OPERATION CARTWHEEL, 1943-1944: INTEGRATED FORCE PROJECTION TO OVERCOME LIMITED ACCESS

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE
Military History

by

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Fort Leavenworth, Kansas
2014-01

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
13-06-2014	Master's Thesis	AUG 2013 – JUN 2014

4. TITLE AND SUBTITLE

Operation Cartwheel, 1943-1944: Integrated Force Projection to Overcome Limited Access

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Christopher J. Killeen, Maj, USAF

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Command and General Staff College
ATTN: ATZL-SWD-GD
Fort Leavenworth, KS 66027-2301

8. PERFORMING ORG REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; Distribution is Unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The inherent problems of limited access in an island campaign magnify when examined through the lens of projecting force on one's enemy. General Douglas MacArthur's campaign through New Guinea and the Solomon Islands provides a focused environment to examine the applicability of using airlift as an option to overcome limited access, while enhancing force projection. The capability of planners and crews to deal with the limitations associated with airlift is evident through the lens of five dimensions. The dimensions of staff utilization, tactical and operational effects, indirect effects, airlift capabilities, and combined arms integration support each other to show how airlift employment provides a force projection capability. The applicability for future operations lies in understanding the impact of each dimension and ensuring full implementation of limitations and effects. Only through this understanding of integrated employment can future forces gain true achievement of unified action.

15. SUBJECT TERMS
Tactical airlift, Intra-theater airlift, Operation Cartwheel, C-47, Southwest Pacific Area, General Kenney

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. PHONE NUMBER** *(include area code)*
(U)	(U)	(U)	(U)	86	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

MASTER OF MILITARY ART AND SCIENCE

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

OPERATION CARTWHEEL, 1943-1944: INTEGRATED FORCE PROJECTION TO OVERCOME LIMITED ACCESS, by Maj Christopher J. Killeen, 86 pages.

The inherent problems of limited access in an island campaign magnify when examined through the lens of projecting force on one's enemy. General Douglas MacArthur's campaign through New Guinea and the Solomon Islands provides a focused environment to examine the applicability of using airlift as an option to overcome limited access, while enhancing force projection. The capability of planners and crews to deal with the limitations associated with airlift is evident through the lens of five dimensions. The dimensions of staff utilization, tactical and operational effects, indirect effects, airlift capabilities, and combined arms integration support each other to show how airlift employment provides a force projection capability. The applicability for future operations lies in understanding the impact of each dimension and ensuring full implementation of limitations and effects. Only through this understanding of integrated employment can future forces gain true achievement of unified action.

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ACRONYMS

CCS	Combined Chiefs of Staff
DAT	Directorate of Air Transportation.
GHQ	General Headquarters
JCS	Joint Chiefs of Staff
SLOC	Sea Line of Communication
USASOS	US Army Services of Supply

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CHAPTER 1

INTRODUCTION

Operation Cartwheel began in August 1943. This was the first combined effort in the Pacific Theater oriented on offensive operations against the Japanese. The offensive followed nearly two years of Japanese expansion after the attack on Pearl Harbor. Most US and Allied operations up to June 1943 consisted of small gains in order to maintain a strategic defense posture. General Douglas MacArthur's buildup of strength in the Southwest Pacific Area of operations helped initiate the switch from defense to offense. Cartwheel was fraught with danger, particularly in the face of a determined Japanese defense. The men of tactical airlift shared these dangers throughout the shaping and execution of Cartwheel.

Lieutenant Ernest C. Ford, a 6th Troop Carrier Squadron C-47 pilot flying one of the first missions into Tsili Tsili, illustrated the dangers when he described his first sortie. This sequence highlights the main obstacles tactical airlift personnel faced during mission accomplishment throughout Operation Cartwheel. Tsili Tsili was a rough airstrip, cut out of kunai grass. This made it difficult to identify from the air. The primitive airfield also possessed surrounding terrain up to ten thousand feet, requiring constant lookout for clearance. While Allied fighter protection provided a capable deterrent, enemy fighters broke through to engage Ford's formation from behind, killing both his wingmen while on final. Ford broke off his approach and executed a head-on pass with a Japanese Zero, his only defensive measure at low altitude. Following this maneuver, Ford and his remaining formation separated at below treetop level, egressing the area in search of relief from Japanese attack while picking through rising terrain between them and their

safe return to Port Moresby. During the engagement, the transports received no assistance from ground based air defense assets, due to the relative proximity of friendly aircraft to enemy. The cold truth was that Allied air superiority, and overall protection, was fleeting and required constant management for mission success.[1]

Lt Ford's recap of events during the initial phases of the Allied advance in New Guinea during World War II illustrates the dangers that transport crews faced. They accomplished their mission while overcoming adversity in terrain, sickness, weather, and the ever present Japanese, ensuring Allied supply and movement towards the next objective. This mission consisted of supporting all efforts on air, land, and sea to push forward the Allied offensive and defeat the Japanese.

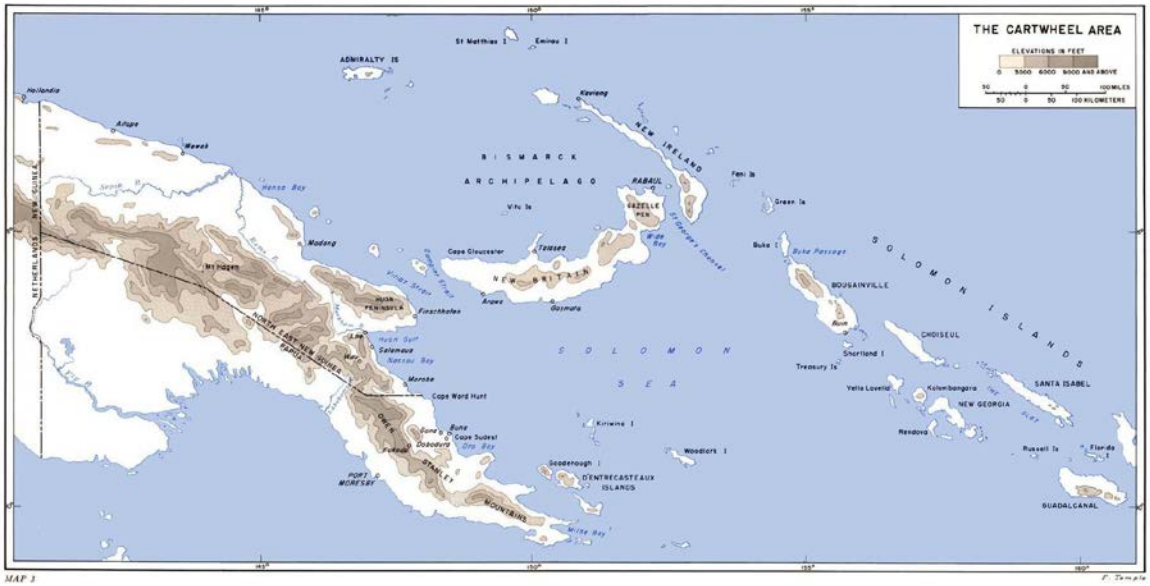

Figure 1. Cartwheel area

Source: John Miller, Jr., *The United States Army in World War II, Cartwheel: The Reduction of Rabaul* (Washington, DC: Office of the Chief of Military History, 1959), 23.

The Cartwheel area of operations was in the Southwest Pacific Area of the Pacific Theater. This area's geographical characteristics are ideal for airlift utilization. Vast sea expanses separate the predominant mountainous terrain of the islands. The islands themselves contain sheer mountain peaks often veiled by clouds. During World War II, the islands also lacked infrastructure such as improved roads, rail, or airfields. The only improvement came from Australian initiatives before Japanese occupation, such as rough airstrips and rudimentary seaports. The timeliness of troop movement, evacuation, and resupply relied on the buildup and employment of airlift capability to overcome these obstacles.[2] The obstacles of terrain and infrastructure existed along with enemy aircraft targeting supply ships or troop transports on a frequent basis.

Operation Cartwheel's objective was to gain the initiative against the Japanese and begin the push toward Japan.[3] Air power was a major factor in the success of this objective, underpinned by tactical airlift employment.[4] The efforts of troop carrier crews provided airland and airdrop resupply capabilities to all forces in the Southwest Pacific Area. Airlift personnel also assisted in ground forces movement and maneuver. This mission of movement and maneuver extended operational reach and added operational flexibility. The reach and flexibility mitigated surface shipping limitations imposed by island reefs, enemy aircraft, and supply priorities.[5] Overall, employment of tactical airlift for logistical supply and maneuver added to the multidimensional flexibility of Allied forces.[6]

Statement of the question

The majority of previous airlift utilization research focuses on European Theater troop drops during Operations Overlord and Market Garden. There is also a wealth of

information on the lifeline to the China-Burma-India Theater provided by the men flying over the eastern Himalayas. The primary question of this study is the impact of tactical airlift on force projection and the overall success of Operation Cartwheel. The answer will provide insight on the development of integrated and flexible use of airlift assets to improve military success. The successive doctrines of the U.S. Army since World War II, AirLand Battle in particular, embraced airlift as integral to speed in maneuver and force multiplication.[7] The research into this integration answers how the Army developed this doctrine. Further, a series of secondary research dimensions support the development of this question.

This study will proceed with Operation Cartwheel's background and execution, with focus on tactical airlift's adaptability. This focus will illustrate airlift capability to help solve the problem of operational reach. The planner's problem was maintaining operational reach while carrying out offensive operations against the Japanese forces in the Southwest Pacific. These airlift operations were key to establishing lodgments supporting continuous attacks to allow the reduction of Japanese strength. Planner preparation for operational reach capacity established a baseline for enabling offensive operations against the Japanese homeland.

The first area of study is the background events leading to Cartwheel execution. These events, consisting of the situation and Allied operational goals in the Southwest Pacific during 1943, set the basis for the events occurring throughout Cartwheel. This provides the next focus in execution, with particular emphasis on tactical airlift employment and support of the overall scheme of maneuver. The final portion of this study will relate back to the primary research question. This relation will provide

applicability of integration and operational effects. The ultimate realization that tactical airlift provides viable maneuver support, aiding in force projection, comes from the critical study of this integration and the manner it was achieved.

All information throughout this study follows five research dimensions. These dimensions consist of: staff utilization of airlift, tactical and operational effects, indirect effects, airlift capabilities, and combined arms integration. The importance of each dimension reflects its relative influence to the thesis question, limited to the application of tactical airlift and contributions to the overall effort of Cartwheel.

The first dimension of study development covers MacArthur's General Headquarters (GHQ) staff's utilization of tactical airlift in support of the overall campaign strategy. Analysis covers the planning capability level on MacArthur's staff, including knowledge and experience with airlift capability and requirements. Included in this analysis is how well they met Joint Chiefs of Staff directives to unify operations. While the strict definition of unity of command meant conduct of operations in a single theater under a single commander, the actual intent for each theater was to achieve unity of effort in all operations.[8] The answer to this question addresses the ability of Southwest Pacific Area forces to achieve internal unity of effort, as well as external unity with Southern Pacific Forces.

The second dimension is the tactical and operational effects of airlift integration on the ground force commander (GFC) scheme of maneuver.[9] The ability to achieve unity of effort through use of integrated effects highlights planning success. The resulting GFC interpretation of this support is found in after action reviews and reports of objectives met during Cartwheel's execution.

The third dimension comprises indirect effects of airlift usage and resultant second and third order effects of air power. Integration of airlift into operational planning also affected naval support requirements and freedom of maneuver. Supply issues in the Southwest Pacific Area were endemic, due to geographical distance from the US and reduced naval shipping capability.[10] Less apparent, however, is how airlift relieved this burden to enable continuing operational reach by Allied forces.

The fourth dimension concerns airlift's ability to provide those effects. Inherent problems in establishing tactical airlift as a practicable means of maneuver included development of new techniques and procedures. Southwest Pacific Area operations required airlift assets to overcome distances required for operations and limited port capabilities of reef-strewn islands. Problems in developing internal airlift capability abounded as well. These consisted of issues such as aircraft and crew availability and overuse, maintenance capabilities, island weather, and fighter escort requirements.[11] The ability to develop plans meeting these requirements supports airlift capability to provide force projection necessary in Cartwheel.

While airlift in Cartwheel provided numerous successes, meeting all objectives was not easy. This requires focus on whether airpower's limitations detracted from the campaign. Air power as a young force continued developmental growth in capabilities and employment methodologies during World War II. This growth required commanders knowledgeable about air power capabilities and limitations. Full appreciation clarifies airlift capacity to project force and assist in the maneuver of troops during Cartwheel.

The final dimension of combined arms integration is integral to the study. Integrated forces consist of two or more forces providing synergistic effects to improve

the overall power of the force. Understanding the level of integration of all air power assets into a cohesive plan will show airlift's practicality as a force projection mechanism. A review of force capability through planning versus execution shows integrative effects achieved. Although integration was innovative in 1943, the capability derived improved the force as a whole. Though growing pains constrained some operations as service plans sometimes overrode operational aims, application of unity of command laid the groundwork for staffs to integrate to achieve the desired operational effects.

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[1]Edward T. Imparato, *374th Troop Carrier Group* (Paducah, KY: Turner Publishing Company, 1998), 101-103.

[2]John Miller, Jr., *The United States Army in World War II, Cartwheel: The Reduction of Rabaul* (Washington, DC: Office of the Chief of Military History, 1959), 23.

[3]Robert W. Coakley and Richard M. Leighton, *The United States Army in World War II: Global Logistics and Strategy, 1943-1945* (Washington, DC: Office of the Chief of Military History, 1968), 396.

[4]Tactical airlift and strategic airlift terminology no longer exists in U.S. Air Force doctrine, replaced by Inter- and Intra-theater airlift. The use of tactical airlift in this document better reflects the differences in airlift utilization during World War II. Tactical airlift forces were typically assigned under the Theater commander for the purpose of supporting operational aims, while strategic assets ferried troops and cargo from the U.S. and were not directly under Theater commander control.

[5]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign, January to October 1943* (Washington, DC: AAF Historical Office, HQ, Army Air Forces, 1946), 26.

[6]Lt. Col. Charles E. Miller, *Airlift Doctrine* (Maxwell AFB, AL: Air University Press, 1988), 138-139.

[7]John L. Romjue, "The evolution of the AirLand Battle Concept," *Air University Review* (May-June 1984), www.airpower.maxwell.af.mil/airchronicles/aureview/1984/may-jun/romjue.html (accessed 13 December 2013).

[8]Coakley and Leighton, *Global Logistics and Strategy, 1943-1945*, 418-419.

