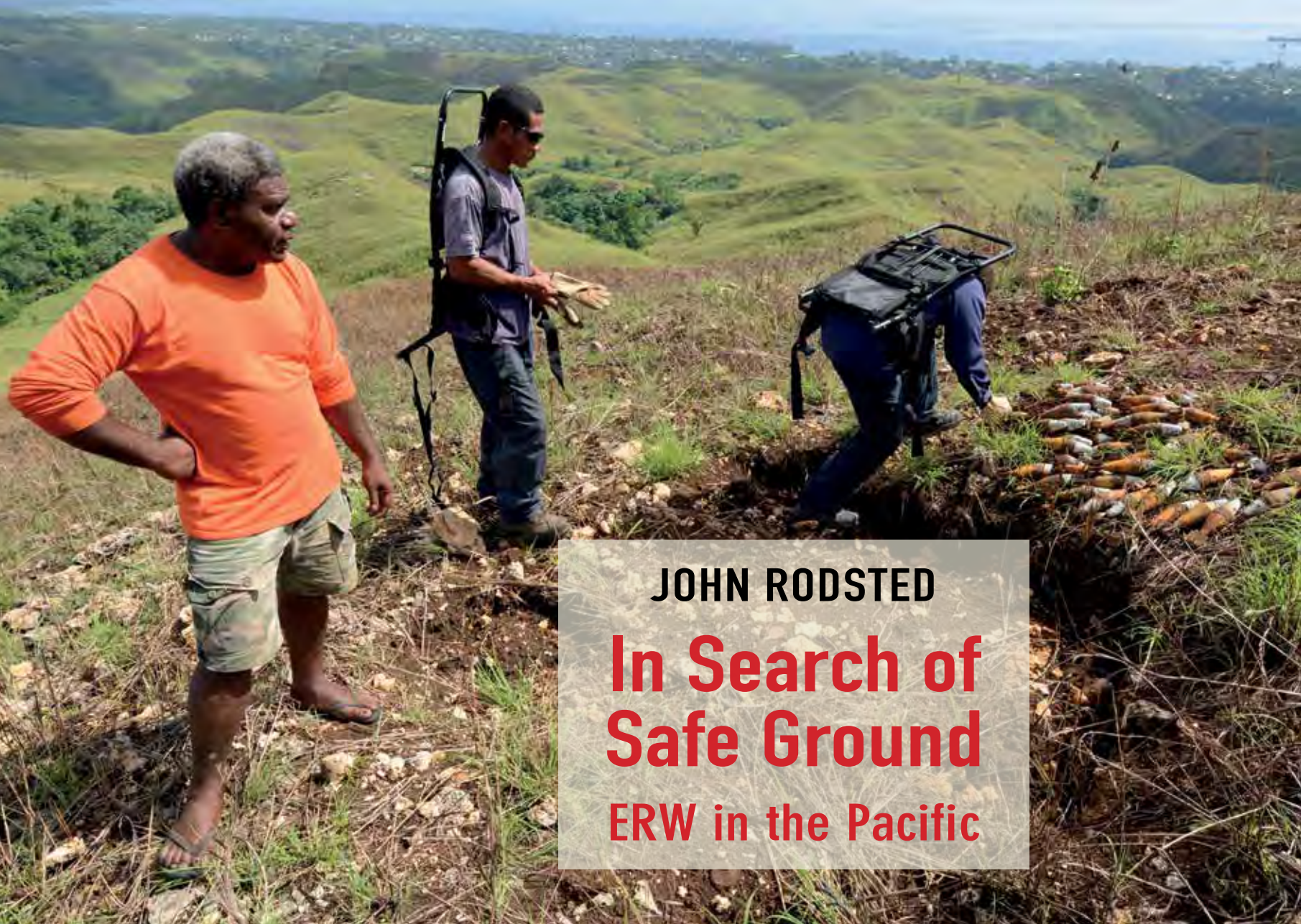

JOHN RODSTED

In Search of Safe Ground

ERW in the Pacific

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Edited by Mette Eliseussen, Helen Stanger and Lorel Thomas

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SAFE GROUND
Reducing impacts of war

Quakers Victoria Regional Meeting

MINELAB

"Sleep when you can, eat when you can." An American soldier catches a quick nap on top of a pile of artillery shells.

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FOREWORD

HRH PRINCE MIRED RAAD. Z. AL-HUSSEIN
Special Envoy of the Anti-Personnel Mine Ban Convention
Chairman of the National Committee for Demining &
Rehabilitation – Jordan

The human mind can be forgetful and the collective human conscience mercurial, to say the least. This is particularly true when the focus is our extensive history of conflict and its resolution (or lack thereof). From the advent of recorded history, as a species, we have proven ourselves excellent in initiating and carrying forward conflict. Not only does there exist a seemingly irresistible urge to engage, but also a fascination for following conflict on the part of non-participants. In all modern wars, the media has taken up the torch of covering global conflict feeding bystanders, academics and the world at large. The appetite for this sort of coverage is voracious. The focus, however, is quite fixed in the here and now. Conflicts are simultaneous and transglobal, displacing people and destabilizing societies. The media swings from one location to the next while the public is left to believe that previously covered conflicts have ended. In reality, they have only ceased to be the headline-in-vogue.

With our memories short and media attention superficial, it's easy for the scars of war to be forgotten and fall from substantive international understanding. This is what we face now looking back at the dangerous legacies created by conflicts like World Wars I & II. One of the greatest conflagrations in history, World War II, ended seventy-three years ago and the last survivors of that time are dying out. Increasingly, the world relies on recorded accounts versus personal experience to carry forward the horror they endured. While the deeds and effects of those decades are fading, their impact remains in areas that live with these dangerous legacies.

The two major areas of battle (the European & Pacific Theatres) have been discussed and studied in academia and world politics for many years. Yet it was only the European Theatre that enjoyed a thorough and thoughtful reconstruction and munition clearance. The Pacific Campaign was brutally fought between the Imperial Japanese Army and the Allied forces from the 1930s (beginning in China) to the end of the war in 1945 with the dropping of atomic bombs on Japan. Through those years, armies of many nations fought bitterly through formerly idyllic island nations.

Following Japan's surrender, all eyes focused on the future with little attention to cleaning up the wreckages. Troops from all countries were repatriated and the larger, easily accessible stockpiles of munitions disposed of. This disposal was largely haphazard in the race to leave the war behind and rejoin civil society. Some munitions were dumped in the sea, others burned and entire caches abandoned. These abandoned munitions have lain dormant in fields and oceans, active and waiting for detonation (accidental or otherwise). They have stunted development and devastated lives in many communities that live amongst them.

This book furthers the conversation around remnants of World War II in the Pacific. It is written in two halves, History and Legacy. The first half (History) illuminates the scope and scale of the Pacific conflict. It then addresses the impact leftover munitions and toxins have in today's societies. This work is largely based on the academic and field research conducted over many years by Mette Eliseussen and John Rodsted. I first met John over a decade ago in Jordan, and was inspired by his passion for shedding light on the dark and forgotten stages of conflict. Recognizing the imperative and impact of his and Mette's work, I attended the release of their book, In Search of Safe Ground – Cluster Bombs & ERW in Eastern Cambodia, in Oslo (2012). It was here that the effectiveness of their team really shone, and I have since supported their work from Palau to Norway, Eastern Cambodia and Columbia.

John and Mette were active in the field and on the political stage long before our meeting in 2007. They were key players in the Landmine Ban Treaty of 1997 as well as the Convention on Cluster Munitions in 2008. They have a truly unique gift for revealing the human links between places of war and the international arenas where treaties and policies are debated and developed. Their field acumen and ability to uncover the core of an issue is exceptional and their dedication to the cause unwavering. For over 30 years, they have forced the attention of those in power on behalf of communities that lack the resources or experience to do so themselves. In the process, they have empowered these same communities to speak up and act. From grass-roots organization, to 'grasstops' advocacy and academic investigation, there is no stone left unturned once a mission is adopted. Their work has sparked international conversations that continue to steer policies and budgets to deal with forgotten issues. Their team will be known as one of the most powerful of our generation, and I am honored to introduce what will become an important step in understanding the enduring effects of abandoned munitions in the Pacific.

GLOSSARY

BAC – Battle Area Clearance.

CCM – Convention on Cluster Munitions.

CCW – Convention on Certain Conventional Weapons.

CGD – Cleared Ground Demining

EOD – Explosive Ordnance Disposal.

ERW – Explosive Remnants of War. ERW are Unexploded Ordnance (UXO) and abandoned explosive ordnance left over from a war. Unexploded Ordnance (UXO) are explosive ordnance which have been primed, fused, armed or otherwise prepared for use or used. They may have been fired, dropped, launched or projected yet remain unexploded either through malfunction or design or for any other reason.

GICHD – Geneva International Centre for Humanitarian Demining

GW – Golden West Humanitarian Foundation

ICBL – International Campaign to Ban Landmines (ICBL). The International Campaign to Ban Landmines is a global network of non-governmental organisations working for a world free of antipersonnel landmines.

IED – Improvised Explosive Device.

IMAS – International Mine Action Standards.

JMAS – Japan Mine Action Service.

MBT – Mine Ban Treaty.

Non Technical survey – The term "Non-technical Survey" refers to the collection and analysis of data, without the use of technical interventions, about the presence, type, distribution and surrounding environment of mine/ERW contamination, in order to define better where mine/ERW contamination is present, and where it is not and to support land release prioritisation and decision-making processes through the provision of evidence.

NPA – Norwegian People's Aid

R&D – Research and Development.

RAMSI – Regional Assistance Mission to Solomon Islands.

RSIPF – Royal Solomon Island Police Force.

Unexploded Ordnance (UXO) – Unexploded Ordnance is defined as weapons with explosives which have been primed, fused, armed or otherwise prepared for use or used. They may have been fired, dropped, launched or projected yet remain unexploded either through malfunction or design or for any other reason.

ACKNOWLEDGEMENTS

This project has been almost a decade in the making. In the 1990s we worked on the creation of the Treaty Banning Anti-Personnel Landmines and in the 2000s the Treaty Banning Cluster Munitions. These treaties did wonderful work in eliminating two dangerous legacy-creating weapons and motivated the international community to clean up areas affected by them. Those are very positive steps but what of all of the varied explosive remnants of war remaining from wars long past? What about the debris left by WW1 and WW2? What is life like in those communities where there is still a dangerous legacy from 70 or 100 years ago? The research began and this book is the result.

The success of a book like this depends on collaboration, support and partnerships. It is with the greatest gratitude we thank a few. I wish there were time, memory and paper to thank everyone, but that is simply not possible.

Our thanks go specifically to:

The bomb disposal personnel throughout the world and the Pacific, Paul Eldred of Golden West Humanitarian Foundation, Sir Bruce and Keithie Saunders, Maney Jezerith and the Royal Solomon Island Police EOD Team. Also Steve Ballinger and Cassandra McKeown of Cleared Ground Demining in Palau, Japanese Mine Action Service and Luke Atkinson at Norwegian People's Aid.

The Australian Federal Police officers who helped in more ways than can be explained, Commissioner Frank Prendergast, Commander Greg Harrigan and Sergeant

Jungle fighting is a very close and intimate affair.

Dennis Sweeney whose generous sharing of historical information was an essential element of this project.

The National Archive and Research Administration at College Park, Maryland USA (NARA), their friendly staff as well as other independent researchers helping us out at the site. Thanks also to Dana Glenn for your systematic support and willingness to help during desk research.

Within SafeGround, Lorel Thomas and Helen Stanger edited and supported the project in so many ways. Miriam Deprez my co-researcher for the last stages of field research in the Solomon Islands and Palau and most importantly Mette Eliseussen who worked on every part of this book, including field and archival research and showed great political acumen. Her abilities are endless and her motivation tireless.

Thank you all and together I hope this book sparks an international conversation that will lead to change with good budgets and clearance projects opened throughout the Pacific Theatre of War. It is time for the physical legacy of WW2 to end and become history.

John Rodsted, Svalbard, 2018.

INTRODUCTION

Pandora's Box was never meant to be opened. An endless supply of mystery and misery awaited the innocent inquisitor upon the raising of the lid. The problems within the box would be endless, as would be its contents, and life would change forever.

These fabled words ran through my mind as our Australian organization, SafeGround, began to delve into the dangerous legacies that still remained in the Pacific Nations from World War 2.

Much has been written about the war but often these books and histories are either superficial, European focused, or lack field detail to gain understanding of the problems faced by the Pacific nations' populations since the war ended over 70 years ago.

As we began our research we found no end of material to study. Volumes of books have been produced and it seemed an impossible project to dig into these and gain any new or relevant information. But dig we must and academic research began in 2010. Linear metres of books were purchased and researchers began visiting various National Archives around the world. Maps, photographs, films, reports and histories were scrutinized and slowly the working material began to emerge.

Unit combat diaries gave operational details that allowed us to understand battles and terrain on a minute scale. Small faded hand-drawn maps were uncovered in platoon commander notebooks that gave a completely new perspective to the way the war was fought. When history looks back at a war, it generally looks at the big picture and deals with vast numbers. The man on the ground deals with the rocks in front of him, the copse of trees and the tracks that wander into the hills. To the man fighting the war or the civilians trying to avoid a war it becomes very personal and relevant on a very fine scale.

The research for this project was always driven by one aim: to digest masses of information and distil it into a short, concise and understandable document that would give a good understanding of life in the Pacific Island Nations today and whether bombs and associated refuse from World War 2 have any impact on today's society.

Nine Pacific Nations were affected by World War 2 and these are distinct from South-East Asian countries such as the Philippines and Malaya.

The nine affected Pacific Nations are Papua New Guinea, the Solomon Islands, Kiribati, the Republic of Palau,

Vanuatu, Nauru, the Marshall Islands, the Federated States of Micronesia and Tuvalu.

Due to limitations of budget and time, we needed to make our field research focused and representative of the overall issues faced in the Pacific. Also issues of political access, field safety for researchers and time constraints all played a role in our selection of field research.

The two countries we eventually focused on were the Republic of Palau and the Solomon Islands. Both of these countries are felt by the Pacific Island Forum Secretariat to be among the top four affected countries. These two countries would allow us to see World War 2 refuse through the eyes of the local populations in two countries with very different World War 2 stories. The main difference we found through our study was that defensive structures were absent in the earlier battle fields, and the closer the battles were to Japan the more defensive infrastructure would be in place. This had a huge impact on the final ERW situation.

The Solomon Islands were the first face-to-face ground war push-back by the Allied forces against the Imperial Japanese Army in 1942. The unique elements of this conflict were that it was a very fluid battlefield, a running fight in many instances. This is a very different situation to Palau where the Imperial Japanese Army had time to heavily fortify the islands and great and detailed preparations were undertaken. These two countries have provided us with clear and detailed insight into most of the physical facets of the post-conflict problems faced by the civilian populations. We hope this book will give the reader a solid snapshot as to what life is like in the Pacific in areas where leftover bombs abound.

The field research has been conducted over many years with three field trips undertaken in the Solomon Islands and two trips to Palau.

We at SafeGround hope this book is an enlightening conversation starter for policy and decision makers both in the Pacific and worldwide.

We welcome any thoughts or feedback and this can be provided to safeground1@gmail.com

THE RESEARCHERS

John Rodsted is the project's chief researcher. He has been studying World War 2 and the Pacific for many decades and deepened his knowledge with this project. He undertook all five field research missions in both the Solomon Islands and the Republic of Palau. He also did extensive archival research in various archives around the world including the Australian War Memorial Canberra, the US National Archives and Research Administration College Park and the Imperial War Museum London. His background spans almost forty years as a photojournalist, film maker and author. In thirty-two of these years he worked in areas of conflict and post-conflict including Afghanistan, Bosnia, Kosovo, Lebanon, East Timor, Cambodia, Eritrea, Sudan and many more.

Mette Eliseussen undertook much of the Solomon Island research and Palau political research. She is also the designer and co-editor of this book. She has spent many years working in areas of conflict including Afghanistan and West Sahara. She worked for Save the Children in Afghanistan and Pakistan from 1989 until 1997, She set up the initial Mine Risk Education programs specifically aimed at Kabul children and created more than 20 safe playgrounds in mined areas of Kabul. She was awarded the Barn av Jorden Prize for her work.

Mette is a co-creator of the Ban Bus which supported the fight for both the Landmine and Cluster Munition Treaties.

Both Eliseussen and Rodsted were key members of the International Campaign to Ban Landmines which won the 1997 Nobel Peace Prize.

Miriam Deprez is a photojournalist whose work focuses on post conflict issues, the environment, animal rights and social justice topics.

Her images and articles have been published in numerous national and international publications and with several NGOs. Miriam has reported from regional Australia, Cambodia, India, Russia, Iceland, the Solomon Islands, Palau and various EU countries.

In 2016, Miriam won the Europe in the World journalism scholarship to study in the Netherlands and Denmark, at Hogeschool University Utrecht and the Danish School of Media and Journalism. Miriam holds a Bachelor of Photography and a Bachelor of Journalism with Honours from Griffith University, Australia.

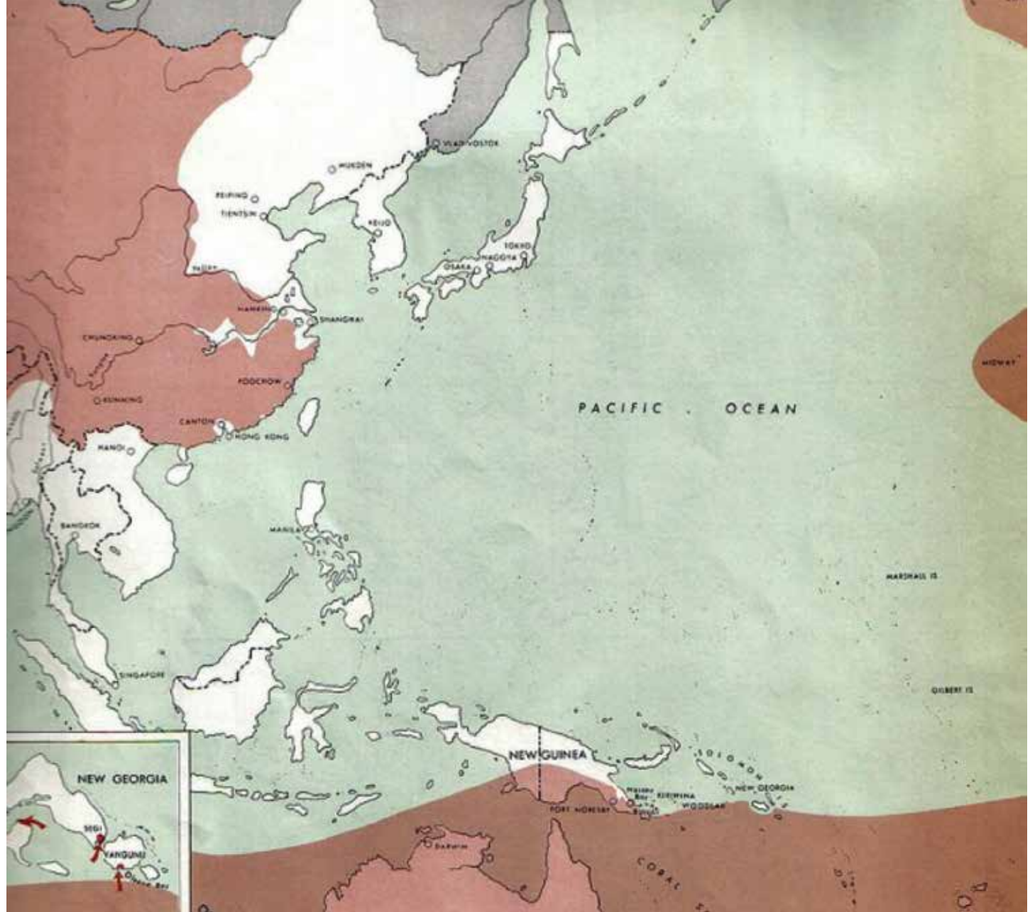
Right:
A machine gun crew wait for an aerial attack.

Facing page:
The Asia Pacific region. This area was the Pacific Theatre of War in World War 2.

"Those who will not learn from history will be condemned to repeat it"

GEORGE SANTAYANA

HISTORY



China to the north, Australia south, Midway Island east and Burma west. The white area shows the farthest extent the Imperial Japanese Army reached during World War 2. The pink colour shows areas controlled by the Allied forces. July 1942.

ORIGINS

The seeds for World War 2 were sown in the negotiations of the Treaty of Versailles after World War 1. The negotiators had the world's future in their hands and influenced the shape of what was to come. Punitive measures and sanctions were imposed on Germany that were designed to cripple her and quite racist policies extended in other directions.

Japan was emerging from self-imposed isolation and aimed to become the regional super-power. In 1868 Japan undertook a period of modernization both politically and economically and the genesis of a modern Japan began. Regionally, Japan had political and territorial ambitions and the success of the First Sino-Japanese War of 1894–1895 and the Russo-Japanese War of 1904–1905 bolstered them as a regional power. The population doubled between the years of 1873 to 1935 from 35 million to 70 million citizens.

During World War 1 Japan joined the Allies against Germany and captured German possessions in the Pacific, while making advances into China. Japan seized the Marianas, the Caroline Islands, the Marshall Islands, Palau, Nauru, East Papua New Guinea, Northern Solomon Islands, Western Samoa and German Chinese holdings. Formal control of much of this area was recognized after the war with the League of Nations appointing the South Pacific Mandate in favour of Japan. This gave them administrative jurisdiction of the Marianas, the Caroline Islands, the Marshall Islands and Palau. One of the terms of the mandate was that the islands must be demilitarized with no further expansion to take place. By the mid-1920s, Japan was actively ignoring this mandate and actively fortifying many islands to create their "unsinkable aircraft carriers".

Under the Taisho democracy from 1912 to 1926, Japan, along with the rest of the world, experienced a period of rapid modernisation. This period of liberalism came to an end with a move towards Statism or Japanese Fascism in the mid-1920s and the fragile democracy began to buckle. The shift towards Statism introduced a new direction for the Japanese people. Individualism was discouraged and western influences rejected. Radical Japanese Nationalist groups emerged that were dedicated to expansionism and militarization. The Great Depression of the 1930s

also reinforced more political internalization while a shift towards totalitarianism and ultra-nationalism was charted.

In 1931 Japan invaded Manchuria. This was widely condemned internationally and led to Japan leaving the League of Nations in 1933. In 1936 they signed the Anti-Comintern Pact with Germany and the Tripartite Pact in 1940 making them members of the Axis alliance.

1937 saw the second Sino-Japanese War with the Imperial Japanese Army invading more parts of China and taking the capital city of Nanking. The Nanking massacre followed and a period of regional expansion was underway. In 1940 Japan influenced French Indo-China in a consolidation of regional power. As a result America enforced more economic sanctions on Japan, including oil embargoes.

December 7–8, 1941 saw the surprise attacks on Pearl Harbor in Hawaii, Hong Kong, British Malaya and Singapore. Japan had pressed her region of domination far into Asia and the Pacific. The December 7 attacks caught much of the world by surprise, and Great Britain, the United States, China, and the Soviet Union found themselves ill-equipped to respond militarily. Regional powers such as Australia had their army fighting in North Africa against the Germans and other Axis powers. The United States had up until this point managed to stay neutral and out of World War 2. This was now to change as defence and military response became a matter of necessity and not a matter of alliance.

Japan's regional invasions were a mixture of a desire for political domination and the need to access raw materials that were being denied them by the USA and others. Some argue that if fairer trade and diplomacy had been afforded the Japanese, then part of the impetus to invade regional neighbours may have been avoided. This can only be speculative as the reality is that Japan did invade regionally and a military response would only be a matter of time.

Pearl Harbour attacked by Japan December 7, 1941.

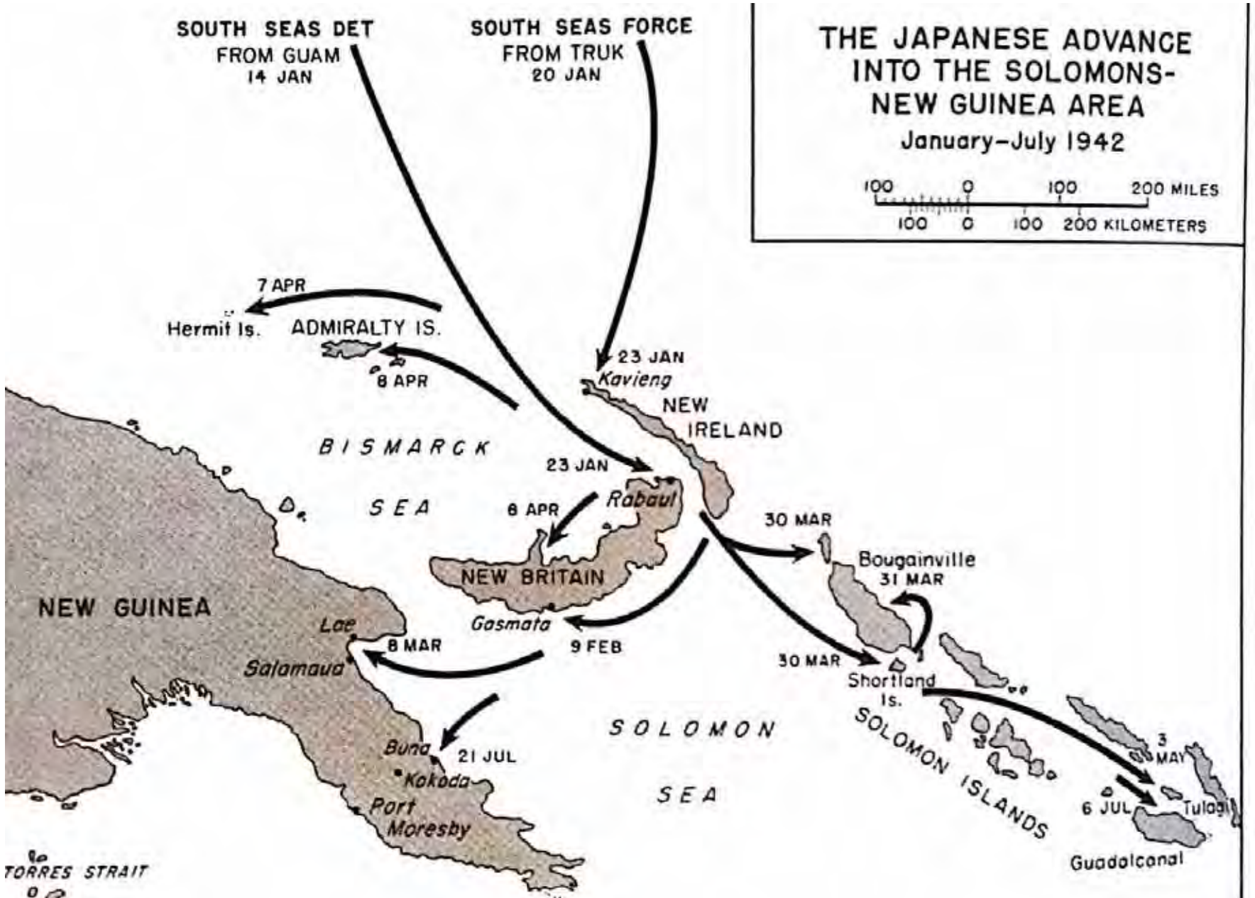
THE WAR BEGINS

With the bombing of Pearl Harbor and simultaneous attacks on Hong Kong, Singapore and Malaya, Japan hoped this would be a knock-out blow to the powerful US navy across the Pacific. Some elements within Japan thought that this should be enough of a strike and they would be left to become the Asia-Pacific dominant power. They could consolidate power and would then be left to create an Asia for Asians without the European domination that had come with colonization. Others within Japan saw the regional aggression for what it would ultimately become: the waking of a powerful giant that would bring nothing but pain and destruction to Japan.

