A Prelude to Multidomain Operations: Joint Fires in Shaping Amphibious Landings in North Africa, Sicily, and Normandy in World War Two

A Monograph

by

MAJ Bryan S. Hammond
US Army

School of Advanced Military Studies
US Army Command and General Staff College
Fort Leavenworth, KS

2019

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
05/10/2019	ASMP Monograph	July 2018- May 2019

4. TITLE AND SUBTITLE
Monograph Title: A Prelude to Multidomain Operations: Joint Fires in Shaping Amphibious Landings in North Africa, Sicily, and Normandy in World War Two

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
MAJOR Bryan S. Hammond (U.S. Army)

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Advanced Military Studies Program
250 Gobbon Avenue
Fort Leavenworth, KS 66027-2134

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Command and General Staff College
1 Reynolds Avenue
Fort Leavenworth, KS 66027

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
Amphibious operations are complex combat operations requiring the skillful integration of joint fires to facilitate inland maneuver by ground forces. The Second World War saw many amphibious operations on the part of the Allies. This study looks at three vignettes from the European Theater of Operations; the amphibious invasions of North Africa, Sicily, and Normandy to better understand the progression of joint fires planning, training, and execution. The level of joint fires integration progressed remarkably over the course of the war as the Allies applied lessons learned across the joint force including lessons from the Pacific Theater of Operations. The Allies used both lethal and non-lethal fires across multiple do

15. SUBJECT TERMS
Amphibious Operations, Joint Fires, Fire Support, Naval Gunfire, Air Support, Joint Planning, Training, Shaping Operations, Second World War, Invasion of North Africa, Operation Torch, Invasion of Sicily, Operation Husky, Invasion of Normandy, Operation Overlord.

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Kirk C. Dorr, COL, US Army
UNCALSS	UNCALSS	UNCALSS	UNLIMITED	50	19b. TELEPHONE NUMBER *(Include area code)* 913-758-3302

Monograph Approval Page

Name of Candidate: Major Bryan S. Hammond

Monograph Title: A Prelude to Multidomain Operations: Joint Fires in Shaping Amphibious Landings in North Africa, Sicily, and Normandy in World War Two

Approved by:

_____, Monograph Director
Justin E. Kidd, PhD

_____, Seminar Leader
Andrew J. Watson, COL

_____, Director, School of Advanced Military Studies
Kirk C. Dorr, COL

Accepted this 23rd day of May 2019 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, PhD

Abstract

A Prelude to Multidomain Operations: Joint Fires in Shaping Amphibious Landings in North Africa, Sicily, and Normandy in World War Two by MAJ Bryan S. Hammond, US Army, 50 pages.

Amphibious operations are complex combat operations requiring the skillful integration of joint fires to facilitate inland maneuver by ground forces. The Second World War saw many amphibious operations on the part of the Allies. This study looks at three vignettes from the European Theater of Operations; the amphibious invasions of North Africa, Sicily, and Normandy to better understand the progression of joint fires planning, training, and execution. The level of joint fires integration progressed remarkably over the course of the war as the Allies applied lessons learned across the joint force including lessons from the Pacific Theater of Operations. The Allies used both lethal and non-lethal fires across multiple domains to gain access to contested shores. These lessons may prove useful as modern armed forces face increasingly sophisticated anti-access area denial networks.

Contents

Acknowledgements

I would like to thank my monograph team Dr. Justin Kidd and COL Andrew Watson of the School of Advanced Military Studies for their guidance and assistance in preparing this monograph. I also want to thank Mr. Russel “Rusty” Rafferty and the research section at the Ike Skelton Combined Arms Research Library, their assistance in finding applicable material was invaluable. I would like to thank Mrs. Vinita Kruger as well for her assistance in editing this monograph. I also want to thank my wife Jessica and our three children Audrey, Barret, and Spencer for their love and support throughout this process, your sacrifices on my behalf are great and my debt to you unpayable.

Acronyms

FM	Field Manual
FTP	Fleet Training Publication
HMS	His (Her) Majesty's Ship (British Royal Navy)
US	United States
USS	United States Ship

Illustrations

Introduction

> The outstanding achievement of this war in the field of joint undertakings was the perfection of amphibious operations, the most difficult of all operations in modern warfare.
>
> — Fleet Admiral Ernest J. King, *Chief of Naval Operations*, 1947

There is a saying in US Marine artillery: "The King don't swim."[1] This colloquial phrase expresses the difficulties of employing field artillery, what the Army calls the "King of Battle," in support of amphibious operations. Amphibious landings require joint fire support delivered by air and sea forces to support the establishment of the initial beachhead. The planning, synchronization, and control of such fires during a period of combat transition requires close coordination and communication at the operational staff level, as well as skill, initiative, and flexibility on the part of the executors. Today's adversaries rely on sophisticated anti-access area denial networks to defend territory from incursion by opposing forces. These networks integrate sensors, lethal fires, and non-lethal fires across multiple domains. Defeat of these anti-access area denial networks will be a key requirement for establishing beachheads by amphibious operations if US armed forces are required to gain access to contested shores. Defeating adversary defensive networks will require the skillful integration of joint fires, both lethal and non-lethal, across multiple domains.

The key to successfully conducting amphibious operations in the future may very well lay in examining the past. Historical amphibious operations can serve as a model for identifying important principles for defeating current adversary anti-access area denial networks to facilitate power projection from the sea. The integration of fires, from air and sea forces to establish an initial lodgment, is one of those principles. The complexity of amphibious operations, with its inherent transition from maritime to land based combat, requires considerable joint collaboration

[1] Thomas Nance, "Interview with Maj. Daryl Laninga" (John A. Adams '71 Center for Military History and Strategic Analysis, Cold War Oral History Project Virginia Military Institute, Lexington, VA, February 2005).

to ensure success. This is particularly true as the force seeks to synchronize fires to facilitate the rapid seizure of terrain by ground troops. The purpose of this monograph is to examine how joint fires from sea and air forces were successfully planned, trained, and executed in the European Theater during Operations of the Second World War through the use of three vignettes. This work will analyze the lessons of the vignettes applicable to current doctrine, and discuss the theory behind the use of joint fires in modern amphibious operations.

Research Questions and Hypotheses

Research Questions

This study was organized around four research questions. The overarching question was how did joint fires integration mature in amphibious operations in the European Theater of Operations during the Second World War? The primary research question was supported by three additional questions. Did the planning for joint fires change as a result of the lessons learned in the sequence of invasions? Did the unit training for joint fires change as a result of the lessons learned in the sequence of invasions? And did the effectiveness of joint fires improve in the sequence of invasions? There were three hypothesis this study sought to prove. The first hypothesis was joint cooperation in planning increased with each successive invasion. The second hypothesis was training for joint fires became increasingly collective, involved larger units, and involved greater complexity as the Allies prepared for each amphibious invasion. The final hypothesis was that the organization for controlling joint fires became larger and more joint in each successive invasion. The analysis of these vignettes was used to determine what changes were made to improve the effectiveness of joint fires in support of amphibious operations.

Methodology

The intent of this monograph was to examine how the experience of each subsequent amphibious operation in the European Theater of Operations, with the North African and

Mediterranean areas included, changed the integration of joint fires in support of amphibious operations. The study examined three vignettes of amphibious operations in the European Theater of Operations. The vignettes were analyzed for changes in planning, training, and the execution of joint fires, for shaping and supporting amphibious landings. The study also examined lessons learned during the campaigns, and their use to improve amphibious operations. To objectively study the use of joint fires for amphibious operations, this work examined the planning, training, and execution for the use of those fires in Operation Torch, Operation Husky, and Operation Overlord. This research allowed identification of those elements of joint fires preparation most effective in shaping the selected campaigns.

This monograph used a method based on structured focused comparison discussed in George and Bennet's *Case Studies and Theory Development in the Social Sciences*.[2] The comparison used consists of a "cross-case . . . analysis" for each of the three vignettes in regard to the research question and sub-questions listed in section one of this work.[3] Developed to study historical examples for "important foreign policy problems," this method of comparison allowed an unbiased analysis of the three vignettes despite a myriad of independent variables unique to each situation.

The material used in this study comes from primary sources in the form of operations' orders and operations' plans, official reports, and after-action reviews. These sources provided insight into the thinking of senior leaders as they worked to solve the complicated problems of supporting amphibious operations with joint fires. Many of the more detailed aspects of planning, training, and lessons learned derive from these sources. Secondary sources used include official military histories from the various services involved, as well as books, and other scholarly studies concerning each invasion period. Secondary sources provide analysis on the part of authors who

[2] Alexander George and Andrew Bennet, *Case Studies and Theory Development in the Social Sciences* (Cambridge, MA: Harvard University, 2005), 67.

[3] Ibid., i.

have the benefit of hindsight as a lens to view these operations through. Secondary sources also helped to fill the gaps sometimes found in the available primary documents through the author's extensive research on their own work.

The focus on changes to planning, training, and execution for the joint fire support of the invasions allows this work to more objectively determine the evolution of joint fires in support of amphibious operations. The comparison results were used to analyze the hypotheses and draw conclusions about the development of measures to integrate joint fires into amphibious operations. Each vignette analyzed the planning, training in advance of, and execution of joint fires in support of the selected operations. The planning of each operation included variance in the structure of those staffs used to plan fire support for the operation. Often planning staffs of this type were task organized, and therefore their structure was likely to show change with each operation. Several factors show changes in training for each landing operation. Based on the situations of the various invasions, changes in facilities, capabilities used, interservice coordination, echelon collectively trained, and amount of time spent training were noted. The vignettes also investigated the time used in shaping the operational battlefield, and to what depth from the shore that shaping was conducted. The vignettes also examined the structure of shore fire control parties, and similar elements deployed with each landing. These teams served parallel purpose to the Joint Assault Signal Companies used in the Pacific Theater, and were the precursor to Air Naval Gunfire Liaison Companies still in use today.