[9]Louis Morton, *The United States Army in World War II: Strategy and Command, The First Two Years* (Washington, DC: Office of the Chief of Military History, 1968), 677.

[10]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign*, 43-44.

[11]Miller, *Cartwheel*, 59-60.

CHAPTER 2

THE SITUATION IN THE SOUTH PACIFIC

The operational environment of the Southwest Pacific Area was shaped by events beginning almost two years prior to Operation Cartwheel. The Japanese attack on Pearl Harbor in December 1941 was the catalyst propelling the US entry into World War II. Although this event dictated a rapid response, combined British and US strategy agreed upon at the Arcadia Conference dictated a "Europe first" overall effort.[1] JCS planners developed multiple iterations of this strategy throughout the interwar years preceding the events of 1941. The US and British belief that Germany posed the greatest threat to Allied security led to implementation of the RAINBOW-5 strategy. This was the overarching strategy for the US to fight a two front war against a European and Japanese enemy.[2] The aspects shaping the strategy included differences in manpower, resources, and overall capability. In January 1941, the final decision resulting from the American British Conversations was to enact a strategic defense in the Pacific in the event of concurrent wars against Germany and Japan.[3] The negative result of RAINBOW-5 was the steady Japanese perimeter expansion. The Japanese strategy rested on resource acquisition, as the home islands provided few natural resources. The Japanese implemented this strategy when they attacked Pearl Harbor, aiming to reduce the US Navy's capability to project power throughout the Pacific. This would also give the Japanese necessary time to consolidate the external perimeter of their layered defense. This expansion shaped the overall Japanese defense.[4]

While Allied strategy dictated priority of effort to the European theater, the US was still reticent to let the entire Pacific fall into Japanese hands. To prevent this, the

strategic defense was designed to ensure US interests remained secure in Hawaii and close to the US mainland. The main loss under RAINBOW-5 implementation was the Philippines. This threatened the US supply lines to Australia and New Zealand due to Japanese naval reach expansion. Meanwhile, the rebuilding effort for the US required rapid regeneration of naval assets and expansion of ground force capability. These necessities drove US attempts to regain control in the Pacific. General MacArthur provided direction towards the eventual Southwest Pacific Area strategy, while Admiral Nimitz' strategy in the Central and Southern Pacific Areas counterbalanced with reconstituted naval power throughout the Pacific. Japanese seizures in the Aleutian Islands also dictated a response in that area. These multiple lines of operation provided five basic lines of advance, communications, and logistics split between the Pacific and India.

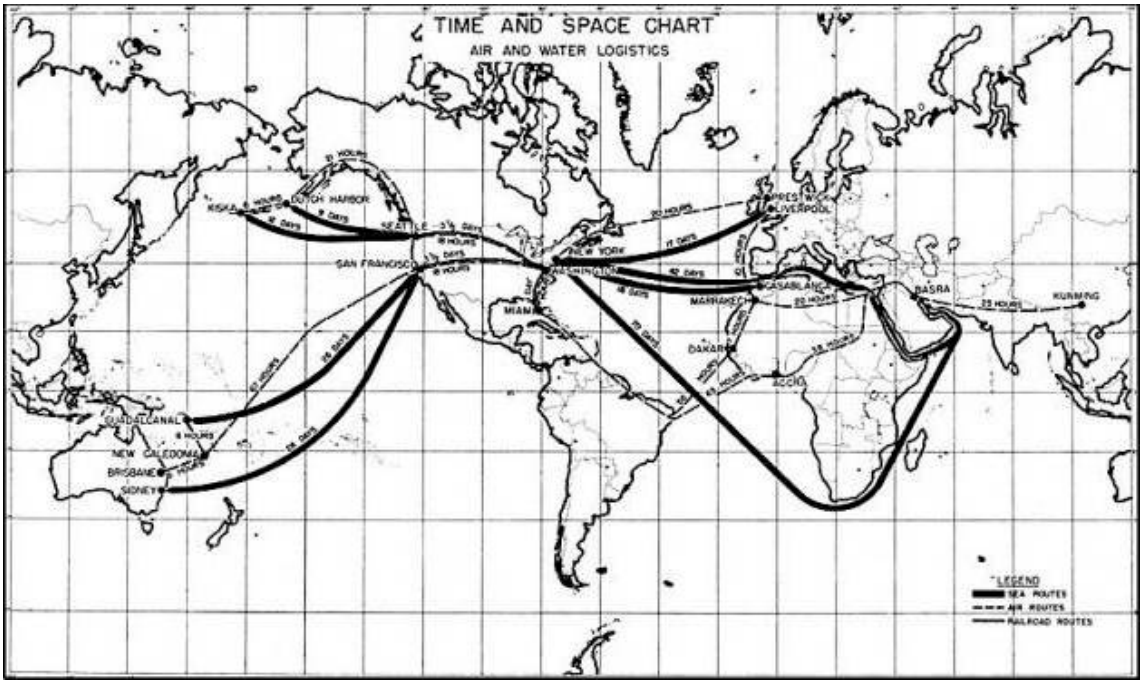

Figure 2. WWII Supply lines

Source: Geographical Imaginations, "US Supply Lines of World War II," http://geographicalimaginations.files.wordpress.com/2012/08/us-supply-lines-world-war-ii.jpg (accessed 24 April 2014).

The plan for Pacific lines of operation servicing the Southwest Pacific Area encompassed the line from Australia through New Guinea and the Bismarck Archipelago into the Palaus and Mindanao.[5] This sea line of communication (SLOC) supported operations throughout all Pacific theaters, requiring prioritization between efforts. The US JCS vacillated upon these priorities until arriving upon a final strategy in 1943. The final direction drove the relationship between the Southern Pacific and Southwest Pacific Area theaters.

The disagreement in strategic focus between these two theaters contributed to primacy of resources, requiring resolution via JCS direction before a concerted effort

could begin. ADM Halsey's plan for the Southern Pacific Area was a naval-based campaign, while MacArthur's "Elkton plan" employed a Southwest Pacific Area advance using land basing to regain the Philippines. MacArthur developed "Elkton" in response to a JCS request in February 1943 for a plan to retake the Solomons and New Guinea through Rabaul. This plan went through three iterations and coordination between MacArthur and Halsey. The resultant "Elkton III" had three Allied tasks. These tasks consisted of movement into the Solomon Islands, seizure of the Solomons and the string of northern New Guinea Japanese strong points, and final seizure of Rabaul.[6] The main issue with "Elkton III" was the lack of dates, as MacArthur did not see the ability to assign dates without understanding the final makeup of available forces.[7]

Operation Cartwheel was born out of these attempts to develop a cohesive plan for the Allied advance in the Pacific. The Japanese defeat at Midway shifted the initiative to the US, based on aircraft carrier preponderance for the US. Allied forces maintained this initiative in the Pacific, although instituting competing strategies. Each strategy aimed at focusing resources to establish secure lines of communication and transition from defensive to offensive operations. The Southwest and Southern Pacific Areas had a common axis of advance toward the Japanese strongpoint of Rabaul. The demarcation line between each area of responsibility lay along the 159th meridian, just east of New Guinea. JCS direction approved General MacArthur as Commander in Chief, Southwest Pacific Area, and Admiral Halsey, Commander in Chief, Southern Pacific Area, to conduct the three-phase Elkton operation. The entire operation became unrealistic due to competing personnel and materiel priorities with Europe. Southwest Pacific and JCS planners decided that the forces in place during the summer months of 1943 could

accomplish Phase I and II of the plan. This final version of "Elkton," named Operation Cartwheel, would serve to gain the initiative against the Japanese and begin the Allied advance toward Japan.[8]

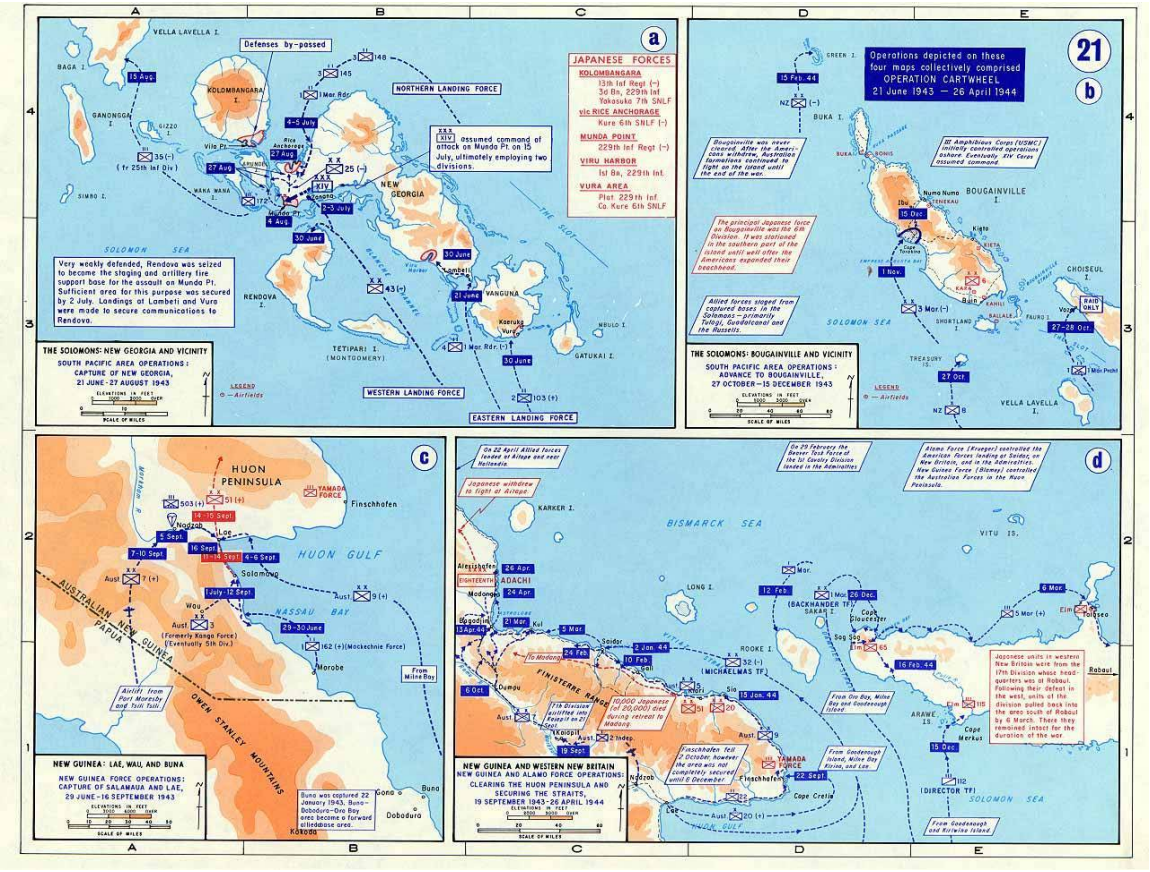

Figure 3. Cartwheel operations

Source: US, Department of the Army, "U.S. Army. Cartwheel Operations Map," http://www.usma.edu/history/SiteAssets/SitePages/World%20War%20II%20Pacific/ww2%20asia%20map%2021.jpg (accessed 23 December 2013).

Cartwheel Strategy

Logistical issues drove US operational strategy for Cartwheel. To facilitate operational reach, the Southwest Pacific Area established an operating base at Port Moresby and conducted successful operations in Papua.[9] Denying the Japanese access to Port Moresby both solidified Allied operations in the area and secured vital Pacific supply lines. JCS planners felt this provided the capability to begin movement towards the Philippines.[10] Admiral Halsey led the central drive with Southern Pacific Theater forces toward the Caroline and Palau islands, while the Southwest Pacific Area looked to secure New Guinea as the main attack.[11] This main attack line would dictate priorities for shipping and supply and garner success over Japanese forces in the area.[12]

The Southwest Pacific Area line of operations lay through entrenched Japanese positions throughout New Guinea, establishing priority of supply as the primary concern. The resulting tactics of Cartwheel to isolate and bypass built up enemy positions was necessary, as the Japanese forces had their own goals. The Japanese base at Rabaul continued growth to support these goals, even after the Allied occupation of Port Moresby. The Japanese strategy was to build up striking power to resume offensive operations focused on retaking Port Moresby. This fit with their overall efforts to cut Allied lines of supply from the U.S. to Australia and New Zealand. Japanese forces during Cartwheel execution held strong points throughout the northern coast of New Guinea, the islands of New Britain and New Island, and the Solomon Islands northwest of Guadalcanal. All these locations boasted concentrated defenses in the vicinity of airfields, providing protection from Allied air raids.[13]

General MacArthur was the overall commander of Cartwheel, meeting JCS requirements for unity of command. In accordance with JCS direction, unity of effort under a single commander remained a priority. The need for unified strength in Cartwheel arose from overlapping areas of responsibility between the Southwest and Southern Pacific Theaters. Each theater's lack of resources to execute the entire plan also necessitated mutually supporting relationships. The JCS defined unity of command in April 1943 as each theater commander having complete operational control over all joint and coalition forces.[14] The final JCS decision to unify Cartwheel operations delineated MacArthur overall direction, while Admiral Halsey retained operational control of Southern Pacific Area forces. This decision met the definition of unity of command and effort, thereby establishing the necessary supporting relationships necessary for success.

While MacArthur did not have operational control of involved Southern Pacific Area forces, he did provide strategic direction to Halsey in support of Cartwheel aims. The intent of Cartwheel was to occupy areas of minimal enemy defense to facilitate employing air power on Japanese forces. This occupation and application of air power also served to reduce Japanese air, sea, and logistical capabilities, while bypassing enemy strong points. Cartwheel implementation of this tactic employed a series of landings at isolated weak locations between June 1943 and March 1944. The strategic focus of Cartwheel was to destroy Japanese lines of communication and supply in the South Pacific and facilitate basing for retaking the Philippine Islands. Each of these objectives facilitated continuing operations toward Japan. Meeting these objectives meant gaining air and naval superiority over various Japanese strong points throughout the Southwest Pacific Area, then bypassing them. This isolation of the remaining Japanese personnel

from internal lines of communication reduced the overall threat. Meeting the objectives of Cartwheel would bring Rabaul and the Philippines to within range of land based fighter and bomber capabilities.[15]

Japanese interests and strategy

Japanese strategy rested on maintaining a perimeter to protect the home islands and secure resources. The recent string of losses by the Japanese throughout Papua and in the Solomon Islands, including culmination at Port Moresby, New Guinea, resulted in strategic setbacks. Continuing Japanese need for oil and aviation fuel resources warranted their presence throughout Southern Pacific and Southwest Pacific areas. Japanese occupation of Lae, Salamaua, Wewak, and Madang also focused on Dampier and Vitiaz Strait surveillance to prevent an Allied Philippines Island invasion.[16] Force protection also justified efforts to build up striking forces out of persistent bombardment range from Allied forces. This dictated Rabaul as a Japanese stronghold, providing the necessary reach by Japanese aircraft to support their efforts. Rabaul also provided protection for land-based assets away from the Allied front to provide a measure of relief from constant attack. The Japanese forces looked at Rabaul as a decisive point in a defensive strategy enabling offensive action against Allied lines of communication.[17] Although the Japanese capabilities were in decline, their strength at the beginning of Cartwheel presented a formidable foe.