Japan's forces spread quickly across the Asia-Pacific region, radiating in all directions as far as Burma in the west, the Aleutians in the north, to the east with the strike on Hawaii and to the south in the Solomon Islands and New Guinea. Japan had quickly gained a wide field of dominance but with this territory came stretched supply lines and a massive demand for troops, administration and finances to secure it.

On June 4, 1942, the Battle of Midway erupted. This was the first major combat between Japan and the USA after the attack on Pearl Harbor. Japan was dealt a decisive blow with the loss of four aircraft carriers, one heavy cruiser, 248 aircraft and the loss of 3,057 personnel. This is in sharp contrast to the American loss of one aircraft carrier, one destroyer, 150 aircraft and 307 men killed. At this battle, many of Japan's major fleet assets were destroyed: a blow from which they would never recover. Their rate of production simply could not replace this many heavy assets quickly enough to be a major naval contender for the rest of the war. Although this battle had weakened the Japanese navy, it had not broken it. Six months into the war the Allied forces were scrambling to consolidate their forces and deal counter-blows to the Japanese.

As Japan and the Allied forces faced off they began the exhaustive task of pounding each other back to gain terrain.



JAPAN CONTINUES ITS ADVANCE

From the opening Japanese shots at Pearl Harbor in December 1941, the rest of the Asia-Pacific region was rapidly and steadily being invaded. Japanese forces had been widely deployed over the region and were on the march.

Thailand, Malaya and Burma were under threat and Japanese advances through the Pacific to New Britain, New Guinea and the Solomon Islands were underway. A large sphere of influence was being extended, one that would herald a new era with Japan as the dominant super-power. Japan, like Germany, had envied France, England and others with their extensive empires and wanted to secure their own. The Asia-Pacific region was the logical place for such expansion.

With the fall of France to Germany in June 1940, the French government and the colonies of Indo-China were ceded to the French Vichy government. Japan looked towards Indo-China, Vietnam, Laos and Cambodia as a source for the raw materials that they desperately needed. They began to pressure the new administration for access and control. The US had placed an embargo on raw materials and on many manufactured components exported to Japan in response to their military activities in China. They saw Japan as a burgeoning major regional power that threatened US interests in the region. The embargo left Japan few options to secure their material needs via trade, and instead they looked for new ways of sourcing. These sources were easily available with the political instability and changing power structures in Indo-China.

The French Vichy government had signed the Protocol Concerning Joint Defence and Joint Military Cooperation on July 29, 1940 with Japan. This agreement defined the Franco-Japanese relationship for Indo-China. It gave the Japanese a total of eight airfields, allowed them to have large numbers of troops present and an Indo-Chinese financial system in return for a fragile French autonomy.

The first Japanese military action was on 22 September, 1940 with a minor fight between Japanese forces and the Vietnamese border forces at Dong Dang. This resulted in 40 deaths.

Japan signed the Tripartite Pact with Germany and Italy on 27 September, 1940 and looked to Germany for help

Within eight months of Japan's bombing of Pearl Harbour in Hawaii they had occupied territory as far south as Papua New Guinea and the Solomon Islands.

and alliance. This new alliance could be used to pressure the Vichy government to allow greater access to Indo-China.

After Japan's entry into Indo-China on 22 September, 1940, the Thai government, under the pro-Japanese leadership of Field Marshal Plaek Phibunsongkhram and strengthened by virtue of its treaty of friendship with Japan, invaded the French Protectorate of Cambodia's western provinces to which it had historic claims. Following the Franco-Thai War, Tokyo hosted the signature of a treaty on 9 May, 1941 that formally compelled the French to relinquish one-third of the surface area of Cambodia with almost half a million citizens.

In August 1941, the Imperial Japanese Army entered the French protectorate of Cambodia and established a garrison that numbered 8,000 troops. Despite their military presence, the Japanese authorities allowed Vichy French colonial officials to remain at their administrative posts until the closing stages of the war in 1945.

Thai Prime Minister Plaek Phibunsongkhram had plans to unify all Thai peoples, including the Lao, under one nation. Following the Franco-Thai War, Japan compelled the Vichy French colonial government to cede parts of the French Protectorate of Laos to Thailand. Laos quietly buckled to Thai-Japanese pressure and a favourable administration was seated. The region was now secure to Japanese interests with Vietnam, Thailand, Cambodia and Laos, all with pro-Japanese governments.

This allowed Vietnam to become a staging point for Japanese troops to muster, thus shortening the distance for invasions planned for Hong Kong, Singapore and Malaya. The political and military scenes were largely now set and time and politics would dictate the next actions.

AWAKING THE GIANT, THE COUNTER-ATTACK COMES

December 7, 1941 was labelled "a date that will live in infamy" by US President Roosevelt. An American territory had been attacked and, it would only be a matter of time before the Americans would respond militarily. The Japanese government and military were split between the hawks and the doves. Where many saw the attack on Pearl Harbor as an expression of ultimate Japanese pride and assertion of regional dominance, others considered it to be a catastrophe that needed to be resolved diplomatically as quickly as possible. The hawks won the day and sealed the fate for Japan's ultimate destruction.

The attack on Pearl Harbor caught a great deal of US naval shipping in the harbour by surprise. Most of the major US shipping assets were heavily damaged or sunk.

Four US battleships were sunk and four more heavily damaged. Of these only two were totally lost and the rest were repaired and returned to service. The anti-aircraft training ship Utah was hit and capsized and three Cruisers and three Destroyers were hit, however they were repaired and returned to service along with another four auxiliary ships.

In the early morning attack, 188 American aircraft were destroyed and 59 were damaged. A total of 2,403 personnel were killed with another 1,178 wounded. These were heavy damages inflicted on the American forces by the two waves of 353 Japanese aircraft launched from six aircraft carriers. This attack was an all-out assault with the specific aim of crippling the US and rendering them incapable of any retaliation.

Missing from Pearl Harbor on that day was the US fleet of aircraft carriers: assets which would be essential in any retaliatory attack. The Pearl Harbor attack was swift and devastating, but not definitive. Most damaged ships were repaired and returned to service. Only the battleship Arizona remained at the bottom of Pearl Harbor along with the training ship Utah.

The US response to the Japanese attack was national outrage and immediate mobilization. President Roosevelt declared war on Japan and America's massive industrial capacity swung into action for war production. Aircraft factories began mass production of everything from bombers to fighters. Naval production geared up and the damaged ships were repaired. The recruiting centres were overrun with volunteers and the next six months would be devoted to preparation for the counter-attack. The questions were "What would that be and where would it be delivered?"

PUSH-BACK

A strategy was created and locations plotted. America would meet Japan head on and begin rolling them back through the Pacific. The Marine Corps had trained thousands of men and the ranks of army, navy and air force had filled.

Japan had expanded rapidly for the past six months but was about to be checked. The first significant Japanese losses occurred at the Battle of the Coral Sea and the Battle of Midway. Both sides wanted to seek out as many major naval assets as possible and to cripple their adversary's ability for speed of movement and strike. These battles were fought within a month of each other; the Battle of the Coral Sea was early May 1942 and the Battle of Midway in early June 1942. At the Battle of the Coral Sea, Japan had huge losses. Subsequently, at the Battle of Midway the following month, Japan lost four aircraft carriers and one cruiser. It was a naval loss they could ill afford. In the bigger picture, the losses at Midway gave America greater superiority in naval assets.

Next a major Allied task force was assembled to begin land invasions in the Pacific. Ships and aircraft could face off and fight each other, but the Japanese advance could not be rolled back until Allied forces occupied the land. They named the operation Watchtower, and the first fighting on Pacific land was to be the Allied invasion of the Solomon Islands.

A naval task force of 75 warships and transports mustered throughout the South Western Pacific with the main body forming in New Zealand. The force of 14,000 Marines under the command of Major-General Vandergrift was the cargo and this fleet rendezvoused near Fiji and sailed north. Their destination was Guadalcanal in the Solomon Islands.

Guadalcanal was the farthest advance the Japanese had made and their supply lines were severely stretched. Once taken, this principal island would make an excellent location for staging the push-back. The Japanese had landed a construction unit on Guadalcanal and they had begun building an airstrip. This was of prime importance to the US, as much of their future strategy was in gaining airfields and using them as points for rapid advance.

The US task force conducted one practice run, landing in Fiji on 26 July, 1942, before they sailed towards Guadalcanal. The approach was risky, as ships are always an exposed target. The weather turned foul and this gave the task force the cover they had hoped for as it steamed at full speed towards the Solomon Islands. The task force entered

The Higgins boat, an amphibious landing-craft was the way most Marines came ashore under hostile fire. These small boats were built in their thousands to deliver troops to shore.

the waters off Guadalcanal on August 6 and split into two forces. One force of 3,000 Marines headed to Tulagi on the Florida Islands and the main force of 11,000 headed to Guadalcanal.

Both forces opened up a fierce naval bombardment to soften up the landing areas. The Marines who landed at Tulagi met stiff resistance and fought a consistent and prolonged battle there. The Japanese defenders on Guadalcanal fled into the jungle and offered little resistance.

The Japanese underestimated the size of the US force and sent 917 men to counter-attack on Guadalcanal. These were killed almost to the man as they charged headlong into entrenched machine gun fire while trying to storm across Alligator Creek. The order was to charge and this order was not changed, resulting in total force destruction. This became known as the Battle of Tenaru.

Realising their miscalculation in numbers and force size, the Japanese began to seriously resupply men and materials to the east of the US forces and the next six months saw massive and decisive battles fought. Both sides needed to control the airfield as this would provide a vital advantage for their aims. The US forces held on under very difficult conditions and with scant supply until the Japanese forces decided to withdraw north through the island chain and reorganise their forces. The area of battle surrounded what is now modern day Honiara, the capital city of the Solomon Islands.

Brutal hand-to-hand fighting ensued for the next six months, with the US Marines holding the key locations for control of the airfield now named Henderson Field. The area space of combat was relatively small with the American area at times reduced to 2,000 by 4,000 metres. The natural boundaries and advantages consisted of the Lunga River to the west, Alligator Creek east, Edison's Ridge south and Point Cruz to the north. High ground was of utmost importance and provided a great advantage to those who could control it. The Japanese used the mountain ridges inland as their supply line for men and materials, then turned north to meet the Marines in combat. Japanese positions on Mount Austen gave the Japanese some elevation that they desperately needed and this became a major objective for the US Marines. By late December 1942 the Japanese High Command decided to withdraw from Guadalcanal and focus their forces in the Central Solomon Islands and on the New Guinea Campaign.

As Japanese supply lines were stretched and manpower diminished, the Japanese forces decided to evacuate to the Western tip of Guadalcanal and across the waters via the Russell Islands and on to New Georgia. Here a second front with an airfield could be established.

As the Japanese forces withdrew, the Marines pursued them vigorously and more severe losses were inflicted. When the last Japanese troops withdrew from Guadalcanal

Munitions were hurriedly delivered to frontline positions and often left behind as battles moved on.

Facing page: Airpower was an important facet of World War 2 and the ability to supply troops on the ground away from supply lines became a possibility. Who controlled aircraft runways was a critical factor in World War 2.

Left: During the height of the battle for Guadalcanal the US forces were pressed inside a small perimeter that protected Henderson Airfield.

A soldier shows a Japanese anti-personnel land-mine he detected and removed by prodding with his field knife.

in February 1943 they had lost 23,000 men. This was a sharp contrast to the US losses of 1,400.

From 4 to 7 February, 1943 the Japanese ran a Destroyer shuttle removing the remaining 10,600 men from Guadalcanal, through the Russell Islands and on to New Georgia. The US Command realised that they were gone on February 9 and Guadalcanal was declared cleared.

Standing on the hill today behind the Australian Embassy in Honiara you find the town is surrounded by a ring of rugged jungle mountains. You can see Mount Austen and the route the Japanese took in pressing down on to the US defenders and ultimately the route of their withdrawal to the western tip of the island at Cape Esperance. The jungle has healed many of its physical scars but much lies just out of sight in jungles and under the buildings of Honiara.

The battle of Midway was the first major engament between Japan and the United States after Pearl Harbor. Both sides suffered major losses, but Japan never truly recovered the loss of many aircraft carriers.

As the fighting moved from Guadalcanal to the northern islands the acquisition of airfields was of prime importance.

KEEP THEM MOVING

As American troops secured Guadalcanal, it was critical to maintain the momentum in order not to allow the Japanese forces time to reorganise themselves. Operation Cleanslate was developed with the objective of pushing the Japanese army out of the Solomon Islands, up through Bougainville Island and on to New Britain and Rabaul. The Japanese stronghold in Rabaul was the major regional Headquarters and this needed to be eliminated, or at the very least, to be neutralized.

Fighting was underway on a range of fronts with actions in the Solomon Islands and on the Kokoda Trail that crosses New Guinea from north to south, directly threatening the Australian stronghold at Port Moresby. The regional Japanese headquarters was situated near on the island of New Britain at Rabaul to the north east of New Guinea, and the destruction or isolation of Rabaul became a major objective of Allied planning. The Allied forces hoped they would succeed in this by executing a two-pronged approach into Rabaul, with their forces arriving via both Solomon Islands and New Guinea.

Operation Cleanslate's first objective was the Russell Islands, 35 miles to the north of Guadalcanal. These are the islands to which the Japanese had evacuated their forces. Admiral Halsey saw them as a real threat for a counter-attack. The US forces landed on Banika Island in the Russell Islands on February 21, 1943. They landed unopposed, as the Japanese forces had already withdrawn to the island of New Georgia.

Within seven days of that first landing the US troops were transforming the island into an aircraft runway, forward radar station and supply staging area. Although the US forces met no opposition when landing in the Russell Islands, they soon suffered daily air raids, which began on March 6 and continued until April 15.

The Russell Islands would become a major supply base for the early phases of the Pacific War. It was close enough to a range of battle areas to reduce the distance needed to access their troops with supplies. It also became a regional rest area to rotate men from the front line for a few days' rest. Little did they know at the time that the Russell Islands housed a rat plague, and days on the island were

Munda Point on New Georgia, one of the Solomon Islands, was the next target for serious combat.

spent fighting the aggressive rodents. Soldiers would even say they welcomed a return to battle to escape the rats that gave them no rest day or night.

The Japanese forces on New Georgia had built another airfield at Munda Point. They used this airfield to attack the Americans to the south and it was also considered their vital front line position. It was ideally located and enough water between New Georgia and the Russell Islands to create some form of natural barrier. These factors would help with the defence of New Georgia.

The US forces also looked to the new airfield as a great tactical advantage. They were developing the strategy of island-hopping and the establishment and acquisition of airfields was of prime importance to this strategy.

If the US and Allied forces could control the air, then they would be able to strike shipping and to break supply lines, thus isolating Japanese forces. If supply lines could be severed, then large bodies of Japanese troops could be isolated and left to 'wither on the vine'. This would alleviate the need to fight every battle. Enemy troops could be left in isolated locations to wait out the war without posing any further military threat. This, in turn, would conserve Allied forces and assets and allow greater numbers of men and machines to be focused where desired and not scattered to tackle every island on the road to Japan. It was a tactic of 'leap-frog' or 'island-hopping'.

Operation Toenails was devised to take New Georgia, its airfield and a few strategically important islands, then bypass and isolate a range of other islands and enemy forces, and push on to the northern island of Bougainville. Toenails was to be executed in two phases.

Phase One would be to secure the islands of Vangunu, New Georgia, Rendova and surrounding islands. Phase Two was to push the Japanese further to the north then secure Vella Lavella and to bypass and isolate the Japanese forces on Kolombangara Island. Phase one landings were made in the south of New Georgia on June 21, 1943 and

This map shows the turning of the tide of war as the Japanese forces were slowly pushed back. July 1, 1943.

in the north around Rice Harbour on July 5. Fierce jungle fighting ensued for the next few months in dense terrain and Munda Airfield was finally seized and operational for the Americans by August 5, 1943. They had their next link in the chain of airfields and their range was dramatically extended to the north as a result.

Phase Two commenced on August 6 with troops landing on Vella Lavella Island. The seizure of Vella Lavella was a flanking manoeuvre to help isolate the main body of Japanese troops that had mustered on the island of Kolombangara. The Japanese dug in and created makeshift fortifications and faced south while waiting for the Allied attack. It never came. These Japanese forces had either been destroyed on New Georgia or forced to flee north and were now isolated with Allied forces controlling the air and sea ways.

US air power strafed and destroyed Japanese ships, and US navy ships dropped hundreds of sea mines along the coast, completing the isolation of those Japanese forces. These forces could now be contained with a moderate force as the main body of allied troops would look towards Bougainville Island for their next action. The central Solomon Islands were declared secured on October 9, 1943.

TO THE WEST

As the Solomon Island campaign was being fought from August 1942 until October 1943, intense fighting was also underway in the rugged mountains of New Guinea.

Japanese forces had landed on the island of New Britain in January 1942 and set up their major headquarters in Rabaul on New Britain's eastern tip. The next expansion was on to New Guinea and the towns of Lae and Salamaua on the northern coast of the Huon Peninsula. They quickly set this area up as a forward base and in July 1942 took the village of Buna unopposed. This first landing was with 1,500 troops but this was quickly reinforced to 11,430 by August 22. This force was tasked to cross the rugged Owen Stanley Ranges and take the city of Port Moresby.

The attack on Port Moresby was to be a two-pronged assault with one force crossing New Guinea from Buna across the Kokoda Track and another landing on the eastern tip of New Guinea at Milne Bay. Allied intelligence intercepted Japanese plans so counter-measures were employed. A mixed force of 8,500 Australians and 1,300 Americans landed at Milne Bay on August 22 in anticipation of the Japanese. The Japanese underestimated the size of the Allied force and sent 1,943 troops of the elite Naval landing force. They landed on August 25 and fierce fighting began. Although greatly outnumbered, the Japanese fought hard and were not displaced until September 7. Australian records estimate 750 Japanese soldiers were killed. The remaining Japanese troops were evacuated by ship and submarine and the rest withdrew to Goodenough Island. This was only partially successful as many were caught by Australian troops in a mopping up operation.

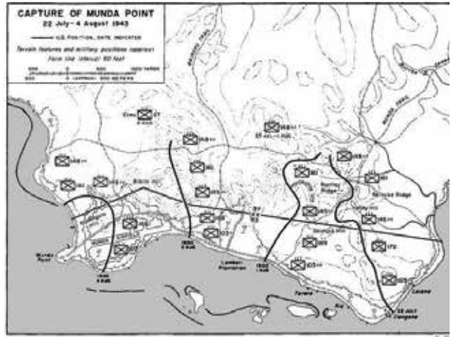
A major part of the Japanese plan was destroyed and they could only rely on a single assault line that would cross New Guinea from Buna in the north to Port Moresby in the south over the Kokoda Track. The battle of Milne Bay had been Japan's first complete land defeat and would herald events and actions of the future. It is also considered the moment that the tide turned and the Allied forces came on the offensive instead of being on the defensive. The Japanese soldier was no longer considered invincible.

The Kokoda Track Campaign began. It was a brutal experience for the Japanese, Australian and Allied troops involved. Every item of supply had to be hand carried or air dropped and as the Japanese got further from the northern coast, their supply lines grew longer and thinner. On 17 September, the Japanese reached the village of

Ioribaiwa, just 30 kilometres from the Allied airdrome at Port Moresby. The Australians had fought a retreat across the Owen Stanley Ranges and stretched the Japanese supply lines as a result. The Australians then stopped and held firm and began their counter-drive on 26 September. Reinforcements had also arrived and a reinvigorated force pursued the Japanese north along the Kokoda Track to the northern shore at Buna. The Japanese retreat down the Kokoda Track had turned into a rout. Thousands perished from starvation and disease and the commanding general, Horii, was drowned. The overland threat to Port Moresby was now permanently removed.

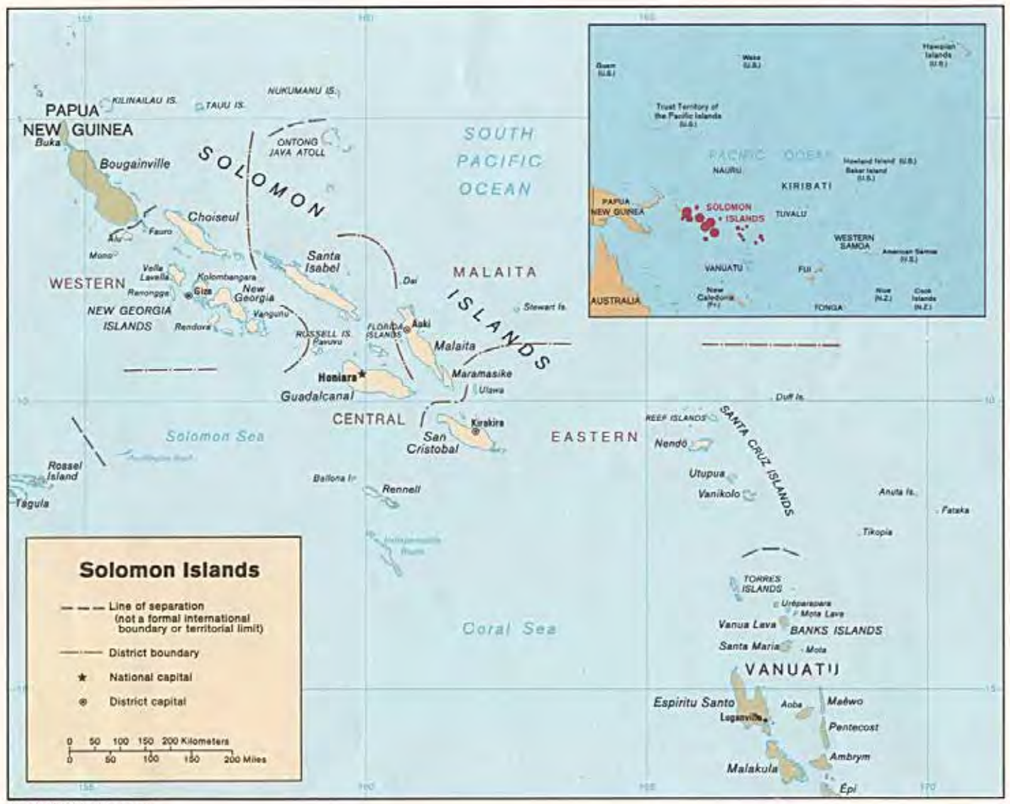
Fighting continued on this section of New Guinea until 22 January, 1943 with the final destruction of the Japanese forces gathered around Buna. There were still more Japanese forces spread out along New Guinea's north coast but the threat to Port Moresby was over. The Allied forces were now on the offensive.

Airpower was the essential element for fighting in the Pacific.



Far left: World War 2 was extensively covered for the Newsreels back home. Photographers and cameramen were normally in the Signal Corps.

Left: The final phase of fighting to gain Munda Point, New Georgia.



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THE TIDE TURNS

The Imperial Japanese Army had now suffered two major defeats in the campaigns, both in the Solomon Islands and New Guinea, and allied forces were closing in on New Britain and Rabaul. Rabaul was the regional headquarters and it needed to be neutralised or destroyed.

The complexion of the war took a dramatic turn as well with the Allied forces now on the offensive. From the beginning of the conflict in the Asia Pacific theatre the Japanese military had been on the advance and had pushed far into the region. As they pushed out in all directions their supply lines grew longer and longer and more territory needed to be secured in order to hold them. This drained supplies of troops, administration, munitions, ship and planes and money. The more successful they became, the harder it was to defend their gains.

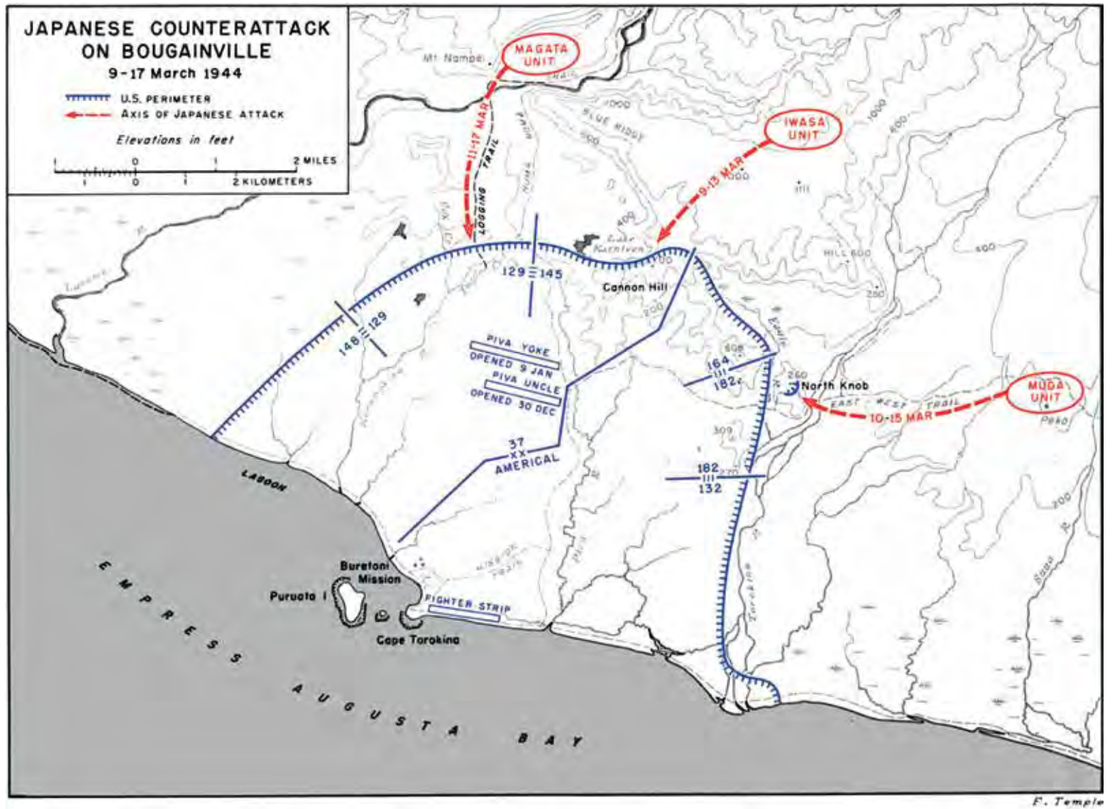
Added to this pressure was the desperate need for raw materials. Japan was not rich in these. In fact, the need for steel, rubber and most importantly, oil were some of the original reasons for going to war. All of these resources existed within the Asia Pacific region, but were not within Japanese control.

As the United States had forced resources embargoes on Japan in response to their actions in China, Japan felt they had no other course but to expand their dominance in the region. This would fulfil not only their economic needs but also their Imperial ambitions: an Asia for Asians under Japanese control.