Particular attention was paid to US Army infantry divisions involved in the various landings. Particularly, the experiences of the 1st Infantry Division are looked at in depth during the assaults in North Africa and Normandy. For the Sicilian invasion the 3rd Infantry Division's experience was studied. Each vignette also analyzed the task organization of the Naval and Air Forces used in the invasion, and how changes over time were indicative of lessons learned and applied to improve effectiveness. Lastly, the desired effects of the fire support plan were

compared to the results achieved in each landing to provide further analysis of the effectiveness of the joint planning conducted prior to each assault.

The study of three amphibious operations as vignettes for examining joint fires integration comes with a certain amount of risk. The vignettes represent just a few of the many amphibious operations during the Second World War. The threats in each case were different due to location, composition of forces, complexity of the plans, and other factors. The strategic, operational, tactical, and civilian environments were unique within each operation as well. Technology was continuously improving as time progressed, and the priority of the operations increased with each subsequent invasion as the lines of operations drew closer to the German strategic center of gravity.[4] These vignettes are far from a sterile, single variable scientific experiment. They are a comparison of multiple singular events in time tied together with common threads. Caution is required to ensure no sweeping generalizations or absolutes are drawn from the comparison of these examples.

Literature Review

No succinct study of the doctrine and organization for integrating joint fires in support of amphibious operations in the European Theater of Operations during the Second World War exists. Much of the literature is concerned with the invasions themselves, the leaders involved, and various aspects of the operations. However, the planning and integration of the joint fires that supported the success of these invasions are treated as an aside, or point of interest along the way to the author's main points. This has left a gap in considering the vital role of joint fires in supporting amphibious landings. Writers on these subjects generally write primarily on either the overall operation, or from the point of view of one of the three primary domains involved, sea, air, or land. The War Department, Army, and Navy applied considerable time and effort to record

[4] Carl Von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 77.

the history and lessons learned in the Second World War's many amphibious operations. The US Army Center for Military History wrote several volumes concerning amphibious operations in the European Theater of Operations. They dedicated an entire volume titled *Cross-Channel Attack to Operation Overlord*. Usually tied to support of the operation during final execution, the discussion of joint fires in these works varies.

Doctrine

An examination of the development of early US amphibious doctrine is important to understanding the framework planners and commanders were building on as the Second World War progressed. As noted by William Atwater, the Gallipoli campaign of the First World War showed, with shocking clarity, the difficulties of amphibious operations against modern defenses.[5] Recognized as one of the most disastrous amphibious operations in modern history was the British efforts to take Istanbul by sea in 1915. Atwater's work deals specifically with the development of US amphibious doctrine prior to the Second World War, with particular intent to give due credit to the US Army and US Navy.[6] His assessment of fire support for amphibious operations going into the Second World War states "how best to deliver and control supporting fires . . . constituted a major technological and doctrinal problem that was only partially solved prior to World War II."[7] Determining how the Army and Navy worked together in Europe to solve this problem is the focus of this study.

US Navy development of amphibious theory and doctrine made great strides in the period between First World War and Second World War. US Marine Corps Major Earl Hancock "Pete" Ellis was instrumental in advocating for the capability to land combined arms forces on hostile shores. He was one of the leading theorists of amphibious warfare in the interwar period, and

[5] William Atwater, "United States Army and Navy Development of Joint Landing Operations 1898-1942" (Ph.D. Diss., Duke University, 1986), iii.

[6] Ibid., vi-vii.

[7] Ibid., x.

considering he died in 1923, his writings on aspects of amphibious operations in the islands of the Pacific are prophetic.[8] The US Marine Corps was the leading proponent of amphibious operations and doctrine development in the 1920s. They conducted a number of exercises involving amphibious warfare in the Panama Canal Zone and Hawaii that included exercises against opposing force role players, along with joint Army and Navy involvement in 1925.[9]

As the Navy applied the lessons learned from these exercises, they developed the 1938 *Fleet Training Publication (FTP) 167, Landing Operations Doctrine.* This doctrinal publication would lead to the development of War Department, *Field Manual (FM) 31-5, Landing Operations on Hostile Shores*, on 2 June 1941, a little over six months prior to the Japanese attack at Pearl Harbor.[10] The US Marine Corps and US Army created the First Joint Training Force consisting of the 1st Marine Division and the1st Infantry Division to test the doctrine. This newly established joint force would conduct the largest amphibious training operation to date in July 1942. *FM 31-5* would become the doctrinal capstone for all US Army amphibious operations in the Second World War.

The introductory paragraph of *FM 31-5* attributes the Navy's *FTP 167* as the basis for most of the manual, including diagrams.[11] The manual dedicated a separate chapter to naval gunfire with a full subsection on the coordination of fires in support of ground troops. Additionally, it described the use of aviation in support of landings with subsections for four phases, the preparation for the landing, debarkation of ground troops from the fleet, the approach

[8] Dirk Ballendorf, "Earl Hancock Ellis: A Marine in Micronesia," *Micronesian Journal of The Humanities and Social Sciences* 1, no. 1-2 (December 2002), 9-17.

[9] Headquarters US Marine Corps, Division of Operations and Training, *Basic Plan Joint Army Navy Exercises 1925. Problem #3. Blue Marine Corps Expeditionary Force* (Quantico, VA: Government Printing Office, 1925).

[10] David Emmel, "The Development of Amphibious Doctrine" (Master's Thesis, US Army Command and General Staff College, Fort Leavenworth, KS, 2010), 77.

[11] War Department, *Field Manual (FM) 31-5, Landing Operations on Hostile Shores* (Washington, DC: Government Printing Office, 1941), II.

to shore, and the advance inland.[12] *FM 31-5* also dedicated a chapter to supporting arms, with field artillery being the first subsection. For the purpose of this study, chapter eight on signal communications was the most informative. That chapter provided several diagrams on ship, shore and air communications for the purposes of observing, directing, and coordinating sea, air, and land based supporting fires. Guidance provided in *FM 31-5* included the communications link between the supporting artillery battery, and the supported combat team. With regard to interservice integration, the manual advised, "It is desirable that the artillery battery observation post is near the observation post of the naval artillery liaison party. This ensures certainty of signal communication between the two observation posts and facilitates coordination of the field artillery and naval fires."[13]

Communication was a critical requirement for coordinating fires in support of amphibious landings, and *FM 31-5* stated "Sufficient suitable type radios should be provided to enable each battery to communicate directly with the observation airplane."[14]

[12] War Department, *FM 31-5, Landing Operations on Hostile Shores* (1941), 113.

[13] Ibid., 127.

[14] Ibid.

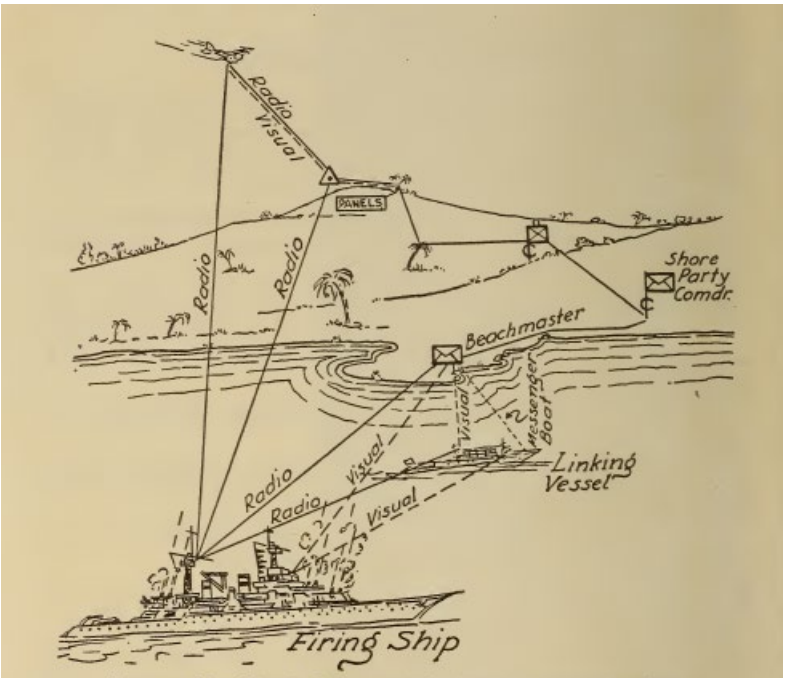

FIGURE 18.—Naval fire control signal communication.

Figure 1. Example Communication Diagram. War Department, *Field Manual 31-5, Landing Operations on Hostile Shores* (Washington, DC: Government Printing Office, 1941) 126.

Figure 1 depicts the various redundant communications between the firing ship, the ground and air observers, and the various command and control nodes. The types of communication include radio, wire, visual and messenger communications. The flags with a "C" on the staff indicate a headquarters with a telephone switchboard. The triangle at the top of the hill indicates an artillery observation post. That symbol is still used for that tactical formation in current doctrine.[15]

The development of an air-ground capability continued in the lead up to the Second World War. The Army expanded greatly by the mobilization of the National Guard, and the first peacetime draft. The Army Chief of Staff established the US Army General Headquarters, an administrative headquarters with the role to manage the quickly growing force. This headquarters, led by Brigadier General Leslie McNair, linked the training of those forces to the lessons learned

[15] War Department, *FM 31-5, Landing Operations on Hostile Shores* (1941), 126.

at a rapid pace in exercises and in combat.[16] The General Headquarters experimented with applications of air support in a series of tests and exercises in 1941 and 1942. *FM 31-35, Aviation in Support of Ground Forces*, published 9 April 1942, was the official outcome of the tests and exercises conducted with air and ground forces in those exercises.

There were many growing pains in establishing a working doctrine that the ground forces and the increasingly autonomous air forces could agree on. Many in the US Army Air Corps saw air power as better used in strategic bombing than in support of ground forces. Five main missions were identified for the support of ground troops in the lead up to the Second World War for the US Army Air Corps, renamed US Army Air Forces in 1942. These missions included: "the close, direct-support fire missions on the immediate front of ground forces, air defense of friendly ground forces and installations in the combat zone, air attack against targets in hostile rear areas, support of parachute troops and air infantry, reconnaissance, liaison, and observation."[17] All of these missions had a role in supporting an amphibious assault.