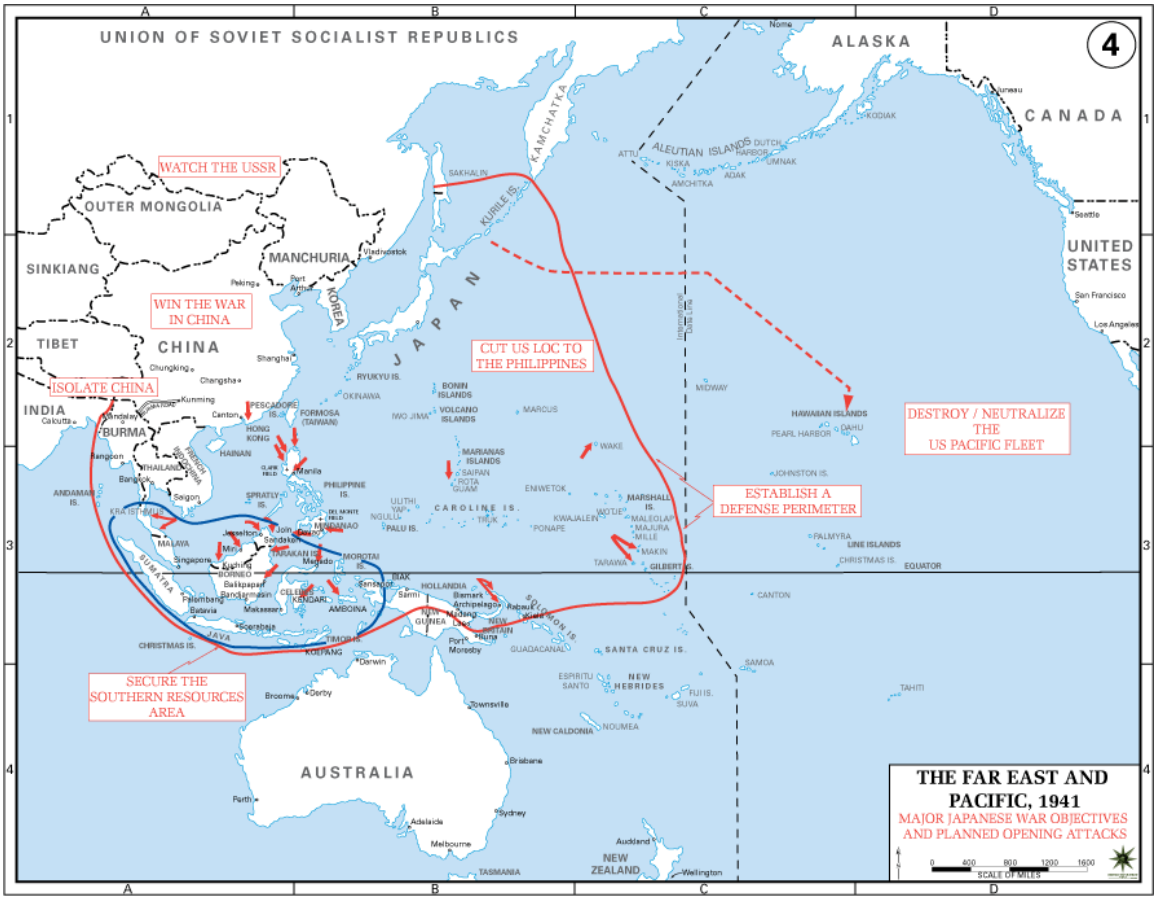

Figure 4. Japanese strategy

Source: US, Department of the Army, "U.S. Army. Japanese Operations Map," http://www.westpoint.edu/history/SiteAssets/SitePages/World%20War%20II%20Pacific/WWIIAsia04.gif (accessed 23 December 2013).

At the time of Cartwheel planning, the Japanese controlled the northern coast of New Guinea northwest of Buna, New Britain, New Ireland, and the Solomons northwest of Guadalcanal. This consisted of concentrated defenses centered on airfields totaling between 79,000 and 95,000 troops. They possessed an estimated 383 land-based planes, 4 battleships, 2 aircraft carriers, 14 cruisers, and 40 destroyers.[18] These troops and assets in the Southwest Pacific Area had to project force in an expanse equaling the entirety of

North and Central America. While the maneuverability of the naval forces gave the Japanese operational flexibility, the land-based fighter and bomber assets presented a specific and achievable goal for the Allied advance to defeat.

Mutual support for success

The Allied need for a coherent strategy to defeat Japan supported the Cartwheel execution timeline. The members of the JCS looked to defeat Japan within a year after defeating Germany.[19] This accelerated previous timelines for the planning staff, requiring clear operational direction for Pacific combat forces. GEN MacArthur's and ADM Nimitz' representatives met with JCS planners at the Pacific Military Conference in March 1943 for operation approval, receiving guidance for Cartwheel completion by May 1944.[20] Meeting this timeline resulted in the approved plan of parallel operation of forces, under overall command of GEN MacArthur. This operation would seize Woodlark and Kiriwina, enabling Allied fighter and bomber reach of Bougainville, Buka, and Rabaul. The following phase included successive Southwest Pacific Area seizures of Lae, Salamaua, Finschhafen, and Madang. Southern Pacific Area forces would support the operation through seizure of New Georgia, Faisi, and Buin. Concurrent operations would speed the advance and provide complementary protection, with the Southern Pacific Area taking Cape Gloucester and Arawe, then Gasmat. This would facilitate additional reach of Rabaul and Kavieng, with final aim as the seizure of Rabaul.[21]

The plan coordinated Southwest and Southern Pacific Area operations for mutual support, as the two-front initiative would dissipate Japan's land-based aviation and capabilities to support organic carrier groups.[22] Southern Pacific Area's carrier strike group maneuverability possessed the advantage of surprise and movement to retain the

initiative. The Southwest Pacific Area strategy of isolating strong points and conducting a bypass relied upon land-based aircraft to reduce Japanese air power capability. The combination of efforts pressured Japanese supply lines and facilitated support of ground maneuver and amphibious assaults. The complementary capabilities of each theater catered to each commander, reinforcing the mutual support capability of the operation.

However, separate Pacific advances also drained resources. Halsey's central drive pointed toward the Carolines and Palaus, while MacArthur's scheme looked to secure New Guinea as the main thrust of attack. The main attack line prioritized shipping and supplies to resource the main effort.[23] The issue of competing resources arose due to the boundary of control's location between the South and Southwest Pacific Theaters of Operation. This boundary ran through the middle of the Cartwheel operational area. Only the final decision on Cartwheel leadership discussed above decided resource primacy under the unity of effort umbrella.[24] Once the resource hierarchy structure was in place, the first priority for both drives was to ensure control of the lines of communication.

Due to the expanse of sea included in the Cartwheel area, mission preponderance for gaining control of lines of communications in the Cartwheel area of operations fell to air power. Air power assets provided the primary method of support in the area of operations due to difficulties of movement with land and sea forces.[25] These difficulties required Southwest Pacific Area Allied Air Forces and Southern Pacific Area's carrier-based aviation to gain localized air superiority to enable operations. To achieve this, the Southwest Pacific Area Air Forces launched large groups of aircraft on multiple missions to isolate and destroy Japanese aircraft in the air and on the ground. These were combined formations of escort, fighter-bomber, and heavy bomber aircraft. Air power as

a form of logistics and maneuver filled a necessary void in the area as well, beginning with the expansion of operations in the Southwest Pacific Area.

Air Power Strategic and Operational goals

Major General George O. Kenney took command of Southwest Pacific Area Allied air forces in August 1942 from Lieutenant General George H. Brett.[26] GEN Brett previously organized the Allied Air Forces as an integrated command, matching one Royal Australian Air Force officer for every United States Army Air Force officer on the staff, and even mixing Australian and American personnel into combat crews. This structure was necessary with minimal US personnel in Australia, but the growing numbers of Americans meant structural change was now possible. Kenney reorganized the fighting forces under a separate Fifth Air Force and Royal Australian Air Force commands. He kept the staffs integrated to ensure operational efficiency, but the integration of fighting forces under one service ensured a measure of unified morale among the fighting men.

Activation of the Fifth Air Force occurred on 3 September 1942. GEN Kenney also retained command of Allied Air Forces consisting of Australian and Dutch crews and aircraft. The Southwest Pacific Area Allied Air Forces executed MacArthur's priorities through Kenney's direction, ensuring Cartwheel operational success. This demonstrated a complete understanding between MacArthur and Kenney, similar to today's successful relationships between a Combined Forces Commander and Combined Forces Air Component Commander.

GEN Kenney's priorities for air power in the Southwest Pacific Area campaign meshed with MacArthur's. These priorities consisted of the defeat of the Japanese Air

Force, destruction of Japanese communications and supply lines, and direct support of ground troops.[27] This ensured that the flexibility and adaptability of air power could shape the conduct of the operational plan, while allowing for vagaries of weather and terrain. The priorities also demonstrated Giulio Douhet's belief that "an Air Force should at all times co-operate with the army and the navy; but it must be independent of them both."[28]

GEN Kenney soon established his authority over planning for execution of Allied Air Forces. After his assumption of command, he learned MacArthur's GHQ staff was issuing tactical directives to Southwest Pacific Area fighter/bomber missions. Kenney immediately confronted MG Richard K. Sutherland, MacArthur's Chief of Staff, about the reasoning why Air Force technical details were assigned by GHQ staff. Sutherland's only reply was that it had not been accomplished by the Air Forces before, forcing him to do it. Kenney offered to take up the discussion with MacArthur as the senior air forces commander, and Sutherland relented.[29] This early confrontation between two key staff members of Southwest Pacific Area ensured better coordination. The resulting relationship also cemented Kenney's ability to prevent future overreach from the GHQ staff into Air Staff responsibilities.[30] Sutherland was the gatekeeper for MacArthur, but his lack of tactical aviation background meant Kenney needed to enforce the air planning staff's role as the directive-issuing agency for all future air operations.[31] As Kenney gained control over employment and methods for Southwest Pacific Area air power, he also shaped role of tactical airlift. This capability expansion would ensure operational flexibility of the fighting forces throughout Cartwheel. His understanding and communication of airlift capabilities facilitated General Headquarters' planning and

MacArthur's situational understanding. This began a partnership that would include tactical airlift as a part of all future plans.

General Headquarters planners needed tactical airlift's capabilities, as Southwest Pacific Area intratheater shipping had minimal assets. Numerous increases in naval shipping requests stacked up with little relief until 1944.[32] The Seventh Fleet alleviated supply issues when possible, with amphibious assault platforms supporting logistical runs. Amphibious invasion support requirements meant that this sea supply capability was not always available, however, as Seventh Fleet asset priorities shifted to support invasions during actual operations.[33] This meant the need for a sustained method of supply delivery was necessary. The terrain characteristics of the Southern Pacific Area also showed a necessity for tactical airlift. Kenney's thorough understanding of the terrain and logistical requirements enabled him to bring tactical airlift employment to the forefront of operational planning. This level of understanding supported tactical airlift employment to enable the accomplishment of resupply and ensure force maneuverability.

Studying German personnel airlift operations during the Spanish Civil War formulated GEN Kenney's ideas concerning troop transport potential.[34] This knowledge was not common among Army acquisition personnel in the inter-war period however, as the initial US forecasts supporting RAINBOW-5 only listed 2560 troop transports as necessary.[35] This amount was roughly a quarter of airlift aircraft employed during the war.[36] While GEN Kenney called for more aircraft and crews from GEN Henry "Hap" Arnold, Commanding General of the Army Air Forces, he also energized current airlift operations. Kenney accomplished this through visiting all locations in the Southwest Pacific Area, ensuring that mission priorities refocused on supplying materials and

maintenance to the aircraft and crews accomplishing the mission, and providing on-site leadership to raise morale. Kenney's quick employment and scheme of airlift employment gained immediate recognition from MacArthur. MacArthur stated in September 1942 that "air transport is the only efficient means of transport" in the Southwest Pacific Area, supporting the overall effort of airlift and the direction of Kenney.[37] Kenney's ability to coordinate tactical airlift into operational plans ensured future viability for airlift contributions. When Arnold delivered more aircraft and changed the crew policies as discussed below, the capabilities increased.

GEN Kenney and MacArthur's relationship grew as each prioritized air power similarly, focusing on reduction of Japanese air and naval capabilities and supporting ground personnel. This relationship with MacArthur, along with a succession of airlift achievements during the Papuan Campaign, overcame staff reticence in airlift employment. Further employment succeeded in speeding up operations by utilizing air power to push the offensive.[38] An early demonstration of tactical airlift capability was the transportation of the US 32nd Division to New Guinea, the first air transport of an entire division. This proved to the GHQ staff the capability of tactical airlift to support schemes of maneuver, setting the stage for follow-on operations.[39]

Tactical airlift proves itself ready

Southwest Pacific Area troop carrier assets fell under Kenney's Directorate of Air Transport (DAT). The DAT oversaw all operation of Troop Carrier Squadrons under Fifth Air Force, with the additional capacity of Australian Transport Squadrons. The DAT also coordinated operations of civilian airlines under Australian military control.[40] This Australian Government contribution mitigated shortage of aircraft, enabling Kenney

to push forward more tactical airframes and leave more Australian domestic deliveries for civilian aircraft. Forty percent of DAT efforts maintained steady routes for routine supply, with the remaining missions covering operations as needed or reducing backlog cargo. Planners could divert up to 60 percent of DAT assets to tactical employment in support of current operations.[41] This meant that tactical airlift provided versatility to support combat operations forward as well as less stressful resupply missions towards the rear. This versatility proved important, as the cargo the troop carriers moved consisted of every imaginable item used by the Allies. These items included troops and all supporting supplies, with additional movement of everything necessary to open up a new air base.[42] The requirement for localized air superiority to protect movements via fighter combat air patrols made air travel easier as it took less time, but also resulted in more movements overall, as naval vessels could carry more cargo or personnel.