Once the area around Buna had been cleared of Japanese troops, the Allied operations headed west along New Guinea's northern coast to deal with Japanese forces at Lae, Salamaua and the Huon Gulf. Some Japanese survivors from Buna had been evacuated here to reorganise and mount a resistance and it was also the closest land mass to the western tip of the island of New Britain and the Japanese headquarters at Rabaul.

The Japanese consolidated their troops in Lae in late January 1943. The Japanese high command in Rabaul was determined to make an all-out effort to resupply Lae in February. Eight transport ships escorted by eight destroyers left New Britain heading for Lae. They hoped for cover provided by poor weather but this weather cleared and the convoy was spotted. The Allied forces had reinforced the area in the belief that a new Japanese build up would take place and improved bombing and strafing techniques made Allied aircraft more dangerous.

Bougainville Island was the next target for the Americans once Allied forces had either secured or bypassed Japanese forces in the Solomon Islands. A landing was planned at Cape Torokina on the west coast.



Facing page: Landing-craft would form up offshore then charge the beach en masse to land their troops. Often smoke screens were laid to hide the advancing boats.

Left: The situation map on Cape Torokina Bougainville Island. March 9, 1944.

The jungles were dense obstacles. One aim of pre-invasion bombardments was to flatten as much jungle as possible to allow easier access and vision.

The Japanese convoy left Rabaul on February 28 and was discovered by Allied spotter aircraft on March 1. Air and sea attacks soon began and the convoy was battered. All eight convoy ships and four of the destroyers were sunk taking 6,900 Japanese soldiers with them. The remaining four Japanese destroyers limped back to Rabaul with the surviving 2,700 troops. The Japanese never risked moving troops in such large numbers and so susceptible to enemy attack again.

New Guinea was rapidly becoming controlled by the Allies and their two prongs of attack on Rabaul were closing in.

To the south of Rabaul, Allied forces were working their way up the Solomon Island chain and to the west they controlled New Guinea. It would be a short crossing to the western tip of New Britain and on to Rabaul.

THE ISOLATION OF RABAUL

The Allied forces now had dominance over the air and sea lanes between New Guinea and New Britain, with Rabaul looking increasingly isolated. Although the routes to the west were looking secure, the approach south was still largely in control of the Japanese. Large forces of Japanese troops had established strong defences on Bougainville Island that lay between New Britain to the north and the rest of the Solomon Islands to the south. Bougainville Island had only one use to the Allied troops: it would serve as an airbase. If a base could be established, then Rabaul would then be within bomber range with fighter support.

Rabaul had been in range of heavy bombers since the establishment of bases on Guadalcanal and Munda Point on New Georgia Island but they had to fly alone as this was outside the fuel range for fighter aircraft and medium bombers. A base on Bougainville would mean all force could be brought to bear on Rabaul.

Operation Cartwheel was developed to take a strategic section of Bougainville Island and to build new airfields. The Japanese had heavily fortified the southern tip of the island and had airfields of their own in the south, north and east. The west was exposed and had little Japanese activity. Mid-way along the west coast of Bougainville is the area of Cape Torokina. This was selected as the site for the next phase of landings. The area had little Japanese presence and was difficult to access from anywhere on the island due to dense jungle, mountains and lack of roads or tracks. The area also had the advantage that there was enough flat land to create some aircraft runways.

Part of Cartwheel's plan was to make the Japanese believe a landing would come from the obvious direction, the south. A crossing from the islands to the south would be easy for the Allies. As a feint to the Japanese, the Allies invaded and occupied the Choiseul and Treasury Islands off the southern tip of Bougainville. Regular naval bombardments now harassed the Japanese fortifications and more Japanese troops were assigned there.

As the Allies had moved up the chain of the Solomon Islands they had destroyed Japanese forces where needed and bypassed and isolated others when possible. The island of Kolombongara was one of these islands the Allies bypassed. This is the next island north of New Georgia Island and when the Japanese were pushed off New Georgia they withdrew to Kolombangara, dug in, fortified and awaited

Papua New Guinea. The island of New Britain was central and housed the Japanese regional command centre at Rabaul. Rabaul needed to be isolated or eliminated.

the Allied response. The response was to leave them there and cut off their supply lines. Aircraft and shipping were heavily targeted and the forces on the island sat and waited for the fight that never came. Food and supplies also didn't arrive and day by day their strength waned.

The US Joint Chiefs of Staff's plan was successful. Large bodies of troops had been isolated and cut off; the Japanese believed landings would take place in areas where they wouldn't and extra troops and equipment were also deployed where no fighting would ultimately take place. All of these tactics had the result of weakening the Japanese forces and diluting their fighting power.

The Cartwheel plan was about gaining land with the minimal amount of actual fighting to establish air superiority. Once air superiority was established, all Allied forces could be focused on Rabaul and it could be knocked out of the war. Once this regional headquarters was non-operational, the Japanese forces to the south would largely become irrelevant. The main war effort would then focus on moving north through the chains of Pacific Islands and on to Japan.

Three groups of transports converged in Empress Augusta Bay by Cape Tokokina on the morning of 1 November, 1943. The existing maps of the Bougainville coast that the Allies possessed were highly unreliable German Admiralty charts from about 1890. A few corrections had been made by reconnaissance flights and submarine scouting, but some longitudes were still wrong. On checking their approach the US naval commanders often found their positions put them many miles inland.

The US commanders had learned that it was imperative to unload landing-craft quickly and get them off the beaches and back for a second load. This was to reduce their time as a shore target and the possibility of being sunk and blocking shore approaches. Many craft came in only 50% full or less, allowing them to make a quick turn-around.

The Japanese force at Torokina was only a platoon and was massively outnumbered. The US force totalled 14,300 personnel. When word of the US landing reached Rabaul, the Japanese high command ordered 1,000 men to set sail and effect a counter-landing. This force was intercepted by US naval ships and aircraft. This allowed the US forces the time to complete their landing of troops, machinery and supplies and begin building runways, and the area around Torokina and Empress Augusta Bay was secured.

The area around the Torokina landing site was not large, however it did not need to be. By using natural obstacles, the jungle and mountains, a reasonable degree of security could be obtained.

On November 7, Japanese troops managed to land and fierce fighting began. They were determined to drive the Americans into the sea but were repulsed time and again. The beach-head was established and a runway construction was well under way. As the relatively small area that the US

forces needed to defend, 7,000 metres of beach front and a 16,000 metre perimeter, they could maximize defence on any Japanese attacks.

The US forces succeeded in expanding their area of control to gain two small Japanese runways and these were rapidly expanded to become adequate places for Allied fighters and light bombers.

The Japanese forces kept up active attacks on the Allies but lost a large number of aircraft in doing so. By November 17, many of their mobile forces were withdrawn to their base at Truk and the Japanese Bougainville forces became largely isolated.

In Rabaul, General Imamura was still convinced that the Allies did not mean to stay long at Torokina and was sure it was just a stepping-stone. He thus had no interest in mounting a decisive counter-attack on the Allied beach-head using the substantial number of troops he already had in the southern part of Bougainville. Instead, he reinforced the Buka Island area, just off the north coast of the larger island, believing it to be the Allies' real target. Thus, the Japanese army repeated the error of Guadalcanal, while the navy could not convince Imamura of the Americans' real intentions.

The stage was now set with Rabaul as the target. The Allied forces had succeeded in largely surrounding and isolating the island. All of New Britain was within bombing range by all aircraft from light to heavy bombers

Facing page: The Allied forces landed at Cape Glouchester on the western tip of the island of New Britain. They needed to push the Japanese forces across the island to the east and into the peninsula that contained Rabaul.

Left: Sometimes jungle, sometimes open ground. Every inch was heavily contested.

and with full fighter support. Japanese military assets had been greatly reduced due to fighting and destruction or by isolation such as the forces sitting in north and south Bougainville and those on Kolombangara.

Construction of the runways now took priority as the main Japanese threat had passed. The first runway was operational by December 10, 1943, the second on Christmas Day and the third on January 22, 1944.

FORTRESS RABAUL

Although Rabaul was becoming encircled, the number of men and arms within the city posed a great threat. The threat was their ability to resupply regionally and to uphold a vigorous defence if attacked. With an estimated 110,000 troops and many kilometres of underground tunnels, a direct attack on Rabaul would prove to be extremely costly in both men and time. The decision was made to isolate and bypass it.

The fighting on New Guinea was closing one door for the Japanese and the Allied forces climbing up the Solomon Island chain closed another. Then came the establishment of Allied forces and airfields on Torokina on Bougainville and the Allies took the Green Islands to the north of Bougainville Island. The Green Islands provided the Allies cover and staging from the east and Rabaul was now surrounded on three sides.

The US 1st Marines were tasked with landing on the western end of New Britain at Cape Gloucester to take the two Japanese airfields there. They came ashore on December 26, 1943, landing on both sides of Cape Gloucester. Fierce fighting ensued which lasted until January 16, 1944. The codename was Operation Backhander and was an extension of Operation Cartwheel.

Significant damage had already been done to Rabaul by Allied heavy bombing and raids were conducted over the city from October 12 to November 2, 1943. These raids had damaged Japanese capacity but the Japanese response was simply to move a lot of their infrastructure underground. Here it was afforded great protection and the high altitude bombing raids ceased to have as great an effect. As the Torokina airfields came into use, so did low level aircraft that would have far greater accuracy and impact on cave entrances and shipping. Ships within the harbour, particularly those with anti-aircraft capacity, were sunk and Simpson Harbour and the ships within it were reduced to smoking wrecks.

By late January 1944, Japanese Admiral Kusaka had banned all shipping except barges from entering Simpson Harbour in Rabaul. This removed any remaining naval threat to the Torokina beachhead coming from Rabaul. In October 1943 Simpson Harbour in Rabaul held over 300,000 tons of Japanese shipping and sheltered powerful

The fighting on New Britain was through some of the densest jungle encountered in the war.

arms of the Japanese navy. By the end of February 1944 it was reduced to a third-rate barge depot full of sunken ships. Air cover had also been either destroyed or ordered out of the area. Rabaul was turning into a 'prison camp' and the Allied strategy to 'let them wither on the vine' took hold.

The 1st Marines landed on the western tip of New Britain on both sides of Cape Gloucester on December 26, 1943. Their objective was to capture the two Japanese airstrips and to extend their air dominance of the region. 13,000 troops and 7,600 tons of equipment were landed the first day and the supply of both men and supplies continued to grow. The two strips were secured on December 29 and Japanese resistance in the area abated by January 16, 1944. The western end of New Britain was now firmly in Allied hands.

Allied forces wanted the airfields and had no further ambition for the island if Rabaul could be contained. Japanese forces had withdrawn east and a large area of 'no man's land' lay between the two sides. This opinion changed with renewed contact with the Japanese and a landing was planned for midway along the north coast of New Britain at Talasea on the Willaumez Peninsula. If the peninsula could be seized and secured quickly then they would be able to cut off Japanese forces in the area and destroy them.

The US 5th Marines landed 3,000 troops on the eastern side of the peninsula on March 6, 1944 and met Japanese resistance. 594 Japanese troops were in the immediate area and engaged the Americans with only medium to light resistance. The beach-head was established and the rest of the operation was ready to proceed. What the small Japanese force did achieve was delaying the Americans for long enough so their own troops could escape from the western tip of New Britain and not be cut off. Although this did save many Japanese troops, it also isolated them more in the east of the island. The fighting was largely over by March 10 and a new demarcation was established.

Much of the control on New Britain was passed to Australian troops in October 1944 as American forces

Japanese withdrawal routes from West New Britain.

were consolidating for the bigger push north towards Japan. The Australians under Major-General Alan Ramsay decided to seek out the Japanese and reduce their area dramatically by forcing them even farther east. The Australians subsequently began a limited offensive, landing at Jacquinot Bay and then pushing further east on both the northern and southern coasts. Eventually the Australians also sought to conduct a campaign of containment rather than destruction after occupying a line between Wide Bay and Open Bay. The Japanese forces were now pressed into the Gazelle peninsula. This is where they would stay for the rest of the war, unconquered but ineffective. Rabaul was fully neutralised.

In reality, Rabaul had been broken as a regional base in November 1943 and by the end of January 1944 was irrelevant. The actions for the rest of 1944 could largely be seen as mopping up and containment operations. The Rabaul forces were locked in and had no way out. They finally surrendered to Allied command in August 1945.

What did come out of the isolation of Rabaul was a new kind of warfare and enemy. The Japanese forces had plenty of time to fortify their positions and the closer to Rabaul the Allied forces got, the tougher the Japanese defences were. Much of the fighting until this point had been a fluid running game with quick strikes and counter-strikes by forces that were both stretched by distance, logistics, supply lines and terrain. The closer to Japan the Allied forces got, the tougher the Japanese were dug in and the harder they would be to dislodge. This had a strong effect on Allied planners as they realised they needed to bypass as many Japanese strongholds as possible. They needed airfields to maximize the speed of advance and the ability to cut off supply lines to the Japanese forces they were bypassing. The tactic of 'wither on the vine' had fully taken hold.

BREAKING THE OUTER RING

Japan's farthest reach to the east was now the fortified atolls of Tarawa in the Gilbert Islands and the Marshall Islands. These chains of coral outcrops were a major stepping-stone for Japanese supply lines and refuelling. Without them, their ability to heavily press east and south-east would be seriously restricted. With their conquest the US military could press in from the east and secure and supply their forces to the south. This ultimately would help strangle major Japanese bases to the south, such as Rabaul, Truk and Yap.

The battle of Tarawa began on November 20, 1943 and was a short but deadly campaign. It was the first time that US troops had faced serious opposition to an amphibious assault. The Japanese were dug in and had strong fortifications prepared but were massively outnumbered. Simple mathematics would dictate that 4,700 Japanese troops could not repel 18,000 US Marines with the might of the US Navy, Army and Marines behind them.

The battle only lasted 4 days and Tarawa was declared secure on November 23, but the cost to both sides was massive. 1,696 US troops were dead and another 2,100 injured. Of the Japanese forces, they were killed almost to the man. 4,690 lay dead with only 17 captured. This was the form that future battles would take, with Japanese forces preferring death to surrender.

To consolidate this area of the Pacific, the Marshall Islands were the next target for US forces and plans were developed and modified to take them. The Marshalls are 3,600 km south-west of Hawaii and consist of 93 islands in a chain around the world's largest lagoon. Although the Japanese defences were substantial at 28,000 troops, they were spread too thinly over many islands and atolls to provide a proper defence. The Japanese forces were thus disadvantaged by not having sufficient numbers in any one place to be able to repel any attempt to invade.

The US forces began with air and sea bombardment to knock out Japanese air power and then focused their forces on the two most significant islands of Kwajalein and Roi-Namur. Once seized, these islands could help isolate the rest of the forces with their air and sea dominance.

The US forces were beginning to modify their strategies due to the very costly encounter on Tarawa. The Japanese strategy was still to stop the enemy on the beaches and drive them back into the sea. The Kwajalein battle lasted from January 31, 1944 until February 3 and killed 4,300 Japanese

Coming to shore on the Marshall Islands under fire was a tense experience in the small and vulnerable Higgins boats.

to the US losses of 142. The invasion of Roi-Namur a few days later cost 3,500 Japanese to 206 Marines. These losses of US troops were a great improvement on the massive casualty rates experienced on Tarawa in November, and the US hoped that these tactics would carry them through the Pacific without the losses the Japanese were suffering.

The last island to be invaded in order to fully control the Marshall Islands was the atoll of Enewetak and this battle went from February 17 until February 23, 1944. Again, US losses were moderate at 313 dead to the Japanese losses of 3,380. The rest of the Marshall Islands could now be isolated and bypassed and those troops left to starve or surrender; the choice was theirs.

The battle of Tarawa also taught an expensive but valuable lesson. To attack Japanese forces that were initially well supplied and fortified would be a costly exercise in men, machinery and munitions. Other techniques would need to be employed to reduce the cost to the Allied forces.

Now that the US forces controlled the Marshall Islands they could use them as an airfield and resupply point, much as the Japanese had done. Their range was now greatly extended west into the Pacific and to the south-west in support of the efforts on New Britain and New Guinea. Other Japanese garrisons to the south of the Marshalls could now be attacked, cut off and left to fend for themselves and wait until the war's end. The pincers from the east and the south were now closing and the next stage was set for the conquests ahead.

A mortar crew drops rounds through the jungle canopy at close range.

A NEW STRATEGY, THE GAME OF LEAP-FROG

With the conquest of the Solomon Islands and New Guinea and the isolation of the Japanese troops contained within Rabaul, the supply lines between Australia and the American forces were now secure. The region of dominance by Japan was reduced and a significant amount of their military power in men and machines destroyed. They were still a formidable force though and massive fortified Japanese garrisons existed across Asia and the Pacific Islands all the way to Japan.

Major areas of Japanese occupation had to be dealt with, such as the Marshall Islands, Tarawa, Micronesia, Tinian, Saipan, Guam, Palau, the Philippines, Iwo Jima and Okinawa in the Pacific and the countries Japan had occupied such as Malaya, Singapore, Thailand, Burma and Indo-China.

The countries that Japan controlled before the war began in December 1941 had far stronger fortifications than those that they later invaded. Notably the former German colonial holdings of Palau, Marshall Islands, Caroline Islands, Micronesia and Mariana Islands had been in Japanese control since the end of World War 1 when all German territorial claims in the Pacific were relinquished. As an example, Palau had massive fortifications dug into coral mountains and any combat conducted here would certainly favour the defenders.

Much of the fighting farther to the south was through recently invaded territory such as New Guinea, the Solomon Islands, Timor and Borneo. Battles here were always plagued by distance, spread resources, limited access, rugged terrain, long supply chains and very fluid battlefield conditions. As the fighting pressed north towards Japan, the Allied forces came into territory that had been controlled by the Japanese for a long time and which had been heavily fortified.

The Allied forces had succeeded in pushing back the front line and isolating Rabaul and other areas but would now need to be very strategic as to where they would allocate their resources.

'The greatest battles won are the ones you never fight', was a very valid doctrine and Allied planners needed to work out where they would wage their battles and how to isolate and avoid fighting in other areas.

The Japanese area of control stretched from Burma in the west, through Indo-China and into China in the north. The United States of America was pressing in from the east and Japanese island outposts had to be taken to secure the right

Top left: A burial party.

Top right: All became shattered including the men.

Bottom left: A Japanese prisoner is interrogated.

Bottom right: Japanese troops surrender.

flank and to reduce their area of influence and control. To the south, the Allies had pushed back in the Solomon Islands and New Guinea and would need to roll back the Japanese forces island by island. Planners realised that the western front in Burma would be a stalemate and this route would not lead to the defeat of Japan. The same could be said for China. Indo-China was heavily fortified with Japanese forces well entrenched. It would simply cost too much to conquer. These areas should be avoided and isolated if possible. The push would need to come through the Pacific. The strategy of island-hopping was employed and the objective was to gain key islands with airfields, then jump farther ahead to the next location that would provide airbases and support. This would bring the fight to the Japanese homeland quickly and hopefully force a capitulation.

US and Filipino forces had surrendered the Philippines to the Japanese army in May 1942, and 80,000 Allied troops were left behind to become Prisoners of War (POWs). As the US General Douglas MacArthur had been forced out of the Philippines, he famously made the statement, 'I shall return'. Fulfilling this promise was an important obligation to MacArthur even if not the best strategy for bringing the quickest end to the war.

This number of POWs now seized in the Philippines added to the 130,000 British, Indian, Australian and Dutch prisoners already taken in Singapore in January 1942. Over 200,000 Allied fighting men were out of the war before it really got started.

In the planning stages to roll Japan back across the Pacific, a number of strategies were studied and discussed. US Admiral Chester Nimitz wanted to follow the logical and expedient plan to head straight across the Pacific, island-hopping as they went. With this plan, the islands closest to the United States of America would give the Americans a heavily secured right flank. This would bring them within air range of Japan relatively quickly and allow them to take on a sustained air campaign. The key islands to secure in this plan would be the Marshalls, Guam, Saipan and Tinian. The left flank, the islands of the Pacific that meet Asia and the Philippines, would be the left buffer for the advance. As long as the Allied forces had air supremacy, they could cut any supply lines the Japanese might want to use to attack the Allied advance. This again reinforced the strategy of island-hopping and airfield acquisition. Once the islands of Guam, Saipan and Tinian were in Allied hands, the mainland of Japan would be comfortably in range of US bombers.

MacArthur rejected this plan and instead wanted the Philippines liberated before heading to Japan. This tactic would require more fighting to the west than would have been absolutely necessary but it would also secure most of the Pacific and aggressively push the Japanese north or leave them stuck with severed supply lines in Indo-China.

The flame thrower was heavily employed in the Pacific Campaign. Its prime purpose was clearing fortifications and bunkers of troops.

NORTH AND WEST

By 1944, American victories in the South-west and Central Pacific had brought the war closer to Japan. American bombers were able to strike at the Japanese main islands from air bases secured during the Mariana Islands Campaign and in particular, the capture of Saipan. There was now disagreement among the US Joint Chiefs over two proposed strategies to defeat the Japanese Empire.

The strategy proposed by General Douglas MacArthur called for the recapture of the Philippines followed by the capture of Okinawa, then an attack on the Japanese mainland. This would fulfil his pledge to return to the Philippines. It would also split the area of Japanese control in two and separate the source of raw materials in Indo-China and the Dutch East Indies with the manufacturing hubs within Japan.

Admiral Chester Nimitz favoured a more direct strategy of bypassing the Philippines but seizing Okinawa and Taiwan as staging areas to attack the Japanese mainland followed by the future invasion of Japan's southernmost islands. Both strategies included the invasion of Peleliu, but for different reasons.

President Franklin D Roosevelt travelled to Pearl Harbor to personally meet both commanders and hear their arguments and MacArthur's strategy was ultimately chosen. However, before MacArthur could retake the Philippines, the Palau Islands, specifically Peleliu and Angaur in the south, were to be neutralized and the airfield seized to protect MacArthur's right flank. The 1st Marine Division under the command of Major-General Rupertus had already been chosen to make the assault.

Facing page: US troops wade ashore. When landing-craft could not clear reefs and hidden obstacles the men would have to walk into heavy gun fire to establish a beach head.

Left: Fighting in the Pacific was one constant. It was always hot and sweaty.

Even with the differing of strategic opinions between Admiral Nimitz and General MacArthur, they both agreed that the Caroline Islands had to be defeated and the Marianas taken to be used as a major stepping stone to Japan. No matter if the main plan was to run through the Central Pacific or push to the Philippines and then north, these islands were an obstacle.

The tactical base objectives for the US military were the islands of Saipan, Guam and Tinian. These islands would move US forces a step closer to the Japanese mainland and allow US airpower to strike unimpeded. To achieve this, they needed to secure the islands to the south and render useless the island fortresses of Yap, Truk and others in the Caroline Islands.

The US dropped sea mines from aircraft to block the exit channels from parts of Palau. Dropping the mines locked the ships in so they could not join the fight on the island of Peleliu and kept them concentrated in one area to make them an easy target.

A leap-frog and isolation move was planned and much of the Caroline Islands would be bypassed once they had been sufficiently destroyed due to air and sea attack. Yap and Truk were the major regional Japanese command hubs now that Rabaul had been cut off, with the massive protected lagoon at Truk which sheltered much Japanese shipping.

Planners believed that much of the shipping assets sheltering within Truk Lagoon could be dealt with by a serious air offensive but the base at Yap would need to be invaded. A land invasion of a base as heavily fortified as Yap would be a costly move.

Truk Lagoon was the Empire of Japan's main base in the South Pacific theatre and was a heavily fortified base for Japanese operations against Allied forces in New Guinea and the Solomon Islands. It also served as the forward anchorage for the Japanese Imperial Fleet.

Truk Lagoon was considered the most formidable of all Japanese strongholds in the Pacific. On the various islands around the lagoon the Japanese Civil Engineering Department and Naval Construction Department had built roads, trenches, bunkers and caves. Five airstrips, seaplane bases, a torpedo boat station, submarine repair shops, a communications centre and a radar station were constructed during the war. Protecting these various facilities were coastal defence guns and mortar emplacements. The Japanese garrison consisted of 27,856 Imperial Japanese Navy men, under the command of Vice Admiral Masami Kobayashi and 16,737 Imperial Japanese Army men, under the command of Major-General Kanenobu Ishuin. Due to its heavy fortifications, both natural and manmade, the base at Truk was known to Allied forces as 'the Gibraltar of the Pacific'.

A significant portion of the Japanese fleet was based at Truk, with its administrative centre on Tonoas. At anchor in the Lagoon could be found the Imperial Japanese Navy's battleships, aircraft carriers, cruisers, destroyers, tankers, cargo ships, tugboats, gunboats, minesweepers, landing-craft and submarines. Yamato and Musashi, the largest battleships ever built, were also stationed at Truk for many months in 1943, unable to participate in battle due to lack of air cover. Some have described Truk as Japan's equivalent of the Americans' Pearl Harbor in that it was their respective nation's largest forward naval base.

Once the American forces had captured the Marshall Islands, they used them as a base from which to launch an early morning attack on February 17, 1944 against Truk Lagoon. Truk's capacity as a Naval Base was to be destroyed through naval air attack. Forewarned by intelligence a week before the US raid, the Japanese had withdrawn their larger warships (heavy cruisers and aircraft carriers) to Palau. Operation Hailstone lasted for three days, as American carrier-based planes sank twelve smaller Japanese warships, (light cruisers, destroyers and auxiliaries) and thirty-two merchant ships, while destroying 275 aircraft, mainly on the ground. The consequences of the attack made 'Truk Lagoon the biggest graveyard of ships in the world'.

The attacks ended Truk as a major threat to Allied operations in the central Pacific. The scattered Japanese garrisons still in the Marshall Islands were now denied any realistic hope of reinforcement. Truk was isolated by Allied forces as they continued their advance towards Japan by invading other Pacific islands, such as Guam, Saipan, Palau and Iwo Jima. What remained of the Japanese forces on Truk were left to face starvation until their ultimate surrender in August 1945 and the end of the war.

Lessons were being learned from the heavy cost of amphibious landings and US Admiral Halsey made a tactical change and cancelled the planned invasion of Yap.

Now with the destruction of Truk, Yap, and the 6,000 Japanese troops stationed there could be isolated and left to starve like Truk. This would save large numbers of Allied troops and allow those troops to be focused on the battles ahead in the Mariana Islands and Palau.

The destruction of large amounts of Japanese shipping in Truk and the isolation of forces in Yap allowed the Allied forces to swing north and west. The western target would now be the Philippines and to the north, Saipan and the Marianas.

Saipan was invaded by 128,000 US Army and Marine troops on June 15, 1944 and met invigorated efforts by Japanese forces. The Japanese had fortified the island well and progress for the US troops was slow. The Japanese also threw a mass of naval air and sea assets to the region only to lose a large majority of them. The US finally had the area under control by late July and airfields made operational. The bombing of Japan could now commence. The Japanese knew they were extremely vulnerable with the Americans on these islands and continued to attack them from November 1944 until January 1945. By this time Japan was beginning to run out of men, machines and materials and was forced farther north and within closer range of Japan.

The consolidation of the area was completed by the end of July with the capture of Guam and Tinian and this major area of the Pacific theatre of war was now relatively secure.