The Army and Army Air Forces worked hard to balance the competing demands for aircraft, pilots, equipment, fuel, and ordinance for training and combat use, while developing a workable doctrine for integrated operations in combat. Trying to grow and develop an army and an air corps, while developing and training new tactics, techniques, and procedures was an incredible challenge for the US Army. The ability of senior leaders, notably, McNair and Major General Henry (Hap) Arnold, Commander of Army Air Forces, to come to some sort of compromise for the greater benefit of the service was a testament to their leadership, and

[16] Kent Greenfield, Robert Palmer, and Bell Wiley, *United States Army in World War II: The Army Ground Forces: The Organization of Ground Combat Troops* (Washington, DC: Center of Military History United States Army, 1987), 6.

[17] Ibid., 101-102.

dedication to a common cause. Finally, the publication of *FM 100-20, Command and Employment of Air Power* in July 1943, gave an independent role to the US Army Air Forces.[18]

Unit Organization

The US armed forces entered the Second World War with a working amphibious operations doctrine that stressed the need to integrate naval, and air fires to support maneuver forces in the assault. They had tested the fundamentals of combined amphibious operations in exercises as far back as 1925. Just prior to the Second World War, the US Army and US Marine Corps developed and trained two amphibious corps. The I Amphibious Corps consisted of the US Army's 1st Infantry Division and the 1st Marine Division, with responsibility for the east coast of the United States. The II Amphibious Corps was comprised of the US Army's 3rd Infantry Division, and the 2nd Marine Division, with responsibility for the west coast. With these forces, the United States prepared for the war looming off both coasts.

To train units to execute amphibious operations the US Army created Amphibious Training Centers at Camp Gordon Johnston, Florida, and Camp Edwards, Massachusetts. Designed to train divisions to execute amphibious landings, including classes for the headquarters staff, these schools began operations on 15 June 1942.[19] These classes included naval gunfire and air-ground support in amphibious operations. The training areas inland of these camps were limited, hampering both maneuver space and the ability to incorporate substantial sea, air, or land fires assets into the exercises.[20]

The Allies conducted a large number of amphibious landings during the Second World War, including the largest amphibious landing on record, the 6 June 1944 invasion of Normandy

---

[18] Henry Lether, "FM 100-20: The Path to an Independent Air Force" (Master's Thesis, Air War College, Maxwell Air Force Base, AL, 1994), 2 ; Francis Ianni. "Close Air Support for the Field Army" (Master's Thesis, US Army Command and General Staff College, Fort Leavenworth, KS, 1964), 3.

[19] Marshall Becker, "Studies in the History of Army Ground Forces" (Study No. 22, Historical Section, Amphibious Training Center, Washington, DC, 1946), 7.

[20] Ibid., 53-54.

known as Operation Overlord. Amphibious operations were a vital component of the allied scheme of maneuver in the North African, Mediterranean, and European Campaigns. Amphibious operations provided the most effective projection of combat power to enemy held territory inaccessible by ground approaches.

Strategic Context

The situation for the Axis coalition in the spring of 1942 was promising. The German Wehrmacht (Army) controlled all of western Europe, and had pushed the British back into Egypt. They were setting conditions to begin second offensive deep into Soviet Russia. Japan had taken Singapore, and had the British retreating across Burma, which threated to cut the lifeline to beleaguered Chinese resistance. On the seas, German U-boat "Wolfpacks" were interdicting shipping in the North Atlantic, threatening the sea lines of communication between the United States and Britain. Japan controlled the Pacific Ocean as far south as the Solomon Islands, and as far east as the Marshall Islands. Things looked bleak for the Allies as the Axis threatened to link up somewhere in Asia, cutting off, and strangling China and the Soviets.

Despite these troubling developments, the situation for the Allies was slowly improving. The United States had joined the Allies in December 1941 after the Japanese attacks at Pearl Harbor, the Philippines, Guam, and Wake Island. The United States would launch a largely symbolic bombing raid on Tokyo with carrier launched bombers in April 1942, and with the aid of broken Japanese communications codes would hand the Japanese Navy a landmark defeat at the battle of Midway in May of the same year.

However, at the ARCADIA conference in Washington DC, US and British leaders, including President Roosevelt and Prime Minister Churchill had decided on a "Germany First" strategy.[21] Germany's greater industrial and military capacity, and the threat of the loss of either

[21] Craig Symonds, *Operation Neptune: The D-Day Landings and the Allied Invasion of Europe* (New York: Oxford University Press, 2014), 31.

the Soviet Union or Great Britain to the Germans, made the decision sound. The question for the American military planners was where to start.[22] Army Chief of Staff, General George C. Marshall's first instinct was to cross the English Channel and drive straight for the heart of Germany. The first plans developed were for a buildup in Britain and an invasion of France in 1943. These operations were known as Operation Bolero and Operation Roundup respectfully.[23]

The British, driven back across the English Channel, from Dunkirk in 1940, urged a different approach. From the British perspective an invasion of western North Africa offered several advantages. The operation would create a two-front dilemma for the German forces fighting the British in Egypt. Success on North African shores would secure the southern Mediterranean Sea, and with the sea lines of communication secured, Allied shipping could be routed through the Suez Canal. Using the canal would save weeks of travel time, and reduce the risk of attack by German warships off the Atlantic coast of Africa.[24]

A landing in North Africa would also provide American troops with needed combat experience, and would likely not be as intense as the baptism of fire they would face in a cross-channel invasion. The invasion of French colonies would also hopefully compel the Vichy French regime, left in power to rule Southern France and French colonies after the surrender to the Germans, and collaborating with the Axis powers, to side with the Allies. Operations in North Africa could also aid the Soviets by providing additional requirements on German combat power and resources. Moreover, an invasion in North Africa would get American forces into the war in 1942, as opposed to 1943, when the Combined Chiefs of Staff determined they would have sufficient resources to conduct an invasion of France.[25] After considerable debate, including

[22] Rick Atkinson, *An Army at Dawn: The War in North Africa 1942-1943* (New York: Henry Holt and Company, 2002), 10.

[23] Ibid., 11.

[24] Ibid., 13.

[25] Ibid.

sending a delegation to London consisting of Army Chief of Staff General George C. Marshall, and Naval Chief of Operations Admiral Ernest J. King, the British option of invading French North Africa was agreed upon.[26]

Vignettes

Operation Torch

The invasion of North Africa in Operation Torch was unique in several respects. The US Army had not conducted an invasion of a hostile shore since 1898.[27] The US Navy and US Marine Corps were testing their theories and doctrine as well, having landed on Guadalcanal in August 1942. The soldiers for the invasion of North Africa were transported from bases in England and the United States over sea lines of communications thousands of miles long. The invasion was conducted on three major landing areas in the vicinity of the port cities of Casablanca, Oran, and Algiers. These cities were separated by hundreds of miles on both the Atlantic and Mediterranean shores of North Africa.[28] While the distance between landing sites made synchronization of the operations difficult, the reasons behind the choice of landing sites were many. One of the main planning factors included landing outside Axis air coverage provided from bases in Sicily. Landing sites were chosen for their proximity to population centers, and seats of power for the Vichy French governing the colonies. Casablanca was chosen to provide a sea line of communication to Allied forces in case the Axis were able to interdict shipping in the straights of Gibraltar that separated the Mediterranean Sea and the Atlantic Ocean. Another unique aspect of Operation Torch was the strategic complexity created by the unknown

[26] William Breuer, *Operation Torch: The Allied Gamble to Invade North Africa* (New York: St. Martin's Press, 1985), 7.

[27] Atwater, "Development of Joint Landing Operations," 2.

[28] Combat Studies Institute, *Battlebook 3-A, Operation Torch, North Africa Campaign: Offensive, Deliberate Assault, Amphibious, 8 November 1942* (Fort Leavenworth, KS: Combat Studies Institute, 1984), 18.

propensity of the Vichy French to resist the invasion. The Allies wanted to give the Vichy French every opportunity to capitulate or join them. These factors meant that a preparatory bombardment was unwise until Vichy intentions to resist were clear.

Another problem facing the Allies was the strained relations between the French and British over the Mers El Kebir incident, where British naval vessels shelled Vichy warships at anchor near Oran to prevent the fleet from falling under German control. The incident resulted in the deaths of over 1,200 French sailors.[29] The strained relations between the British and Vichy France meant British involvement in the landings had to be kept covert, lest their presence inspire the Vichy French to resist. American relations with the Vichy regime were more cordial, and it was hoped that by emphasizing the American composition of the forces involved, resistance would be light, short lived, or non-existent.[30]

Planning

Operation Torch was planned and executed in a comparatively short time compared to subsequent amphibious operations. Only one hundred and five days separated the president's decision to invade North Africa from D-Day, the day set for the landings. The commander for Operation Torch, Lieutenant General Dwight D. Eisenhower, issued the basic outline for the plan, a three-group invasion, on 20 September 1942, only seven weeks prior to the target date of 8 November 1942. In contrast, planners would spend over a full year putting together the details for the invasion of Normandy.[31]

Major General Mark Clark was selected to be the lead planner for the Americans, although most of the expertise came from British planners.[32] The plans took into account the need for naval surface fires and carrier aircraft to support the landing. Each naval task force supporting

---

[29] Atkinson, *An Army at Dawn*, 26.

[30] Ibid.

[31] Dwight Eisenhower, *Lessons of Operation Torch* (LaCrosse, WI: Brookhaven Press, 2003), 6.

[32] Atkinson, *An Army at Dawn*, 9.

the landing beaches was subdivided into three groups to support the assaults: the covering and escort group, the fire support group, and the air support group. The US Navy supplied the shipping for the Western Task Force, while the Royal Navy provided the shipping for the Center and Eastern Task Forces.[33] The fire support group of the Western Task Force consisted of the battleships United States Ship (USS) *Texas* and *New York*, three cruisers, and twenty destroyers. The Center Task Force's fire support group had the battleship His Majesty's Ship (HMS) *Rodney*, two cruisers, and twelve destroyers. The Eastern Task Force fire support group was led by four cruisers, a monitor, and twelve destroyers.