On 5 October 1942, Kenney again directed troop ferrying as a form of maneuver, moving members of Australian infantry and US engineers close to Buna. This set the stage for movement of two regiments of the 32nd Division and a company of Australian infantry to finalize the push towards Buna.[43] Troop carriers also averaged over 100 air medical evacuations per day during this same period.[44] These evacuations proved backhaul capability as a critical enabler tactical airlift employment provided to the fight.[45] Airlift's flexibility in application began to gain notice with this lift and continued during the Australian Kokoda retreat. Pilots conducted airdrops at altitudes below 100 feet due to the terrain, conducting free-fall drops for accuracy (and due to limited parachute availability).[46] MSgt Glenn McMurray, a C-47 crewmember, related the importance of the airdrop mission as "the salvation of many isolated infantry units."[47]

Some of these drops occurred in drop zones as small as fifty by twenty-five yards, with troop carrier crews still maintaining a high percentage of recoverable drops.[48]

Southwest Pacific Area General Headquarters planners remained reticent to depend on the capabilities of airlift to enable maneuver, despite the early success. GEN Sutherland's plan for the remaining campaign in New Guinea was to use a road, then just beginning construction. Kenney felt the necessary pace of operations would outstrip the time for road completion. The ending of the Buna operation and decreasing requirements in Wau freed more assets to concentrate on airlift supply of Lae, compensating for supply shortfalls and aiding Kenney's directions.[49] This set the basis for leapfrogging from air base to air base to speed operations.[50] This leapfrog technique was then incorporated into the overall plans for the conduct of Cartwheel. The understood capability of tactical airlift enabled Kenney to push for further reinforcements from GEN Arnold, with Arnold finally delivering additional relief in airframes and crews as Cartwheel began.

Airfield establishment enabled the leapfrog technique. Tactical airlift accordingly supported the majority of each endeavor. MSgt McMurray explained the inherent growth of capabilities through the direct support of adaptable ground and aircrews. Troop carriers established an initial presence through delivering airborne engineers to rough landing strips. Following initial improvements, airlift then delivered trucks, bulldozers, graders, and other manner of machinery. This enabled further improvements and expansion to handle an increasing number of airlift sorties. Finally, building supplies and personnel were flown in to establish a working operation. This including establishment of all supporting facilities for supply, maintenance, mess halls, tents, and squadron facilities. McMurray's statement fit the role of tactical airlift in enabling Cartwheel: "Thus a base is

born to grow fat as the fires of battle warm it and to die as its airborne mother - the Troop Carriers - leave it to follow the Gods of War."[51]

Overcoming obstacles

Tactical airlift's success in execution overcame numerous obstacles. These obstacles include aircraft availability and training, flying conditions, replacements, supplies, and force protection. Meeting the objectives of Cartwheel meant planning for ways to negate each obstacle, through gaining more assets or applying new methodologies of employment. Growth of internal troop carrier capabilities reached maturity in 1943, timely for Cartwheel support.[52] Kenney's capability to capitalize on airlift success depended on continuing this growth with additional aircraft.

On 1 November 1942, the USAAF activated the 374th Troop Carrier Group. This group consisted of the 21st and 22nd Troop Carrier Squadrons, as well as the 6th and 33rd Troop Carrier Squadrons.[53] These crews employed a collection of forty aging aircraft, in need of replacement to support the coming operation and meet intratheater supply demands discussed below.[54] Kenney continued to demand additional assets, finally gaining an additional group, the 317th Troop Carrier Group. Reorganization put the 374th under operational control of the Fifth Air Force advance echelon (pushed to Port Moresby), and the new 317th Troop Carrier Group under the Directorate of Air Transport, Allied Air Forces.[55] In January 1943, the arrival of 52 new C-47s shored up the 374th Troop Carrier Group, while its old planes went to the newly activated 317th Troop Carrier Group.[56] This collective aircraft capability formed the resupply and maneuver resource to facilitate the planning and execution for Cartwheel.

Another obstacle facing tactical airlift crews occurred before they even arrived in theater. Stateside pilot training provided minimal experience, in order to get them to the fight as soon as possible. Aircrew training for C-47 pilots went through the 89th Troop Carrier Group, then the only US formal training unit for troop carrier aviation. The pilots flying during Cartwheel graduated with between 20 and 26 flight hours. There were also limited instructors, as the practice of the time was to retain graduates, eventually resulting in less-experienced instructors.[57] These issues combined to produce pilots arriving in Australia with little flight time, unprepared for the demands of the mission thrust upon them. The offset to this was that the co-pilot program would allow them time to grow in proficiency prior to being the pilot in command, assuming overall responsibility for crew success.

With increased numbers of aircraft and crews came more personnel exposed to the hazardous local flying conditions. Thunderstorms frequently covered the high terrain throughout the Owen Stanley Mountains, forcing dangerous weather avoidance tactics or mission termination.[58] Often flying groups would send missions despite the minimum weather. Lt. Ernest Ford was one of the frequent volunteers. His mission focus is inherent in why he flew in mission grounding conditions: “we always delivered the urgently needed troops, supplies and equipment and returned the wounded.”[59] These volunteers overcame the weather and terrain obstacles, and still had to identify and land on primitive landing strips. Multiplying the danger was the continual threat of enemy aircraft. 5th Fighter Command maintained air superiority over Port Moresby, but Japanese fighters massing from Rabaul remained a threat throughout all operations. [60] This forced planners to ensure fighter escort for transport aircraft supporting maneuver and supply. The

combined nature of the threats facing the crews took its toll, just as it did on all personnel in the Southwest Pacific Area.

Some aircrew members remained in continuous combat operations for ten months. Support personnel, such as maintenance and cargo loaders, worked from twelve to eighteen hours a day. Noticeably absent to all personnel was a clear replacement policy. The only single group replaced before the institution of a policy by Kenney was the 19th Bombardment Group (H), having 45 to 60 percent of its personnel suffering from combat fatigue according to the flight surgeons.[61] Tactical airlift was not immune from this issue, as the shortages of qualified crews, combined with the demands of keeping men at the front supplied, meant that transport crews flew constantly through the summer of 1943. Weather and maintenance provided the only grounding mechanisms for these aircraft. The 317th Troop Carrier Group flew missions for a combined distance of over 1.2 million miles during this period. This meant averaging 183 flying hours in the month of June alone, with individual crewmembers averaging 130. Kenney used these numbers to achieve relief in the form of an increased crew ratio for transport personnel, greatly relieving the stress on the crews in preparation for Cartwheel execution.[62]

Climate and food problems faced all personnel as well. Little variety to food and limited shipping and storage facilities necessitated canned food during Port Moresby's expansion and for some time thereafter. The combined lack of variance in diet while living in the tropical climate contributed to fatigue and lowered resistance to local diseases.[63] Dietary issues and the climate also contributed to recurrences of malaria, dengue fever, and diarrhea.[64] The climate itself caused numerous issues for maintenance personnel to overcome in order to turn aircraft for following missions. Moisture

promoted fungus growth on all surfaces, requiring daily cleansing and inspection of both visible and unseen surfaces. The ever-present moisture also ensured that corrosion was rampant. Corrosion reduction lubricants did not work as advertised due to the heat, compounding the problem.[65] These issues all drove an increasing work schedule for maintenance ground crews to keep the aircraft flying. The maintenance problems also placed great demands on rear echelon maintainers in Australia. These personnel overcame lack of sheet metal and poor supplies to enable aircraft repair and return planes to the front.[66] Colonel Edward Imparato, commander of the 374th Operations Group, knew firsthand the climatic considerations:

> The Japanese were not our only enemy in New Guinea. There were other elements at work to destroy us in our fast-forward pursuit of victory. The animals, the insects, the disease, the terrible heat and the mountains - always the mountains which claimed so many…Three years of combat flying in New Guinea reveal, in estimate, that as many losses occurred due to the unforgiving jungle mountains and weather as resulted from actual aerial combat by fighters, bombers and transport aircraft.[67]

In spite of the combined hardships, the ground crews maintained a stellar 80 percent maintenance reliability rate, meaning 80 percent of assigned aircraft were capable of flying on a given day.[68] Maintenance personnel also overcame limitations in depot-level maintenance capabilities. This alleviated maintenance downtime due to aircraft structural maintenance requirements. Maintenance crews were unable to perform structural inspections in the forward area, lacking qualified personnel and facilities, or in northern Australia for lack of equipment and time. GEN Kenney achieved great aircraft maintenance success here, supported by Australian venues such as Australian National Airways and Qantas.[69] This freed maintenance personnel to stay forward with aircraft, while ensuring rear area inspections and maintenance met required timelines. The

combination of capabilities ensured all Southwest Pacific Area aircraft remained in the best possible condition to support Cartwheel execution.

As maintenance crews continued to provide the best possible work under the circumstances, limitations in aircraft tested the adaptability of airlift employment in different ways. An example of this mentality to succeed occurred in the events surrounding a mission to Bena Bena, New Guinea, in January 1943. The events also gained US national attention through the syndicated cartoon pictured in figure 5.[70] A C-47 received left wing damage after stalling on approach and was stuck at the remote location. After maintenance personnel located a spare left wing at Port Moresby, crews had to devise a method to transport the new wing to Bena Bena, in order to repair the aircraft and return it to flying status. As the wing was too large to fit in one piece internally in the C-47, and cutting it in multiple pieces would negate a rapid repair, crew devised an unconventional delivery method. Members of the 478th Service Squadron devised a method to streamline and strap the wing under the belly of another C-47.[71] Incredibly, despite the risks to an unproven method of delivery and unknown lift implications, every pilot from the 33rd Troop Carrier Squadron and pilots from three sister squadrons all volunteered to fly the mission. These volunteers understood the risks, with the characteristics of Bena Bena's 1500-foot runway well known. The additional external weight also pushed the aircraft landing speed higher, making the short-field landing even more problematic. The final issue was that high terrain surrounded the field, dictating a singular approach direction with no missed approaches possible due to the additional weight and airspeed limitations. The crew accomplished the mission with no

issues, landing at Bena Bena on 13 February 1943. Native labor from the surrounding area assisted with movement of the new wing and attachment to the disabled aircraft.

Figure 5. Three Wings and a Prayer

Source: Edward T. Imparato, *374th Troop Carrier Group* (Paducah, KY: Turner Publishing Company, 1998), 869.

Another hurdle to overcome was the issue of supply. Cartwheel success relied upon an ad-hoc supply chain to ensure continued viability of fighting forces. A dual arrangement of naval vessels and tactical airlift was necessary due to environment and transportation shortages throughout the Southwest Pacific operational area. The initial Cartwheel logistical support plan used US Army Service of Supply (USASOS) small ships to move supplies by water, facilitating sustainment of ports, bases, and airfield completion. Allied naval forces assisted with resupply during assault operations.[72] This did not ensure sustainment for forces without a port, nor for rapid resupply under combat conditions. These conditions made tactical airlift essential, contributing to decisions to capture areas suitable for airfield establishment. The growth of airfields would allow supply by air to keep the fighting forces operational. Bulk cargo not movable via airlift had to move by ship, another commodity in short supply. Southwest Pacific Area naval supply depended on shore-to-shore landing craft of the 2nd Engineering Special Brigade, 7th Fleet assault shipping, and a small number of merchant ships.[73] This ensured that bases and outposts close to ports received a sufficient amount of supplies. Forces farther inland or beyond the established theater supply lines depended on tactical airlift for almost their entire existence.

Although operational supply within the Southwest Pacific Area was feasible, receiving the supplies in the first place was an obstacle hard to overcome. Sustainment issues developed from the distance between US and Australia, subpar shipping availability, and the need for priority balance between theaters.[74] The distance is evident, as this was the longest supply line from the US at the time. The length caused increasing timeline lags as naval shipping took longer and longer to complete supply voyages.

Commensurate naval troop and cargo shipping requirements were far behind in the Pacific, due to competing priorities between Pacific and European Theaters. Diversion of these shipping resources from the Atlantic was necessary to make up the shortage.[75] The main priority remained supply for the upcoming Overlord operation, but Allied naval supremacy in the Central Pacific and preponderance of assets started to increase the capability of the Pacific supply base.[76] This growth facilitated continuing operations by the end of 1943, but the backlog of orders was so severe that once met by the reallocation of forces to move the orders, it created another backlog in the theater shipping system. The cyclical nature of the problem was just one of many requiring constant planning adjustment by Southwest Pacific Area planners. The combined effects of issues with supply inter- and intra-theater provided an opportunity and a demand for airlift success. This success would enable overcoming the Japanese war aims.

The final obstacle facing crews in New Guinea at the start of the Cartwheel operations was simple force protection. Enemy aircraft remained a threat, as Southwest Pacific Allied Air Forces could only maintain localized air superiority when aloft. The Japanese stronghold at Rabaul gave the Japanese enough range to mass raids on Port Moresby in support of their operations. Early warning radar did not get to Port Moresby until September 1942, forcing reliance on spotters in the mountains to radio information on approaching enemy aircraft.[77] While these raids from Japanese airbase such as Rabaul, Wewak, and Madang occurred less often as Cartwheel execution approached, the threat of surprise nighttime attacks was a continuing concern for commanders and crews alike.

All personnel involved with the planning of Cartwheel faced their own set of problems. From GEN MacArthur to the crews flying troop carriers in support of ground

operations, the Southwest Pacific forces faced difficulties in mission accomplishment. The way they succeeded through execution provides evidence of tactical airlift's capacity to project force and assist in achieving operational success.

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[6]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign*, 28.

[7]Louis Morton, *The United States Army in World War II: Strategy and Command, The First Two Years* (Washington, DC: Office of the Chief of Military History, 1968), 389-399.

[8]Coakley and Leighton, *Global Logistics and Strategy, 1943-1945*, 399.

[9]Author's note: Papua and Australian New Guinea didn't unify into a single entity until 1975. http://www.worldstatesmen.org/Papua_New_Guinea.htm (accessed 21 April 2014).

[10]Miller, *Cartwheel*, 5-7.

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[12]Coakley and Leighton, *Global Logistics and Strategy, 1943-1945*, 400.

[13]Miller, *Cartwheel*, 13.

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[16]Miller, *Cartwheel*, 34.

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[18]Ibid., 13.

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[38]Kenney, 97-102.

[39]Ibid., 97-98.

[40]Miller, *Airlift Doctrine,* 123.

[41]Ibid., 124.

[42] Imparato, 159.

[43]Army Air Forces Historical Study # 34, *The Army Air Forces in the War against Japan, 1941-1942*, 156.

[44]Wesley Frank Craven and James Lea Cate, ed. *The Army Air Forces in World War II, Vol IV, The Pacific: Guadalcanal to Saipan, August 1942 to July 1944* (Washington, DC: Office Air Force History, 1983), 121.