There was still one major obstacle to overcome in the area and it was the island chain of Palau to the south-west of Guam. Japan had controlled Palau since the end of WW1 when they had seized this former German colony. Since 1919 they had spent 20 years planning and building impregnable defences throughout the island chain.

TURNING POINTS AND A NEW DEFENCE STRATEGY

With the Allied seizure of Saipan and the Mariana Islands the focus of the fighting could be turned towards the north and on to a possible conclusion of the war. Palau to the south-west still needed to be removed as a threat to secure the Allied rear.

As the US fleet steamed farther west, the Palau group of islands came into range and a co-ordinated air operation was to begin before any amphibious landing and invasion could be executed. The specific target for invasion needed to be selected and the Japanese forces given the belief that an invasion would be launched elsewhere.

The Palau group of islands is a chain that loosely runs north to south. Its structure is a mix of coral and volcanic rock surrounded by rings of reef. These reefs create protected lagoons that make ideal anchorages, protected from the elements, but perfect ship traps in a war. Penetrating these outer reefs can only be achieved through three channels and if these could be blocked then Japanese ships could be isolated.

The Japanese commanders were convinced any invasion would be aimed at Babeldaob in the north. It was the largest island in the group with an airfield and options that made it more difficult to defend. This seemed a logical place for the US to target. Its neighbouring island of Koror also seemed a tempting primary target for US forces.

The Japanese forces on Palau were substantial at 35,000 but again they faced the question as to where the concentrations should be. Japanese General Inoue kept 25,000 troops in the north on Babeldoab and assigned 10,500 troops to Peleliu and another 1,400 troops to Angaur to the south.

Defensive strategy was also changed. Gone was the ideal of stopping the invaders on the beach and driving them back into the sea. Light coastal defence would be given, then forces would be withdrawn to heavily fortified inland defences to begin siege warfare. The defences they had created in caves and bunkers were heavily supplied with food, water and ammunition with the hope they could drive the fight the way they wanted and hold out and wear the enemy down.

This tactic had been employed in the Marianas and showed promise and the cave defences on Palau made it a natural fortress.

In the time leading up to the US invasion, Japan completed fortifications and stocked many impromptu defences. Any munition that was not of primary use to this kind of siege was to be re-used in another form. Part of this tactic was the recycling of 500lb aircraft bombs and 1.5 ton sea mines that had been buried on beaches and in jungle, adding to the already formidable defences. Any beach that was seen as a potential landing place was heavily booby-trapped in these ways, as were creeks and estuaries where troops could try to gain entry. The Japanese made crude command-detonated bottle bombs cast into concrete blocks then laid these blocks around the island. The intent was that US forces would try and use them as cover only to have them explode on command. The islands of Palau had arguably the best and most detailed defence that the Japanese could manage.

Palau was also within the inner defensive perimeter for homeland Japan. They had now lost their outer defensive ring of strongholds from the Marshall Islands through the Gilbert, Caroline, Solomon and Mariana Islands and New Guinea and the noose was tightening on Japan. The Japanese troops were indoctrinated with the idea that they would not survive this battle, but were expected to sacrifice their lives and die honourably. This was their duty and they were to make the enemy attack as costly and prolonged as possible. The orders were issued for no surrender.

The US forces did not change their tactics but did a lot of pre-invasion preparation. As many Japanese ships sheltered within the protective lagoons of Palau, it was decided to lock them in and then systematically destroy them. Starting in late March 1944, low flying aircraft would strafe the shipping within the lagoon, sink anything trying to escape and drop sea mines in the few navigable shipping channels to prevent escape. The sea mines were either short- or long-fused. Short-fused mines would arm in a few hours and long-fused up to 35 days in the future. This would destroy the Japanese forces' ability to move between the islands, cut off their supply and troop movements and hinder any kind of future re-supply. It was a tactic to isolate the split troop concentrations so one body could not come to the aid of another.

March 31 was the date for the attack if the weather was favourable. Twelve Allied submarines were also covering the various exits from Palau and would sink any ships that succeeded in getting out of the lagoon.

Eleven US aircraft carriers had converged in the waters around Palau and were now prepared to strike. The mission was to destroy Japanese aircraft and shipping and to lay detailed minefields in the channels and sea lanes around the islands. This would destroy the immediate threat and paralyse Japan's ability to respond in the near future. Carrier-based Avenger aircraft made up the majority of the strike force and they were equipped with mines, torpedoes and fighter escort.

The action saw intensive focus on the waters around Palau and planned objectives were achieved. The focus of the strike also reinforced the Japanese belief that the main attack would come on Babeldaob thus strengthening the belief that their defensive plan was correct.

Although crippling the Japanese defences in Palau was of high importance it was also intended to lock up Japanese assets so that they were not able to assist Japanese forces who were about to be deployed in western New Guinea. Operations Reckless and Persecution were planned to be joint landings of Australian, Dutch, British and US forces on the west of New Guinea. This was part of General MacArthur's attack towards the Philippines as he pushed west. By smashing or locking in the Japanese forces in Palau they could not defend themselves nor come to the aid of Japanese forces on New Guinea. Operations Reckless and Persecution landed on the shores of western New Guinea on April 22, 1944.

This left Palau broken and surrounded. To the north the Allies controlled the Marianas with the conquest of Saipan, Guam and Tinian. To the east Truk and Yap had been broken and isolated and now to the south the Allied forces were fighting on western New Guinea. The Japanese forces on Palau were in a precarious position.

All throughout the Pacific stockpiles of supplies began to grow. These stockpiles would be issued to units or abandoned as the war quickly moved to other locations.

BLOODY PELELIU

Plans were drawn up for a sea-borne invasion of Peleliu and planned for September 15, 1944. US navy ships began their bombardment of Peleliu on September 12 and continued for three days. By September 15 the navy announced that they had run out of targets and had expended 519 rounds of 16-inch ammunition, 1,845 rounds of 14-inch and had dropped 813,500 kg of general bombs on the island. This was a massive battering of an island that was only 6 square miles in size. The US command believed that nothing could still live there after this opening bombardment.

The reality was very different. This was not a hit and run jungle fight as much of the previous battles had been, but an attack on a massively fortified mountain complex. The Japanese military had spent their time wisely and used and converted the island's 600 caves into interconnected bunker and tunnel complexes. These complexes housed and protected the island's garrison of 14,000 troops. The tunnels were purposely complicated with twists and turns to harass attackers and dampen explosions. Openings in different directions allowed for full fields of fire and fire slits were angled to make the throwing in of grenades difficult. This style of island fortification was now on many of the islands to the north on the approach to Japan. Further advances would be difficult and costly.

General Rupertus was confident that this action would be short and fast and that he would have the island under Marine control in a few days. With a combined force strength of 47,000 troops he knew he massively outnumbered the Japanese forces and he had the numbers to take the island. As a result, very few war correspondents were interested in the attack. Most were holding out for the attack on the Philippines that was soon to begin. One notable exception was the Australian War cameraman Damien Parer. He arrived with The Marines and was determined to give this action a face and a story although it may be considered insignificant.

The Marines came to shore on Peleliu at 0832 hours on September 15, 1944 and right from the start things started to go wrong. Incorrect tide information had the effect of holding many landing-craft off shore. Men had to disembark into waist deep water and wade ashore under heavy Japanese fire. Strongly built Japanese bunkers had simply closed their blast doors and waited for the US bombardment of the last few days to end. Once the landing commenced they opened up and engaged with withering

If it was not mud it was water. Pacific battlegrounds tested soldiers in all ways.

fire. The main landing beach on the south-western side of the island was in a perfect cross-fire for the Japanese and they wrought havoc on the invading troops.

US troops did get ashore and at the end of the first day they held a strip of beach two miles long but little else. The northern end of the line was bogged down due to heavy Japanese resistance but forces on the southern end managed to penetrate one mile inland. At the end of the first day, 200 Marines were dead and 900 wounded. General Rupertus expected the Japanese to break and run as their normal strategy had been to mount strong shore defences. Once these were broken, penetration inland was possible. To complicate matters further, the temperature rose to 115 degrees F or 46 degrees C. The water delivered to the Marines came in old fuel drums and fuel residue had contaminated the water. Heat fatigue began to take a high toll.

The Japanese had changed their tactics and as the Marines landed on the beach they withdrew, after giving strong opposition, to their fortified caves on Mt Umurbrogol. This high ground became known as Bloody Nose Ridge.

The Marines succeeded in securing the southern part of the island, including the two long runways on the second day of fighting and had the southern part of the island secured by day 8. 'The Point' on the southern tip was particularly hard to secure, with heavily fortified Japanese bunkers protected by effective cross-fire. Australian cameraman Parer lost his life here as he was hit by Japanese fire.

The Japanese held the high ground and could fire on the airfield at will as Navy Corsairs took off from the runway to fly bombing missions on the mountain. The distance was so short that from take-off to bomb drop was often only 10 to 15 seconds. The pilots would then turn and land and load up for another sortie. Napalm was employed by the flyers here for the second time in the war. The pilots dropped napalm canisters on Japanese positions, killing many of the Japanese and burning the jungle. This took away a lot of the tree cover and opened the battle field up considerably.

For the operational needs of the Marines, they could have held the southern end of the island and kept the Japanese blocked in the mountain caves. However, General Rupertus decided he wanted the island cleared and the Marines and Army troops set about the task.

From the speedy gains of the first few days, the fighting bogged down into an inch by inch fight over every rock and every hole. Two weapons of choice for the Americans were the flame-thrower and bulldozer. Flame-throwers were effective in opening up cave defences and bulldozers could simply entomb the occupants. The Japanese fought to the death almost to the man and made the US soldiers pay dearly for every inch won. Fighting continued until November 24 when the Japanese commander Nakagawa proclaimed "Our sword is broken and we have run out of spears." He then burnt his regimental colours and performed ritual suicide. He was posthumously promoted to Lieutenant General for his valour displayed on Peleliu. On 27 November, the island was declared secure, ending the 73-day-long battle.

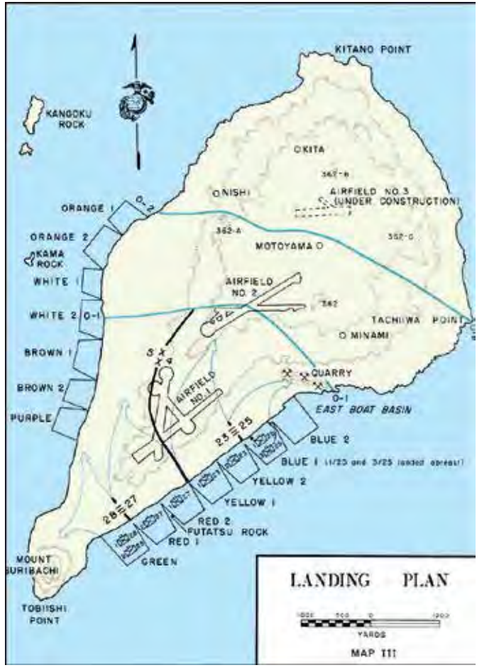
This was what island siege warfare was about and was a stark message for what future battles would hold.

The fighting on Peleliu was considered the toughest faced by any American force in the entire war. On the recommendation of Admiral Halsey, the planned occupation of Yap Island in the Caroline Islands was cancelled. More fortifications like Peleliu lay ahead in Okinawa and Iwo Jima and deep into Japan.

Post-war statisticians calculated that it took U.S. forces over 1,500 rounds of ammunition to kill each Japanese defender, and that during the course of the battle, the Americans expended 13.32 million rounds of 30-calibre, 1.52 million rounds of 45-calibre, 693,657 rounds of 50-calibre bullets, 118,262 hand grenades and approximately 150,000 mortar rounds.

The Japanese lost 14,000 troops killed and the Americans had 10,000 casualties with 3,000 killed: over one third of their force.

Fighting fortified positions would always be a costly affair.



The US landing plan for Peleliu Island.

COMING TO THE END

The biggest naval battle in history was now poised to erupt in the Battle of Leyte Gulf on the east coast of the Philippines. The largest armada of US ships was assembled and it steamed in to engage the Japanese. This was going to be an all-out effort by both sides. Japan committed almost all of its remaining naval power to the region as they realized that to lose the Philippines would basically cost them the war. Forces in Indo-China could not be supplied with munitions from Japan and manufacturers in Japan could not receive raw materials. This loss would be catastrophic.

The Battle of Leyte Gulf was fought in four distinctive engagements. The battle commenced on October 23, 1944 and lasted until October 26. In this short but excessively violent sea struggle, Japan lost many of her last major naval assets. All 300 of Japan's aircraft that engaged were lost and 28 ships sunk with the loss of 12,500 lives. The Allied force was massive and definitive with ships of all sizes numbering over 300 and 1,500 aircraft. Their human losses were over 3,000.

Supply lines for Japanese troops in Indo-China and to the south were now majorly disrupted and the focus swung north. The few remaining ships that Japan possessed limped home and stayed at anchor for the remainder of the war due to insufficient fuel to set to sea again. What aircraft Japan still had were land-based and of limited range and use in what was now a sea-borne battle.

The Battle of Leyte Gulf was a definitive action for the outcome of World War 2 in the Pacific. Ahead lay the fortified islands of Corregidor, Iwo Jima and Okinawa and then the home islands of Japan.

The war continued into 1945 and the Japanese military fought ferociously in every battle. The losses of men were staggering on both sides but the Japanese losses were disastrous.

Gone were the days of responsive jungle fighting as in the Solomon Islands and New Guinea in 1942 and 1943. Now the war was fought against concrete and steel bunkers, with all available Japanese resources pulled back to defend the homeland or perish in the effort. The closer to Japan the Allied forces got, the more fanatical the defence. The Japanese tactic of Kamikazi attacks was first introduced in the Battle of Leyte Gulf and these would accelerate as Allied forces pressed on to Japan.

A US soldier checks a well-constructed Japanese bunker.

All landings started by storming a beach. This was a dangerous and exposed excercise.

The Pacific was largely secure or isolated and Japanese forces in the Dutch East Indies and Indo-China were cut off. Peleliu was operating as an Allied airbase and long-range US bombing raids could fly from Saipan to Japan. The next stepping-stones towards Japan were the islands of Iwo Jima and Okinawa. Both locations had long expected a large-scale attack and were ready.

SCALING MT SURIBACHI

Peleliu had been an example of things to come. The Japanese forces had well planned, heavily fortified positions ahead, and to tackle these positions would be costly.

Iwo Jima was to the north and would give Allied bombers flying to Japan the fighter escorts they would need for the length of a mission. The B-29 Flying Fortress could cover the range for the return flight from Saipan to Japan but fighters had a far shorter range and could not cover this distance. The distance from Iwo Jima to Tokyo one-way was 1,200 kilometres. This could be covered by fighters with long-range fuel tanks that could be jettisoned. This would extend the range of a P-47 Mustang to 2,900 km in total, more than enough for a round trip to Tokyo.

Iwo Jima had five runways and a sixth under construction, so control of this island would allow Allied forces to completely dominate the skies over Japan. What Iwo Jima did not provide was any sort of good port or anchorage for shipping. All waters around Iwo Jima were exposed so their use by the Navy was limited.

There was a break in the fighting from the end of the Battle of Peleliu on November 27, 1944 until the Battle of Iwo Jima. This did not extend to air operations though, and bombing raids continued on both sides although the Japanese forces were greatly reduced and weakened.

From June 15, 1944, the US began a 'soften up operation' on Iwo Jima. For the next nine months the island was bombarded by sea and air. Aerial reconnaissance saw an island that was largely a sand flat with a mountain at the northern end. The intense and sustained assault would surely break and destroy any defenders. The US amphibious assault would also be massive and would overrun the island quickly and easily.

Prior to the landings taking place, Admiral Chester Nimitz stated, "Well, this will be easy. The Japanese will surrender Iwo Jima without a fight." He was convinced that most defenders were killed or broken after the nine-month combined assault.

The landings came on February 19, 1945 with a massive amphibious landing on the southern section of the island. The first landing-craft came ashore at 0859 hours and met no resistance. Men and equipment landed and the concentration of American soldiers on shore grew. The shoreline had been underestimated by planners and the

There are two kinds of soldiers on a beach, dead men and soon to be dead men. They had to move inland as quickly as possible.

gentle beach they had expected was in fact a 15-foot-high wall of loose volcanic sand. Rapid advance was impossible, nor was it possible to dig a foxhole for cover. At 1000 hours, the Japanese began to fire and this quickly built up to a maelstrom of sustained fire. The impact on the US forces was terrible. The 25th Marines 3rd Battalion had landed approximately 900 men in the morning. Japanese resistance in their sector was so fierce that by nightfall only 150 were left in fighting condition. This is an astounding 83.3% casualty rate.

By the evening, 30,000 Marines had landed and another 40,000 more would soon follow. The battle had only just begun when the facts dawned on the US commanders. Nine months of bombardment had done little to the massive Japanese underground defences on the island.

The Japanese military had invested considerable amounts of time, money and labour into turning Iwo Jima into an impregnable fortress. Within the island they had built a labyrinth of tunnels and bunkers. 11 miles of tunnel had already been built and the total objective was to build 17 miles. Japanese troops could lose a position and be killed to the man, only to be able to reoccupy the same position and attack American forces from the rear. This made for a very dangerous and confusing battle field. American marines felt like they were fighting ghosts.

The simple operation that Admiral Nimitz believed was ahead turned into a hole by hole nightmare for his troops.

The Japanese commander, Lieutenant General Tadamichi Kuribayashi, had learned from the lessons on Peleliu and had largely abandoned any beach defences. Some were created at the insistence of Tokyo, but they were destroyed in the nine-month pre-landing assault by the US. Kuribayashi had focused on the strong fortification within the island and the hit and run tactics they could achieve from these bunkers and pill boxes linked by tunnels.

His command of Iwo Jima was also a suicide posting as he knew that he would not be resupplied or relieved. His job was to tie up and delay the American forces as long as possible, thus allowing stronger defences to be constructed in Japan.

Although the US Marines had raised their flag over Mount Suribachi on February 23 the fighting would continue for over one month more.

The fighting raged until March 26. Kuribayashi sent his last message of farewell and led a final night assault on US positions. He was killed but his body never identified as he fought without any insignia of rank.

In his autobiography, Coral and Brass, Lt.-Gen. Holland Smith paid him one of his highest tributes: “Of all our adversaries in the Pacific, Kuribayashi was the most redoubtable.”

The US believed the invasion of Iwo Jima would take 5 days; it took 36 and cost the lives of 6,800 Americans and 18,000 Japanese. The last Japanese soldiers to surrender on Iwo Jima were Yamakage Kufuku and Matsudo Linsoki who lasted four years without being caught and finally surrendered on 6 January, 1949.

Although Iwo Jima had been costly in lives and time it was still only a stepping-stone to Japan. The next step was Okinawa, then on to the invasion of the Japanese home islands. The Japanese forces had run out of places to go and they would have to give 100% in these coming battles.

OKINAWA, THE GATES OF HELL

The day after Iwo Jima was declared secured, Operation Starvation was launched. This operation was to air drop thousands of sea mines in the shipping lanes, channels and waters around Japan. The intent was simple. To sink, destroy and disrupt any and all shipping trying to enter or exit Japan. This would be another layer of isolation.

From March 27, 1945, the US Airforce flew 1,529 missions over Japan dropping mines into the waterways. The mission continued through April and May and eventually 12,135 mines were laid into 26 fields. This directly resulted in the sinking of 670 ships and a tonnage loss of 1,250,000 tons. As an example of its effectiveness, Kobe Harbour had its shipping reduced by 85%, dropping from 320,000 tons in March to 44,000 tons in July.

Direct bombing of Japanese cities was also underway and in March 1945 the first major firebombing missions began. Most military targets were already destroyed or disrupted and targets for fire-bombing were often selected due to their combustibility. Napalm, used by the Americans for flame-throwers and incendiary bombs, was increased in production from 500,000 pounds in 1943 to 8 million pounds in 1944. Much of the napalm went from nine US factories to bomb-assembly plants making the M-69 incendiaries and packing 38 at a time of them into the E-46 cluster bomb. These were shipped across the Pacific and stored for future use.

The commanders in the Pacific were stockpiling napalm to have sufficient supplies for all-out aerial attacks. These attacks were ordered for the nights of March 9 and 10 over Tokyo. 325 B-29 Super-fortresses flew low over Tokyo and disgorged their flammable cargo. The resulting conflagrations consumed masses of Tokyo and killed between 90,000 and 100,000 people.

The violent tempo of the war was now being brought home to the Japanese people. The night of the bombing the conditions were clear and windy, providing perfect conditions to create a true fire-storm. And a fire-storm was what came.

Pressure was being brought to bear on the Japanese homeland with aerial bombings and sea mines dropping into their waters. The next part of the destruction of Japan was to be the invasion of the Island of Okinawa. Only 550 km from the mainland of Japan, it would be the needed staging post for the upcoming full invasion of Japan, Operation Downfall.

A Japanese soldier surrenders to US soldiers.

Japan was now in a hopeless situation with supply lines cut and a massive build-up of international military on their doorstep. Surrender leaflets were being dropped all over the country, some urging a government surrender and some encouraging the people to overthrow the government.

Three young Japanese prisoners looking exhausted and dejected.

The invasion of Okinawa began on April 1. The operation was the largest of the Pacific war with 540,000 Allied troops of all services and of these 250,000 combat troops. The Japanese had mustered 76,000 soldiers and added to that another 20,000 civilian conscripts. The initial landings and fighting was not too heavy as the Japanese forces had withdrawn to the more mountainous north. This was better land for a defender due to rugged ridges and ravines making any kind of advance difficult and dangerous.

The fighting continued until June 22 when Okinawa was finally considered secured. The cost was huge with over 14,000 dead Allied troops and more than 45,000 injured. The Japanese had made an all-out defence and lost heavily. Of the almost 100,000 brought to battle, very few survived. Added to this were massive civilian deaths due to suicide and being caught in the battles. The accepted figure of 142,058 civilian deaths is given at the Okinawa Cornerstone of Peace Memorial. This memorial has the names of all who died on Okinawa whether Japanese, Allied soldier or civilians. The total number of names given here is 240,734 and this does not cover those missing or too mutilated to identify. The cost was massive but it also gave a stark warning of what was to come with the planned invasion of Japan.

DOWNFALL

Japan was almost surrounded, broken financially, starved of materials and running out of trained combatants, but it was not beaten. A final assault was to be undertaken to bring about its complete defeat. Operation Downfall was the name of the planned operation for the conquest of Japan. It was to be executed in two parts, Operations Olympic and Coronet. Olympic would invade the southern part of the southern island Kyushu in November 1945 then Operation Coronet would launch in the spring of 1946 on the Kanto Plain near Tokyo on the Japanese island of Honshu. Olympic was to create the land-based logistic hub to support Coronet with everything from land-based air support to ready supplies.

Both sides realised that Kyushu would be the target of the next invasion and the Japanese Military made plans for an all-out defence holding almost nothing in reserve. Responsibility for planning Operation Downfall fell to Admiral Chester Nimitz and General Douglas MacArthur and the Joint Chiefs of Staff. They were to plan, coordinate and execute the largest amphibious landing in history, followed by the world's largest battle. The stakes were high and the casualty and death rate on both sides would be phenomenal.

Casualty rates and estimates for the operations were studied and figures submitted. The death and injury rates expected for both sides would be massive. One universally accepted figure is that the Japanese military would fight almost to the last man and that a large amount of the civilian population would either join in or be conscripted to fight. The estimated Japanese military presence that could be mustered to Kyushu was 917,000.

Studies were undertaken by the members of the US Joint Chiefs of Staff and other officials. Figures of US casualties were forecast and in all cases the numbers were high. They did vary though, with General LeMay estimating 500,000 US dead, whereas MacArthur's planners thought 105,000 and revised this to 381,000. General Marshall estimated 183,000 casualties in the first 30 days of fighting and Admiral Leahy thought 268,000. MacArthur's intelligence chief Major-General Willoughby estimated nearly 500,000. A study done for Secretary of War Henry Stimson's staff by William Shockley estimated that conquering Japan would cost 1.7–4 million American casualties, including 400,000–800,000 fatalities and five to ten million Japanese fatalities. The key assumption would be the large-scale participation by civilians in the defence of Japan.

Massive stockpiles of munitions were assembled ready for use. These munitions needed to be disposed of when hostilities ended.

The Allied losses in Europe from D-day to V-E day were 766,294 and reason and judgement of the Japanese military simply painted the losses as far higher.

Operation Olympic, the invasion of Kyushu, was to begin on 'X-Day', which was scheduled for 1 November 1945. The combined Allied naval armada would have been the largest ever assembled, including 42 aircraft carriers, 24 battleships, and 400 destroyers and destroyer escorts. Fourteen US 'division-equivalents' (13 divisions and two regimental combat teams) were scheduled to take part in the initial landings. Using Okinawa as a staging base, the objective would have been to seize the southern portion of Kyushu. This area would then be used as a further staging point to attack Honshu in Operation Coronet.

The war in Europe had ended on May 8, 1945 and this meant many combat troops could be re-assigned to the fight with Japan. November 1 was going to change the world as it was poised to endure the world's largest and fiercest battle.

The morale of the US troops was at an all-time low after the savage fighting that had led them to the edge of Japan. The US 1st Marines had been the first ashore on Guadalcanal in 1942 and had fought on through New Britain, Peleliu and Okinawa were now faced with the prospect of annihilation in the closing chapter of the war. With the proposed losses being studied there was little enthusiasm from General to Private soldier in what seemed to be the next operation.

The top secret Manhattan Project had been in development since 1942 and very few knew of its existence, including the US Vice President Harry Truman. US President Franklin D Roosevelt died on April 12, 1945, of a cerebral haemorrhage and Truman found himself as President of the United States of America and Commander in Chief. He had a lot to catch up on to fill the office he had now inherited.

The battle of Okinawa was underway and American losses were felt heavily at home. Now Truman was briefed on the existence of the atomic bomb and its potential to end the war. The air campaign over Japan continued and a date was set for an atomic bomb drop if they would not surrender.

General George Marshall began contemplating the use of a weapon that was "readily available and which assuredly can decrease the cost in American lives." Poison gas including quantities of phosgene, mustard gas, tear gas and cyanogen chloride were moved to Luzon from stockpiles in Australia and New Guinea in preparation for Operation Olympic, and MacArthur ensured that Chemical Warfare Service units were trained in their use. Consideration was also given to using biological weapons against Japan.

The July 16, 1945 success of the Trinity Test of the atomic bomb in the New Mexico desert exceeded

A flyer dropped over Japanese cities urging surrender. Anyone caught reading one would be arrested.

expectations in its destructive ability. On July 26, Allied leaders issued the Potsdam Declaration, which outlined the terms of surrender for Japan. The declaration outlined the terms of unconditional surrender and was presented as an ultimatum. It further stated that without a surrender, the Allies would attack Japan, resulting in "the inevitable and complete destruction of the Japanese armed forces and just as inevitably the utter devastation of the Japanese homeland." The atomic bomb was not mentioned in the communiqué.

The Japanese government was split on whether or not a surrender should be considered and if so on the terms they would accept. The four main conditions the Japanese wanted were: no Allied troops to land on Japan, they would not fully disarm, they would deal with any Japanese accused of war crimes internally and the retention of the Emperor and their political system. These terms were still

an internal discussion and on July 28 the Japanese papers reported that the Allied declaration and demands had been rejected by the Japanese government. The US military code breakers had broken the highest level Japanese codes earlier and deciphered the Japanese messages at almost real time.