The initial air support was provided by aircraft carrier groups assigned to each task force. The Western Task Force was supported by the USS *Ranger*, along with three auxiliary carriers, an anti-aircraft cruiser, and nine destroyers. The Center Task Force was supported by HMS *Furious* loaded with fifty-seven fighter bombers, and two auxiliary carriers.[34] Finally, the Eastern Task Force was provided air support by HMS *Argus* and an auxiliary aircraft carrier.[35]

Training

The 1st Infantry Division was probably one of the best prepared, and best trained units in the US Army for amphibious operations at the time. The division had been part of the First Amphibious Force along with the 1st Marine Division who during this time was conducting their own amphibious operation on Guadalcanal in August 1942. The 1st Infantry Division had moved to the British Isles where they conducted additional amphibious training at the Combined Training Center in Western Scotland. This included a rehearsal on 18 to 19 October, a mere three weeks prior to the landing.[36] There was no mention of training for the use of naval gunfire by the 1st Infantry Division in Scotland in the official records. However, Samuel Eliot Morison stated in

[33] Eisenhower, *Lessons of Operation Torch*, 7-8.

[34] Breuer, *Operation Torch*, 122.

[35] Eisenhower, *Lessons of Operation Torch*, 7-8.

[36] Ibid., 8.

his book, *Operations in North African Waters*, "fire support ships conducted shore bombardment exercises at near-by Bloodworth Island," while landing regiments of the Western Task Force were conducting landing exercises at the "Solomons Island training area in Chesapeake Bay."[37] Morrison's account provided evidence that the naval contingent of the Western Task Force conducted training for supporting ground troops with naval gunfire prior to the invasion of North Africa.

Execution

The day set for the beginning of the invasion for Operation Torch was 8 November 1942. Despite the great distances traveled from multiple locations, and with radio silence strictly enforced for fear of Axis direction finding capabilities, each task force reached its destination almost simultaneously. The invasion began with loudspeakers and radio broadcasts in French that called out for the defenders to surrender, and not resist the invasion. The French sense of honor, and orders from their government demanded resistance. The stage was set for combat operations on the shores of North Africa. The codeword "Play Ball" was relayed throughout the formations as it became apparent the French would resist the landings.[38] Most of the resistance encountered in the initial landings came from costal batteries and fortifications in the vicinity of the ports. Although limited naval action occurred as well.

Operation Torch was unique among these vignettes as the only invasion supported by carrier-based aircraft. The distance from any large expanse of Allied territory required carrier aviation to supplement what few air forces could be brought into the fight from Gibraltar, the closest allied airfield. The use of carriers aided greatly in the surprise aspect of the landings as well. A large buildup of aviation resources on Gibraltar, an island in close proximity to Spain, and closely watched by German intelligence would indicate impending action nearby. The use of

[37] Samuel Eliot Morison, *Operations in North African Waters, October 1942-June 1943* (Annapolis, MD: Naval Institute Press, 2010), 23.

[38] Breuer, *Operation Torch*, 120.

aircraft carriers prevented the Axis from knowing with certainty what the Allies intended with their fleets. The Germans may have supposed the shipping was bound for either Malta to supply the island's dire needs, or perhaps Egypt to reinforce the British Eighth Army.[39] There were twelve aircraft carriers involved in the Torch landings, five US Navy carriers in the western task force landing in Casablanca, and seven Royal Navy carriers organized into two task forces to support the landings at Oran and Algiers.[40] Targets engaged by the Allied air fleets included enemy warships, aircraft, and costal defense batteries. Some aircraft from the center task force even dropped leaflets on air fields near Oran in an example of non-lethal fires incorporated into the plan.[41] Given the uncertain strategic situation between the Allies and the Vichy regime, the non-lethal fires and other information operations were quite appropriate, and were likely helpful in ending resistance on the part of the Vichy French in just a few days.[42]

Lessons Learned

The use of naval gunfire received some harsh criticism from General Patton. He wrote of naval gunfire's usefulness in future amphibious operations, "In my opinion, naval gunfire support is a very weak reed on which to lean. It is too inaccurate, and they will not get close enough (to shore)."[43] Communication problems had plagued the naval gunfire spotters on the ground and in spotter aircraft launched from carriers. Radios were unreliable and susceptible to water damage. Fire discipline and ammunition consumption had been inconsistent among warship crews. According to Major General Wilson who was aboard the Cruiser USS *Brooklyn* for the invasion,

[39] Atkinson, *An Army at Dawn*, 13.

[40] Peter Merskey, "Naval Aviation in Operation Torch," *Naval Aviation News* (November-December 1992): 25.

[41] Ibid.

[42] Atkinson, *An Army at Dawn*, 149.

[43] Martin Blumenson, *The Patton Papers 1940-1945 Volume 2* (Boston, MA: Haughton Mifflin, 1974), 135.

"it appeared the cruiser was ranging with broadside,"[44] The use of this procedure instead of using one gun to adjust the strike of the shells to the target before firing the ship's full allocation of guns, indicated poor training on the part of the crew. Using the proper naval procedures would produce greater effects on the target, and save ammunition.

Eastern Task Force Commander Major General Ryder was also less than pleased with both naval gunfire, and air support. In the 1st Infantry Division official lessons learned he stated that the two requests for naval gunfire took one and two hours respectfully. In the same vein he was displeased with the two-hour delay for Fort Lazaret to be bombed by carrier aircraft. His final statement in the report expressed his hope that the problem would be given careful consideration and study.[45]

Ryder's statements were echoed by the staff of the division in the lessons learned document, where they made two observations. The first was that supporting ships needed to be kept informed of the location of ground troops, and second, "Naval fire on a point target at long range cannot be expected to be very accurate."[46] The HMS *Rodney*, a British battleship, opened fire on Fort Du Santo at a range of 32,000 yards. The ship fired 120 rounds of sixteen-inch shells, and 180 rounds of six-inch shells. The results were that only seven rounds fell within the fort area.[47] A 2.3 percent hit ratio on a target measured in acres was not cause for confidence in a sister service's capability. Admittedly the six-inch guns were likely at or beyond their maximum range of 25,480 yards, but the wastage of the huge sixteen-inch shells was almost inexcusable.[48] There was certainly room for improvement.

---

[44] Arthur Wilson, *Memorandum for The Chief of Staff, Headquarters Services of Supply, Report of Operations in North Africa, 12 December 1942* (LaCrosse, WI: Brookhaven Press, 2003), 31.

[45] S. B. Mason, *Memorandum to First Infantry Division Commander, G3 Report: Torch Operations, 24 November 1942* (LaCrosse, WI: Brookhaven Press, 2003), 7.

[46] Ibid., 19.

[47] Ibid.

[48] John Campbell, *Naval Weapons of World War Two* (Annapolis, MD: Naval Institute Press, 1985), 35-36.

One other suggestion offered in the 1st Infantry Division critique was to reorganize some field artillery units from 105mm medium howitzers, and replace them with a 75mm pack howitzer that could be broken down into portable loads. This change was suggested in order to get fire support on shore as soon as possible.[49] The reorganization may have been meant to supplant the need for the ineffective and delayed support by both naval and air fires, or as an effort to improve the mobility of the first waves of infantry to extend the beachhead more rapidly. The true motivation likely involved aspects of both reasons.

During Operation Torch, the use of supporting fires seemed to be sufficient for the limited threat encountered, and recommendations for improvements were disseminated rapidly across the force. Naval gunfire and supporting aviation had been employed to good effect on static batteries, and those were the elements that offered the stiffest resistance to allied landings.[50] After Operation Torch, the development and training for naval gunfire procedures rapidly accelerated. Naval gunnery exercises incorporated shore targets as a feature of regularly scheduled training.[51] The shore fire control parties, at first a solely Navy enterprise, were converted to a joint force. The new organization included a naval officer to act as a liaison from the ships to the ground forces who provided artillery spotters and communications personnel. This increased emphasis on a joint approach was exemplified in the statement by Lieutenant Colonel S. B. Mason, Assistant Chief of Staff for Operations (G3) in the 1st Infantry Division, in his assessment of the invasion. He noted "The one single factor which contributed most to the success of this operation was the joint planning in London where the Army Staffs and Navy Staffs worked side by side through the whole planning stage." The results of the cooperation were in his words, "the complete understanding of both services." His final comment in the assessment

---

[49] Mason, *First Infantry Division, G3 Report: Torch Operations,* 13.

[50] Wilson, *Report of Operations in North Africa, 12 December 1942* (LaCrosse, WI: Brookhaven Press, 2003), 11.

[51] Atwater, "Development of Joint Landing Operations 1898-1942," 187.

says volumes about joint coordination, "This joint planning is considered essential for the success of an amphibious operation."[52]

Although the amphibious assaults in Operation Torch were lightly opposed, the theory and practice gained in the lead up to the operation played a significant part in the success of the landings.[53] The light opposition contributed to the opportunity to learn, as many of those involved would play key roles in subsequent operations.

Operation Husky

The invasion of Sicily, codenamed Operation Husky, was the first amphibious operation for the Americans on European soil. Following the success of the Tunisian campaign, the Allies decision to invade Sicily was a logical step in the line of operations in the North African and Mediterranean Theaters. This invasion marked Allied reentry to the European continent, and placed pressure on Italy, who was thought to be the weaker of the two Axis players in the region.

Planning

Planning for the invasion began in January 1943, while the fighting in Tunisia was still underway. British General Montgomery protested his involvement in the planning because it was seen as a distraction from the current campaign, but was overruled by Eisenhower.[54] The 3rd Infantry Division had received word to begin planning for their portion of the assault on 6 April 1943, approximately eight weeks prior to the invasion. Due to the simultaneous need to plan, prepare, and train forces to be used in the invasion, while at the same time conducting combat operations in North Africa, an operational planning team was established so the main force could concentrate on the fight.[55] Joint and multinational cooperative planning was considered essential

---

[52] Mason, *First Infantry Division, G3 Report: Torch Operations*, 19.

[53] Atwater, "Development of Joint Landing Operations 1898-1942," 186.

[54] Rick Atkinson, *The Day of Battle: The War in Sicily and Italy 1943-1944* (New York: Henry Holt and Company, 2007), 53.