[45]Army Air Forces Historical Study # 34, *The Army Air Forces in the War against Japan, 1941-1942*, 157.

[46]Ibid., 150.

[47]Imparato, 162.

[48]Ibid.

[49]Kenney, 212

[50]Ibid.

[51]Imparato, 160.

[52]Ibid., 211-212.

[53]Army Air Forces Historical Study # 34, *The Army Air Forces in the War against Japan, 1941-1942*, 155.

[54]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign*, 10.

[55]Ibid., 6.

[56]Ibid., 9-10.

[57]Army Air Forces Historical Studies No. 18, "Pilot Transition to Combat Aircraft" (Maxwell AFB, AL: Assistant Chief of Air Staff, Intelligence Historical Division, 1944), 119-121, www.afhra.af.mil/shared/media/document/AFD-090602-044.pdf (accessed 17 November 2013).

[58]Army Air Forces Historical Study # 34, *The Army Air Forces in the War against Japan, 1941-1942*, 146.

[59]Imparato, 104.

[60]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign*, 10.

[61]Ibid., 12.

[62]Ibid., 157.

[63]Ibid., 16.

[64]Ibid., 13.

[65]Ibid., 43.

[66]Kenney, 56-57.

[67]Imparato, 139.

[68]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign*, 45.

[69]Ibid., 46.

[70]Imparato, 348-354.

[71] Ibid., 351.

[72]Miller, *Cartwheel*, 29.

[73]Coakley and Leighton, *Global Logistics and Strategy, 1943-1945*, 402.

[74]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign*, 43-44.

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[77]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign*, 10.

CHAPTER 3

CARTWHEEL EXECUTION

Southwest Pacific Area forces executed Operation Cartwheel in three phases. These phases followed the planning framework of Woolark–Kiriwina, Lae–Salamaua–Finschhafen–Madang, while providing air power support to Southern Pacific Area operations in New Georgia–Faisi–Buin, then Cape Gloucester–Arawe–Gasmat. The completion of the second phase for Southwest and Southern Pacific forces enabled all Allied air forces to target Rabaul on a regular basis, supporting attainment of the Cartwheel ultimate objective, the seizure of Rabaul.[1] This section focuses on execution of the Cartwheel plan, with emphasis on airlift support and secondary effects of the first two phases accomplished by Southwest Pacific forces.

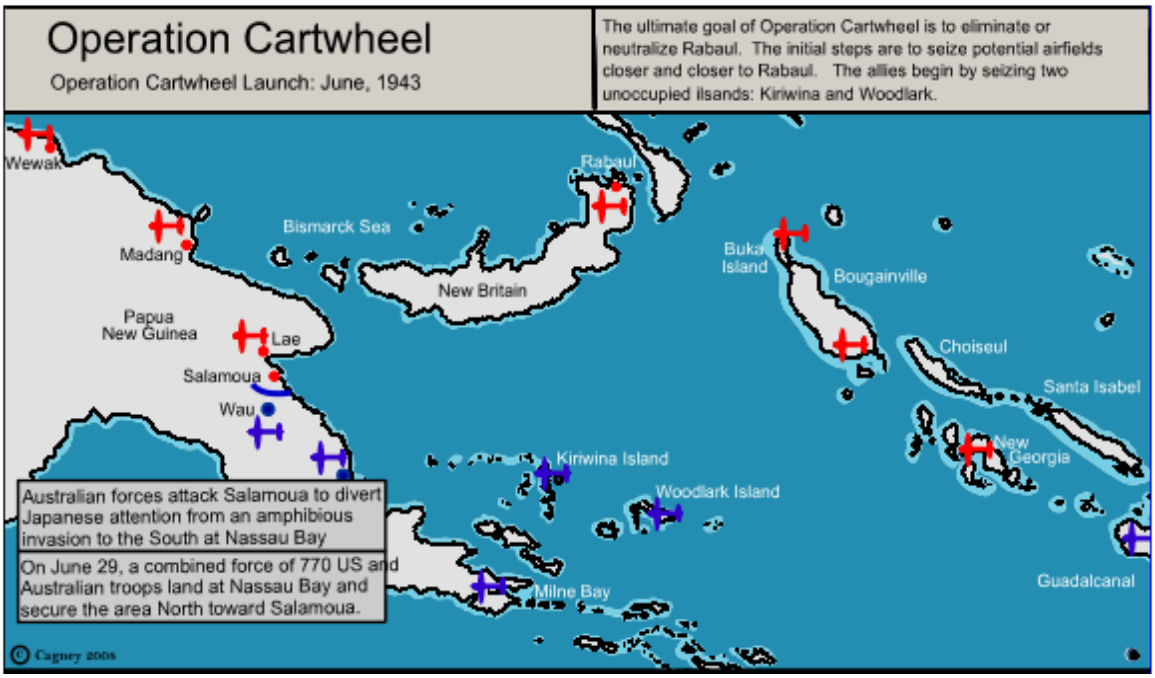

Figure 6. Cartwheel Launch

Source: History Animated.Com, "Animation of Operation Cartwheel," http://www.historyanimated.com/CartwheelPage.html (accessed 2 February 2014).

Kenney's assumption of command from Brett and subsequent direction in employing airlift set the stage for airlift force projection of Cartwheel forces.[2] The principal resupply bases of Port Moresby and Milne Bay each provided logistical support for tactical airlift to funnel to fighting personnel. Troop carriers also used a forward landing strip in the Dobodura area, enabling widespread avenues of approach to push forward supplies.[3] The airlift forces involved were the 54th Troop Carrier Wing, supporting operations with 10 squadrons at Port Moresby, and the 375th Troop Carrier Group, part of the First Air Task Force operating from Dobodura.[4] The combined efforts of these units enabled advancement, proving vital in the initial maintenance of garrison sustainment at Wau and Dobodura as Japanese air attacks prevented sea-borne

movements.[5] The widespread area necessitated multiple airstrips to maintain this advance, in contrast to the island hopping maneuvers employed in Southern Pacific Area. Allied advance in New Guinea demanded an alternate to jumping from one island to the next.[6] The terrain and threat characteristics required continuous movement forward of fighter cover for amphibious operations. The C-47 was the only dependable asset to achieve the mission.[7]

The strategy employed in Cartwheel employed the lessons learned though the Papuan campaign and previous years solidification throughout southern New Guinea. Accomplishment of the three phases occurred by pushing forward air power to reduce Japanese strike capabilities along New Guinea. Southwest Pacific Area forces would advance through a series of air bases, supported by air and water transportation. Each advance would bypass Japanese troop concentrations, neutralizing to prevent loss of time and personnel. Air power provided flank and naval protection. Southern Pacific Area carrier aircraft would support Southwest and Southern Pacific amphibious assaults beyond air base reach. The combined effort lengthened operational reach and minimized the overall timeline. This application employed the lessons learned through previous success in the Southwest Pacific Area.[8]

The first operation for the Southwest Pacific Area in Cartwheel was the taking of Kiriwina, while Southern Pacific forces took Woodlark. Neither location possessed any significant enemy occupation, fitting the requirements of the by-pass strategy. Each location also provided the necessary ingredient of easy airstrip establishment. The main advantage Kiriwina provided Southwest Pacific forces was intermediate service for the next phase against Salamaua and Lae. The island also extended reach for Fifth Air Force

fighters and bombers to provide coordinating attacks for Southern Pacific Area actions in New Georgia and beyond. Tactical airlift supported the effort through transport of entire fighter and bomber groups to Kiriwina. This support continued during subsequent operations at Nassau Bay, as the amphibious landing and subsequent sea resupply proved difficult due to rough seas. Troops instead received resupply through airdrops from tactical airlift.[9]

The integration of fighter patrols from Port Moresby and Kiriwina provided valuable air cover for tactical airlift between Port Moresby and Marilinan. This protection was vital to defend the C-47s from the Japanese fighters launching from Rabaul, Wewak, and Madang. The Allied fighter cover provided protection during unloading operations at forward supply strips as well. The fighter loiter time of one hour pushed ground crew capabilities. Air Freight Forwarding Units perfected practices to reduce loading times to meet this restriction. The loading time reduced from forty minutes to load and unload one jeep in a C-47 to a two minute average over a single hour.[10] This enabled fewer fighter sorties to cover tactical airlift missions and ensured overhead protection from Japanese interdiction.

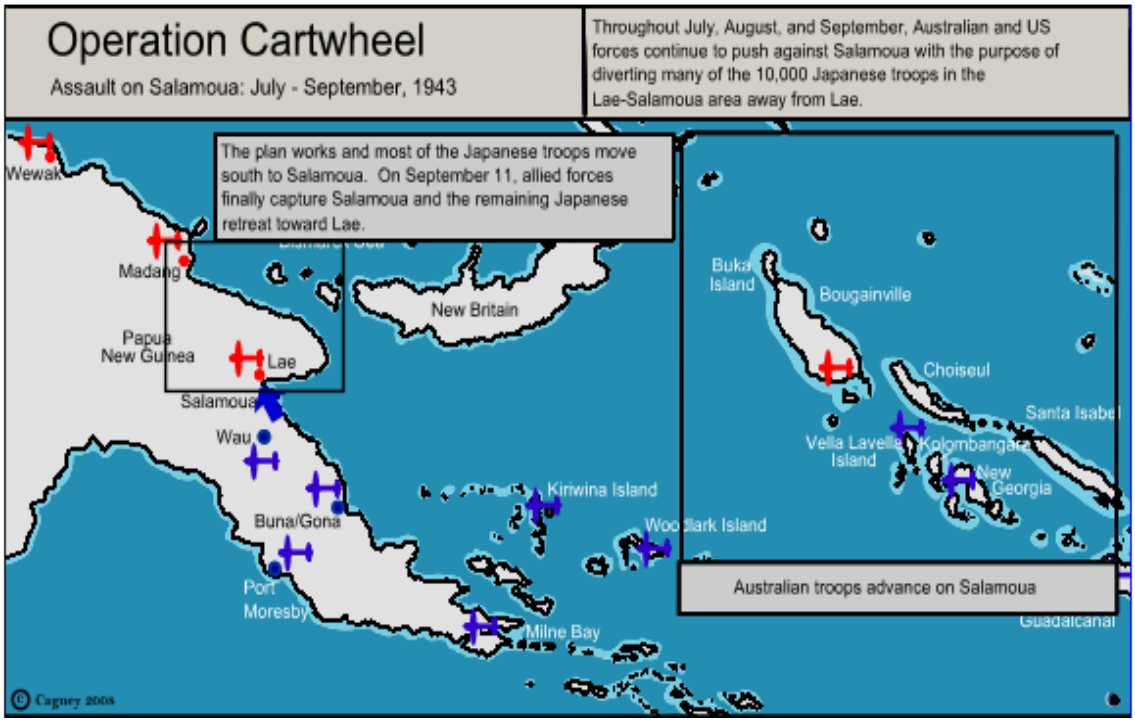

Figure 7. Assault on Salamaua

Source: History Animated.Com, "Animation of Operation Cartwheel," http://www.historyanimated.com/CartwheelPage.html (accessed 2 February 2014).

After the seizure of Kiriwina, Southwest Pacific forces established a forward operating base at Tsili Tsili. The base was only 38 nautical miles from Wau, providing a secret operating location for Fifth Air Force fighter aircraft.[11] Tsili Tsili served as the advance base for employing sustained air power against Wewak. The effect was to reduce Japanese air power in preparation for the taking of Lae. Tactical airlift accomplished movement of all items necessary to ready the airstrip. These C-47s completed this movement in only ten days.[12] The movement included an entire airborne engineer unit, complete with all equipment necessary to establish and expand an airfield.[13] The delivery of the engineers enabled establishment of a 4200' runway, with later growth to 7000'.

Numerous taxiways and revetments complemented the runway construction, providing necessary space to expand operations up to 150 C-47s per day.[14] Troop carriers also provided airlift for protection assets, vital to provide defense against Japanese air discovery of the secret location. The protection assets included Australian infantry and an American automatic weapons battery, providing valuable air defense.[15] The importance of this movement was evident when Japanese forces found the location. On 15 August 1943, twelve Sallys made a surprise visit to the new air base.[16] One C-47 was shot down with all crew lost, while another was lost in the mountains. The remaining C-47s used various evasive maneuvers to escape.[17] This sequence indicated the need for enhanced protection, seen in the subsequent establishment of fighter and bombers assets at Tsili Tsili.

The importance of tactical airlift's support is seen in the air offensive capability launched from Tsili Tsili against Wewak, as well as against Japanese supply centers at Hansa Bay and Alexishafen.[18] Fighters and bombers launched from Tsili Tsili destroyed 175 Japanese aircraft on the ground in August 1943 alone, with an additional 126 enemy planes claimed through aerial engagements.[19] The third order effect of tactical airlift's movement and subsequent resupply of fighter and bomber assets and ground forces was regional Allied air superiority. This regional advantage supported Southern Pacific Area actions against New Britain and Southwest Pacific Area operations against Lae, solidifying Cartwheel objectives toward the final seizure of Rabaul.

The next objective after the Tsili Tsili establishment and the reduction of Japanese air power in Wewak was the seizure of Lae. This was a combined operation consisting of an American amphibious assault east of Lae and airborne seizure of Nadzab, supported

with an overland march by supporting Australian forces.[20] Tactical airlift's role as airborne delivery platform was critical to the overall scheme, while also retaining responsibility to supply the troops on the overland march. Troop carriers pushed forward to enable assault on Nadzab by delivering the Australian 7th Division forward to assist in establishing forward operating locations at Kaiapit and Dumpu, providing an advanced power base to project force against Wewak. This overall advance was completely supplied by tactical airlift.[21]

Joint training enables joint success, and the Nadzab operation proved the concept. The Allies prepared for the airborne operation with the 503rd Parachute Infantry Regiment and the 317th Troop Carrier Group conducting joint training near Cairns, Australia between 21 April and 6 May, 1943.[22] This preparation enabled the successful employment that came later. The three-pronged assault on Lae was enabled by tactical airlift as well, when thirteen C-47s landed a company of Australian troops at Sangan. These troops were to form the advance party to accomplish the overland march portion of the assault. The operation began the Allied advancement west to secure the Markham Valley.[23]

The Southwest Pacific Area needed to perform a three-pronged operation, as the command did not have enough naval or air transport assets for either to accomplish the mission alone.[24] These insufficiencies required integration of assets to gain overwhelming force. The operation set standards high as the first airborne operation in the Pacific Theater and the first to show complete integration between airdrop, airland, and amphibious forces in a coalition effort.[25]

Integration of Southwest Pacific Area assets began with Allied Air Force fighter coverage of the naval landings and personnel airdrops. A Navy destroyer supported the fighters by positioning to fill in radar coverage for landing convoy protection. The US Navy Seventh Fleet forces also provided landing craft and ship borne fires during the amphibious invasion.[26] The seizure of Nadzab was designed to complement the successful amphibious operation at Lae, remove the chance of Japanese escape, and establish Allied control of the Markham River valley.[27]

The operation proceeded with air strikes on all Japanese air base locations in order to keep Rabaul area based aircraft out of the fight.[28] These air strikes interdicted Japanese air power capacity and established air superiority for operation execution.