The Japanese Ambassador to Russia, Ambassador Sato, tried and failed to gain assistance from Russia in negotiating a favourable end to the war. He reported back to Tokyo that the best they could expect was an unconditional surrender and the retention of the Royal House. These reports met mixed and confused reception in Japan as the mood swung between 'national suicide' and 'surrender with terms'.

The treatment of Allied POWs was also of great concern to Allied leaders. Approximately 200,000 Allied military were in captivity with another 300,000 forced civilian labourers. During their period of incarceration death rates of the military prisoners were between 23% to 34% depending on nationality: Dutch the lowest at 23% and Australian the highest at 34%. The 300,000 forced local labourers suffered far greater losses with a 74% death toll. Standing orders had been issued to Japanese Prison Camps in August 1944 to kill all prisoners if defeat was inevitable. Methods of killing were recommended and the disposal of the bodies described. These methods consisted of poisoned rice for women and children to shooting and beheading for others. All bodies were to be burned. Many prison camps had long trenches dug that were ten feet wide and ten feet deep with machine gun positions placed at the ends. Prisoners were to be herded into these pits, shot, then burned. A Japanese medical experimentation unit called Unit 731 also existed. This unit conducted medical experiments and vivisections on live POWs and civilians alike. An American bomber crew shot down on August 5, 1945 was captured and the commander, Lt Marvin Watkins of the 29th Bomb Group, was separated and taken to Tokyo for interrogation. The rest of his crew was transferred to Kyushu University where they were subjected to vivisection and killed.

Pressure came from many directions on President Truman on how the final chapter of the war would be played out: invasion, blockade, negotiated peace, unconditional surrender or the atomic bomb. The lives of his fighting forces were of concern as were the lives of the POWs in captivity. The losses projected for the Japanese were also a factor as Okinawa demonstrated that ground battles on Japanese soil would be bitterly costly for both sides. He chose to use the atom bomb.

The first atomic bomb was shipped to the island of Tinian in the Marianas and a date set for the mission. August 6 would be that day. Seven B-29 aircraft flew over Hiroshima with different roles from weather evaluation to photography. The message to take the primary target, Hiroshima, was given and the aircraft carrying the bomb headed to the target. At 0815 hours flying at 31,000 feet the B-29 bomber, Enola Gay, dropped her payload of one atomic bomb. It detonated 800 feet from the target point over the Shima Surgical Clinic at an altitude of 1,900 feet. About 80,000 people were killed and another 70,000 injured as a major part of the city turned to ash. A new era in warfare had arrived.

Sixteen hours later President Truman made the radio announcement of the bombing of Hiroshima. Truman then warned Japan: "If they do not now accept our terms, they may expect a rain of ruin from the air, the like of which has never been seen on this earth. Behind this air attack will follow sea and land forces in such numbers and power as they have not yet seen and with the fighting skill of which they are already well aware." This was a widely broadcast speech picked up by Japanese news agencies.

On August 7, a day after Hiroshima was destroyed, Dr. Yoshio Nishina and other atomic physicists arrived at the city and carefully examined the damage. They then went back to Tokyo and told the cabinet that Hiroshima was indeed destroyed by an atomic bomb. Admiral Soemu Toyada the Chief of the Naval General Staff, estimated that no more than one or two additional bombs could be readied, so they decided to endure the remaining attacks, acknowledging "there would be more destruction but the war would go on."

American code breakers intercepted this message and planned a second attack for August 9.

Facing page:
Mud was everywhere.

Left:
By the end of the war, Japan was pressing the very young into service.

At one minute past midnight on the morning of August 9 the Soviet Union declared war on Japan, 11 hours before the dropping of the plutonium bomb on Nagasaki. Russian Foreign Affairs Minister Molotov met with the Japanese Ambassador Sato at 2300 hours on the evening of August 8 and announced that Russia was declaring war on Japan. Stalin had privately stated to Allied leaders that the Soviet Union would enter the war with Japan three months after the defeat of Germany. Germany surrendered on May 8, 1945 and Russia planned on entering the Pacific war around August 15. With the surrender of Nazi Germany, Russia moved masses of troops across the country ready for an all-out assault on Japanese-held Manchuria and the Japanese mainland. The Japanese Empire was obviously on the verge of collapse and Russia wanted their share of the spoils. The planned entry into the Pacific War for August 15 was brought forward to August 9.

Soviet forces streamed into Manchuria at 0001 hours on August 9, 1945, opening a second front for Japan to deal with and cancelling the Soviet-Japanese Neutrality Pact from 1939.

Added to this, the sea lanes around Japan were cut and their ports blockaded, they had no access to raw materials and their industrial capacity was shattered. They were simply surrounded and didn't have any material means to continue fighting except through willpower alone.

At 0349 hours on the morning of August 9, 1945, the B-29 bomber Bockscar, flown by Major Charles Sweeney, took off from Tinian carrying Fat Man, the second bomb, with Kokura as the primary target and Nagasaki the secondary target. The mission plan for the second attack was nearly identical to that of the Hiroshima mission, with two B-29s flying an hour ahead as weather scouts and two additional B-29s in Sweeney's flight for instrumentation and photographic support of the mission. Sweeney took off with his weapon already armed but with the electrical safety plugs still engaged. The weather was poor over Kokura so they diverted to Nagasaki.

The bomb was plutonium and dropped at 1101 hours over the city. The destructive force of Fatman was far greater than the bomb over Hiroshima but the bomb was dropped 3 km off target and as a result, much of the blast was deflected by hills. The numbers killed are still disputed with ranges between 40,000 and 80,000 and many more injured. Many transit workers and other undocumented people were in town and this makes an accurate count difficult.

On August 12, the Emperor informed the imperial family of his decision to surrender. One of his uncles, Prince Asaka, then asked whether the war would be continued if the Kokutai or system of sovereignty could not be preserved. Hirohito simply replied, "Of course," as

The atomic bombing of Japan killed tens of thousands but still was not the final factor that brought about Japan's surrender.

the Allied terms seemed to leave intact the principle of the preservation of the Throne.

There was still opposition to surrender or at the least to an unconditional surrender. Much of the military favoured fighting on to a complete and honourable destruction of their nation while others could consider surrender if the various terms were met. There was also a short military rebellion and coup attempt which ended in the suicide of the participants.

Meanwhile to the US commanders it appeared the surrender process had stalled and a final onslaught of air bombardments was ordered. More atomic bombs were in production or on their way for delivery, but on August 14 a massive air attack was ordered. 828 bombers with a fighter escort of 186 flew against a range of targets on Japan. The destruction was massive. Another strike was flown over Japan on August 15 and this was the last strike of the war. More airstrikes were called off when the surrender

Facing page: The centre of Hiroshima was obliterated.

Left: The final positions of Allied and Japanese forces at the end of the war. Many areas that were bypassed and isolated are clearly seen here. White colour shows Japanese controlled areas. Pink colour shows Alleid controlled araeas.

was announced that day. It had been forwarded through Switzerland.

On August 14 Hirohito recorded his capitulation announcement, which was broadcast to the Japanese nation the next day. Hirohito's statement bound the Japanese military to cease hostilities and thus steered the nation and its military towards a binding peace. The majority of Japanese military commanders obeyed the order from their Emperor and hostilities ceased. The POWs were not executed en masse and the formal surrender took place on September 2 in Tokyo Bay aboard the Battleship USS Missouri. This brought World War 2 to a close.

From the Marshall Islands to the Burmese frontier and Guadalcanal to Manchuria, the area lay in ruins. Millions of people were dead, economies destroyed and the land saturated with destruction. Soldiers would need to be repatriated and the process of rebuilding begun.

Below: The war ends with Japan's surrender.

The decision to use the atom and plutonium bombs on Hiroshima and Nagasaki has been shrouded in controversy since their use. We ask whether it was really necessary, whether it was to demonstrate military might to Russia, and whether it was to end the war as quickly as possible, and finally did it save more lives than it killed? Whatever was in President Truman's mind is open to speculation, but the only certainty is that history has since judged any contemplation of the use of another nuclear bomb as abhorrent. It did however usher in the Cold War and many sides developed and armed themselves with nuclear arsenals and a standoff to Armageddon dominated the rest of the 20th century.

The end of World War 2 left countries destroyed at an industrial level with millions dead, maimed and missing. Never in human history had a conflict extended to most regions of the world and been fought at an industrial level. The treasure of nations and the lives of the innocents and combatants alike had been trampled and extinguished and a smoking ruin of the world now needed to be rebuilt.

Facing page: America's industrial might was demonstrated in its ability to produce and replace massive assets like ships and aircraft as losses were incurred.

LEGACY

"Something handed down by a predecessor"

OXFORD DICTIONARY

"Something that is a part of your history or that remains from an earlier time"

CAMBRIDGE DICTIONARY

GOING HOME

With the surrender of the Imperial Japanese government came the end of World War 2. The message and directive from Tokyo had to be sent to the remaining Japanese troops stationed throughout the Asia-Pacific region. Surrenders had to be received and those troops disarmed and repatriated. Home was now a smoking ruin and few could really comprehend the absolute destruction that lay before them. Japanese commanders in New Guinea, Timor, Taipei, Bougainville, Indo-China, Burma, Penang, Rabaul, Borneo, Sarawak, Singapore, Malaya and China were ordered to come forward and lay down their arms on behalf of themselves, their troops and the Emperor of Japan. These soldiers needed to be brought home to begin the business of building a new Japan. Then there were all the Japanese troops who had been bypassed and left to 'wither on the vine' on various islands across the Pacific.

Large troop concentrations were spread across the Caroline Islands, the Gilberts, parts of the Solomons, the Marshalls, Rabaul, Truk, Yap, Western New Guinea and others. All of these troops needed to be contacted and convinced the war was over and also transported home. Some known garrisons had vanished or died while others refused to surrender due to honour.

The problem was the same for all Allied forces in all theatres of war around the world. The war was over and all wanted repatriation as quickly as possible. First there were a few urgent repatriations such as POWs and the wounded, who needed to take priority. They needed to get to better medical care and rebuild their bodies and minds as well as their lives.

The numbers that needed transport of one form or another were massive. The US alone needed to move their 12,000,000 under arms. Some were in America, others in Europe and many more in the Pacific. The British had 5,000,000 who had to be transported and Australia 600,000, then Canadians, Africans, New Zealanders, Indians and others all needed to get home. The war was over and the troops had little patience with waiting. In total it stretched an already overloaded system to breaking point.

The only method of mass movement in 1945 was ships and countries began the long and time consuming process of splitting their troop strength into those who would remain as an occupation force and those who would head home. The military worked on a point system and you got home once you had accrued enough duty points or via seniority of service time.

All available shipping was hastily converted to troop transports and joined the armada of ships returning soldiers home.

Many of the overseas serving military forces had the required points and were desperate to get home. With transport stretched to the limit this was not going to be either easy or speedy. Aircraft carriers, battleships, cruisers and destroyers were all hastily converted into troop ships and ferrying of forces home began. In the following 18 months 4,300,000 British personnel were returned to civilian life. The US forces had 7,600,000 of their 12,000,000 men serving overseas. Some of these would not see home until 1947. By mid-1947 the US military had gone from 12,000,000 to 1,500,000 and these 1,500,000 were largely the occupation forces.

On January 4, 1946, the War Department backtracked on its previous promises of early demobilization and announced that 1.55 million eligible servicemen would be demobilized and discharged over a six-month period rather than in three months as previously announced. This announcement generated immediate protests from soldiers around the world. 4,000 soldiers in Manila had demonstrated against the cancellation of a repatriation ship on Christmas 1945; on January 6, 1946, 20,000 marched on army headquarters. The protests spread worldwide, involving tens of thousands of soldiers in Guam, Hawaii, Japan, France, Germany, Austria, India, Korea, the United States and England where 500 disgruntled soldiers confronted Eleanor Roosevelt. In Washington, Chief of Staff General Eisenhower ordered an investigation of the Manila demonstration and concluded that the main cause was "acute homesickness" and recommended that "no mass disciplinary action be taken" against the demonstrators.

Soldiers simply wanted to return home and they had no patience for any extended military service.

Millions of Japanese military personnel also surrendered at the end of the war. Soviet and Chinese Communist forces accepted the surrender of 1.6 million Japanese and the Western Allies took the surrender of millions more in Japan, South-East Asia and the South-West Pacific. Repatriation of some Japanese POWs was also delayed by Allied authorities. Until late 1946, the United States retained almost 70,000 POWs to dismantle military facilities in the Philippines, Okinawa and the central Pacific. British authorities retained 113,500 of the approximately 750,000 Japanese POWs in south and south-east Asia until 1947. The last POWs captured in Burma and Malaya returned to Japan in October 1947.

Nationalist Chinese forces also took the surrender of 1.2 million Japanese military personnel following the war. Over the next few months, most Japanese prisoners in China, along with Japanese civilian settlers, were returned to Japan. However, the nationalists retained over 50,000 POWs, most of whom had technical skills, until the second half of 1946. Tens of thousands of Japanese prisoners captured by the Chinese communists were serving in their military forces in August 1946 and more than 60,000 were believed to still be held in Communist-controlled areas as late as April 1949.

Then there were the pockets of 'holdouts'. These were the troops, in strength or individuals, who thought surrender was a disgrace and simply would not lay down their arms. Thirty-four men remained hidden in the caves of Peleliu, living off the land and still mounting the occasional attack on US forces there. They eventually surrendered in March 1947. Others stayed hidden in jungles and caves and eventually either gave themselves up or died. A few held out until 1974 and reports were still coming in in the 1980s of possible Japanese troops living in remote areas of the Solomon Islands.

In January 1990, Shigeyuki Hashimoto and Kiyoaki Tanaka returned to Japan from Malaysia. After the Japanese surrender in 1945, they joined the Malayan Communist Party's guerrilla forces to continue fighting against the British during the emergency.

The reality of the end of World War 2 in the Pacific was that there were millions of men, both friend and foe, who needed to get home. The logistics involved in achieving this would be fully stretched.

While waiting for ships, there was work to be done with civil infrastructure needing repair and restoration and masses of weapons and munitions that needed collection and disposal. This was another task that would not be dealt with quickly. Stockpiles could be as simple as munitions ready for battle around fighting positions or as daunting as the nine million tons that awaited disposal in Vanuatu. Every crate, every box, every bomb needed to be handled, transported, loaded and disposed of one way or another.

THE REFUSE OF WAR

As troops slowly filtered off islands and mountains to the ships that would take them home, they handed their weapons over for storage or destruction. In the positions they had abandoned, operational stockpiles of munitions were left behind. These munitions can be looked at in a few different ways.

Supply dumps and major stockpiles were munitions ready to be despatched to front line troops. These stores of munitions could be as small as a few tons up to millions of tons. These were also the easiest stockpiles to deal with as they were in known places and easily accessed. In many cases they were warehoused or in single secured positions, well contained and stored.

More problematic were the munitions that had been despatched to the front line units. These were more scattered in location and due to the fluidity of battlefields often lost or abandoned as the war had moved on. If known about or found these could also be removed and destroyed.

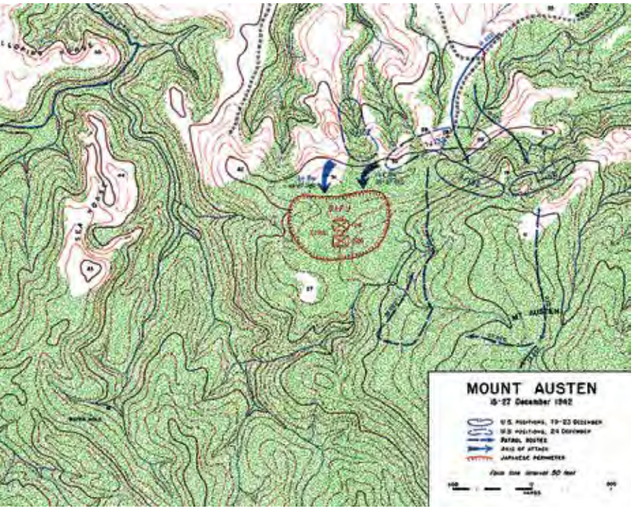
Finally, there were the former battlefields. Munitions were fired and failed or never fired and piled ready for use. These areas would generally be overtaken by jungles and would blend into history. All created a dangerous legacy for anyone who would return and try and use the land.

World War 2 was an industrial war fought on an industrial scale, despite the fact that many battles wove their way through jungle ravines and mountains. Supply lines had improved dramatically since World War 1 and munition drops were often achieved by aircraft as well as being delivered by men, vehicles and ships. The ability to move large tonnages of munitions to remote locations existed and was used. Japanese areas that were controlled before the war were well supplied and fortified and large caches of munitions were stockpiled. Much of this was simply abandoned as soldiers went home.

As the militaries withdrew, local populations slowly returned. What they returned to was scorched earth and military refuse scattered across their tropical beaches and bombs embedded in fields and hills. Life was never going to be the same.

Adding to the danger of leftover munitions were destroyed vehicles, burned tanks and trucks, sunken ships and landing-craft and aircraft crashed in the jungles. Many of the ships were sunk with full tanks of fuel that may have ruptured or could rupture in the future creating another layer of toxicity and pollution. For the local people who

Massive stockpiles of munitions were spread right across the Pacific region. Proper disposal was not a priority at the end of the war.



A tactical map of Mount Austen on Guadalcanal from 1942. This same area is now being developed for the growth of Honiara. Munitions are regularly found as earth is turned.

relied on their fishing and crops, this created another problem for them to deal with.

As some Japanese troops were isolated, they realised they had to live off the land. In situations like Truk and Babeldaob the troop numbers that needed feeding were massive and they would have had great trouble surviving alongside a local population. In most cases, the locals were reduced to slave labour and got far less than the Japanese who were already living on very little. The mortality rates of soldiers and local people were very high.

When the troops left, the locals had to try and rebuild their lives, begin farming and fishing again.

Both of these occupations became difficult due to the lack of boats and the land full of leftover bombs and munitions. Any interaction with land and sea was either dangerous or impossible. Although the war was over, the danger had not ended.

The US military took over the administration of many of these islands and surplus supplies of military rations began to feed some of the local people. In the US military stockpiles were boxes of rations and these became a cornerstone of the local diet. Spam, corned beef hash, rice and pasta replaced yams, fish and fruit. Many local diets would change and would never be the same again.

MAN vs JUNGLE – THE SPEED TO LEAVE

As fighting troops who had accrued enough points were transferred home, they were replaced by troops who still had time to serve. To them fell the task of a certain degree of clean-up, stockpile removal and destruction. Although all places of combat had leftover munitions, only the major stockpiles were dealt with. The munitions that were fired and failed and the old battlefields were abandoned to history and ignored.

No one wanted to find extra work or extend their service time by identifying more clean-up tasks to do. If a ship full of bombs or oil or both was underwater then it was ignored for the elements to deal with. Out of sight and out of mind was a convenient attitude, as this limited responsibility and workloads.

The stockpiles to be disposed of were mainly in the major supply points. Places like Vanuatu and the Russell Islands had massive quantities of munitions in transport cases ready to move. The method of disposal would be quite straightforward by loading barges and ships with bombs and dropping them in the sea. As the munitions were unused they were very stable and this was a very straightforward process. The unstable munitions that were in the jungle were left there.

The stockpiles Pacific-wide had a full mix of all the tools of war, from rifle ammunition to mortars, machine guns, artillery and aircraft bombs. Naval shells and torpedoes were also available and all needed dumping. The dark secret that existed was stockpiles of poison gas.

With dumping at sea, the orders were to load up barges and take them far enough offshore to be in deep water, then push the loads over the side. In deep water they could not be accessed and would eventually rust away and dissolve in the ocean. In reality, the troops tasked to do the dumping would load the ships, push off the beach and start heaving the crates of munitions over the side as soon as they had cleared the beach. These boxed munitions were still accessible and could impact the local people into the future.

Lever Point on the Russell Islands, part of the Solomon Islands, was one such stockpile. The Russell Islands was bombed by Japan but never became a battlefield, once the Japanese left Guadalcanal. The islands instead soon became a major ammunition supply point. This was the main

A pile of Japanese artillery shells sits in the jungle of the Solomon Islands. The need to build new villages and farms brings civilians into contact with old munitions.

distribution centre for the region and as the battles moved farther north they became a transit and resupply point. The Russell Islands were also used as a rest and relaxation base for Americans off the front line. These islands held many secrets and one is that they suffer from a rat plague to this day. Men were so distressed at the rodents' persistence that many commented on a welcome return to combat.

The stockpile on the Russell Islands was massive and accurate figures are hard to define. What can be found is that the stockpile was pushed into the sea from Lever Point and two massive ridges of rusty leaching fused munitions run from just off the beach and away into deeper water. The ridges are over 10 metres high in many places and were formed when the loaded barges left the beach and men quickly began to unload. The two ridges of munitions were created as crates of munitions came off each side of the ships. Barge after barge was loaded and left the beach following the track of the barge in front. As each one unloaded the munitions settled on the one previously dumped.

The end result was masses of munitions that have now formed two artificial ridges. As the disposal was conducted over 70 years ago the shell casings are rusting away, exposing the explosive content. The explosive is leaching into the water and into the food chain through the fish that have taken this artificial reef as a home. If the munitions had been spread over a wider distance or into deeper water they would not have created such a concentration of explosives and toxicity.

TOXIC SOUP

Munitions come in many forms but the common factor is they are full of explosives. An explosive is a solidified chemical compound that combusts to expand from a compressed form to a state of rapid vaporization. This is an explosion. The faster an explosive expands the higher its 'brisance'. A munition ideally has a high brisance and expands very quickly, shattering a shell into fragments. A different compound with a lower brisance is used for propelling a round from a cannon. Explosives used in mining normally have a lower brisance as their purpose is to shatter rocks apart and not blast them long distances.

Chemical compounds that make up explosives come in many formulas and have changed and developed over the years. One formula that was common during the start of the 20th century was 'Picric Acid'. In the years following WW1, picric acid was found to cause major health problems and was replaced with other compounds.

By WW2, much of the world's munitions contained TNT but a great deal of Japanese munitions still contained picric acid. Picric acid is a toxin that has a wide variety of effects and causes much damage to humans, such as dermatitis, anaemia, liver and kidney damage, destruction of red blood cells, blood in urine, headaches, vertigo, nausea, bleeding kidneys, hepatitis, eye damage and cancer. Safe amount thresholds are very low and any presence in the food chain is to be avoided. Just 0.1 milligrams of picric acid per cubic metre of air is considered the maximum safe amount.

The presence of this chemical compound and others in the Solomon Islands potentially has an impact on the health of local communities but to date, no health research has been conducted. The research conducted for this book project raises significant points for consideration.

A 105mm artillery shell contains about 2kg of picric acid and a 150mm artillery round up to 5kg. With these kinds of amounts present in the environment it is not hard to pass the safe level thresholds. Picric acid does not readily decompose or evaporate. It does dissolve in water though. If these munitions had been disposed of in deep water they would have eventually dissolved and washed away. As many munitions were dumped in shallow coastal water, the effect is a toxic beach soup. The toxicity will largely depend on the saturation and amount of munitions and depth of water in which they were dumped

Facing page:. Far left: A suspected chemical round on the Russell Islands in the Solomons.

Left: Local residents of the Russell Islands have a variety of health concerns. Blisters often form on the skin as people go about their daily business.

With the war now over 70 years in the past we enter a period where many of the metal outer casings are rusting away or splitting and the picric acid is now exposed to the environment. The subsequent exposure to communities living with this as a legacy is now greatly increased.

Another question would be, how much do the fish living in amongst these man-made reefs of munitions ingest the picric acid and how is this passed through the food chain to humans? When the local people of the Russell Islands are asked, they strongly believe a variety of health problems and concerns stem from the bombs that surround them in their waters.

Yandina is the main town on the Russell Islands and was near the old US military ammunition supply area from the war. Constable Douglas of the Royal Solomon Island Police Force escorted the SafeGround researchers to a suspected danger area near Hai village.

Another bomb had been reported sticking partly out of the ground by a villager called Basil. Basil guided us to the bomb. "It's a suspected chemical bomb" explains Constable Douglas. "You see how the sides of the bomb do not go to a smooth point but come to this straight sided collar? I have been told this is one way to identify a possible chemical bomb but I do not know for certain."

"15 years ago we had a big bush fire here," says Basil. "Lots of bombs started to explode in the fire that burned for one week. We could not work due to the danger and

smoke and hid in our houses waiting for it to end. We were very frightened. When the fire stopped, experts from the US army came and told everyone to stay away from this area as there were chemical bombs here. They said they took them away but other army people and EOD teams have been back since and destroyed more."

A collection of gas shells was discovered in 1987 and a local demolition team came to destroy them. They set charges and exploded them only to create a massive cloud of poison gas. They were unaware of the toxic contents. Former police members who were part of that operation recounted how they had trouble with skin issues and breathing after they exploded the shells. Luckily for them, most of the cloud blew out to sea.

Constable Polykeana of the Royal Solomon Island Police Force was trained in EOD techniques in the 1990s. "We dealt with many things back then and in big quantities too," said Polykeana. "We would gather the ammunition together and destroy it with explosives. One time the detonation was not normal and we had a cloud go over us. All involved had breathing and chest problems for at least the next 10 years. I think we must have had mustard gas in that detonation," said Polykeana.

In 2000, US bomb disposal experts removed and destroyed 115 artillery shells containing mustard gas from the Russell Islands. Another reported finding of gas shells

Public safety posters detailing poison gas symptoms.

came in 2006 and a US Marine chemical team came and destroyed these too.

Russell Island locals also remember that time and said, ever since, many people have suffered skin irritations, blisters and sores.

Basil said, "Many people in my village have experienced problems. My daughter and other children develop blisters regularly. The doctors do not know what it is or the cause either. The blisters develop and are filled with a clear liquid. They last a few weeks then disappear and then come back again later. They are painful and itchy and she misses school regularly. Another strange problem here is many young men, in their 20s, go bald. This makes them very embarrassed and they have even stopped going to church as they will not take their hats off. We wonder if this too has something to do with the chemical weapons and pollution to our food."

Poison gas became the weapon of choice in World War 1. On April 22, 1915, the German Army drifted clouds of Chlorine Gas across the frontline during the Second Battle of Ypres and ushered in a new method of warfare. This created an arms race with both sides developing toxic cocktails that were liberally used. Mustard gas was used in one of these cocktails.

A generation of combatants was affected by these gas attacks which caused blistering to the skin, burned lungs when inhaled and burned eyes. The post-war conferences realised the horror of poison gas and banned the use in the 1925 Geneva Protocol. This was again reinforced in the 1993 Chemical Weapons Convention.

Despite this ban, many countries continued to develop chemical and gas weapons before and during World War 2. The known stockpiles at the start of the war are substantial.

The British had an estimated 40,719 tons and the Americans held 87,000 tons, the Germans had 27,597 tons but the Japanese numbers are harder to measure accurately.

What is known is that Japan shipped 839,956 gas shells out of Japan between 1937 and 1941. Approximately 571,940 of these shells were sent to China and the remaining 268,010 sent to South-East Asia. Larger quantities are believed to have been produced and shipped during 1942 and 1943 but estimates are vague on the numbers.

