

### 3.5.2 Beaufort A9-217

In January 2000, the RAAF was notified that aircraft wreckage had recently been discovered lying in 18 meters of water near Kawa Island in Papua New Guinea, with initial determination that it was of a Beaufort Bomber. A Defence team from the Australian High Commission in Port Moresby inspected the wreckage, which showed significant battle damage, with a data plate recovered from a wing flap assembly confirming the aircraft as a Beaufort. Other evidence determined that in all probability it was that of A9-217, one of 12 engaged in a torpedo attack on enemy shipping in Rabaul Harbour on 15 November 1943. A patrol boat from Kiriwina Island was dispatched to the area to investigate a report of a crashed aircraft in the sea near Kawa Island at that time, and upon arrival located a fuel tank belonging to the crashed aircraft. However, no survivors of the four crew were located at the scene and all were officially reported missing, presumed dead.

A subsequent investigation and recovery mission was conducted in March 2001 and recovered the remains of the four crew and the aircraft's manufacturer's plate which definitively identified the aircraft as A9-217. Ironically, the fuel tank seen by the patrol boat in 1943 was being used by the village on Kawa Island for water storage.

The airmen were individually identified by comparison of dental and physical characteristics and were laid to rest with full military honours at the Rabaul (Bita Paka) War Cemetery, PNG, on 2 May 2001 (Figure 6). Figure 6 also highlights a Catalina Memorial in Cairns, Australia. A Catalina A24-25 was lost in 1943 off the Australian coastline, south east of Cairns. The wreck was located in 2013 and confirmed in 2015. The wreck was located at a depth of 34 meters near the Frankland Islands, thus RAAF made the decision to leave the wreck undisturbed. Subsequently a Commemorative Service was held in February 2016 at the Catalina Memorial in Cairns for the families of crew of Catalina A24-25. Another service was also held over the wreck site.



Figure 6: (left) Funeral at the Rabaul (Bitapaka) War Cemetery for the four crew recovered from Beaufort Bomber A9-217, located near Kawa Island PNG, at a depth of 20 metres. The remains of the crew were recovered by RAAF in March 2001. Source: Brad Cone © All rights reserved; (right) The families of the crew of the Catalina A24-25 lost on 28 February 1943 off the coast south of Cairns, Australia, standing in front of the memorial built in its name in February 2016. The Catalina Memorial is located in Cairns is observed in the background. Source: Brenton Kwaterski © All rights reserved. Photograph used with the permission of ADF (2021).

### 3.6. Summary

RAAF is committed to the recovery, identification and burial of its men and women who died while serving during WWII and the Korean War. The dedicated search effort during and immediately after WWII reduced the number of missing personnel by half, and in the past 70 years, 72 RAAF personnel from 25 aircraft have been recovered and buried in war cemeteries. Additionally, another nine aircraft have been located and positively identified, and whilst recoveries are not possible in those cases this has accounted for a further 66 RAAF personnel, two Army and one Navy service personnel.

## 4 CONCLUSIONS

The responsibility for the recovery, identification and subsequent burial or repatriation of the historical Australian war casualties' rests with the individual services of the Australian Defence Force (ADF). For the Australian Army the specialised unit is the Unrecovered War Casualties -Army (UWC-A). For RAAF, their equivalent is the Historical Unrecovered War Casualties – Air Force (HUWC-AF). Despite this individual service response, a joint approach is taken in terms of policy and in the sharing of highly trained reservist and civilian specialists.

The breadth and scale of search, recovery, identification and burial/commemorative activities UWC-A and HUWC-AF have been involved in over the years is extensive, particularly for a small organisation. Collectively, the priorities of the UWC-A and HUWC-AF and the various

staff within, or associated with, the three services of the ADF are the respectful recovery and treatment of the dead, thorough forensic identification efforts, resolution for families and honouring the ADF's proud history of service and sacrifice.

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