On 5 September 1944, the airlift package totaling 84 C-47s launched from Port Moresby. The aircraft carried the US 503rd Paratroop Infantry Regiment and associated Australian units, demonstrating the capability to employ tactical airlift in support of maneuver. The final package that made the drop totaled three flights of 79 planes, complete with fighter and bomber support raising the total to 100 aircraft.[29] Kenney's letter written to GEN Arnold immediately afterwards expanded on aircraft details of the airborne insertion. The letter included all support aircraft of the operation, raising the total to 302 aircraft in all. The operation was a spectacle of integration, with aircraft launching from eight separate airfields throughout New Guinea and performing an enroute rendezvous over Marilinan. This feat alone highlights the integrated achievement of timing and operational prowess. The remaining conduct of operations shows the depth.

After joining up to form the largest single aerial armada in the Pacific Theater, all airlift squadrons slotted into formation positions and descended through the designated

terrain locations, while ensuring clearance through the cloud cover. This positioned them for their final approach through the Markham River valley. Covering at separate altitudes were six squadrons of B-25s, six A-20s, varying stacks of close and detached escort fighters, and five separate weather aircraft to ensure adequate weather knowledge capacity. Following the initial incursion was five B-17s, remaining on station over Nadzab to perform supply airdrops once the area was secure. The command and control package consisted of three B-17s above the C-47 formation, manned by MacArthur and Kenney.[30]

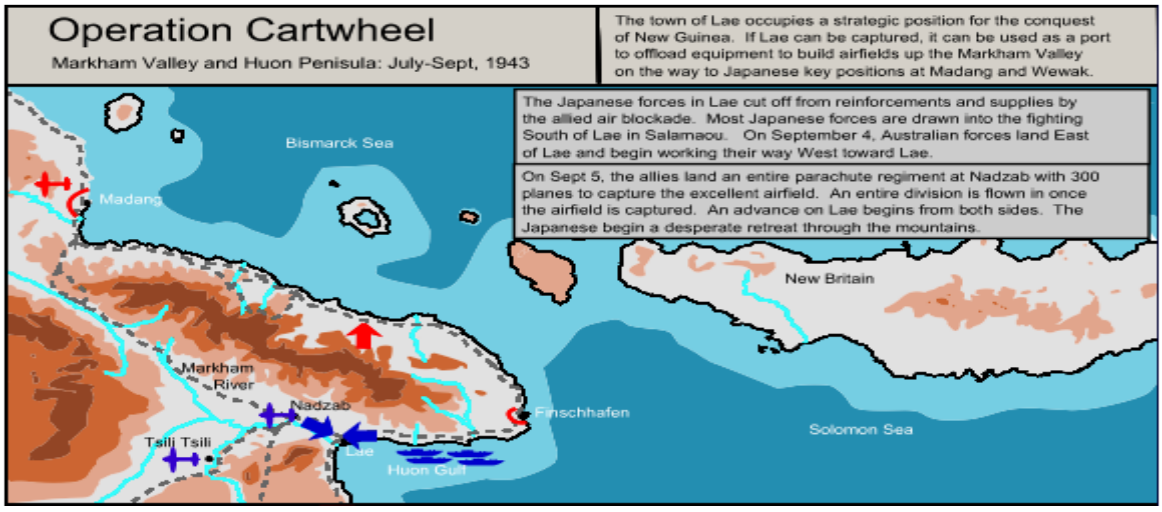

Figure 8. Assault on Lae

Source: History Animated.Com, "Animation of Operation Cartwheel," http://www.historyanimated.com/CartwheelPage.html (accessed 2 February 2014).

The successful execution of the Nadzab operation secured the airfield and enabled follow on troop carrier landing of the 7th Australian Division for a second drive on Lae. This delivery occurred in concert with the 9th Australian Division Amphibious landing

east of Lae.[31] The first C-47s began landing at Nadzab on 6 September. In six days, over four hundred planeloads of personnel and supplies came from Tsili Tsili and other bases. The rapid improvements of the strip and ground handling capabilities facilitated the operation, ensuring the capacity to receive the aircraft and push supplies to the fighting front.[32] These initial forays expanded to cover over 2000 planeloads by 20 September. The 7th Australian Division formed part of the delivery, setting the stage for the following assault on Lae.[33]

The establishment of Nadzab shows the pinnacle of tactical airlift employment during Operation Cartwheel. The troop carriers continued to support the remainder of Cartwheel through airdrops and smaller deliveries to airfields seized, but not on the scale of the operations to seize Kiriwina and Lae. Although tactical airlift's role in force projection declined compared to previous usage, it continued to shape the operational environment through adaptability and managing risk. This environment enabled Southwest Pacific Area forces to meet Cartwheel objectives, as tactical airlift maintained support through moving supplies necessary for fighter and bomber assets to finish reduction of Rabaul.

The Nadzab operational success enabled rapid conquest of Salamaua on 13 September and Lae on 16 September.[34] These area seizures enabled establishment of the Second Air Task Force at Nadzab, led by 35th Fighter Group HQ.[35] The Second Air Task Force provided the crews and aircraft to assault Rabaul. This also finalized the ring of airbases that employed airpower against Rabaul. The locations of Lae, Nadzab, Finschhafen, and Gusap also served to protect the Vitiaz Strait, critical for future sustainment operations.[36] This solidification provided the bedrock for the final push to

reduce and isolate Rabaul before movement towards the Philippines. During January and February 1944, Southern Pacific Area forces continued development of advanced air bases while bringing "forward new strength for the continuing assault on Rabaul."[37]

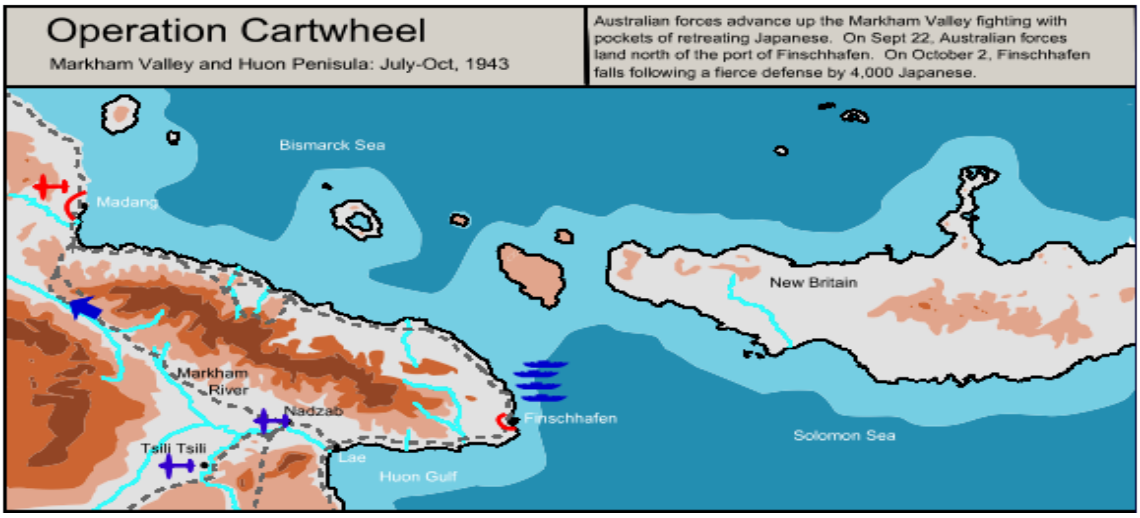

Figure 9. Fall of Finschhafen

Source: History Animated.Com, "Animation of Operation Cartwheel," http://www.historyanimated.com/CartwheelPage.html (accessed 2 February 2014).

The achievements in projecting air power were evident in the reduction of Japanese air power capacity. Direct bombing missions accomplished by Allied Air Forces reduced Japanese fuel and maintenance capability while also bombing Japanese Naval resupply vessels. The reduction in capabilities forced Japanese commanders at Rabaul to minimize their usage of aircraft by the middle of February 1944, only employing them for scouting and messenger movements.[38] This was a direct result of growing Allied air superiority reducing Japanese strike capability, supported by the employment of tactical airlift to project the force forward. The final objective of Rabaul was thus neutralized.[39]

The result of Operation Cartwheel differed from the initial plan, as the decision to isolate and bypass Rabaul saved both time and Allied casualties in an assault.[40] Fifth Air Force fighter and bomber success in reducing the effectiveness of the Japanese air and naval forces generated from Rabaul assisted in this JCS decision.[41] The final victory was fittingly shared by the Marines, the Navy, the AAF, the New Zealanders, and the Australians.[42] While the Allied force bypassed Rabaul, Australian forces retained responsibility for final disposition of Japanese forces post-wartime activities. The choice to bypass was proven correct, as enemy force estimates were mistaken. Following the Japanese surrender, Australian forces proceeded to round up the remaining Japanese personnel. Taking only ten thousand personnel, the Australian commanders soon learned they had to control around one hundred thousand Japanese in Rabaul and forty thousand at the outlying location. The initial estimates of thirty thousand proved far from correct.[43]

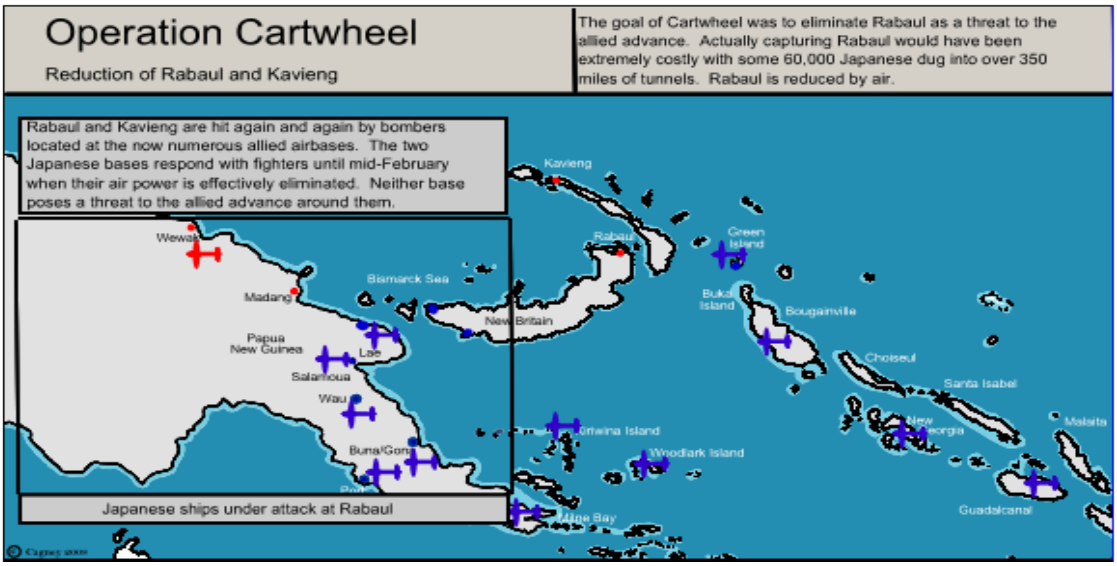

Figure 10. Reduction of Rabaul

Source: History Animated.Com, "Animation of Operation Cartwheel," http://www.historyanimated.com/CartwheelPage.html (accessed 2 February 2014).

Successful planning of the GHQ staff relied on personal ability to work with MacArthur. As the Southwest Pacific Area Commander surrounded himself with those who shaded news with details known to please MacArthur, Kenney proved able to the task.[44] Kenney leveraged his previous success in directing airlift operation during the Papuan campaign and continuing operations in New Guinea to gain further airlift employment in achieving Cartwheel objectives. This relationship proved successful, as airlift usage achieved a movement schedule unachievable with the small fleet of amphibious supply ships under MacArthur's command.

Utilization of Tactical Airlift

With the employment of tactical airlift in support of operational success in Cartwheel, the troop carriers met Kenney's third priority in the employment of air power in Southern Pacific Area–direct support of ground troops.[45] This was also in line with MacArthur's priorities in Cartwheel accomplishment. The speed of advance was necessary to meet the JCS-directed timeline to reduce Rabaul, in order to fit into the overall strategy for the defeat of Japan. The key input that tactical airlift provided was speed. The trade-off in employing tactical airlift to accomplish Cartwheel's larger scale movement was reduced capacity per lift.[46] This speed of advance provided advantages over sea-borne lift, chiefly that of overcoming reliance on sea supply infrastructure. Tactical airlift capability also proved necessary with little road infrastructure throughout New Guinea. These items indicated necessary growth of airlift employment, enabling Kenney to receive more airlift assets to support Cartwheel execution.

The 54th Troop Carrier Wing at Cartwheel start comprised fourteen squadrons.[47] Personnel replacements and expansion necessarily accompanied growth in aircraft

numbers. Kenney's desire for a two crew per aircraft ratio, with a reserve force of 15 percent was finally addressed with a limited increase of "no more than 7.5 percent, but any increase in combat crews beyond one per aircraft would have to be accomplished within the replacement limits set."[48] The limited success is evident in the crew available listings in US Air Force statistics, showing a growth of Far East Air Forces (with 5th Air Forces as a member) C-47 crews from 151 in June 1943 at Cartwheel start to a high of 505 during January 1944 at the apex of Cartwheel execution.[49] Direct engagement with GEN Arnold succeeded in Kenny's achievement to increase capacity, although "Arnold emphasized that the action constituted an exception to established policy."[50]

The growth in capacity enabled airlift to perform force projection. While troop resupply and wholesale movement of forces forward provided a mainstay capability from tactical airlift, its manner of employment in the Nadzab operation achieved a first for the Pacific Theater. The 54th Troop Carrier Wing was the first in the Pacific to employ troop carrier doctrine expressed in FM 100-5, *Operations*, and War Department Circular 113, *Employment of Airborne and Troop Carrier Forces*. Both of these documents emphasized priority on troop carrier usage as an airborne delivery platform.[51] Although the Nadzab drop was the first employment of troop carriers in this role, the lessons learned throughout execution lend credence to the capability tactical airlift provides when integrated within the whole operational plan. The integration achieved through the overall combined operations plan points to future employment opportunities.