In WW2, all of the major powers possessed chemical weapons but this was a closely guarded secret. In a game of brinkmanship, these weapons existed for retaliation if an opposing force used them first. The only reported use of poison gas in this era was by Japan in China in the 1930s.

The Russell Islands was a forward supply point for munitions and chemical weapons and operational stockpiles were maintained there. Much has been disposed of since the war in a variety of manners from sea dumping to demolitions. Many munitions still exist across the islands and some of these are probably still chemical.

It looks peaceful, but down this road a war rages.

SECRETS IN THE HILLS

Guadalcanal was definitely a running battle. The US Marines met the farthest extent of the Imperial Japanese Army and began to push back. With the US forces holding the area around Henderson Field and Tulagi they eventually rolled the Japanese off and away from this essential runway and pushed them west along the island. This route to the west became littered with leftover munitions and refuse of war by both sides, including the dead and dying.

To this day Honiara and the hills around Honiara hide many secrets.

To the south of the former Japanese stronghold of Mount Austen lies the Lungga River and across the river is a mountainous ridge line that surrounds Honiara. This was the 'highway' for Japanese supplies during the war. Japanese forces landed to the east and later to the west of the American positions, then carried their munitions and weapons along this and other ridges to the front line. Many a cache or stockpile was left in these mountains and ultimately abandoned by both forces as the battles pressed to the west and the Japanese were pushed off Guadalcanal.

This adds to the unexploded munitions that were fired by both sides and failed to detonate. A conservative estimate of munition failure is 10% but the reality is far higher when weather conditions, terrain, range and other factors are brought into the equation. What is one day a battlefield again becomes land needed for civil development.

Point Cruz in Honiara was an epicentre of some of the fiercest fighting. Once the battle moved west and the town of Honiara developed, the munitions needed dealing with. The reality was much that was gathered was dropped in the sea or burned and later destroyed by EOD teams once they had been formed. Point Cruz now is the centre of Honiara with the ship terminal, banks and yacht club and the US Consulate. All of this sits upon this former battlefield.

In 2015 a family went to bury their dead baby in the central cemetery. They uncovered an unexploded mortar round while digging the grave, making a very sad day dangerous. In 2017 a road crew was doing road and fencing work in central Honiara behind the National Museum and uncovered a body. This was probably another casualty from the war.

Whether city or country, the effects of the war can still be found.

Maney Jezerih is a forestry worker and timber cutter in the mountains around Honiara. "We are very scared to use

The fighting in much of the Pacific was through dense jungle where visibility was limited. This increased the mental tension and danger. After the war the vegetation grew back quickly, hiding many dangers.

Facing page: Maney Jezerih is a forest worker who regularly finds abandoned munitions in the hills around Honiara.

the land," he said, "but we must make a living." Sitting down by the stockpile of Japanese bombs that he found he continued, "I cut trees in the forest and often find old munitions and bombs. We also find stockpiles or are told by friends of more bombs they find. I never move these bombs and the Police EOD teams are notified when we do find them. It makes me very happy when they come and take the bombs away. It makes me feel much safer. I know there is danger up here but there is danger down there too." (pointing towards Honiara).

Mount Austen commands the terrain south of Honiara. This was the Japanese observation position and artillery base and target of the Battle of Mount Austen by the Americans. The hills were numbered for fast reference as the battle raged from 15 December, 1942 until 23 January, 1943.

Willy Basi lives on the slopes of Mount Austen on Hill 31. "I have a small military museum and search the hills around Honiara for artefacts. I look for helmets and water bottles and old guns. I do not want ammunition as it's dangerous and I am scared the piccanninis (children) will find them and get killed." Willy notified members of the RSIPF EOD team that he had found 3 mortars around old US foxholes on Hill 31. A four-man team from the RSIPF EOD team came to remove the 3 mortars and Willy walked them out of the village to the old positions. Laid out ready for use were 69, 60mm fused mortars. Some still had their safety clips in but most were removed. The EOD team searched the immediate area and removed all they could find. These were transported to RSIPF Hell's Point demolition range and destroyed the following day.

15 year old Alec Sou lives in a village on the Russell Islands near Lever Point. Like any boy his age anywhere in the world, he explores the area around his home looking for interesting things. Sometimes he catches crabs or bats and fish and gathers coconuts. He also likes to find old bombs. In his blue sandals he walks across a large pile of munitions and rusty explosive rounds. He likes to find detonators or pick up propellant granules to make fire crackers. His mother Florence said, "I'm very scared of the bombs and tell my children again and again not to touch them. I hope they do as I say." The beach is littered with old munitions that local people have recovered from the sea. They want the copper driving bands that are on each round.

As the driving band is made of soft copper, it creates a compression seal between the round and the barrel of the gun it is fired from, creating a spin that gives great range and accuracy. It also tells EOD personnel if a round has been fired or not. An unfired round is considered safer to handle than one that has been fired and failed. The driving band on an unfired round is smooth and one on a fired round has grooves cut into it from its passage up the rifled barrel of the gun. Copper is worth money to anyone who brings it to a metal recycler and local people often search for

ammunitions and pry the rings away from the munition. This is a dangerous procedure and can lead to a detonation and death. These risks are ignored in the quest to make some money from the copper.

The beaches around Lever Point are littered with pieces of ammunition that were once in the sea and now have no driving bands fitted. People also bring diving equipment from Honiara to access munitions that are in deeper water. This activity contributes greatly to creating a dangerous environment.

Yandina is the main town on the Russell Islands. Mr Akwai reaches into the rusting hulk of a WW2 shipwreck and pulls out a corroded artillery shell. Children in their blue and white school uniforms walk past to launch their canoes from the beach next to the wreck and head home. "How long will this bomb stay?" he asks of Constable Gato. Constable Gato has no answer as there is no EOD presence on the Russell islands. He does his best and can only measure the bomb and report it to the EOD team in Honiara. The EOD team has a very limited budget and it is very hard to visit any area that is not on the island of Guadalcanal. The last time they had visited the Russell Islands was over a year earlier. Mr Akwai's wife Ruth grabs hold of her small son and fiercely instructs him to stay away from the bomb.

Willy Basi guides a team from the RSIPF EOD team to a site outside his village to recover 69 mortars. Honiara is only a few kilometres to the north.

A young boy on the Russell Islands collects explosive fragments to make fireworks.

ISLAND-HOPPING

Leftover munitions were spread across the Pacific basin. The land and sea detritus from the years of fighting during World War 2 continued up the chain of islands, from Guadalcanal to Japan.

When the Japanese army was pushed from Guadalcanal, they transited the Russell Islands and continued on to New Georgia Island. This was their next stand and the airfield at Munda Point on the north-west of New Georgia was the prize for both American and Japanese forces.

Vicious fighting came and went and the Japanese forces of 12,400 soldiers withdrew to Kolombangara Island, north of New Georgia and to the rest of the Solomon Islands to the north.

Kolombangara has a few small villages far apart. Since the end of the war, population growth now looks north from New Georgia to the potential of this neighbouring island. Rex Oderinggi stands on the southern shore of the island looking towards New Georgia. "This place is called Teme" said Rex and this was where the Japanese army came when they left New Georgia. "We want to build a village here but look at this place, there are bombs everywhere."

Rex walked a few metres and the ground is carpeted with unfired artillery and mortar rounds. Two kilometres to the west was a runway, and the island's southern tip was the obvious place for the Japanese to defend to repel

Sgt Rex from Munda Point shows many munitions that are scattered and abandoned on the island of Kolombangara. This island was fortified by the Japanese and bypassed by the Allied forces.

the US advance. The advance never came and the island was bypassed and the Japanese forces were left isolated 'to wither on the vine'.

The Japanese had dug in and supplied a lot of ammunition for the defence and this stays to this day. Piles of munitions are stacked by trenches ready for use. When the war ended they were simply abandoned. The ocean was also isolated as US ships dropped hundreds of sea mines in the waters around the island to complete its encirclement. Ground fighting never happened on Kolombangara but air and sea bombardments did. A few hundred metres from the water's edge are unexploded aircraft bombs and more bombs spread into the interior.

"This is a good place" said Rex. "We can fish here and farm inland. It's an easy crossing by boat to Noro on New Georgia." But he added, "the bombs are everywhere."

In a small clearing by a good beach and breakwater there are over 200 scattered artillery rounds. A short walk to the east and hundreds more rounds are piled or scattered. Land need and pressure to expand are the economic realities and the need to access good land will bring people. The question will be, will those people have to move to a dangerous environment full of discarded ammunition or can it be cleared so they can have a safe and prosperous future?

Abandoned Japanese munitions are stacked on a jungle path on Kolombangara Island.

THE ECONOMICS OF GETTING AHEAD

Land ownership in the Pacific is an essential element of life. If you have land you can prosper. The Solomon Islands is a chain of 6 major and 900 smaller islands and was first discovered by Europeans in 1568. As the inhabitants were active head-hunters and cannibals, the islands were bypassed for many years. In the 19th century, missionaries tried to Christianise the islands with mixed success. One of the main tensions between the local population and the outside world was the activity of the 'Blackbirders'. They were 'recruiting agents' who would coerce or kidnap locals to work on plantations in Australia and Fiji. This trade ran from about 1860 until 1904, when authorities finally succeeded in breaking the trade.

In 1893, Britain declared the Southern Solomon Islands a protectorate and expanded this to include most of the Solomon Islands. The Northern Solomon Islands were absorbed from German control into the British protectorate in 1900. Germany still maintained control over Bougainville Island and areas known as German New Guinea. With a 'protectorate' comes economic control.

The protectorate brought a form of government and control by Britain that lasted until the Japanese invasion of WW2. The ultimate result was local people lost the control of their lands. The process of Christianisation also continued and by the 20th century many had converted. This gave the colonial administrators a considerable amount of economic and physical control of the people.

Social and economic progress for the local people was slow as large plantations were established for international and local companies. A strong example is the Lever Brothers Company. They were awarded 400,000 hectares of prime farming land in the Solomon Islands on a 999 years lease. This 'lease' has been the subject of fierce debate ever since. The core of the debate is the legality of a colonial administration pre-WW2 giving away so much land for such a period of time when they did not own it.

Since independence in 1978 these types of land ownership laws have been contested.

Land ownership is at the very core of what it is to be a Solomon Islander and all land is owned by someone. This extends to what may be on your land or abandoned on your land, such as refuse from the war. If it is on your land,

A downed aircraft can now become a tourist attraction for whoever owns the land it is on. If you own the land you own what is left behind on it.

you own it and anyone wanting to see it, or take it away must negotiate with the land owner.

An example of this is the land owner of 'Red Beach' to the east of Honiara. This is the beach on which the American forces landed in 1942. Left behind were many wrecked landing-craft and other detritus of battle. The land owner has made a collection of these relics and has created a small museum that he charges people to visit. Over the years he has also found munitions that he has brought to his museum and displays. He animatedly declares these munitions are his and does not willingly part with them for removal and destruction. This 'ownership' can hinder reporting of munitions that are found as some feel it could be of financial value to them. Back on Hill 31 overlooking Honiara and the airport there is a similar museum where the admission charge is $25 USD.

If old munitions are perceived to have a value, then it will be difficult to get open reporting to authorities for destruction.

Right: Abandoned munitions in the hills overlooking Honiara.

Facing page: An abandoned tank sits where it was destroyed in 1942.

HELL'S POINT

Hell's Point is a mere few hundred metres from the eastern end of the airport runway at Honiara. It is just across Alligator Creek on the eastern bank and was the scene of fierce fighting during the war. Once the fighting had moved west and north it was turned into a major ammunition supply store. Exact figures of the stockpile have still not been discovered but the amount of ammunition stored there is estimated between 200,000 and 300,000 tons.

A wildfire burned into the depot in November 1943 and caused havoc. Munitions began to detonate and the subsequent explosions blew munitions over a 120-hectare area. The fire was left to burn itself out as it was too dangerous to fight and eventually this area was abandoned to the jungle. Live munitions of all shapes and sizes were now seeded over this area and eventually someone would need to clean it up.

In the 1990s, the Royal Solomon Islands Police Force in conjunction with the Australian Federal Police began using Hell's Point as a training facility for Explosive Ordnance Disposal (EOD) teams. It is the ideal location as the area is saturated with Explosive Remnants of War (ERW) of all kinds. Local police personnel could work on-site learning the techniques of detection, clearance and demolition then hopefully deploy nationwide to begin national clearance.

Civil unrest began in 1998 and resulted in the Regional Assistance Mission to the Solomon Islands (RAMSI) being formed. This mission consisted of 2,200 police and military personnel from Australia, New Zealand and other Pacific Nations and was deployed to the Solomon Islands in 2003. The relationship was bolstered in 2006 as a result of an improvement in the national security situation and the disarming of many of the rivalled factions. Hell's Point was a facility that needed to be secured as a priority due to its ready access to military grade explosives and old munitions.

In 2011, Golden West Humanitarian Foundation took over the running of Hell's Point and the continued training of the local police EOD teams. They are trained to International Mine Action Standards (IMAS) and are considered experts in WW2 munitions. Up until 2018, the funding has largely come from the USA and Australia.

Part of their mandate is Research and Development (R&D). New techniques are created and tested to make the business of ERW detection, clearance and destruction safer, quicker and cheaper. Many technological advances have been tried and deployed from Hell's Point, such as

Memebers of the Royal Solomon Islands Police Force EOD team X-ray a munition to see if it is high explosive or phosphorus.

the use of X-ray equipment to determine if a munition is high explosive, poison gas or phosphorus. The separation is essential in determining the method of destruction.

One method Golden West has developed in destroying munitions is to use a remote controlled industrial band saw to cut the munitions in half. This can only be done to high explosive rounds and not phosphorus or gas. Once a high explosive round is found by X-ray, it can be cut in half and stored for the weekly demolition. Instead of destruction with more explosives, the cut munitions are simply covered in diesel fuel-soaked rags and set alight. The exposed explosive burns well and safely. This is an extremely cost-effective and safe method of destroying large numbers of munitions.

Any gas rounds found are dealt with by specialist teams with specific techniques and equipment. The

Facing page:
Once a munition is X-rayed and determined not to be phosphorus, it is cut in half by a remote controlled band saw, then the munition halves are burned.

Left:
A member of the RSIPF EOD team brings munitions from a sunken ship as local people walk by.

phosphorus rounds are destroyed with high explosive to incinerate the phosphorus contents.

The recent availability of 3D printing has prompted another innovation by Golden West. One of the most dangerous parts of bomb disposal is the fuse and how it is dealt with will determine the safety outcome. There are many different types of fuses available but one of the more dangerous types is a mechanical time fuse. When these are found on a fired but failed munition they have become stalled somewhere in the detonation process. These are very sensitive and must not be moved or touched as movement could initiate the fuse and cause a detonation of the munition. Golden West has now created a set of colour coded 3D-printed working models of the fuses they may come in contact with. The EOD team members can handle and dismantle these working models and really come to terms with their construction and design.

At least nine suspected ship wrecks are in shallow water along the coast of Guadalcanal near the airport. These wrecks need to be cleared of munitions before they are discovered by local fish bombers.

The members of the Solomon Island EOD team are all serving members of the police force. Although now experts in their field of WW2 munitions, they continue training. Golden West's training mandate is to train the police team to IMAS Level 3 which will leave them able to autonomously run their EOD needs and capacity. Other skills achieved are scuba diving and underwater clearance so they are able to deal with the many shipwrecks and munitions that are ever present but out of sight. These too are a danger to local people and a potential supply of military grade explosives for criminals.

Crossing the main road from Hell's Point it is a short distance to the ocean. This is the mouth of Alligator Creek, where over 900 Japanese were killed in the early stages of the war making suicide charges against US machine guns. The beach area has rusty steel and some wrecks that were run aground and the suspicion is that munitions may exist here.

Recently the Golden West and RSIPF team tested side scan sonar along the beach looking for shipwrecks. They identified 9 possible targets of ships sunk in very shallow water. SafeGround researchers accompanied the police team as they began their underwater search for shipwrecks. Immediately on entering the water on a target site a sunken ship was found. Its bow was run to shore and it had broken up in the shallow water.

Most of the barge was in waist-to-neck-deep water and the team rapidly began removing munitions. Quickly a pile of artillery was piled on the beach then removed for destruction.

This was a very successful proof of concept of the side scan sonar and many more areas were logged for search in the future. It is hoped this will speed the discovery of sunken ships and barges so they may too be searched and cleared of any dangerous objects.

DYNAMITE FISHING

Not everyone is scared of bombs. Some people see them as a ready source of explosives to make 'fish bombs' and go 'dynamite fishing'. This dangerous practice either has existed or does exist in many communities affected by ERW across the Pacific. In the Solomon Islands the practice is widespread in some communities. There is evidence of early colonialists using this crude fishing method in the 1900s. They simply would light a stick of dynamite and throw it in the sea or river. The local people would then jump into the water and recover what fish they could.

Areas like Hell's Point and Lever Point have such large and readily available amounts of munitions, it is easy for modern fish bombers or bomb makers to get their ingredients.

Fish Bombing is the dangerous practice of finding old munitions, cutting them in half to expose the explosives, removing the explosives and filling a 300ml water bottle with them. They then have a crude grenade. A basic and very unreliable fuse is fashioned from readily available items, which we will not list here and inserted in the bottle. Bombers then take the homemade device over a reef, or areas where concentrations of fish will be found, and light the fuse and throw it into the water. The resulting detonation compresses the water in the immediate area, killing all life within that radius. It also shatters reefs and destroys the environment for future marine life and tourism. Once an area has been fish bombed, the coral is dead and shattered and will take many years to begin to recover.

A detonation in water sends out a compression wave that shocks all life in that area. The resulted 'squeezing' ruptures blood vessels, bursts eye balls and squeezes organs out of orifices like gills and the anus. A fish that has been caught by fish bombing can be identified by the trained eye and has a far lower market value due to the damage to the flesh. It does still have a value though as a food for poorer people or export to the fish patty market.

A person fishing with this method throws the bomb from their boat and waits a few seconds, depending on the reliability of the fuse, for the detonation. The radius from the explosion where life is killed depends on the size of the bomb and amount of explosive. An average home-made 300ml fish bomb would kill all life in a minimum 10-metre radius. The fisherman then dives into the water with snorkel equipment and scoops and nets as many dead fish as he can. The reality is many more fish are killed than

Honiara Fish market. The fish on the left shows signs of fish bombing with ruptured eye balls and internal organs squeezed out.

can be captured and much of the kill drifts off with the current. The result is a reasonable catch for the fisherman but complete and permanent destruction to that section of reef and marine life. One detonation on average can make a fisherman $250 USD which is very good money compared with the time that it would take him to catch that value using traditional methods such as nets or spears.

Fish bombing has polarized communities in the Solomon Islands. Often fish bombers visit waters owned by other communities and destroy their reefs, fish and future fish habitats. This renders an area useless for a generation. Tensions exist and violence has been the result of people fishing with explosives.

A growing industry in many Pacific countries is tourism and the tropical waters and pristine environment are a great attraction for scuba divers. Many local people are embracing this and now value the quality of their reefs and waters above all else. Fish bombing is the single biggest threat to this growing and lucrative business.

Accidents do happen and it can be difficult to get the full picture. Most fish bombing accidents result in death and these are rarely reported to authorities due to the distance from major towns and police presences. Someone who dies is usually simply buried and there is no way to produce a death certificate. Even if a report was made and a death certificate was issued it is doubtful anyone would list the cause of death as fish bombing.

One major reason for a fatality is the unreliability of fuses. These homemade devices can burn quickly or slowly and there are many factors that can influence this. The standard method of lighting a fish bomb is from a cigarette held in one's mouth. The bomber raises the bomb to his face and brings the fuse into contact with the cigarette. Once it starts to ignite he will throw it overboard. The aim with the fuse is to have it burn for the minimum amount of time to reduce the possibility of being extinguished in the water. It is a game of 'Russian Roulette' with death.

The results due to an accident are quite obvious. A detonation of 300ml of explosive held next to one's head normally removes the head and the arm holding it. Death would be instantaneous, or a very serious injury obtained.

Frank lives in a small community near the island of Tulagi. He took up fish bombing and was pleased with the money he was making. His actions did not please the local community though and he was alienated for his actions. He was lighting the fuse of a fish bomb when it ignited very quickly. He says he had just enough time to turn his face and try and throw the bomb. It detonated, obliterating his left hand and giving him other injuries. Local people came to his aid and transported him to the hospital in Honiara. Although he had a cover story ready, the doctors knew exactly what had happened to him. An injury due to an explosion is quite obvious with burned and flayed flesh hanging in strips.

Frank tells his story of dynamite fishing, the loss of his arm and his arrest.

Michael suffered a similar fate. Too fast a fuse created a premature detonation and took his right arm. For Michael, it was enough. He had lost his arm and this would greatly damage any future livelihood. He turned away from fish bombing and began boat repairs with his son. He also works with the local Pastor, visiting villages and talking of the dangers of fish bombing. He has become a strong community role model.

Frank's injury did not deter him from continuing his dangerous occupation. He had lost his arm but was not charged by the police with any crime. The police felt that he had suffered enough by losing his arm and this was a sufficient lesson. Once he had recovered he continued fishing with explosives and eventually his community was so worried he would die that they reported him to the police. They arrested him, he was charged and convicted. He served 18 months in prison.

Dr Rooney at the Honiara Referral Hospital said that on average five or six patients per year are brought in with explosive injuries from dynamite fishing. One of the great problems is the distance injured people have to travel to get any medical help. This distance is exacerbated by the fact that more often than not they will need to be brought by open boat for a long distance. This decreases the chances of survival dramatically. Some, if not most, will die on the way. If they do die the people bringing them will just turn around and go home and bury them there. The facilities at the Referral Hospital are reasonably basic and they are not equipped to deal with what is in effect a war wound.

The police believe that about twenty people die per year from dynamite fishing. There is no real way to verify if this is true or false or too high or too low an estimate but local people in distant communities that researchers visited came up with the same figure. They also had stories to match.

One of the Tulagi local dive operators is frustrated with the fish bombers. "One explosion and that section of reef is gone" said the dive master.

Researchers dived on an area of reef called the Blue Hole. Fish teemed around massive columns of colourful coral and the whole marine eco system was embedded in its walls. Similar sites near by create a scuba diving paradise. A very short distance from here is a different tale. The fish bombers have been and everything is shattered and the sea floor is a litter of shattered coral bleached white from its death. There is no life and no physical structure for fish to find a home in. It does not take ten or twenty fish bombs to destroy a reef, just one, and one is too many.

Michael lost his arm during dynamite fishing. Now he works with the local church trying to discourage others from the practice.

A DEADLY HARVEST

Any garbage from WW2 should be seen as of no value, just rubbish to be removed and disposed of. In many Pacific Nations munitions do have a value as the base of fish bombs. This practice is relatively widespread in the Solomon Islands and New Guinea and to a far lesser degree in Palau. Only further research will shed light on the extent in other nations.

Using the Solomon Islands as an example, some people search out munitions of the larger calibre and harvest the explosive from them. 75mm and above is preferable as the explosive yield warrants the risk and effort in obtaining it.

Any munition of the right size would be taken and cut in half and the explosive dug or steamed out. This is then pounded to a powder and 300ml water bottles are filled. The operation is simple and crude and very dangerous.

In the Solomon Islands, cheap Chinese made metal detectors are available and searchers use these to look for metal signatures in the ground. When a detector gives a signal, they dig in the hope that it is a munition and not just a piece of scrap metal.

Once a munition is found, it is removed and cutting is the next step. Some will take a munition to the beach or river and sit in the water and cut it in half using a hacksaw. This is a very dangerous exercise on a munition full of TNT but is fatal if it is a phosphorus round. Phosphorus bursts into flame when exposed to air. A bomb maker cannot tell from the outside of a rusty munition if the contents are high explosive or phosphorus. Once phosphorus starts to burn it is almost impossible to extinguish. It has to run its course and run out of its own fuel.

Once the explosive is removed it is packaged into water bottles and used by the fishermen themselves or sold in the markets to those who know. There are stall holders who have pre-made fish bombs under the table. If you as a customer are known or recommended, then one will be slipped into a bag and you are ready for fishing. The fuse is simply a plastic drinking straw filled with a readily available material that will detonate the main charge. (material name withheld so not to turn this into a 'how to' manual)

One major problem the police at the EOD training facility have at Hell's Point is of people coming illegally into the compound and searching for munitions in the late afternoon or at night. There is not enough resource or manpower to secure and guard such a large area full of dense jungle. The signs of explosive searchers can be found

A home made fish bomb. An explosion from a bomb this big would kill hundreds of fish and shatter the reef in a large radius.

most mornings in the areas of Hell's Point. Footprints in soft ground and fresh digging is always evident. Smaller calibre rounds are found and discarded due to not enough explosive content.

Hell's Point is surrounded by a perimeter fence and it is crossed daily or its wires are cut. Obvious tracks through vegetation and soft ground can be found as people have come and gone on their way to search for explosives.

Dynamite Fishing or Fish Bombing is linked to a variety of social and economic issues. Poverty is a key driver as are lack of educational opportunities and economic possibilities. The desire for short-term gain and the money earned by this kind of activity outweighs any larger or more far-sighted view. Drop a bomb, get some fish, make some fast money, move on.

We hope the focus in the future can be the benefits of a pristine marine wilderness and not the short-sighted industry of fish bombing, but for the present there will be a collision between the two groups. Legislation exists and can help, but in a country like the Solomon Islands covering vast distances of many islands, enforcement will be a difficult if not impossible task. Education and the understanding of the value of their environment will perhaps be the driver for change.

Munitions await destruction. Many of these, if in the wrong hands, could be recycled into fish bombs.

EXPANDING ECONOMY

Capital cities are always under pressure. People move in for perceived better opportunities and as a result, the physical size of a city expands. Honiara, the capital of the Solomon Islands, has undergone such expansion.

During the war there was no Honiara. It grew largely as a result of the airport being developed at Henderson Field. The main area of local government before the war was at Tulagi. The city grew and spread along the coast in that narrow band of land between the sea and the ridgeline behind. This strip of land is only a few hundred metres at best and expansion was soon creeping into the hills.

All of what is now central Honiara was a major battlefield during the war. The area from Kokombona to the west and Alligator Creek to the east was heavily fought over. The same went from Point Cruz on the coast to Mount Austen in the south. Strongholds were dug and both sides pounded away at each other until the Japanese forces began to withdraw.

Now Honiara is a bustling city with great expansion pressing south into the hills and along the coast. With expansion come people and more people, houses and more houses, infrastructure – and all of this requires digging the earth.

The Japanese War Memorial stands on a hill that was a former fire base on the way to Mount Austen. It was a lonely hill in the jungle that gave elevation and command of the surrounding countryside. Now it is being pressed by the urban sprawl and could be consumed by housing developments in the next few years. Standing at the Memorial you look north into Honiara and the labyrinth of roads and houses as they stretch to the coast. At the base of the hill only a few hundred metres away, the earth is being churned and dug in preparation for the houses that will soon be built there. Children play on the hill and roll and push each other over in the broken clay. This hill was a major target during the war and suffered every kind of battering imaginable. Japanese troops held the top while American troops tried to dislodge them and aircraft and navy ships pounded away at it also. The north side where the housing development is being constructed faces the sea and got that extra attention from the ships' guns.