[55] Lucian Truscott, *Participation of 3rd INF DIV (REINF) in Sicilian Operation: July 10-18, 1943* (LaCrosse, WI: Brookhaven Press, 2003), 4.

based on the lessons learned from Operation Torch. Intelligence sharing occurred between the 3rd Infantry Division planners, and the British Interservice Intelligence Service who provided the most up to date photographic information on the landing beaches. The division staff was also augmented by, Lieutenant Colonel R. D. Q. Henriques, of the British Combined Operations Staff, who joined them in late May1943. His role was that of liaison between the 3rd Infantry Division and British elements that were assigned to the invasion. In addition, the operations officers of the three infantry regiments, the division artillery, the 150th Anti-Aircraft group, the 3rd Chemical Weapons Battalion, and other special staff were also brought in to help the planning team as well. The planning team worked closely with the US Navy, especially on the construction of the assault transportation tables, and determining the capabilities and limitations of certain landing craft that were so far untested in theater.[56]

Fire support planning was inherently joint. Naval gunfire support for the assault was planned by a four-man team consisting of a US Navy Commander, a US Navy Lieutenant Junior Grade, a US Army Lieutenant Colonel, and a US Army Major.[57] The sharing of the responsibility for the naval gunfire support plan by an equal number of officers of both services spoke to the full cooperation in planning on the part of the US Army and US Navy. This coordination could be directly tied to the lessons learned from the difficulties encountered during Operation Torch.

Coordination with the US Army Air Forces, despite their being technically in the same service as the division, was remarkably poor. Ground and naval planners were thoroughly dissatisfied with the lack of participation in joint planning and communication. No air liaison was provided to the division from 12th Air Force, despite numerous requests, until "just prior to the invasion."[58] Targets for the 12th Air Force to attack were requested by way of a "note" to the air command. These requests were often denied without clear indication as to why. This left planners

[56] Truscott, *Participation of 3rd INF DIV (REINF) in Sicilian Operation*, 5-6.

[57] Ibid., 57.

[58] Ibid., 56.

with fewer options for support during the assault.[59] Complaints about the poor joint coordination on the part of the Army Air Forces, from Army and Navy planners ranged from the unknown amount of fighter protection from enemy air, to when and where to expect allied planes to avoid fratricide by anti-aircraft fire. Additionally, requests were made to the air forces for the pilots to be briefed on the area of operations, and that they check in with the headquarters ship upon entering the area. These measures would enhance command and control of air support, and maximize efficient allocation of fire support assets. A final request was made for the dive bomber pilots to be briefed on all four targets, four in total, in case a change of primary targets was necessary in order to provide flexibility.[60]

Training

Training for the invasion was conducted concurrently with combat operations in North Africa. The 3rd Infantry Division sent nine teams, one per infantry battalion, of shore fire control party personnel to the Invasion Training Center in Arzew, Algeria for a ten-day course. This course included a live fire bombardment of shore targets by a squadron of ships consisting of the cruiser USS *Savannah* and nine destroyers. Additionally, each shore fire control party was given the opportunity to direct the fire of their supporting ship followed by a "critique of the bombardment firing practice."[61] This after-action review had the added benefit of providing direct dialogue between the artillery officer on the ground, and the gunnery officer on the supporting ship.[62] This was a remarkable improvement from the haphazard cooperation in Operation Torch.

Training for air support was limited due to the competing demands of concurrent combat operations. The 3rd Infantry Division received only twenty-two sorties of air support training for

[59] Combined Operations Headquarters, *Bulletin Y/1: Notes on the Planning of Operation Huskey* (LaCrosse, WI: Brookhaven Press, 2003), 7.

[60] Truscott, *Participation of 3rd INF DIV (REINF) in Sicilian Operation*, 55.

[61] Ibid., 56.

[62] Ibid., 57.

Operation Husky, consisting of six dive bomber, four reconnaissance, and twelve fighter missions of two aircraft each. The training involved communication with the division aboard its headquarters ship via very high frequency radio, exercising interservice communication capabilities. Dive bomber crews attacked prearranged targets, practiced adjusting to changes in targets, and being directed to an opportunity target by the headquarters ship. Reconnaissance missions were both prearranged and on call, with distances approximating the expected distances for Operation Husky for realism. Fighter sorties were dispatched by the 12th Air Force based on their schedule, and reported to the division headquarters upon entering their airspace. They were then vectored using plots from the ship's radar.[63] The training conducted was realistic, and replicated the missions expected to be carried out by the Army Air Force during the invasion. The success of the training seemed to provide a positive outlook for air ground cooperation in the upcoming invasion.

Execution

The initial actions for the invasion began on the night of 9 to 10 July 1943. The invasion was preceded by airborne operations that began with the insertion of COL James Gavin's 505th Parachute Infantry Regiment. His regiment included the 456th Parachute Field Artillery Battalion to form a Regimental Combat Team.[64] The incorporation of field artillery with the airborne element provided those forces with organic fire support prior to the amphibious landings. The airborne landings were not without their own problems, and many would be seen again in Normandy. Poor navigation by C-47 Dakota aircraft crews scattered the paratroopers all over the island.[65] The towed troop gliders proved difficult to land, when loaded with the heavy equipment and ammunition for artillery units.

---

[63] Truscott, *Participation of 3rd INF DIV (REINF) in Sicilian Operation*, 58.

[64] Albert Garland, and Howard Smyth, with Martin Blumenson, *Sicily and the Surrender of Italy* (Washington, DC: Center of Military History US Army, 1993), 144.

[65] Atkinson, *The Day of Battle*, 77.

The amphibious landings also experienced some problems as both soldiers, and elite rangers and regular infantry, struggled and drowned under the weight of their equipment when they were offloaded in water too deep to wade ashore.[66] Land mines, shore batteries, and other shelling hampered onward movement. Special equipment to deal with the mines was unavailable due to poor load planning.[67] Despite these difficulties the casualties in the landings were light. Resistance on the part of the Italian forces was stiff at first, but short lived.

To enhance surprise the naval bombardment was held until fifteen minutes before H-hour, the designated time the landings were to begin. This despite protests from naval officers who wanted a longer, more thorough bombardment.[68] Naval gunfire played a role in weakening resistance, and providing responsive and effective fires to the elements on the ground. They were much more effective than in the opening hours of Operation Torch, because they were directed through the artillery battalion's fire direction centers. Use of the fire direction centers for coordination and direction of fires was considered responsible for much of the success of the naval gunfire used.[69] The incorporation of both US Army and US Navy personnel in the shore fire control parties, as well as the training prior to the invasion, made naval gunfire much more effective in Operation Husky.

The Naval forces assigned gunfire missions were task-organized as fire support groups in accordance with both *FTP-167* and *FM 31-5*.[70] In addition, individual destroyers were assigned to directly support each shore fire control party, and cruisers served as general support for the division as a whole.[71] This allocation of fires provided the Regimental Combat Teams with robust

---

[66] Atkinson, *The Day of Battle*, 78.

[67] Ibid., 80.

[68] Ibid., 60.

[69] Truscott, *Participation of 3rd INF DIV (REINF) in Sicilian Operation*, 58.

[70] US Department of the Navy, *Field Training Publication (FTP) 167, Landing Operations Doctrine* (Washington, DC: Government Printing Office, 1938), 30; War Department, *FM 31-5* (1941), 19-20.

[71] Truscott, *Participation of 3rd INF DIV (REINF) in Sicilian Operation*, 58.

firepower capabilities until organic fire support could be brought ashore. To enhance the fires provided by the Navy during the assault, the landing craft that were loaded with M4 "Sherman" tanks, M7 "Priest" 105mm self-propelled howitzers, and other anti-tank and anti-aircraft guns were configured so their guns could provide additional fires while in transit from the ships to the assault beaches. The landing craft carrying the howitzers were staged in a holding pattern several thousand meters off shore to engage targets on the beach until they shifted fire prior to H-hour.[72]

In the 1st Infantry Division sector, naval gunfire support directed by the shore fire control parties was credited with breaking two Italian armored counterattacks. The destroyer USS *Jeffers* fired a 120-round mission with its five-inch guns which suppressed the enemy infantry, neutralized their artillery support, and destroyed some of their tanks. The overall effect of the naval gunfire caused the first counterattack to withdraw. The second Italian counterattack was disrupted by a 125-round mission from the destroyer USS *Shubrick* which drove the supporting infantry to seek cover, and also destroyed some of the tanks. The remaining tanks were subsequently dispersed and neutralized by infantry with hand held weapons inside the town of Gela. No further armored attacks were conducted by Italian forces against the 1st Infantry Division.[73]

A German counterattack that same day was also neutralized by naval gunfire at the direction of the shore fire control parties. Approximately ninety Mark III and Mark IV tanks of the German *Herman Goering* division, and supported by infantry, were engaged by a light cruiser and a destroyer. The official Army history is quoted as saying "The tanks slowed, sputtered and eventually stopped. The tankers could not go because they had nothing to cope with the five- and six-inch naval shells that whistled in from the sea."[74]

---

[72] Combined Operations Headquarters, *Bulletin Y/1: Notes on the Planning of Operation Huskey*, 16, 25.

[73] Donald Weller, *Naval Gunfire Support of Amphibious Operations: Past, Present, and Future* (Dahlgren, VA: Naval Surface Weapons Center, 1977), 27.

[74] Garland and Howard with Blumenson, *Sicily and the Surrender of Italy*, 154.