Synchronization of Cartwheel supporting forces, with airlift at the forefront, enabled integrated operational effects. GHQ and Air Staff planners planned in concert, ensuring preparatory fires by bombers, fighter and bomber support during assaults for

overland and amphibious forces, and insertion of forces via airdrop or airland by tactical airlift. Tactical airlift's responsiveness to needs of the fighting forces proved critical, as they provided the sustained means of supply and reinforcement to the fight. Tactical airlift's medical evacuation capability also boosted life expectancy among the fighting men, ensuring a way to get wounded personnel to medical support as necessary.[52]

Viability of tactical airlift as a force projection platform

The Southwest Pacific Area need for a reliable system of logistical supply depended on the flexibility of tactical airlift. Crews had to maintain an ability to employ their aircraft over long stretches of water, in and around treacherous terrain, through extreme weather conditions, and avoid the Japanese fighters.[53] Tactical airlift showed this flexibility in the Papuan Campaign during the Australian Kokoda retreat.[54] They continued by proving adaptability to support the operational situation, providing troop ferrying as a form of maneuver. This same period also saw the adaptability of the troop carrier as a medical evacuation platform. The troop carriers averaged over one hundred air evacuations a day, proving the backhaul utility.[55]

The airdrop capability for tactical airlift was still in development. The drop zones the crews tried to hit were small, requiring very low altitudes to drop the cargo.[56] The opening of the Papuan campaign showed that resupply drops were initially hit or miss.[57] Improvements in capability and understanding of required drop zones soon came, however, and the troop carrier units took great pride in their "biscuit bombing."[58] Airdrop capability growth in Cartwheel was evident in the increase in accuracy as crews developed proficiency. By the end of 1943, crew success drove the percentage of

airdropped food packages from 50 percent to upwards of 85 percent.[59] This proved a valid enabling tactic for Cartwheel success.

This success pushed planners to call on tactical airlift repeatedly. The speed of delivery enabled the fighter and bomber line to advance at greater pace than reliance on surface movement alone. Establishment of the secret base at Tsili Tsili was only possible through the efforts of tactical airlift employment. Development of supporting mechanisms to enable airlift continued as well. In order to prepare operations for future movement on Nadzab, the strip was opened using native labor and expanded to handle up to 150 C-47s a day.[60] While these operations enabled Cartwheel success, airlift employment did not play as large a role after the Lae operation.

Residual operations of Cartwheel still required troop carrier support for success. The difference was in scale. The Hollandia operation encompassed C-47 transport of over 4000 loads of cargo in May 1944, as well as an additional 500 loads into Tami.[61] This was followed by direct support to fighting soldiers with the 54th Troop Carrier Wing dropping 671 tons of supplies to Allied patrols operating out of Hollandia.[62] They even supplied personnel with another airborne drop of the 503rd PIR of 1424 troops on 3 and 4 July 1944 at Kamiri Strip on Noemfoor Island.[63] While the scale of tactical airlift support declined relative to the Kiriwina and Lae operations, maintaining the logistical network ensured Allied capability to continue the amphibious and air operations to complete Cartwheel.

The total airlift figures for tactical airlift kept rising during these successes. From July through December 1943, total weight hauled by the 317th Troop Carrier Group alone went from 3865 short tons (STONs) to 5330 STONs.[64] Tactical airlift

accomplished supply movement in rear areas as well. The 317th made resupply missions within and from Australia to New Guinea on a daily basis. While the threat of enemy aircraft was reduced, the infrastructure of Australia itself provided its own hostile circumstances. Outposts in Darwin, Fenton, and Horn Island needed resupply by airlift as shipping continued forward during Cartwheel. The complications of flight without radio aids in the northern territory of Australia meant performing different methods of navigation, such as contact flying. This form used visual navigation to find where one was, but fog, fires, and natural camouflage proved difficult for pilots in locating landmarks to accomplish the mission.[65] COL Imparato described the difficulties for the men in the 317th as just as dangerous as those faced by his 374th Troop Carrier Group operating in New Guinea. Lack of current charts, weather, and hazard information coupled with negligible radio coverage combined to create unsafe conditions for all flight activities.[66]

Tactical airlift demonstrated the resourcefulness and adaptability the Allies needed to execute Cartwheel through to a successful conclusion. Troop carrier usage provided the secondary and tertiary effects that demonstrated projecting force through maneuver of personnel. This consisted of moving ground troops and entire echelons of fighter and bomber groups. Tactical airlift then maintained the supply lines, ensuring the forward personnel received the subsistence and firepower logistics to enable mission accomplishment. While surface-shipping capabilities provided some support, the scale of airlift usage throughout Cartwheel enabled the speed and tactics employed. This ensured mission success and assisted Allied efforts to return to the Philippines.

[1]Miller, *Cartwheel*, 26-27.

[2]Army Air Forces Historical Study # 34, *The Army Air Forces in the War against Japan, 1941-1942*, 143.

[3]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign*, 9.

[4]Ibid., 149.

[5]Ibid., 117.

[6]Craven and Cate, 177.

[7]Ibid.

[8]Ibid., 196.

[9]Ibid., 165-167.

[10]Kenney, 287-288.

[11]Google.Com, "Google Map data," https://maps.google.com/ (accessed 14 April 2014).

[12]Craven and Cate, 176.

[13]Ibid.

[14]Ibid.

[15]Ibid.

[16]Japanese medium bomber, similar to the American B-25 Mitchell. http://www.militaryfactory.com/aircraft/detail.asp?aircraft_id=558 (accessed 21 April 2014).

[17]Craven and Cate, 177.

[18]Ibid., 178-180.

[19]Ibid., 180.

[20]Ibid., 181.

[21]Ibid., 190.

[22]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign*, 203.

[23]Kenney, 300-301.

[24]Miller, *Cartwheel*, 190.

[25]Ibid., 191.

[26]Craven and Cate, 181-182.

[27]Ibid., 184.

[28]Ibid., 182-183.

[29]Ibid., 184.

[30]Ibid., 185. Letter, Kenney to Arnold, 7 September 1943. Numbers differ from official reports.

[31]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign*, 19.

[32]Craven and Cate, 186.

[33]Imparato, 247.

[34]Craven and Cate, 186.

[35]Ibid., 189.

[36]Ibid., 191.

[37]Ibid., 350.

[38]Ibid., 353-354.

[39]Ibid., 354.

[40]Coakley and Leighton, *Global Logistics and Strategy, 1943-1945*, 206.

[41]Miller, *Cartwheel*, 224-225.

[42]Craven and Cate, 354.

[43]Steven Bullard and Tamura Keiko, ed, *From a Hostile Shore: Australia and New Zealand at War in New Guinea* (Canberra, Australia: Australian War Memorial,

2004), http://ajrp.awm.gov.au/ajrp/ajrp2.nsf/WebI/Chapters/$file/Chapter7.pdf?OpenElement (accessed 23 December 2013), 140.

[44]Lt Col Jeffrey E. Furbank, "A Critical Analysis of the Generalship of General Douglas MacArthur as Theatre Commander in the Pacific during World War II" (Defense Analytical Study, Air War College, Maxwell AFB, AL, 1990), 3-4.

[45]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign*, 19.

[46]Major Robert L. Charlesworth, "Using an Intratheater Regional Hub Heuristic in Iraq," ACSC Wright Flyer Paper No. 25 (Maxwell AFB, AL, May 2007), 10.

[47]Craven and Cate, 171.

[48]Ibid., 173.

[49]US, Department of the Army, *Army Air Forces Statistical Digest* (Headquarters, Army Air Forces: Office of Statistical Control, 1945), 88.

[50]Craven and Cate, 173.

[51]Miller, *Airlift Doctrine*, 138.

[52]Craven and Cate, 127.

[53]Army Air Forces Historical Study # 34, *The Army Air Forces in the War against Japan, 1941-1942*, 146.

[54]Ibid., 150.

[55]Ibid., 157.

[56]This explains why some drops went awry, as some of these drop zones were less than 100 square yards. Coupled with the terrain features of New Guinea and early navigational systems, it made them hard to find and then put the aircraft into position for an accurate drop.

[57]Craven and Cate, 167.

[58]Ibid.

[59]Ibid.

[60]US Air Force Historical Study #113, *The Fifth Air Force in the Huon Peninsula Campaign*, 189.

[61]Miller, *Cartwheel*, 132.

[62]Ibid.

[63]Ibid., 133.

[64]Imparato, 241. Short tons are total poundage delivered ÷ 2000.

[65]Ibid.

[66]Ibid.

CHAPTER 4

OPERATION CARTWHEEL RESULTS

Operation Cartwheel solidified the Allied advance in the Pacific. The combined efforts of the Allies met the overall objectives of Cartwheel, negating Rabaul as a Japanese offensive capability and providing a springboard for Allied operations in the Philippines. The preceding discussion shows the leadership, operational, and logistical efforts that went into shaping and dominating the operational environment in the Southwest and Southern Pacific Areas during Cartwheel. The results of those efforts arise through examination of the five dimensions of the thesis question. The five dimensions are: staff utilization of airlift, tactical and operational effects, airlift capability, indirect effects, and combined arms integration. Each dimension played necessary roles throughout the planning and execution of Cartwheel. Analysis of the combined planning and execution successes and failures shows each dimension's input and finalizes the impact of tactical airlift's capability to provide force projection and aid overall success of Cartwheel aims.

Planning impact on the five dimensions

The planning phase of Cartwheel included application of operational lessons learned from the Papuan Campaign in 1942. This campaign provided valuable lessons to GHQ and Air Staff planners for future employment of the few logistical assets available to support and project forces. Staff usage of airlift capitalized on the proven speed and dependability that tactical airlift provided. Kenney's leadership and direction overcame air and ground staff misconceptions of airlift capabilities and provided a platform for

tactical airlift to exhibit the desired characteristics of speed, capacity, and adaptability. This leadership and direction carried over into planning efforts of each staff echelon.

Air staff planners did well in balancing operational risk versus the safety of the airlift crews and the cargo they carried. Kenney's direction for airlift to move assets forward via leaping from air base to air base provided established locations to defend support personnel and enable continuity of operations. Staff planning for fighter coverage mitigated aerial risk from Japanese aircraft and ensured delivery of vital personnel and supplies to extend Allied capability. Evidence of detailed planning arises in the Nadzab operation, as planners provided the detail necessary for integrated arrival and support of attack aircraft necessary to support the long airlift train delivering the seizure package. Air Staff efforts in risk mitigation required this level of detail to ensure such a large formation of unarmed aircraft could accomplish their mission.

The tactical and operational effects planned included integrated efforts between General Headquarters, Air, and Task Force staffs. All planners united in the common effort of applying the leapfrog technique, employing all required assets to do so. The troop carriers provided the austere landing capability to gain a foothold, and airfield growth soon followed by airlifting in expansion capabilities. Staff adoption of rudimentary geospatial analysis concerning terrain hospitable to airfields and minimal enemy presence contributed to seizure plans and operation expansion. Each planning echelon then incorporated these final plans into the overall plan for Cartwheel accomplishment, complementary to each phase of the advance.

The integration of the plans also capitalized on growing knowledge of airlift capability. General Headquarters, Air, and Ground Commander staffs applied knowledge

gained in airlift requirements, capacity, and necessary ground support. The application of these lessons enabled thorough planning necessary to the success of airlift as a force projection tool. Staff management of airlift capabilities, capacity and ground requirements provided the details necessary to crews to accomplish assigned missions. The details in turn provided necessary data for staffs to prioritize airlift when demand exceeded capacity. The integrated planning success overall ensured complementary efforts while contributing to indirect effect applications.

The indirect effects supported the advance in multiple ways. The two methods most contributory were logistical relief and medical evacuation capability. The logistical relief provided to forward personnel capitalized upon the buildup of air bases to establish an air bridge of supplies to the front. This air bridge eliminated dependency on sea support and added speed to the operation overall. Aerial logistical relief that overcame minimal surface shipping commensurately provided an on-call capability, mitigating risks from sea support interdiction by threat or natural causes such as sea states or reefs. Airlift support also came in the form of airdrop, providing critical supplies to troops cut off from the supply chain due to location or enemy presence.

Tactical airlift's medical evacuation role grew with the increasing backhaul capabilities of troop carrier aircraft forward employed. Airlift provided a rapid means of transporting wounded personnel to medical care. Airlift support in this mission overcame the length of time and inherent dangers in sea transport of patients, and provided a boost in morale to forward troops. The integration of air and ground force commander staffs in planning and providing logistical relief and medical evacuation proved critical in overall support of mission success.

The final planning dimension of combined arms integration provides the greatest indicator of success. The capability of planners to integrate the effects necessary for forward advance linked the planning phase to Cartwheel's operational success. The Southwest Pacific forces achieved thorough integration throughout each operation. The Kiriwina and Nadzab operations again provide evidence supporting this. The integrated planning efforts of the land, sea, and aerial forces employed in these operations deconflicted forces by time and space, ensuring a common focus on the overall objectives. Each effort complemented the next (as the aerial incursion into Nadzab shows) via aerial support provided by fighter coverage and naval early warning support, land forces providing reconnaissance and security, and naval forces providing amphibious assault capability. All GHQ and Air Staff planning efforts oriented towards a common objective, achieving a three-pronged encirclement of Japanese forces and mitigating any defensive effort. The land, sea, and air support enabled airlift success in delivering the airborne personnel, while minimizing risk to crews and personnel enroute.

Execution impact on the five dimensions

GHQ and Air Staff planners managing the execution phase of Cartwheel capitalized on previous planning efforts and lessons learned to ensure mission success. Troop carrier crews' adaptability to perform resupply under various conditions while dealing with numerous obstacles provided a critical link in Cartwheel execution. Operational employment of GHQ and Air Staff planning efforts proved the balance between operational risk and safety to airlift assets. This balance is evident in coordinated fighter coverage for airlift missions during Cartwheel operations.

Troop carrier crews' achievements of tactical effects are inherent in force projection. The taking of Kiriwina brought direct airlift in to establish forward fighter and bomber coverage, mitigating the distance from Port Moresby and ensuring further offensive and defensive capabilities throughout the area of operations. The ensuing operation at Nassau Bay again demonstrated tactical effects, as rough seas prevented naval support. As tidal effects do not affect aerial delivery, timely airdrops provided the entire means of early sustainment. Operational effects of tactical airlift revisit the forward movement of air and land power. Establishment of the fighter and bomber groups at Kiriwina enabled air power expansion through the Southwest and Southern Pacific. This expansion contributed to achieving air superiority as required. Forward movement of land power ensured the security of air base establishment and brought direct effects against Japanese land forces. The combination of these efforts became a force multiplier in Operation Cartwheel, moving towards the final objective of Rabaul while minimizing Japanese defensive capability.