The RSIPF EOD team has had quite a few call-outs to this area in response to contractors finding old munitions. Paul Eldred, the Program Manager for Golden West Humanitarian Foundation, plots all call-outs into his computer. "Every

Looking from Mount Austen, the suburbs of Honiara are being built along its slopes. The earth works regularly uncover old munitions.

call is plotted and added to my database and you can see the areas of highest intensity regarding munition saturation. This is a constantly growing body of information and it will make future bomb detection easier" he said.

His computer has a satellite image of the area and it is covered with small coloured marker flags. When clicked on, each opens with the individual details of what was found and the exact location.

The EOD team can only respond when called out and something is found. They do not have the budget or mandate to proactively clear a suspect area for ERW. In a perfect world the whole of the Pacific that was fought over in WW2 should be systematically cleared but the reality is there is no money for this. Budgets simply do not exist. Governments could pass a law that no development can take place without prior search and a certificate of clearance issued. This cannot happen as it would bring to an expensive halt any physical development within their countries.

Housing, industry and infrastructure is coming, whether the land is ready for it or not. They have waited over 70 years to climb the economic ladder and the remnants of an old battlefield will not hold this back.

Nick West is an Australian technical consultant working with the Solomon Islands Electricity Authority. "Much of our work is laying power lines for the national electricity grid. We are always digging the earth to lay power cables or erect power poles and we often unearth large and small bombs in our work. This area around Honiara was hit heavily during the war and we find everything here from small munitions to large aircraft bombs and ship artillery. Whenever we find something, we call the EOD team and they always come quickly and remove it. We have also brought some small metal detectors and try and check the ground as much as we can before we dig. Recently one of our backhoe operators hit a big bomb and unearthed it. Thankfully it didn't explode but it terrified the operator and he ran home and is now too scared to return to work. This kind of thing happens all the time and it is the same for the telecommunications and water companies and road builders."

Three small local companies have been started to try and proactively deal with the ERW problem for the contractors. They can be called for any development and paid to prove the ground before construction begins. Presently there is no national standard for them to adhere to nor is there a set of standards that demand a certain degree of professional understanding at a technical level. This said, some of the members of these three clearance companies are ex-members of the RSIPF EOD team and do have the required skills. What does not exist is a way to determine that all personnel who would search for ERW are properly trained. This is where a concise set of national standards would come in and create a set of rules that all operators must adhere to.

The data base of found munitions around Honiara is a colourful mosaic of little markers. Every mark represents a munition found and a possible life saved.

The pressure to access and use more land stretches across the Solomon Islands and through the Pacific Nations affected by the war. This land pressure is not only felt in the cities but the country too.

Chris Jamakana lives in Barkek on the island of New Georgia. His farm straddles the area the US forces landed at when they came to dislodge the Japanese from the area around Munda Point.

"I can only farm lightly," said Chris. "I do not cultivate the land to the depth I should for fear of hitting bombs. This limits the kind of crops I can grow and the return I can get from my land. I also have trouble improving my land with manure and organics as this requires digging the earth aggressively and I am too scared to do so. I feel I could get far more from my land if I could work it properly but with the bombs present, I cannot. My main crop is cassava. It has shallow roots and does not require too much digging to put it in. The money earned from this is medium to low. There are many other crops I could grow with a greater return but these would require greater working of my land. When I harvest my crop I then burn the land to add nutrients to it and prepare it for the following crop. When I light the fires I run away and wait until the fire has burned out before I return. Sometimes they get out of control as I am not there to look after them."

The growing tourism industry is a strong foreign money earner for the Solomon Islands. Excellent opportunities for scuba diving exist and Eco-Lodges and jungle trekking have possibilities too. Much of the Solomon Island tourism opportunities look to the sea for diving on coral reefs and WW2 shipwrecks. Only recently have some entrepreneurs begun looking inland to the possibilities of jungle trekking and WW2 historical tours. Inland the jungles also hold an array of wildlife unique to the area. Tropical birds are in abundance and some rare species like the Hornbill abound.

Jungle trekking holds great potential and areas like the Kokoda Track in New Guinea are a good example. The ridgelines surrounding Honiara are full of natural beauty and war relics, such as abandoned artillery and camps as well as graves and munitions. But the munitions must be dealt with prior to tourism in the mountains being developed.

Mountain tourism would provide good opportunities for local villagers who own the land. They could provide guiding services and camp facilities along the way and gain a strong advantage in earning foreign money. Much of the Pacific has very high unemployment and opportunities for local people can be very limited. The development of a land-based tourism industry could help counter this.

Chris Jamajkana shows the latest munitions he has uncovered while farming on New Georgia. He is scared to dig the ground too deeply for fear of detonating one.

Training is ongoing. Members of the Royal Solomon Island Police Force EOD team are constantly learning new techniques. These men are an elite unit within the police force.

TRAINING THE TRAINERS

Throughout the Pacific there are many areas that are still affected by WW2. Because of this there exists a need for professionals trained to deal with the ongoing problem of ERW. The people who will need to deal with these problems will ultimately be locals as it is in their interest to have the bombs removed and the land safely used.

A villager in Palau fiercely stated, "Why should we have to deal with the bombs? We didn't make the war or fight it but we're victims of it. It is America and Japan who fought here. They need to clear it up!"

This is a sentiment expressed across the Pacific and is a valid and fair point. The problem is, fairness has nothing to do with politics or international responsibilities.

Legally, when a land is controlled or owned by a nation, that nation bears responsibility for all problems on that land. This is the law. Land ownership means bomb ownership too. If it is your land, then they are your bombs. This might be an international legal point but not necessarily a moral point. Is it really morally right to fight a major war through neutral ground and leave it destroyed and condemn the local populations to a future of economic hardship and danger?

Ownership of land vicariously gives the governments of Pacific Nations the dangerous legacy and responsibility for the bombs. This is legal, but is it not also a moral imperative for the countries who were the combatants and the wealthy developed world to contribute substantial amounts of money to facilitate the clean-up?

In total, World War 2 cost an estimated $1.075 Trillion dollars in 1945. To bring this to a modern money value this would be about $14 Trillion dollars in 2018.

In 1945, the last year of WW2, the US spent 40% of their GDP on the war. The numbers are huge and the economic impact is immense.

The 1945 figures tally the total cost of the war for some of the major countries as follows-

The USA spent $341 Billion
Britain $120 Billion
Italy $94 Billion
Japan $56 Billion
Germany $272 Billion

These figures exclude Australia, Canada, India and many other combatant nations.

In any terms, these are major figures that left the world in ruins. The amount of money that since has been spent on all forms of post-battle clearance and clean-up around the globe pales into insignificance compared with the cost of waging the war.

Cleaning up after a war costs money and the people who need to clean up need training and then those teams need vehicles, supplies and equipment and ongoing budgets to cover all their needs until the task is complete.

Money=Time=Lives. It is a fairly simple equation. The more money available quickly, the faster a problem is solved and lives will be saved.

Very little in real terms has been invested in clearing up the former battlefields in the Pacific. To date, most former battlefields have never seen a clearance professional or had any form of budget to employ them. There are a few exceptions and they fit into a David and Goliath struggle of trying to do a massive job with very little funding.

A joint military training exercise has existed for many years around the Pacific called Operation Render Safe. This is a joint mission normally involving the military from Australia, New Zealand, Canada, the USA and a variety of Pacific Nations' Military or Police. They choose an area and deploy to conduct clearance operations there. Emphasis must be placed on this being a training exercise and not systematic clearance. The participants gain great experience working on WW2 UXO. The problem is that the clearance is more about spot tasks and not systematic clearance, nor is there an available database to see what they have done and where. Such a database, if available, would greatly help local teams by not duplicating search in areas that may have been cleared already.

There are numerous accounts of Operation Render Safe visiting areas and conducting some work. Sometimes, since they had attended an area, the local people assume all bombs are gone, when in fact no clearance was undertaken. Other times areas are cleared and not reported so local teams plan and deploy to an area only to find the area has been cleared by the training exercise. Ultimately, all of these scenarios waste money if efforts are duplicated.

What is needed is a central point of data collection and dissemination.

The personnel who attend such an exercise leave for their homes or next deployment and take with them the information and experience they had gained. This leaves no valid contribution to local problems or skills base.

The small budgets that have been available for creating clearance teams have been well spent in a few locations. Palau, the Solomon Islands, the Marshall Islands and New Guinea are four recipients of clearance aid.

The Marshall Islands and New Guinea have seen more spot tasks than extensive clearance efforts but Palau and the Solomon Islands have created well trained and dedicated teams to handle their ERW problems.

Old munitions are regularly found in the jungle. You must always look where you step.

During the 1990s the Royal Solomon Islands' Police Force, in partnership with the Australian Federal Police, began to use the area at Hell's Point. As the site of a burned and exploded WW2 ammunition supply storage area, it provided a unique environment to train personnel to become EOD specialists. The area is full of munitions and this environment is a training scenario dream.

The areas in and around Honiara have a high saturation of munitions from the war and these teams began to clear up the munitions as much as possible. The early days of clearance had them doing more Battle Area Clearance (BAC) tasks as much was still lying about in people's yards and fields. Much of this was a simple visual search and removing munitions that lay about on the surface.

From 1998 to 2003, the political situation rose and fell with the activities of various violent militant political factions. In 2003, the Regional Assistance Mission to the Solomon Islands (RAMSI) was formed and deployed. This had a calming effect to some degree, but the violence flared again in 2006 when the Prime Minister was accused of paying bribes to Chinese business men. Riots followed and much of Chinatown was burned to the ground. This latest round of violence prompted the RAMSI and RSIPF forces to secure the Hell's Point facility as best they could for fear that rebel groups would raid it for the military grade explosives it contained.

The RAMSI mission was a great success and has now been withdrawn and the Solomon Islands are on a more stable political path.

The facility at Hell's Point is now the national EOD training school and the Royal Solomon Islands' Police Force EOD team train and operate from there as their base. The objective of the Royal Solomon Islands' Police Force EOD team is to be trained to IMAS standard Level 3 by February 2019. At this point they will be truly standing alone in their skills and will be able to deal with anything they may find in their region. The IMAS Level 4 is a very specific qualification and focuses on Chemical, Nuclear and Biological weapons. The scope and scale of the Level 4 qualification is well outside the requirements of the local situation and if Chemical munitions are found in the future then an international team can be brought in to deal with it.

A possible long-term objective is to train islander personnel from any affected Pacific Nation to be able to deal with their own ERW problems. This sharing and export of knowledge would greatly enhance any local efforts in dealing with local ERW problems. Skill acquisition is one thing but long-term budgets are a major problem. Without them, programs will grind to a halt and lose their capacity to respond to UXO reports.

The low cost methodology that has been imported by Golden West such as identifying types of munitions with X-ray and cutting high explosive rounds in half with

When munitions are found they are taken to the police EOD facility at Hell's Point. Here they are destroyed by either cutting and burning or blasted to pieces if too dangerous to cut and burn.

band saws has reduced operating costs dramatically. The method of cutting and burning munitions has eliminated the need to import expensive commercially manufactured explosives and thus saved money. Another improvement has been their development of a high brisance two-part liquid explosive that takes the roll when high explosive demolitions are needed. All of this has contributed to new ways of looking at ERW destruction and ways of bringing the ultimate costs down.

The RSIPF EOD is considered an elite unit in the police force and members hold great pride in their work and position. Some members have been working in the team since close to its inception and are true experts in the trade and have a lot to teach others about WW2 era munitions, detection, clearance and destruction.

A large demolition is detonated in Palau. Over 2 tonnes of unstable munitions were destroyed by Cleared Ground Demining.

TO EMPTY A FORTRESS

Palau was administered by the USA from the end of WW2 until 1994 when it gained independence, created a constitution and became a Republic. In the era since the end of the war, little had been done in the clearance of WW2 munitions and bombs. Surface area clearance was conducted in an ad hoc manner in high visibility and high traffic areas but most areas were simply left and forgotten.

To simplify the understanding of the ERW problem in Palau we can look at it in a few ways.

Firstly there are the islands of Peleliu and Angaur in the south. These were the sites of the US forces' invasion and were both bitterly fought over and eventually subdued and invaded. Japanese forces fought largely to the death and also extracted a high toll in US casualties. Both islands suffered fierce ground fighting against heavily fortified Japanese positions and both island battles had massive fire support by the US Navy and Air power.

The rest of Palau was battered by naval and air power then isolated and left with no means to join the fight to the south or resupply. These Japanese forces were cut out of the war and left to wait and starve until surrender or evacuation.

The larger northern islands on Palau, in particular Koror and Babeldaob, were heavily fortified by the Japanese forces in anticipation that any US invasion would target these two islands for occupation.

As the Japanese forces were led to believe that any US invasion would land on Koror and Babeldaob, they put a lot of effort into fortifying these islands and creating formidable defences. Japanese forces were spread over the area in the necessity of having a strong presence on all land masses. Any place they neglected could be used as a stepping-stone for the US forces. This weakened their position by reducing troop saturation in various locations and thus allowing the US forces to exploit this dilution of force. The main Japanese force was stationed on Babeldaob under the erroneous belief that the major fighting would happen there.

A third major consideration was the sea around the entire island chain. This became the pre-focus of US military activity in the 'soften up to invasion'. A lot of naval and air power was focused in the waters around Palau with the objective of smashing the Japanese air and sea assets. Airfields were continually bombarded and aircraft stationed

The remains of a Japanese soldier are discovered where he fell over 70 years ago. A live grenade is visible to the right of his belt buckle. The grenade was removed and destroyed and the remains of the soldier were repatriated to the Japanese authorities.

there were destroyed. The sea lanes and narrow channels through the outer reef surrounding Palau became the target of intense interest as ships of any size were bombarded and sunk by air attack and naval bombardment. These waters were also heavily mined by both the Japanese and US forces. The Japanese mined many beaches, rivers and estuaries where they thought US forces may get ashore and US forces dropped sea mines to lock all shipping inside the outer reef, preventing them from joining any battle or escaping their ultimate fate of being sunk by American forces.

When the US invasion finally came, it divided Palau into distinct sectors. In the north, the Americans had been able to sink most ships and Japanese forces were left isolated in their well-constructed defences. Surrounded by sea mines, no one could come or go.

To the south were the two target islands that were also isolated with a large but inadequate garrison for what was to come.

In all parts of Palau the Japanese forces had sufficient time to construct elaborate defences. They dug in, built well planned bunker complexes and changed their defensive strategies. The tactic of trying to repel the invaders on the beach was abandoned in favour of fighting from well-built fortifications.

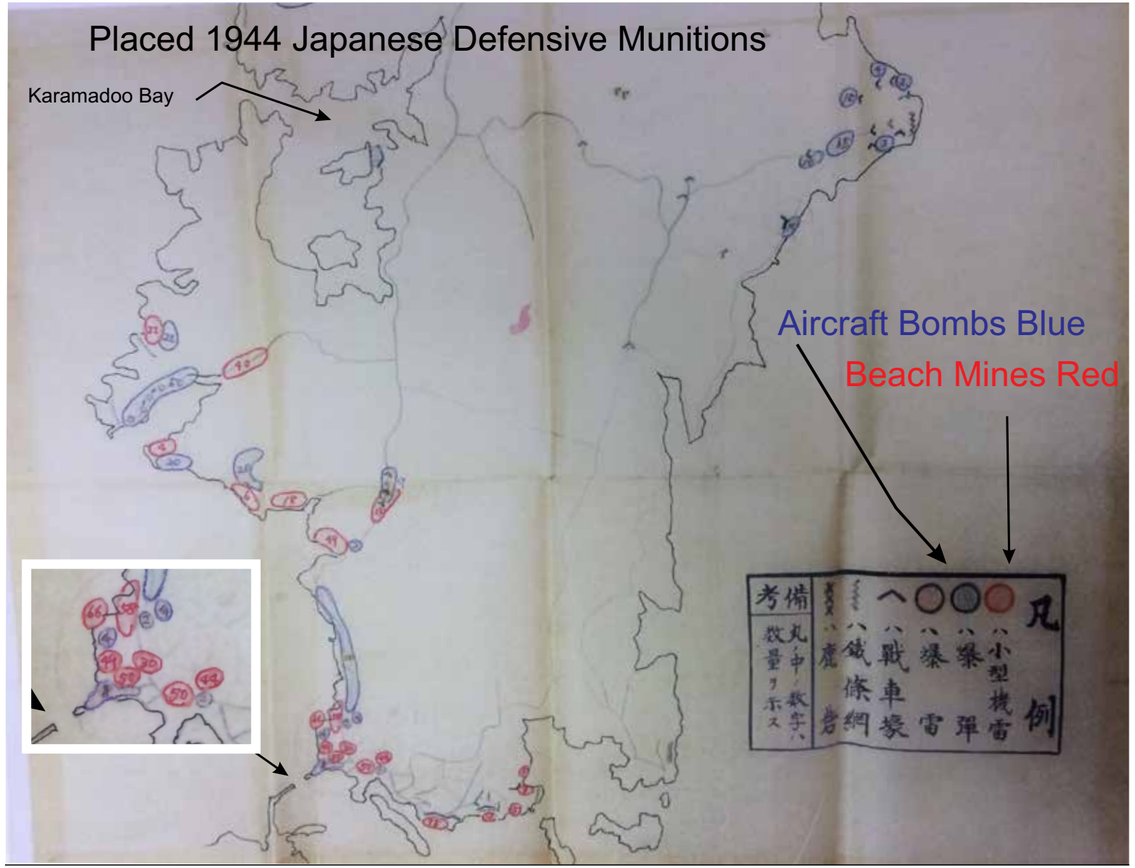
Strong beach defences were created with obstacles, beach mines and fortified gun positions, but these were also considered expendable in favour of the bunkers inland in the hills. This would become the standard defensive method employed by the Japanese forces for much of the remaining war.

The Japanese forces wasted nothing when it came to mounting their defences. Any munition that was not immediately useful was employed in a different way. Aircraft bombs and sea mines were hauled inland and buried to become either command detonated or victim activated booby traps. Today they would be referred to as IEDs or Improvised Explosive Devices.

1.5-ton sea mines were hauled into open plains and buried, as were 500-pound aircraft bombs. Fuses faced the sky awaiting an unwary footfall, vehicle, or detonation by a command wire. These IEDs abounded around the coast line and into any area the Japanese commanders felt the invading forces may go. Areas any landing force could use would be dictated by the outer reefs and this gave a certain amount of predictability to Japanese planners.

Where 1.5-ton sea mines and 500-pound aircraft bombs were on one end of the defensive spectrum, on the other side were small booby traps that were strategically laid. Any leftover cement was cast into blocks and these blocks were scattered about to give simple cover and protection for their forces. These bricks did contain a sting if used by invading forces as many also had homemade bombs cast inside them. Any old bottle could be filled with a variety of homemade

Archives around the world hide great secrets that have been forgotten since the war. Recently the Japanese Mine Action Service discovered a series of WW2 defence maps for Palau. This map shows areas that were booby trapped with sea mines or aircraft bombs. Each coloured circle is a danger zone and the number inside is how many booby traps are within.



Home made bombs were cast in concrete blocks by the Japanese army as part of their defence of Palau. They would have had wires protruding for a command detonation.

explosive compounds and left around the islands. These had a subtle secret of two wires protruding that when joined to a battery would detonate the block and potentially kill any soldier trying to use it for cover. Command detonated bricks such as these were in abundance and are still found around the island and in Koror.

Major booby trapped devices have been found around old Japanese defensive positions and have been removed over the years when found during encroaching developments. Other munitions and devices have simply been built over. Both of these scenarios greatly hinder systematic clearance efforts today.

What has not yet been undertaken is a systematic searching for and removal of these devices. Another obstacle to this has been the lack of historical and archival information available from Japan. This is coupled with small or non-existent funds and the lack of a full national UXO survey ever being undertaken. The situation improved in February 2017 when Japan released the defensive maps that were made during the war in 1944 by the defending Japanese military.

These maps give an exceptional insight into the areas that heavy defence was planned for and allow clearance teams to target suspect areas by location and by numbers of major munitions laid. The Japanese maps give excellent detail with colour coded circled areas that depict what is inside, bomb or mines and a number as to how many were laid there.

The recent availability of these maps provides many startling pieces of information. The maps of Koror city show how many IEDs have possibly been built over as Koror expanded. Figures are not available on what has been found in the past or where and what has been removed or not. It does create a disturbing thought that any future ground work needs to be undertaken with an eye to the possibility of uncovering some old munitions and booby traps.

In 2009, the British bomb disposal NGO Cleared Ground Demining began work in Palau. After an initial survey they began training local teams in clearance and underwater operations and by September of that year they had commenced work on clearance in earnest. They have since worked country-wide on reported tasks but have always lacked the advantage of any previous exhaustive nationwide ERW survey having been undertaken. They set up intensive operations on the main battle island of Peleliu and have since built an EOD training facility and their teams had cleared most of the island of Peleliu by 2018.

As Peleliu was the subject of the major ground fighting and invasion by US forces it has been a complex and difficult task. All manner of munitions have been detected and removed under extremely difficult and dangerous circumstances. The south was heavily bombarded, followed by close quarter ground fighting, then the battle moved into the mountainous spine of the island. This area was fought for inch by inch, ridge by ridge and cave by cave. An estimated 600 caves, both natural and manmade, are pock-marked from south to north along the island. All of these became Japanese defences that the Japanese fought to the death to defend.

Intensive physical searching has found these caves and in later years some archival information has also become available.

Members of the National Safety Office EOD team inspect a booby trapped 1.5 tonne sea mine many kilometres inland. Hundreds of similar devices were deployed during the war.

Working in such an underground environment is slow, very hot and extremely dangerous. Inside the caves have been caches of munitions, booby traps and dead soldiers. All of the munitions needed to be removed and any bodies found recovered and repatriated to Japanese authorities.

The clearance operation on Peleliu is part mountain climbing in dense tropical forests that are saturated with bombs. An added hazard is what the local people call the poison tree or the 'Tonget tree'. This plant is related to Poison Oak or Poison Ivy and creates a violently blistering rash when the sap or powder from the leaves gets on your skin. This problem is amplified in the rain as the substance

dissolves and creates a form of 'acid rain' that will burn on contact with skin.

The clearance capacity on Palau was increased further with the Japanese Mine Action Service setting up operations in 2012. In the years since they began their operations they have taken the task of underwater survey and clearance. Former Japanese Navy divers come on a rotation for a period of months and scour the ocean floor looking for any UXO from bombs to depth charges, torpedoes or dumped stockpiles. This exploration of the ocean floor is slowly building an understanding of dangers that are present although not obvious. Once an extensive underwater survey has been completed then underwater clearance in earnest may begin. Their work adds a new dimension to the clearance efforts in Palau and slowly the waters around Koror and the rest of Palau will become safe from toxins and the danger of explosion.

Norwegian People's Aid took an interest in Palau in 2015 and sent an advisor to establish a working relationship with the government and operational NGOs. They formed a relationship with the National Safety Office and have since expanded into survey and clearance. With the economic and building expansion comes a lot of earth work and digging. These activities could be road works or site preparation for new buildings and they all have the possibility of disturbing old munitions. The recently

Facing page: A member of Cleared Ground Demining carefully works his way into a fortified cave on the island of Peleliu.

Left: A beach mine is found in a tidal river flat near Palau's main airport. Many more were discovered in this area.

made available maps of the Japanese defences of 1944 give some indication of what might be expected when digging commences, and staff from the clearance NGOs are on hand to oversee the operations and deal with any hazards that are uncovered.

One notable underwater site is a shipwreck in Malakal Harbour in Koror called the 'Helmet Wreck' or 'Depth Charge Wreck'. The wreck is 189 feet long and resting on an underwater hill with its stern at 45 feet and the bow at 110 feet of water. The wreck was not discovered until 1990 by sport scuba divers searching for new wrecks to dive on. The wreck's name is unknown but it is a cargo ship converted to depth charge deployment and is full of depth charges, munitions and general ship's articles. Boxes of detonators were also present but were removed in 2013–2014. An accurate number of depth charges on the wreck is difficult to ascertain but 167 are clearly visible. This gives a total explosive content of 27 metric tonnes of high explosive if a total detonation of the wreck were to occur.

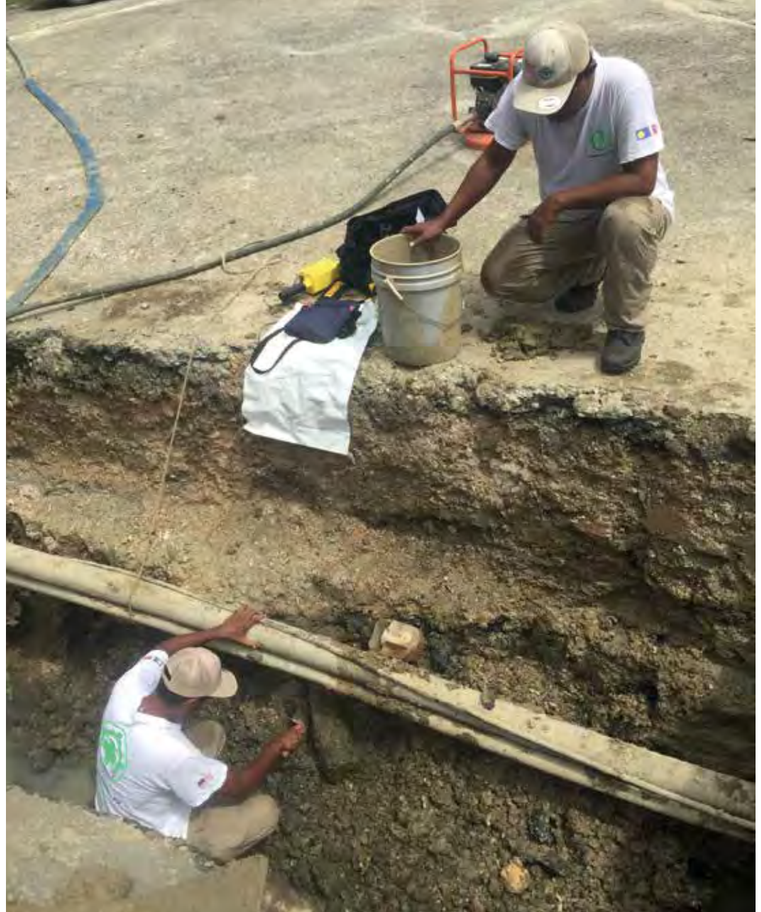
The lagoon on the southern tip of Peleliu contains over 40 aircraft bombs and all must be removed. This lagoon is a popular tourist scuba diving site.

The Geneva International Centre for Humanitarian Demining (GICHD) conducted a research mission to Palau in June 2013 to look at the Helmet Wreck. They met with the government and the two NGOs working in Palau and determined the wreck was of a low danger if not interfered with. The problem is the wreck is in the main commercial harbour and has the potential to be interfered with either accidentally or by the tourist scuba divers who dive on it.

An example of interference is the wreck's original name as the 'Helmet Wreck'. It got this name as there were Japanese helmets piled on the decks. In recent years all of these helmets have been stolen as souvenirs. To a tourist there is not much to distinguish a souvenired helmet, munition or any other artefact. The depth charges are also leaking picric acid and this creates a toxic dead zone around the wreck.