Air support, although poorly coordinated, tended to be mostly effective during the landings. Operations in the months leading up to the invasion had been aimed at interdicting Axis resupply and reinforcement of North Africa. It had the added effect of providing some shaping actions for the invasion of Sicily. The Allies had targeted ports, airfields, and marshalling yards in North Africa, Sicily, and Southern Italy, and dropped thousands of tons of high explosives. This did considerable damage to the infrastructure vital to the defense and sustainment of Sicily. Targets on the island were also bombed the night before the assault, resulting in grass fires and smoke that obscured the armada assembled off shore. This further contributed to confusion among the defenders.[75] These grass fires also provided illumination of the shore for shipping, and bombardment by naval vessels. Axis air attacks were kept to a minimum, and losses of ground-based combat power was negligible.[76]

Lessons Learned

The many successes of joint fires marked the vast improvement over the disorganized execution of Operation Torch. Naval gunfire's effectiveness and responsiveness was a clear indicator of the success of joint planning and training that had been developed from the lessons of Operation Torch. Naval fires were able to silence shore batteries, disrupt tank attacks, and demoralize the enemy.[77] The planning and training by the joint shore fire control parties with their assigned ships had paid off on the investment of time and resources. The strides made in regard to naval gunfire support of amphibious operations gave good account of the soldiers and sailors of the US and British services.

The integration of air forces on the other hand left something to be desired. The air services treated their part of Operation Husky as an independent operation. The lack of

---

[75] Atkinson, *The Day of Battle*, 69.

[76] Combined Operations Headquarters, *Bulletin Y/6: Digest of Reports on Operation Huskey* (LaCrosse, WI: Brookhaven Press, 2003), 3.

[77] Atkinson, *The Day of Battle*, 82-83.

coordination with ground and naval forces had resulted in confusion and fratricide. Naval anti-aircraft fire resulted in the loss of twenty-three allied transportation aircraft, and seriously disrupted the majority of the second wave of airborne insertions on Sicily.[78] Reinforcements to airborne operations were hampered considerably by this preventable situation. Despite the poor coordination however, the air forces prevented enemy air power from having a significant effect on the invasion. The invasion of Sicily was by far the most contested airspace of the three landings. Again, the lessons learned from Operation Torch aided greatly in the effectiveness of Allied air power. The allies were fast becoming a learning organization on a large scale, and that development would serve them well as they planned to assault the European mainland.

Operation Overlord

The Allies had committed to a Germany first strategy early in the war. The threat of losing the Soviet Union to defeat by the Germans required such a strategy. For much of the early war years from 1942 to 1943, the Soviets had implored the United States and Great Britain to open a second front on the mainland of Western Europe. The British dissuaded an eager United States from conducting such an invasion as early as 1942.[79] Instead the two powers agreed that Operation Torch would be the first offensive into Axis territory. Logistics, in the way of landing craft, and the sundry supplies required to maintain operations on the European continent, were also factors for postponing the invasion of Europe. The strategic opportunity to isolate the Germans by eliminating their ally Italy as a belligerent power, however, certainly played a role as well.

[78] Harry Butcher, *My Three Years with Eisenhower: The Personal Diary of Captain Harry C. Butcher, USNR Naval Aide to General Eisenhower 1942-1945* (New York: Simon and Schuster, 1946), 511.

[79] Atkinson, *An Army at Dawn*, 11.

In the meantime, the Germans had taken measures to resist an amphibious landing on the western European coast with what Hitler called the "Atlantic Wall."[80] German strength in France and the Low Countries at the time of the invasion was estimated to be sixty divisions. The quality of the troops employed ranged from low, with limited employment costal defense units made of the very old and medically unfit, to crack SS and Panzer divisions.[81]

Planning

For the Allies, the ability to get troops ashore and able to fight towards their objectives required considerable planning and preparation. The concept of an invasion across the English Chanel had been discussed since Germany had declared war on the United States. Some conceptual planning and logistical preparation had occurred during the time leading up to the invasion of North Africa, but detailed planning began in earnest when Lieutenant General Fredrick Morgan (UK) was designated as the Chief of Staff to the Supreme Allied Commander in April 1943.[82] This position made Morgan the chief planner for the Normandy invasion, although a target date would not be set by the combined US and UK Chiefs of Staff until the next month.[83] The concept of the overall invasion had also changed over time. Prior to the Dieppe raid in August 1942, the conventional wisdom was for the invasion, then code named Operation Roundup, assault forces to be dispersed over several landing sites. The intent of the dispersion was to prevent German concentration of combat power on a single beachhead. After Dieppe, the planners looked to concentrate their combat power to avoid defeat in detail.[84] The requirement for the landings to be supported by land-based fighter aircraft from the British Isles narrowed the

---

[80] Cornelius Ryan, *The Longest Day* (New York: Simon and Schuster, 1959), 23.

[81] Adrian Lewis, *Omaha Beach: A Flawed Victory* (Chapel Hill, NC: University of North Carolina Press, 2001), 5.

[82] Gordon Harrison, *United States Army in World War II: European Theater of Operations: Cross-Channel Attack* (Washington, DC: Center of Military History US Army, 2007), 51.

[83] Atkinson, *The Day of Battle*, 20-21.

[84] Harrison, *Cross-Channel Attack*, 56.

proposed landing sites available. The Allies also needed to find landing sites that had beach defenses "capable of reduction by naval fire, air bombardment, or airborne troops."[85] Based on those considerations, Normandy was selected as the primary landing site, and the port at Caen was the primary objective for establishing the logistical hub necessary for further offensive actions.

Operations to set favorable conditions for the landings began as early as July of 1943. Allied forces worked on weakening German capabilities through direct air and sea action. They also used psychological, political, economic, deception, and sabotage tactics. The overall objective of these shaping efforts was to provide to the greatest extent possible a favorable air force ratio, with the goal of complete air supremacy in the area of the landings. The new Chief of Staff, Morgan noted "since only through air power can we offset the many and great disabilities inherent in the situation confronting the attacking surface forces."[86] Those efforts to shape the environment so early before the target date, and at such high levels of coordination, are quite unique to the Operation Overlord preparations. Another unique aspect was the so called "Transportation Plan," a two-month long air campaign targeting key rail and road infrastructure in France. The goal was to disrupt the German Army's ability to quickly bring additional combat power to bear against the beachheads.

The allocation of resources for this effort were the result of coordination and negotiations at the highest levels of leadership within the Supreme Headquarters Allied Expeditionary Force.[87] Eisenhower had lobbied for, and eventually succeeded in obtaining, operational control of all air forces in Europe. He used this air power to assist in shaping conditions favorable for the successful amphibious operations against the continental mainland. As part of this effort, Bomber

[85] Harrison, *Cross-Channel Attack*, 56.

[86] Ibid., 75-76.

[87] Butcher, *My Three Years with Eisenhower*, 509.

Command of the Royal Air Force dropped more than 28,000 tons of ordinance in direct support during May 1944.[88]

Actions were also taken to ensure naval dominance in the English Channel prior to the invasion. The naval actions in the vicinity of the British Isles from 1943 to 1944 were tied to multiple efforts. The Battle of the Atlantic was fought to secure sea lines of communication between the United States and Britain, but also contributed to the security of the English Channel for the upcoming invasion. Allied intelligence and radar supremacy facilitated the rapid attrition of German naval vessels, especially submarines. The rapid reduction in German submarines had two effects that contributed to the success of the invasion. Fewer submarines meant the less the threat they posed to shipping for buildup operations in Britain, and this meant there was less chance the German Navy could contest the invasion.[89] Much of the success of the landings and the subsequent campaign inland was due to the planning, synchronization, and delivery of fires from sea, air, and land forces. Joint fires in multiple domains were used to both shape the battlefield, and support the amphibious landings. These fires consisted of both lethal and non-lethal means including electronic warfare, naval gunfire, air interdiction, close air support, and surface to surface fires.[90]

In planning joint fires for Operation Overlord, the Allies encountered their first deliberate shore defense in the European Theater. The planning was begun by the 1st Army Artillery Planning Group. This unit collaborated with many joint and combined headquarters including the Allied Expeditionary Airforce, the Allied Naval Staff, the British21st Army Group, the British 2nd Army and US Navy Task Force 122. The planning group was built on the lessons learned from the British experience in the Mediterranean, and US Marine Corps' experience in the Pacific

[88] Lewis, *Omaha Beachhead*, 6.

[89] Harrison, *Cross-Channel Attack*, 84.

[90] Rick Atkinson, *The Guns at Last Light: The War in Western Europe 1944-1945* (New York: Henry Holt and Company, 2007), 54.

against prepared defenses. They modified current doctrine to develop a new "hybrid doctrine" specifically for Operation Overlord.[91] This new doctrine included the "Activation, organization, and training of Naval Shore Fire Control Parties." These units were a replacement for the Shore Fire Control Parties in Operation Huskey, and were meant for "employment with airborne and ground troops."[92]

The joint fire plan was devised to "destroy the enemy artillery and strong point positions," and if that failed then "neutralization would be maintained by continuing some of the air bombardment and gunfire on the targets up to H-5 minutes before lifting to flanking or more distant targets."[93] To meet this mission at Omaha Beach, which had been selected as the landing site for the 1st Infantry Division, the US Navy supplied two battle ships, four light cruisers, and twelve destroyers. The plan for naval support was divided into three phases consisting of counter battery bombardment, an attack of the beach defenses, and close supporting fire on call. The last phase was controlled by the naval shore fire control parties. Naval gunfire coverage was much more robust in comparison to Operation Husky where each Regimental Combat Team had received a destroyer in direct support. For Operation Overlord each battalion received roughly two destroyers in direct support, an increase in firepower of roughly 600 percent.

Training

Training for Operation Overlord benefitted from the ability of Allied forces designated for the invasion to concentrate solely on preparation for the upcoming battle. Unlike Operation Husky where ground forces were still fighting almost constantly prior to the invasion, forces for Operation Overlord were marshaled in Britain far from active combat. Training for the 1st Infantry Division forces was intensive and battle focused. In February 1944, the division began to

[91] Lewis, *Omaha Beachhead*, 211.

[92] Ibid.