Tactical airlift achievements garnered thorough recognition among Allied forces. This recognition is evident in the increasing use of troop carriers to ensure reliable supply and aid speed of advance. Figure 5 and Appendix B show how the missions accomplished by tactical airlift were portrayed by the media to the home fronts in the US and Australia. The capitalization of increased planner awareness of airlift requirements and capacity ensured increasing airlift success of ground force commanders. Airlift ground support personnel provided valuable input as well. These personnel ensured increasing throughput of airlift capability at each station. This throughput is highlighted

in the expansion of operational capability at Nadzab, with only a few days' time growing handling capability from a handful to over 150 C-47s per day.

The increase in tactical airlift capabilities through staff planning efforts, crew adaptability, and effort expansion multiplied indirect effects. The success of troop carriers in the medical evacuation mission is inherent in the patients' speed of transport. Increasing numbers of wounded personnel made it to necessary medical treatment, as the speed of air travel overcame shipping limitations and slowness. The limitations of shipping provide another indirect effect of tactical airlift utilization.

The modern-day growth of operations in Afghanistan provides a metric for the support levels achieved by airlift. While Air Mobility Command uses a formulaic metric for convoy reduction to mitigate insurgent attacks along ground lines of communications, the same methodology is applicable to Southwest Pacific shipping mitigation. Appendix B delineates how the combined efforts of troop carriers represented cargo and personnel movements throughout New Guinea. While only representing 3 percent of available cargo capacity, troop carriers provided 43 percent of personnel carrying capacity. As the infrastructure throughout the Southwest Pacific Area made ground lines of communication unusable, this metric provides a direct application of airlift's applicability in a limited access environment. The Allies achieved this solution to limited access during Operation Cartwheel by the application of critical thought in employing unified action beyond a single service capability.[1] The joint maneuver of the Army Air Corps (fighter, bomber, and transport) and ground branches, supported by naval forces, enabled the operational reach of the Southwest Pacific forces.

While the previous four dimensions covered during execution illustrate tactical airlift's usefulness, its position in combined arms integration points to their complementary relationship overall. The integration achieved during execution again highlights the adaptability and effectiveness of troop carrier support throughout Cartwheel. The Nadzab operation shows evidence of split-second timing in multiple formation linkups, mitigation of radio frequency limitations and enemy actions, integrated efforts in force protection, and joint understanding of mission responsibilities from forces launched from multiple locations. The achievement of this level of integration utilizing rudimentary maps and radios, combined with a lack of a centralized control mechanism, is remarkable.

Resultant five dimension input to Primary Research Question

The situational context and examination areas contribute to development and answering of the primary research question. The success of Operation Cartwheel shows evidence of tactical airlift's relation to the overall operational scheme. Airlift enhanced force projection during Operation Cartwheel through movement and maneuver, providing a vital link in mission accomplishment. The adaptability of the crews, the planners, and the leadership showcase this capability throughout Cartwheel execution. Allied preparedness to execute operational maneuver for overall advance shows the value of tactical airlift utilization and made it indispensable in Cartwheel execution.

[1] Peter J. Munson, "Why Operational Access is no Revolution," *Small Wars Journal Blog*, http://smallwarsjournal.com/blog/why-operational-access-is-no-revolution (accessed 14 December 2013).

CHAPTER 5

SUMMARY

Operation Cartwheel demonstrates the large strides airlift made in support of achieving status as a force multiplier for military forces. The operation illustrates insight into the capability and adaptability of tactical airlift and how effective utilization can provide speed and maneuverability in support of strategic, operational, and tactical goals. Tactical airlift provides the force projection capability necessary to enable successful mission accomplishment. This force projection capability is proven through the competence to support commander initiatives through overcoming reliance on traditional means of movement, enabling leaps of maneuver to overcome access obstacles.

The previous study of the planning and execution phase of Cartwheel highlights troop carrier crews' employment of tactical airlift to provide force projection capabilities. The five dimensions of study throughout this narrative highlight the capabilities and adaptability of airlift as a force projection platform. The dimensions also highlight the requirements for successful integration to enable airlift support of operational reach. Each dimension is also complementary, combining in a total effort to encompass the contributions to success and requirements of tactical airlift to project force. Finally, each dimension relates to the original research question, achieving compounding success with thorough planning and understanding of requirements.

Staff utilization of tactical airlift supports force projections through the planning and execution phases through thorough understanding of airlift capabilities and requirements. Clear understanding of these issues enables proper balance to mitigate operational risk to crews, cargo, and tertiary effects of loss to either asset. Successful

planners balance the risk with thorough planning for safety factors, mitigating the threats of terrain, weather, and enemy through existing supportive measures such as crew rest, weather minimums, and fighter coverage integration. These measures proved necessary to protect transport aircraft from increasing losses. The Army Air Forces Office of Statistical Control showed transport losses in the Far East Air Forces (Fifth and Thirteenth Air Forces) as totaling 191 aircraft lost along with 47 crews throughout 1943 and 1944.[1] While these numbers seem disparate on the surface, they underscore the evidence presented thus far that the geographical characteristics and constraints in the Southwest Pacific Area proved more deadly than the enemy. Data provided by COL Imparato concerning the 374th Troop Carrier Group is commensurate, showing 100 aircraft lost during the same two year period, with 17 losses due to enemy activity.[2] The reduction in Japanese threat capacity to the airlift mission shows how successful staff planning enhances achievement of effects.

Tactical and operational effects are byproducts of the initial plan. These effects form the backbone of the missions for tactical airlift to perform. Cartwheel provides numerous examples of tactical airlift employment. Cargo and personnel airdrops, unimproved surface resupply, and large force sustainment contributed to tactical and operational success throughout Cartwheel execution. The achievement of these objectives also enabled indirect effects to assist in Cartwheel success.

The indirect effects achieved also contributed to tactical airlift's success in force projection. Troop carrier movement of air and land power projected forces toward the overall objective of Rabaul. This capability overcame limitations in shipping and mitigated timeline requirements to aid in speed of mission success. The increasing

capability to provide medical evacuation via air set a new standard in platform utilization and aided in troop recovery. These indirect effects came through by planner and crew understanding of airlift capabilities.

The capabilities and adaptability of tactical airlift demonstrated force projection by applying lessons learned through tactic development and employment. The troop carrier groups in the Southwest Pacific Area learned valuable lessons throughout the Buna campaign and applied these lessons while evolving into a Troop Carrier Wing and associated task forces. The application of this tactical development enables integration with related combat arms.

The combined arms effects achieved through tactical airlift integration solidify airlift's force projection capability. Planner and crew understanding of applying airlift growth to operation plans ensures integration of supporting efforts to achieve operational success. Uniting capabilities of all arms provides this holistic view of mutual support, with the airlift platform projecting forces over inhospitable terrain and threat.

The overall lesson gained from this analysis is to ensure airlift integration into all phases of an operational plan. The incorporation of air power capability to overcome the effects of terrain limitations and to aid speed of advance should occur at every opportunity to maximize effects. As commanders seek to gain and maintain initiative in operations, thereby winning the war of decision cycles against opposing commanders, airlift provides an inherent effect to aid in this endeavor. Maximizing the inherent reach of air power also mitigates infrastructure and access limitations. Accordingly, Operation Cartwheel provides an example of employing airlift to project force. Through complementary actions, both planners and crews performing the missions established a

legacy of tactical airlift capability to overcome obstacles through application of lessons learned and critical thought. Although adequate preparation is necessary to establish a baseline for airlift operations, the resulting capability of support enhances overall success for operational and strategic aims.

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[1]US, Department of the Army, *Army Air Forces Statistical Digest*, 106 and 202.

[2]Imparato, 807-814.

APPENDIX A

NEWS ARTICLE

Written by F. B. Peterson, Brisbane Telegraph (Australia), October 30, 1943.

"Every single item of equipment carried by air for the famous A.I.F. force fighting in the Markham-Ramu Valley and up in the rugged Finisterre Mountains was weighed in advance to prepare one of the most amazing loading schedules ever compiled by the Army. Supply Experts even weighted single rounds of ammunition and put on the scales ammunition boxes made in different parts of Australia to test any variation in the weight of wood used in box construction.

This is the first time an Australian division has ever been supplied and maintained entirely by air. It is stated to be the first occasion in any war theater that an air supply job of this magnitude has been carried out.

There is no special magic in the airplane as a load-carrier. In fact, the freight-carrying transport is subject to many strict limitations not encountered in land or sea transportation. The Douglas transport (C-47's), which daily roar up the New Guinea valleys to the supply point of this Australian force, can carry the same load as a large truck. And that is a small vehicle compared with the giant six-wheelers which rumble over the roads in New Guinea's rear areas every day.

An amazing fact about this big operation 'up the valley' is that every single item of food and equipment, from the inevitable tin of bully beef to the bulky field gun, has been flown in. The airplane has done the job which "which in a normal operation would be handled by land, sea and air transport. The transports have even 'carried the carriers' - large numbers of jeeps that handle the trail haulage, and natives who comprise the daily

food and ammunition trains up into the hills. The experts who planned every phase of this big air supply project were faced with the task of carrying out the same work, with limited plane loads a day, as a division operating in the Western Desert employing hundreds of freight-carrying trucks.

This meant the compilation of a huge ‘ready reckoner’ which filled 75 pages of foolscap length and twice foolscap width. This blueprint is regarded as the air supply ‘bible’ in New Guinea. British armies all over the world are watching the air supply experience with the greatest interest. Copies of the load tables have been sent to the British War Office.

Achievement of the objective would never have been possible without the enthusiastic co-operation of the American Troop Carrier organization, and Australian supply officers pay the highest tribute to the keenness of the pilots and crews who, particularly in the early days of the campaign, worked ‘like beavers’. In the first 20 days the transports made 2000 takeoffs and landings at Nadzab. The American crews saw that the men and the equipment were delivered at the right spot at the right time.

The supply experts operate on the formula that for every man in the field so many pounds of food, ammunition, clothing, equipment and medical stores are required every day. The forecast, made weeks before the move into the valley was undertaken, has worked out ‘almost to the ounce’. These soldiers are being fed on a ration scale which comprises “36 items. Even the ‘hard’ scale has 16 items. So smoothly has the supply schedule been worked out that the troops have never missed a meal, even when the advance was being made at a breakneck pace in the first days out from Kaiapit.

When troops reached advance positions at the end of a long day's hike the planes sometimes resorted to dropping to keep up supplies. At some stages the troops even enjoyed the luxury, for this part of the world, of fresh meat and bread. At no stage had they to fall back on operational rations. Just behind the front lines they were able to get new uniforms and boots, gaiters, mosquito nets, ground sheets, and water bottles and all the 'mod. cons.' of a rear area quartermaster store."[1]

[1]Imparato, 422-427.

APPENDIX B

SHIPPING MITIGATION CALCULATION

The actual shipping mitigation through use of tactical airlift is difficult to ascertain, due to scattered sources and incomplete records.[1] The main method used below is through establishing equivalencies and corroborating known information. The baseline for the troop carriers was the C-47, with specifications established through numerous sources as capable of transporting three tons or twenty eight passengers.[2]

The main challenge to establishing total mitigation is due to makeup of the US Army Services of Supply Small Ships fleet during the Southwest Pacific Area growth. While very small during the Papuan Campaign and opening months of Cartwheel, growth came through contracts to Australian builders to produce small wood frame ships and barges to facilitate movement along the northeast New Guinea coastline. The main impact of these ships was to follow the advancing bomb line and provide bulk resupply when able, with items such as aircraft fuel, bombs, and ammunition.[3]

As the makeup of the fleet used various sizes of ships and barges, the main makeup of MacArthur's fleet at the beginning of Cartwheel consisted of 59 Liberty equivalent ships.[4] The majority of the makeup was in larger class ships, contributing to movement of large bulk items for buildup throughout New Guinea. The main equivalent to the tactical airlift mission was the services conducted by the small ships section. This section possessed the equivalent of four Liberty ships. The capacities of these ships stand as 36,000 tons or 2016 Passengers inclusively.[5]

Records for numbers of sorties flown by troop carriers are scattered as well. The primary record-keeping source was the Group Statistical Officer. The 374th Troop

Carrier Group Statistical Officer, Captain Harold Simpson, compiled data for Group activities in New Guinea from 1 January through 30 September 1943. These figures show 51,347 tons and 51,840 personnel moved. As this was the primary group in operations throughout Cartwheel execution, these figures are indicative of tactical airlift support throughout the operation.

The monthly airlift averages of 5,705 tons and 5760 personnel moved via the 374th Troop Carrier Group are useful to show logistical relief. Assuming that the small ships represented by the four Liberty equivalents take 6 days per cycle (load, transport, unload), then the US Army Services of Supply Small Ships were capable of transporting a monthly average of 180,000 tons or 10080 passengers. This represents 97% greater capacity in sea supply for tonnage movement, but only 57% greater capacity for personnel transport. This data converts the actual amounts moved to indicate the airlift capacity available through sorties generated in absence of actual sortie numbers. This realizes a final airlift capacity of 6320 tons or 7661 passengers. As records for actual shipping or airlift sorties remain incomplete, only the capacity comparison indicates the level of achievement. The impact of airlift on shipping mitigation relies focused on speed of advance, however. While only possessing 3% capacity of available cargo movement or 43% capacity of available passenger movement, the effect of rapid advance by employing the airlift tactic directly supports Cartwheel success.

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[1]The necessity to show strict capacity comparisons is driven by lack of data. The data necessary to present more fidelity includes actual small ships information, C-47 sortie rates, actual numbers of passengers and cargo moved by both aircraft and small ships, and mission scheduling or loss information particular to the Southwest Pacific Area.

[2]Douglas DC-3.Com, “Douglas DC-3 Specifications,” http://www.douglasdc3.com/dc3specs/dc3specs.htm (accessed 14 April 2014).

[3]Kenneth J. Bobcock, “MacArthur’s Small Ships: Improvising Water Transport in the Southwest Pacific Area,” *Army History*, no. 90 (Winter 2014): 33-36.

[4]Dr. James R. Masterson, U. S. Army Transportation In The Southwest Pacific Area 1941-1947 (Transportation Unit, Historical Division, 1949), 336.

[5]Ships.Com, “Liberty Specifications,” http://ww2ships.com/usa/us-os-001-b.shtml (accessed 4 April 2014).

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