When GICHD conducted their research, they established a major underwater destruction radius, if all depth charges detonated, to be 2000 metres. This radius effect would mainly be to shipping but the pressure/shock wave would be hazardous to swimmers to a distance of 8.15 km. Any detonation would pose a massive danger to all marine life in a very wide radius and destroy fragile corals. Palau is a sanctuary to dugongs, sharks and other marine life and they are very proud of their pristine marine environment. As much of Palau's GDP is made up by tourism, any procedures to remove the danger posed by the depth charges needs to have minimum environmental impact on the surrounding marine environment. Any detonation underwater, either intentional or unintentional, would be disastrous to this fragile environment and the national income.

Within the main boat traffic area of Malakal Harbour in Koror is the 'Helmet Wreck'. This wreck of a Japanese ship contains over 167 depth charges.



Facing page:
Members of Cleared Ground Demining remove a 100 pound bomb from a hill top in central Koror. A few hundred metres below is a gas station and hotel.

Left:
Any public works or earth works undertaken in Koror needs supervision by EOD personnel. As a trench was dug to work on a sewer an artillery shell was unearthed. Members of the National Safety Office then took over and safely removed it

ONWARD AND UPWARD

Palau and the Solomon Islands are two nations with large ERW issues but differing experiences. The fighting in the Solomon Islands was a responsive running battle that was fought on a fluid battlefield. Attack, counter-attack, dig in, push out, pursue, ambush, move on, were all accurate descriptions of many of the battles in the Solomon Islands. The Japanese had stretched themselves regarding distance and supply and the Allied forces met them head-on and started to push them back.

Palau was different in that the Japanese forces had the time to construct well planned, heavy fortifications and fight on their own terms from these positions. This was an invasion against a fortress as opposed to a running battlefield.

As Allied forces pressed in from the other reaches of Japanese occupation, they found more fortifications like Palau and gradually fewer of the Solomon experience. The islands of Saipan and Guam had strong and well-constructed defences but nothing was as strong as the Japanese defences around the islands near Japan such as Iwo Jima and Okinawa. Both these islands had miles of elaborate underground tunnels and bunkers and strategic and tactical plans to match. The resulting battles reflected these elements in the numbers killed and wounded on both sides and the massive amount of munitions expended to gain any physical advantage.

Once the war ended, there needed to be reconciliation and rebuilding on a grand scale. A lesson was learned from WW1 that if you grind a defeated nation down both physically and economically the result will be hatred and blame and eventually retaliation. The end of WW1 and the conditions imposed by the Treaty of Versailles on the defeated set an inevitable course that led to WW2. The same mistake could not be repeated.

The Marshall Plan and eventual reconstruction of Germany was aimed at delivering the German people from destruction, starvation, poverty and economic ruin. It was also aimed at breaking the blind nationalism that had been in control for the previous 20 years.

A similar effort was aimed at the restoration of Japan, with over $2.44 billion invested in Japan's future from 1945 onwards. Cities were eventually rebuilt and industries developed and the world of nationalistic fervour left behind.

What was also largely left behind was the same level of investment and engagement for many of the former

Facing page: US soldiers inspect a heavily constructed Japanese bunker. A dead soldier at the entrance died while attacking it.

battlefields across the Pacific. Places like the Philippines, where a mutual economic benefit could be gained, were invested in, but the small island battlefields drifted off into the shadow of history with their individual dangers largely intact.

The physical clearance of former battlefields that were not simple stockpiles was not on many national or aid agendas and only in relatively recent years have international bodies and nations begun to focus on ERW.

Bomb awareness is a key part of community involvement. Events such as these bring in many reports of munitions that people have lived with for over 70 years.

A few recent disarmament treaties drove focus to the plight of communities affected by ERW. The treaty banning landmines, the Mine Ban Treaty or MBT, was created in 1997, then the treaty banning cluster bombs, the Convention on Cluster Munitions or CCM, in 2008. In 2017 the treaty banning nuclear weapons, the Treaty on the Prohibition of Nuclear Weapons, was also formed. Both the campaigns that drove the landmine and nuclear ban treaties won the Nobel Peace Prizes in 1997 and 2017 respectively.

With the creation of these three treaties and the two Nobel Peace Prizes the plight of many former battlefields came back on to international agendas. These treaties have a similar genesis and cover similar responsibilities. One shared goal is to make land safe. Safe means the destruction of stockpiles and also clearance of affected lands. Although each of these treaties is weapon-specific, it does open the argument that no land is clear and safe if it is not all clear and safe from all dangerous weapons and munitions.

Each of these treaties grew in support and with signatories and slowly the world closed in on these weapon systems. The Mine Ban Treaty has a massive number of signatures, followed by the Cluster Munition Treaty. The Nuclear Ban Treaty is new but already making strong headway into many a national agenda.

A region that has not been well represented on many of these treaties is the Pacific. For an area that has been so heavily affected by war, the absence of many Pacific Nations in these international forums is noticeable. The few strong exceptions to this are Palau, the Solomon Islands and Papua New Guinea.

Palau discovered its strong international political voice and began championing the issues faced by Pacific countries with legacies of war. They have embraced, signed and ratified both the Mine Ban Treaty and the Convention on Cluster Munitions as well as recently signing and ratifying the Treaty on the Prohibition of Nuclear Weapons. By being a participant in these treaties they have become associated with potential donor nations and NGOs that could help them clean up the mess from WW2. As a result, three international NGOs are working in Palau alongside the national body. Participation has brought focus, and the focus has brought money and a progressive solution to their problem of ERW.

The Solomon Islands is proceeding at a slightly slower pace but is a member of the Mine Ban Treaty and working towards acceding to the Convention on Cluster Munitions. These two treaties have brought them to the attention of the international disarmament community and in turn has attracted money and skills needed to clear their land of bombs.

Papua New Guinea acceded to the Mine Ban Treaty in 2004. It felt its existing legislation covered the issue and stated that it was already not mine affected. This position could be questionable as no national survey has ever been conducted nationwide and areas that had strong defensive perimeters like Rabaul could be in question.

Noticeably absent from any of these treaties are the Federated States of Micronesia and many other Pacific nations. The Marshall Islands is another country that still sends mixed messages of intent with these treaties. The Marshalls signed the Mine Ban Treaty on Dec 4 1997 but has never ratified it. It has not signed the Convention on Cluster Munitions nor engaged in any of the process meetings that either led up to the treaty or since. As a

The fear and tension is fixed over the faces of men in combat. Inch by inch the battles crept across islands and finally onto Japan.

The beach ahead burns and explodes prior to the arrival of landing craft.

small nation the issue is more related to not holding a standing army or having either cluster bombs or landmines. It is affected by ERW though and engagement at an international political level could help it attract donors and assist in the clearance of the land. Climate change is the highest issue on its political agenda and the scant resources are intensely focused on their response to rising sea levels. This does not change the fact that the country still has many bombs and this limits the use the people can get out of their land.

Between 1946 and 1962, the US military conducted 67 nuclear weapons tests on and around the Marshall Islands. This severely damaged and radiated large areas on the Marshall Islands and has left the islanders living with a toxic, radiated legacy that impacts the lives of the local population to this day. This, added to the ERW contamination from WW2, means there is a lot of work that still needs to be done.

A HEALTHY MIND, A HEALTHY BODY

Prior to WW2 most of the Pacific people lived simple lives. They fished and farmed vegetables and fruit, and islanders were known for their strength, stamina and strong physical condition.

World War 2 left many legacies and traumatised the people, both combatants and civilians. When your land is invaded by either side and bombardments follow, you suffer the same fate as the forces in occupation and in many cases worse due to lack of safe places to hide. Today we would look at populations that survive such nightmares as suffering Post Traumatic Stress Disorder or PTSD.

Combatants return home and try to pick up the pieces left from when they first went to war. Local Pacific populations rise out of the ash and mud to gaze across their landscape, their farms and their villages, to see what is now left of their once tropical island homes. This, as a single experience, is enough to damage people psychologically but it is amplified when their world is saturated with left-over bombs.

The generations after the war have had to contend with this dangerous legacy that has been passed down to them. Normal tasks of life became difficult, dangerous and in some cases impossible. Their world had become split into land and sea and in most cases the sea offered less danger than the land.

The boundary between beach and sea was soaked in oil, shattered landing-craft and leftover munitions. Added to this were the beach defences of barbed wire, landing obstacles and beach mines. Life would truly never be the same.

The various protagonists of the war faded away and headed home and the legacy of war was all that was left. The local people that had survived had lived through murder, starvation, enslavement and abuse, now they needed to regain their lands, protect their families and put food on their tables.

The provision of food was not an easy prospect. Farming was difficult with crops destroyed and a land seeded with unexploded bombs, UXO. The sea was an obstacle due to lack of boats of all sizes, from fishing boats to canoes, as these were all targets during the war.

People looked to the withdrawing military for aid and supply in the difficult task of survival.

Aid came in the form of surplus army rations and some building materials. The local ingenuity would then take over and the refuse of war would also be employed to their advantage.

Army surplus was not always readily available from the withdrawing military. In the case of Vanuatu there was a massive stockpile of munitions of 9 million tons that needed disposal. Sea dumping was the desired method and it was dumped in the ocean and nearby harbours. The military presence also had significant amounts of machinery and infrastructure and the departing US military tried selling this to the local population for the cost of 6 cents in the dollar.

The returning British and French colonial powers, together with local leaders, assumed they could refuse to pay as the US would leave and abandon the supplies.

The departing US military took a different view and piled many millions of dollars worth of trucks, jeeps, bulldozers, guns, tanks, forklifts, tractors, sealed boxes of clothing, food and Coca Cola into the sea off the island of Espiritu Santo. The local people were appalled to find this area now polluted with oil, rubber and vehicles in this final act of political spite. The area has become known as Million Dollar Point and is now a local scuba diving site for tourism operations.

In other parts of the Pacific useful supplies such as food became available and supplemented the local diet. As farming and fishing had become difficult, the supplement of the army rations became important for survival. This dramatically changed many local diets from a healthy one based on fish, fruit and vegetables to one of tinned meats, rice and pasta. The resultant effect on many island populations was obesity and the health issues associated with it.

These high fat, high carbohydrate diets created a certain taste addiction and the detriment to their health has become obvious.

William lives in Palau but is visiting his family on the island of Peleliu. His shopping bag holded a few tins of SPAM and some packets of spaghetti and rice.

"What are you buying?" our researcher asked.

"SPAM and rice," replies William. "We love SPAM and rice, it tastes great together."

"What do you do for work around here?" the researcher asks.

"There is no work around here and very little in Koror either. I live with my family and we take care of each other," he said.

"So do you farm or fish; where does your food come from besides the store?" he is asked.

"No, we don't farm, we do fish a bit but don't farm, we get our food from the shop," he said.

"So why don't you farm, what is wrong with the land?" he is asked.

"The land, nothing I guess, we just don't, the shop is easier", he said.

"Did your father or grandfather farm in the past?" he is asked.

"No, Dad never farmed but Granddad did, he farmed up there somewhere", waving his hand to the area behind that joined the rugged hills.

"So when was that that your Granddad farmed?"' he is asked.

"Before the war, then the Japanese pushed him out and the land was left", he said.

"So wouldn't it be good to go back and use that land and start some farming again?" he is asked.

"No, it is full of bombs up there, I don't want to go near them," he said.

"So what did your Dad die of and how long ago?", he is asked.

"Oh, Dad died lots of years ago, big problems with diabetes, he was really fat," was the reply.

"And how is your health?" he is asked?

"Oh my health is no good, I have diabetes too and it is giving me a lot of trouble. I'm told my circulation is no good in my arms and legs and my eyes are weak too," he said.

William is obese and suffers type 2 diabetes due to his diet and excess weight. This is a problem throughout the Pacific with diets changing from the healthy traditional diets to those full of fat and carbohydrates and supplemented with drinks full of sugar. Some of this is simply a lifestyle choice where for others it is a societal change – and then there are the bombs. While there are bombs there will always be the reality or perception of land they cannot use and this can manifest as an unhealthy population.

The Marshall Islands has a massive problem with morbid obesity. The Marshallese are some of the heaviest people globally and diabetes is at epidemic proportions.

A health study conducted in the Marshall Islands in 2007 to 2008 concluded that type 2 diabetes rates are one of the highest in the world. 28% of people above 15 years suffer from diabetes, and this increases to 50% for people above 35 years. 75% of women are obese, as are 50% of men. The regional hospital does not have renal care capacity through dialysis and 50% of their work is amputations due to complications of diabetes.

None of these effects could ever be considered the unequivocal results of UXO on their land but it does beg the question to how different their lives and health could be if their land were free of bombs and danger.

A boy on the Russell islands searchs munitions for copper to sell.

Far left: A landmine found on Peleliu Island. Children have the right to grow up in safety.

Left: Children playing on the beach.

Steve Ballinger from Cleared Ground Demining interviews two women about possible munitions in their area. Community outreach is an essential part of clearing any land of munitions.

A ROSY FUTURE

The far-flung nations of the Pacific that were affected by WW2 have dangerous legacies that affect them to this day. Not until their lands and seas are cleaned of old bombs and munitions can the impact of WW2 finally be relegated to the rear chapters of a history book. The task in doing this is large but not infinite or impossible.

Very definite factors would contribute to any clearance of munitions. Although it was World War 2 and the fighting was massive and covered widespread areas, it still did not have the capacity of sheer saturation of targets as is possible with the military powers that exist today. The saturation bombing that took place over Laos and Cambodia by the US military from B-52 bombers and the like in the 1960s and 1970s delivered a higher tonnage of bombs on those two small countries than by all sides on all battlefields during WW2.

Detection of WW2 era weapons and munitions is simplified due to their high metal content and physical sizes. This is different from the landmines that were spread across the developing world in many Cold War conflicts since the end of WW2. Many landmines were purposely constructed of plastic and Bakelite which makes detection very difficult.

The end result is the clearance of the Pacific nations of the dangers of World War 2 is possible. It is definitely not a technological impossibility. The hurdles are purely financial not physical.

With a concerted effort and funding in the clearance of WW2 munitions, the region could fulfil its full economic potential and develop with the shadow of historical danger removed.

Tourism and commercial fishing would probably spearhead any immediate financial steps forward, but with a completely safe environment the possibilities for a good future would be determined by them, the populations of the Pacific and not by the dangerous legacies that have shaped many lives for over 70 years.

There also needs to be cooperation between potential donor nations and the organisations that would undertake the work. Archival research would need to be conducted and battle plans and maps made available so money and effort could be targeted to the areas of greatest need.

The research conducted for this project has taken over eight years and in that time we have found small unit battle plans, situation reports, contemporary maps made during

the war, photographs, films and a range of other material that can greatly aid the discovery and ultimate clearance of dangerous areas. All this aids in the focusing of resources to search areas with a high possibility of finding ERW and not wasting time searching areas that may or may not have suffered fighting.

One example is the archival maps released by the Japanese government through JMAS. These maps not only show where they buried munitions as IEDs in the defence of Palau but give the types of munitions used and their quantities. This quality of resource material is of the highest value and speeds clearance dramatically. It provides a 'shopping list' of what is hidden in very specific areas.

These kinds of resources combined with a Pacific-wide non-technical survey would achieve some specific results. It would create a work plan of what areas are NOT affected by ERW, hence leaving what is left as what MIGHT be affected. Then the available resources are focused in that area for clearance.

A natural human tendency is to focus clearance efforts on land but the oceans must also not be forgotten. Ocean areas where stockpiles are dumped and accessible need to be dealt with to finally end the interaction between man and bombs. Then there are the shipwrecks to deal with.

In the theatre of war that was the South West Pacific, an estimated 3,100 ships were sunk. Of these it is believed 298 to 310 were fuel tankers and bunker craft. Most of these went down with full loads of fuel and oil aboard. Many ruptured and burned when originally sunk while others partly lost their cargos and went down intact or at least with intact fuel tanks.

These steel sarcophagi have been steadily rusting since the end of the war. A study undertaken by the West Australian War Museum estimated the steel of ships and tanks would reach a point of catastrophic decay after approximately 65 years. We have passed that milestone and things are changing beneath the waves.

Truk Lagoon in Micronesia, Kwajalein Island in the Marshall Islands and Iron Bottom Sound in the Solomon Islands are three examples of many shipwrecks in relatively confined areas. All locations have a constant stream of oil slicks weeping from underwater shipwrecks. When you travel by boat the few hours between Honiara and Tulagi in the Solomon Islands you will pass through such slicks.

The scuba diving sites of Truk Lagoon and Kwajalein Island are constantly weeping steady streams of oil from their hulks. If the stream stays small it will probably be dispersed by nature with minimum environmental impact. If there is a rupturing or catastrophic collapse of fuel tanks, then entire cargos of oil will be disgorged into what should be the pristine environment of these Pacific Nations. An environmental catastrophe would be the outcome and yet another physical and financial hurdle placed in the way for these countries to deal with.

The waters around the populous areas also need searching to avoid any possible accidents. A US aircraft bomb encrusted in coral is found by divers from JMAS near the Palau capital, Koror.

Above:
Troops advance into a shattered smoking valley.

Facing page:
Good detailed archival research is essential in locating search areas. Bombing missions during the war were photographed to check accuracy. These photographs can now be used to see where dropped bombs did not detonate and denote a possible search area.

Organisations exist that can deal with sunken ships full of fuel. One example is the Major Projects Foundation from Australia. They have the skills and the ship and are ready to deploy to any site with sunken ships full of fuel. What they do not have is the money to do this.

The technique of cleaning a ship of fuel is reasonably straightforward. The fuel tank is located and a steam lance is inserted. This heat by steam warms the oils into being of a consistency that may be pumped out. The wreck is left checked and cleared and can continue its future as a tourist attraction for divers and earner of foreign moneys.

ALL TOGETHER NOW

Simple facts can sum up many factors in this book.

World War 2 was bitterly fought across the Asia Pacific area. Many soldiers and civilians died. Masses of munitions were manufactured and expended and economies were destroyed and created as a result of the war. The earth was scorched. Danger from old bombs and munitions shape the lives of many to this day. Oil-filled wrecks laden with bombs are still just below the ocean's surface. No one can achieve a life of safety while they live with munitions, toxins and pollutants and are wary of the dangers in their land and seas.

Life is better without bombs, it is a simple fact.

After the initial recognition that the war left a dangerous legacy, we can then focus on what still needs to be done to remove that danger once and for all. There are many factors that will drive this. The first is always money. Money needs to be allocated to allow a systematic survey of the battle areas in the Pacific to determine which ones are most affected by the dangers created by World War2.

Once these areas are identified there needs to be more money to create and train teams of professionals to deal with the dangers. There is never a shortage of people wanting this work. Many of the countries affected by ERW have high unemployment and the chance to gain internationally recognised skills is always welcome.

Clearance strategies need to be planned and the teams funded and deployed. This takes more money and budgets sufficient to equip the teams to begin and finish the task of clearing the affected areas, country by country.

Assistance in the rehabilitation of areas that were danger zones and former battlefields, once cleared can be developed in any way the local people wish. Farming, homes and villages, wildlife reserves, schools, tourism, industries, whatever they decide is best for their individual circumstances. All of this is possible, if there is political will both locally and internationally.

Palau is the model example here. They have engaged on a high political level and engaged in the arenas of international treaties. This in turn has helped them present their case and gain international assistance. Their world is being cleared and they are well on their way to a brighter future.

The Solomon Islands has developed excellent local capacity with its EOD team and has engaged internationally. Various domestic political and security difficulties have slowed pace at times but at the time of writing this book

The strain and exhaustion is clear on the faces of these American soldiers still in combat towards the end of the war.

this nation has made great movement towards more international treaties and relationships.

The remainder of the Pacific nations have a variety of differing situations when it comes to the world of munition clearance and international engagement. For many, the simple cost of sending a delegation to any of the relevant meetings of the United Nations or the various treaties is prohibitive. Money is often in short supply and priorities need to be made. Assistance to bring Pacific countries to participate in these arenas would be an excellent beginning.

There is also the issue of political will. In some cases, Pacific nations have been offered engagement and support, have been asked to meet, have been offered financial assistance to participate in these arenas, only to have those offers rejected, ignored or squandered. The question they must ask themselves is what kind of representation are they really providing to their people if they are not interested in clearing their land of bombs when help is offered.

The opposite situation has also occurred when a country has been invited to an international meeting with full sponsorship, only to have this sponsorship cancelled at the last minute. This sends a very dismissive message and can greatly discourage further engagement.

The Pacific region needs to gain some form of priority from donor nations. For over 70 years it has been a case of 'out of sight, out of mind'. When the war ended, a certain amount of clearance was undertaken but much has also been abandoned to this day. The bombs will never clear themselves but clearance is also a finite task. In a perfect world a proper impact study of the Pacific would be conducted and resources allocated to finish the job. Nations would be able to plan around a solid financial commitment and NGOs could equip and train the staff needed for the task.

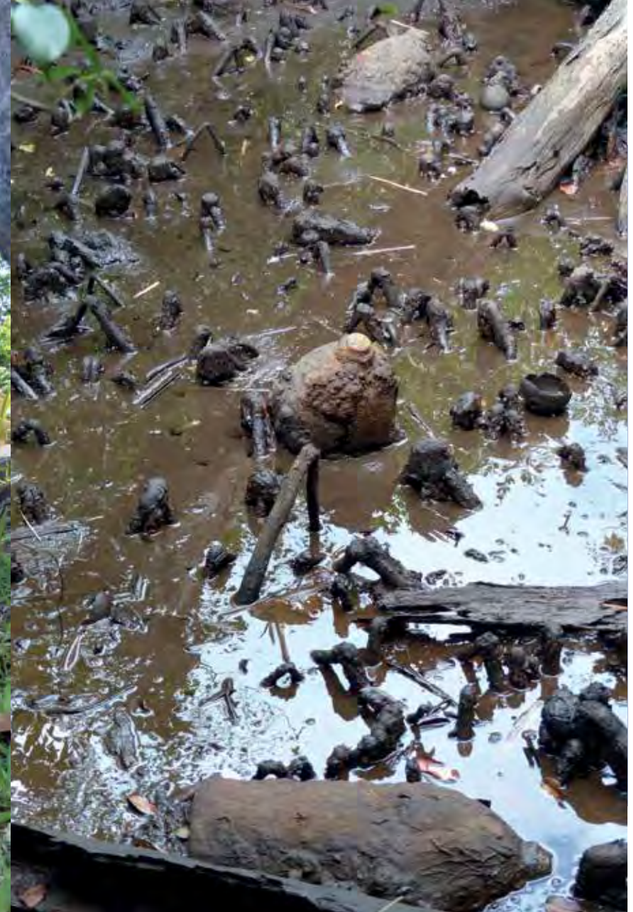
Teamwork will always be needed as different organisations have different skills and donor bases. A fully integrated and coordinated approach will amplify skills and speed the task to fruition. Data gathering and sharing is an important part of any clearance operation to allocate the correct resources to the appropriate task and stop duplication of roles and projects. Training clearance personnel to IMAS standards and using tools such as IMSMA would standardise methodologies and approaches.

National or regional coordination bodies can be a central depository of information and can build and manage the necessary data bases to assure the highest standards of clearance are met.

Any organisation working in a nationally coordinated program should also feel secure in its relationship with its donors. Transparency from both sponsor and organisation is the key to a solid relationship and to maximizing output in the area cleared. Funds must be spent wisely and the work result driven.

Greater cooperation also needs to exist between NGOs, so mixed relationships can be supportive and not

The team from Cleared Ground Demining loads a bomb found in central Koror into a vehicle to be transported to the demolition area.



combative. Situations of one organisation undermining the resources of another only result in mistrust, duplication of work and animosity. This ultimately fragments a working environment and costs more money with less of a positive outcome.

All post-conflict clearance needs to focus on what is good for the people and not be politically driven by ambiguous agendas. The world's major powers can and should play very strong roles in clearing the Pacific of ERW. The resources do exist if donor nations are prepared to focus funds to close this chapter of World War 2 history.

During the war years the Pacific region became important due to its strategic location. The triangle formed between Japan, America and Australia was an area each side wished to control to achieve regional dominance of sea lanes and supply lines. Japan wanted unfettered access to Indo-China and dominance over the routes to Australia to secure their empire and supplies of raw materials.

Similar circumstances are beginning to exist today as a new strategic focus is emerging in the Pacific between rival Superpowers and allies alike. If various countries are looking for regional influence, then maybe their 'good neighbour policies' should extend to cleaning the Pacific theatre of war of World War 2 munitions once and for all.

The Pacific nations have lived with a dangerous legacy since hostilities ended in 1945 and with a concerted effort

Facing page: One of many beach mines found in the rivers near Koror Airport. It and others were removed and destroyed.

Left: A muddy swamp behind a residential house contains a number of aircraft bombs and beach mines. It is filthy work recovering them for demolition.

this legacy can become history. Only then will Pacific nations have a future without fear and a future controlled by them.

The international community and in particular the regional neighbours need to focus on this, then clear and end the issue of ERW. There are peoples desperate to have safe lands and organisations ready to make that dream a reality. The key is to focus on the job to be done, to work together and get access to the funds to make this dream a reality. Then, and only then will World War 2 and the misery created by it over 70 years ago truly end.

Facing page:
A 106 pound Japanese beach mine is removed from a residential area by Cleared Ground Demining.

Left:
After digging up a US aircraft bomb it is prepared for transport by Cleared Ground staff to be destroyed.

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Children around the world deserve a happy and safe future, free from dangers and fear from a war long gone. Only with all bombs removed can they have such a peaceful future.

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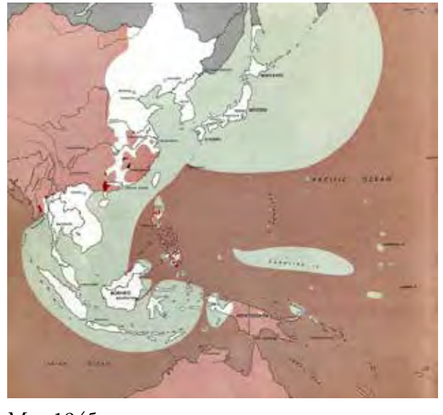

May 1945

These maps show how Japanese controlled areas grew and shrunk through the war. White colour shows areas controlled by Japan, pink colour shows areas controlled by the Allied forces.

Right:
The locals in Russel Islands live in close proximity to abandoned munitions.

Facing page:
Soldiers on the frontline. Suicide Hill, Peleliu in Palau.

This project looks at the Pacific Theatre from World War 2 with the aim to educate the reader and start conversations. The war has been over for 73 years but a dangerous legacy still exists in many of the former battlefields. When the war ended and troops returned home, they left the refuse of war in the form of wreckage, oil and toxic pollutants and munitions. Small efforts were undertaken in the late 1940s but much was simply abandoned. Out of sight and out of mind.

This book is built on detailed historical, archival and field research into the jungles and towns of the Solomon Islands and Palau and archives from the USA, Australia and Japan.

It is hoped the reader will learn a great deal about what happened during the Pacific Campaign and gain an understanding of the dangerous legacy that still exists in many an idyllic Pacific Nations.

With this knowledge we call for change. That change comes in budgets for bomb clearance and development so the final violent chapter of World War 2 may now be written and eyes can focus on a bright future rather than the violent past.

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SAFE GROUND
Reducing impacts of war

John Rodsted

IN SEARCH OF SAFE GROUND — ERW IN PACIFIC