[93] Ibid., 212.

concentrate on amphibious operations. They trained at the US Assault Center, another specially designed amphibious training center located at Braunton and Slapton Sands, on the southern coast of England.[94] These areas were large enough to facilitate live fire exercises that included naval and air bombardment.[95] Plans were updated constantly with lessons learned from those exercises, and lessons already learned in combat.[96]

One of the amphibious combined-arms landing exercises which took place at Slapton Sands in March 1944 was Exercise Fox. This exercise was "notable for the use of live naval gunfire" in preparation for the Normandy invasion. It included the 1st Infantry Division's 16th Infantry Regiment, and the 116th Infantry regiment of the 29th Infantry Division. These units were part of the first units that would assault Omaha beach. The exercise included over one hundred naval vessels of varying types, and included five British destroyers for escort and naval gunfire support. Air support for the exercise was provided by the 9th US Air Force.[97]

Exercise Tiger was another combined arms exercise for the US forces landing in Normandy. This one was for the 4th Infantry Division, which was set to assault Utah beach. The exercise was basically a full-scale rehearsal with live naval gunfire and an air bombardment of the beach. It also included the use of new landing craft launched rockets, which were designed to be used prior to the assault by ground troops. However, lessons learned from exercise Tiger showed the limited effectiveness of the landing craft rockets as few made it to targets on shore, and some falling as much as three hundred yards from the beach.[98] Naval gunfire was criticized for being sporadic and "tapered off as Assault Forces made the final approach."[99] The poor

---

[94] John McManus, *The Dead and Those About to Die: D-Day: The Big Red One at Omaha Beach* (New York: Penguin Group, 2014), 35.

[95] Lewis, *Omaha Beachhead*, 6.

[96] Ibid., 7.

[97] Christopher Yung, *Gators of Neptune: Naval Amphibious Planning for the Normandy Invasion* (Annapolis, MD: Naval Institute Press, 2006), 157.

[98] Ibid., 15.

[99] Ibid.

performance of the naval gunfire was attributed to command decisions made for safety reasons due to a delay of the exercise's H-hour (landing time). The air bombardment was also canceled for this reason.[100] Both of these situations were unfortunate given the results of the actual invasion.

Execution

Preparatory fires for the invasion included a number of non-lethal fires. Balloons with radar reflectors were flown in the Pas de Calais area to simulate ships at sea in order to deceive Germans as to the true target of the invasion. Aircraft were used to drop aluminum chaff, code named Window, to simulate the radar signature of bomber formations. In the invasion area the largest electronic warfare array in history was assembled, where over 600 jammers targeted German fire control systems and target detection radars used for shore batteries. Allied shipping was protected by over 360 jammers. These sophisticated countermeasures and deceptions offer a true prelude to the multi-domain operations of the twenty-first century.[101]

The air bombardment of the Normandy beaches, especially Omaha, was largely ineffective due to actions taken to avoid fratricide. The bombers supporting Omaha were ordered to fly perpendicular to the landing beaches, and for safety to drop their bombs late. This had the effect of their bombs landing up to several miles inland from the beaches.[102] These misplaced bombs had little effect on the enemy defenders, as they were well planned but poorly executed. The intent was there, but the capability to accurately deliver heavy bombardment in a tactical setting was not. Many factors had played into the mis-dropping of the bombs, not least of which was the poor visibility for air crews approaching the beaches. The decision by General Eisenhower to go on 6 June 1944, with bad weather clearing from the day before, contributed to

[100] Yung, *Gators of Neptune*, 160.

[101] Atkinson, *Guns at Last Light*, 54.

[102] Ibid., 56.

the difficulty of all aerial delivery, including airborne, glider, and ordinance in the early hours of the invasion.

Naval gunfire proved more effective, but was not without its problems as well. Radios for observers were in short supply, because many were lost on landing craft that sunk. Poor visibility from the weather and the fires on shore made observing and directing naval gunfire problematic. The response on the part of the destroyer crews was to close in to shallow waters, and deliver fires at almost point-blank range. These actions assisted the assault troops greatly by destroying or neutralizing enemy heavy weapons emplacements. This action showed good leadership and initiative on the part of their captains, not deliberate planning on the part of operational planners. Many ground troops credited the destroyers' actions as crucial to the success of the opening phases of the invasion when many units were pinned down on the beach, especially at Omaha.[103] The task organizing of ships into support groups aided the effectiveness of these fires by ensuring destroyers were equitably distributed among the landing beaches. The combined effects of these fires presented the German army with multiple dilemmas that eventually overwhelmed their ability to provide effective resistance to allied maneuver forces.

The Landing Ship Tanks fired over 14,000 rockets at Omaha beach, however, much like the 4th Infantry Division's experience in Exercise Tiger, they mostly fell short of their targets. Their greatest impact may have been the grass fires ignited by those that hit the bluff, and provided some concealment for the assault troops.[104] The obscuration effects of the grass and other fires on shore contributed markedly to the assaults later in the day. A greater benefit could have been achieved by using more smoke or white phosphorous on shore to support the landings. Smoke was used significantly in Operation Husky so it is quite possible the decision not to use it so generously at Normandy may have been a deliberate decision. Smoke was used to obscure the

[103] McManus, *The Dead and Those About to Die*, 176.

[104] Stephen Ambrose, *D-Day: The Climactic Battle of World War II* (New York, NY: Touchstone, 1994), 271.

supporting ships and to good effect as far as can be determined. The USS *Corry* was successfully targeted by a shore battery at St. Marcouf after wind dispersed its smoke screen for mere seconds.[105]

Lessons Learned

Joint fires were not as effective as expected during Operation Overlord. Much of the aerial delivered ordinance was wasted. Most of the naval shells missed their mark, and those that did score direct hits sometimes failed to destroy their target. Much of the effective naval gunfire was reactive on the part of destroyer crews who took the initiative. Lack of communication due to the susceptibility of the radio sets to water damage was a problem that had yet to be solved. New techniques were tried, among these were the landing craft mounted rockets that performed poorly in both training and combat. Another technique that failed in Operation Overlord was the loading of artillery pieces, crew, and ammunition on the two and a half ton amphibious trucks for the landing. The 111th Field Artillery Battalion lost eleven of twelve of these trucks in its attempt to land at Omaha Beach.[106]

Despite all these problems the landings were successful. The impact the shaping efforts had on the success of the invasion is difficult to quantify, but the inability of the Germans to successfully contest the landing from the air and sea certainly aided significantly. The inability of the Germans to quickly reinforce the defenders played a large role in allowing the Allies to gain a sustainable lodgment in Northwestern France.

Findings and Analysis

Each amphibious operation is unique in its strategic context. The quantity and quality of enemy force composition, enemy resistance, new technology, and Clausewitz's fog and friction, play a role. These factors made the planning requirements for amphibious operations particularly

[105] Atkinson, *The Guns at Last Light*, 58.

[106] Ibid., 68.

intense. One of the most important requirements was the development of the joint fire plan. Using fires from the sea and air forces to facilitate land-based operations was paramount given the limitations of ground-based fires to operate in the earliest phases of these amphibious operations.

As shown in the vignettes, Allied planners continued to grow and adapt all aspects of joint fire support in order to meet the changing needs of their situations. The planning became ever more sophisticated and deliberate, and required more time and greater joint and multinational cooperation. The staffs used to plan fires for the invasions grew with each subsequent invasion. The 3rd Infantry Division staff for fires planning in Operation Husky was four officers, and the air arm was completely absent from the effort. This contrasted sharply with the size and scale of the staff used to plan Operation Overlord. That staff was comprised of sea, air, and land planners from both the US and British armed forces in significant numbers. Although this comparison may be somewhat unfair as the 1st US Army is two levels of headquarters above the 3rd Infantry Division, the more deliberate and long-term planning effort by Operation Overlord planners is clear.

The time and sophistication for each invasion grew remarkably over the course of each invasion and many new lessons were learned. Joint fires training in preparation for Operation Torch had been hampered by the lack of facilities on the US east coast, and by the nascent amphibious doctrine in place. In North Africa, training for Operation Husky had been degraded by the requirement to train forces while continuing combat operations. Despite these competing demands, significant joint fires training was conducted to incorporate lessons learned from Operation Torch. Shore fire control parties conducted live fire training and held discussions with the gunners of the ships designated to support their units in the upcoming invasion. The 3rd Infantry Division had been able to conduct limited air-ground integration training in preparation for Operation Husky. Given the competing demands for combat aircraft for operations in North Africa, Sicily, and the Mediterranean, the lack of comprehensive air-ground training was understandable. The maturation of training was most evident in preparations for Operation

Overlord, where the Allies conducted largescale live fire rehearsals with the joint forces designated for each invasion beach. Naval and air fires were incorporated into the exercises, and were directed by the newly formed naval shore fire control parties executing new doctrine that had been developed from worldwide Allied lessons learned.

The execution of each operation's fire support plan shows a clear evolution in the scope and scale as well as integration and cooperation of each service. In Operation Torch it sometimes took hours for the requests for air or naval fires to answer the calls for support from ground forces. Fortunately, the resistance in Operation Torch was more limited in comparison to the resistance encountered later in the war. Naval fires were considerably imprecise, and the procedures among the crews were not to standard. The opportunity to learn from the mistakes of Operation Torch were providential for the Allies, especially for the untried Americans. Operation Husky saw vast improvement in joint fires integration and cooperation, especially between naval and ground forces. Naval fires were able to interdict and suppress armored counterattacks with considerable effectiveness. The integration of naval fires through the battalion fire direction centers were instrumental in prioritizing targets. Operation Overlord saw the most dramatic increase in integration. The strongly contested nature of the landings made the execution of the plan difficult, as a true peer tenaciously defended the beaches with combined arms of their own. The ability of the Allied forces involved to adapt and effectively suppress the German forces was a testament to the strides made from the early days of Operation Torch.

Conclusions

Organizationally, the US military today has much more experience in operations that require the integration of sister services and multinational partners than our Second World War predecessors did. The doctrine on amphibious operations has been updated and modified to take into account technologies not existent in 1944 including, nuclear weapons, supersonic jet aircraft, and satellite-based surveillance and communication. The doctrine of amphibious operations is

much the same as it was immediately prior to the Second World War. Many of the methods employed in modern doctrine owe their lineage to lessons learned in the Second World War. The Joint Staff published its most recent revision of *Joint Publication 3-02, Amphibious Operations* on 4 January 2019. A quick scan of *Joint Publication 3-02* provides numerous examples to show this document is a direct ancestor of *FTP-167* and *FM 31-5*.[107] The methods for employing joint fires to defeat the anti-accesses area denial capabilities of an adversary have continued to grow since the mid twentieth century.

Even with all the progress, there are some disadvantages resident in the forces of today. The lack of landing craft and supporting Naval vessels may make an amphibious operation difficult for US Army forces. Conducting large scale amphibious operations is not a mission that can be rapidly employed without significant training and equipment. The US Marine Corps are the established experts in amphibious warfare, and they are the best trained and equipped of the services for that mission. However, the nature of operations today is inherently joint, and US Army forces will be required to assist is some capacity in any large-scale amphibious operation. They could be used to sustain, exploit gains, continue offensive operations, or to augment Marine forces.

In this era of warfare marked by conflict spanning multiple domains simultaneously adversaries of the United States have invested heavily in sophisticated and redundant anti-access area-denial networks aimed at preventing US forces from gaining access to territory they control. In many cases joint fires may be required to open gaps to gain access for maneuver forces to conduct large scale combat operations. The United States may likely face the need to project ground combat power by sea into a region where access is contested by a near-peer adversary

[107] US Department of the Defense, Joint Staff, *Joint Publication (JP) 3-02, Amphibious Operations* (Washington, DC: Government Printing Office, 2019), I-1 - I-10.

with sophisticated anti-access area denial capabilities. The neglect of skills, and the equipment needed for large amphibious operations make conducting an operation of this type problematic.

The last large-scale amphibious operation using US Army troops were the Inchon landings in 1951. The last significant amphibious operations by a North Atlantic Treaty Organization partner were the British landings during the Falkland Islands war in 1982. Much as the 1973 Yom Kippur war was eye opening to the lethality of modern armored warfare, the Falkland Islands war showed the vulnerability of sea-based forces in an amphibious invasion. In future amphibious warfare, missiles such as the Tomahawk Land Attack Missile, and missile defense systems such as the Aegis Ballistic Missile Defense System, will be crucial to striking enemy capabilities and defending friendly assets. Precision guided munitions have greatly improved the efficiency, and accuracy of air and sea delivered fires. This capability will enhance the opportunity to surprise defenders with overwhelming, well timed, incredibly accurate fires immediately prior to an invasion. This capability provides the opportunity to overwhelm adversaries with multiple dilemmas in multiple domains, and to strike at decisive points with telling effectiveness.[108] In the end the king might not swim but he has some powerful friends to help him get ashore. The integration of joint fires across multiple domains was key to facilitating seizure of land objectives in amphibious operations during the Second World War.

[108] US Department of the Army, Training and Doctrine Command (TRADOC), *Training Pamphlet (TP) 525-3-1, The US Army in Multidomain Operations 2028* (Washington, DC: Government Printing Office, 2014), iii-v.

Bibliography

Allied Force Headquarters, Office of the Chief of Staff G-2. *Intelligence Lessons from North Africa OPERATION "TORCH": Up to 1st March 1943*. LaCrosse, WI: Brookhaven Press, 2003.

Ambrose. Stephen. *D-Day: The Climactic Battle of World War II*. New York: Touchstone, 1994.

Atkinson, Rick. *An Army at Dawn: The War in North Africa 1942-1943*. New York: Henry Holt and Company, 2002.

———. *The Day of Battle: The War in Sicily and Italy 1943-1944*. New York: Henry Holt and Company, 2007.

———. *The Guns at Last Light: The War in Western Europe 1944-1945*. New York: Henry Holt and Company, 2007.

Atwater, William. "United States Army and Navy Development of Joint Landing Operations 1898-1942." Ph.D. Dissertation, Duke University, 1986.

Ballendorf, Dirk. "Earl Hancock Ellis: A Marine in Micronesia." *Micronesian Journal of The Humanities and Social Sciences* 1, no. 1-2 (December 2002): 9-17.

Becker, Marshall. "Studies in the History of Army Ground Forces." Study No. 22, Historical Section, Amphibious Training Center, Washington, DC, 1946.

Blumenson, Martin. *The Patton Papers 1940-1945.* Vol. 2. Boston MA: Haughton Mifflin, 1974.

Breuer, William. *Operation Torch: The Allied Gamble to Invade North Africa*. New York: St. Martin's Press, 1985.

Butcher, Harry. *My Three Years with Eisenhower: The Personal Diary of Captain Harry C. Butcher, USNR Naval Aide to General Eisenhower 1942-1945*. New York: Simon and Schuster, 1946.

Campbell, John. *Naval Weapons of World War Two.* Annapolis, MD: Naval Institute Press, 1985.

Clausewitz, Carl. *On War*. Edited and translated by Michael Howard and Peter Paret. Princeton, NJ: Princeton University Press, 1976.

Combat Studies Institute. *Battlebook 3-A, Operation Torch, North Africa Campaign: Offensive, Deliberate Assault, Amphibious, 8 November 1942*. Fort Leavenworth, KS: Combat Studies Institute, 1984.

Combined Operations Headquarters. *Bulletin Y/1: Notes on the Planning of Operation Huskey.* LaCrosse, WI: Brookhaven Press, 2003.

———. *Bulletin Y/6: Digest of Reports on Operation Huskey.* LaCrosse, WI: Brookhaven Press, 2003.

Eisenhower, Dwight. *Lessons of Operation Torch*. LaCrosse, WI: Brookhaven Press, 2003.

Emmel, David. “The Development of Amphibious Doctrine.” Master’s Thesis, US Army Command and General Staff College, Fort Leavenworth, KS, 2010.

Garland, Albert, and Howard Smyth, with Martin Blumenson. *Sicily and the Surrender of Italy*. Washington, DC: Center of Military History US Army, 1993.

George, Alexander, and Andrew Bennet. *Case Studies and Theory Development in the Social Sciences*. Cambridge, MA: Harvard University, 2005.

Greenfield, Kent, Robert Palmer, and Bell Wiley. *United States Army in World War II: The Army Ground Forces: The Organization of Ground Combat Troops*. Washington, DC: Center of Military History US Army, 1987.

Harrison, Gordon. *United States Army in World War II: European Theater of Operations: Cross-Channel Attack*. Washington, DC: Center of Military History US Army, 2007.

Headquarters US Marine Corps, Division of Operations and Training. *Basic Plan: Joint Army and Navy Exercises, 1925 Problem No. #3.* Quantico, VA: Government Printing Office, 1925.

Howe, George. *North Africa: Seizing the Initiative in the West*. Washington, DC: Office of the Chief of Military History US Army, 1957.

Ianni, Francis. “Close Air Support for the Field Army.” Master’s Thesis, US Army Command and General Staff College, Fort Leavenworth, KS, 1964.

Lether, Henry. “FM 100-20: The Path to an Independent Air Force.” Master’s Thesis, Air War College, Maxwell Air Force Base, AL, 1994.

Lewis, Adrian. *Omaha Beach: A Flawed Victory*. Chapel Hill, NC: University of North Carolina Press, 2001.

Mason, S. B. *Memorandum to First Infantry Division Commander, G3 Report: Torch Operations, 24 November 1942*. LaCrosse, WI: Brookhaven Press, 2003.

McManus, John. *The Dead and Those About to Die: D-Day: The Big Red One at Omaha Beach.* New York, NY: Penguin Group, 2014.

Merskey, Peter. “Naval Aviation in Operation Torch.” *Naval Aviation News* (November-December 1992): 25.

Millet, Allen. “Assault from the Sea: The Development of Amphibious Warfare Between the Wars.” In *Military Innovation in the Interwar Period,* edited by Williamson Murray and Alan R. Millet, 50-95. Cambridge, UK: Cambridge University Press, 1996.

Morison, Samuel Eliot. *Operations in North African Waters, October 1942-June 1943.* Annapolis, MD: Naval Institute Press, 2010.

Mortensen, Daniel. *A Pattern for Joint Operations: World War II Close Air Support North Africa*. Washington, DC: Office of Air Force History and US Army Center for Military History, 1987.

Nance, Thomas. “Interview with Maj. Daryl Laninga.” John A. Adams '71 Center for Military History and Strategic Analysis. Cold War Oral History Project, Virginia Military Institute, Lexington, VA, February 2005.

Ryan, Cornelius. *The Longest Day*. New York, NY: Simon and Schuster, 1959.

Symonds, Craig. *Operation Neptune: The D-Day Landings and the Allied Invasion of Europe*. New York, NY: Oxford University Press, 2014.

Truscott, Lucian. *Participation of 3rd INF DIV (REINF) in Sicilian Operation: July 10-18, 1943.* LaCrosse, WI: Brookhaven Press, 2003.

Turabian, Kate. *A Manual for Writers of Research Papers. Theses, and Dissertations*. 8th ed. Chicago, IL: University of Chicago Press, 2008.

US Department of the Army, Training and Doctrine Command (TRADOC). *Training Pamphlet (TP) 525-3-1, The US Army in Multidomain Operations 2028*. Washington, DC: Government Printing Office, 2018.

US Department of the Defense, Joint Staff. *Joint Publication (JP) 3-02, Amphibious Operations.* Washington, DC: Government Printing Office, 2019.

US Department of the Navy. *Field Training Publication (FTP) 167, Landing Operations Doctrine*. Washington, DC: Government Printing Office, 1938.

War Department. *Field Manual (FM) 31-5, Landing Operations on Hostile Shores.* Washington, DC: Government Printing Office, 1941.

———. *Field Manual (FM) 31-5, Landing Operations on Hostile Shores*. Washington, DC: Government Printing Office, 1942.

———. *Field Manual (FM) 31-5, Landing Operations on Hostile Shores*. Washington, DC: Government Printing Office, 1944.

Weller, Donald. *Naval Gunfire Support of Amphibious Operations: Past, Present, and Future*. Dahlgren, VA: Naval Surface Weapons Center, 1977.

Wilson, Arthur. *Memorandum for The Chief of Staff, Headquarters Services of Supply, Report of Operations in North Africa, 12 December 1942.* LaCrosse, WI: Brookhaven Press, 2003.

Yung, Christopher. *Gators of Neptune: Naval Amphibious Planning for the Normandy Invasion*. Annapolis, MD: Naval Institute Press, 2006.