

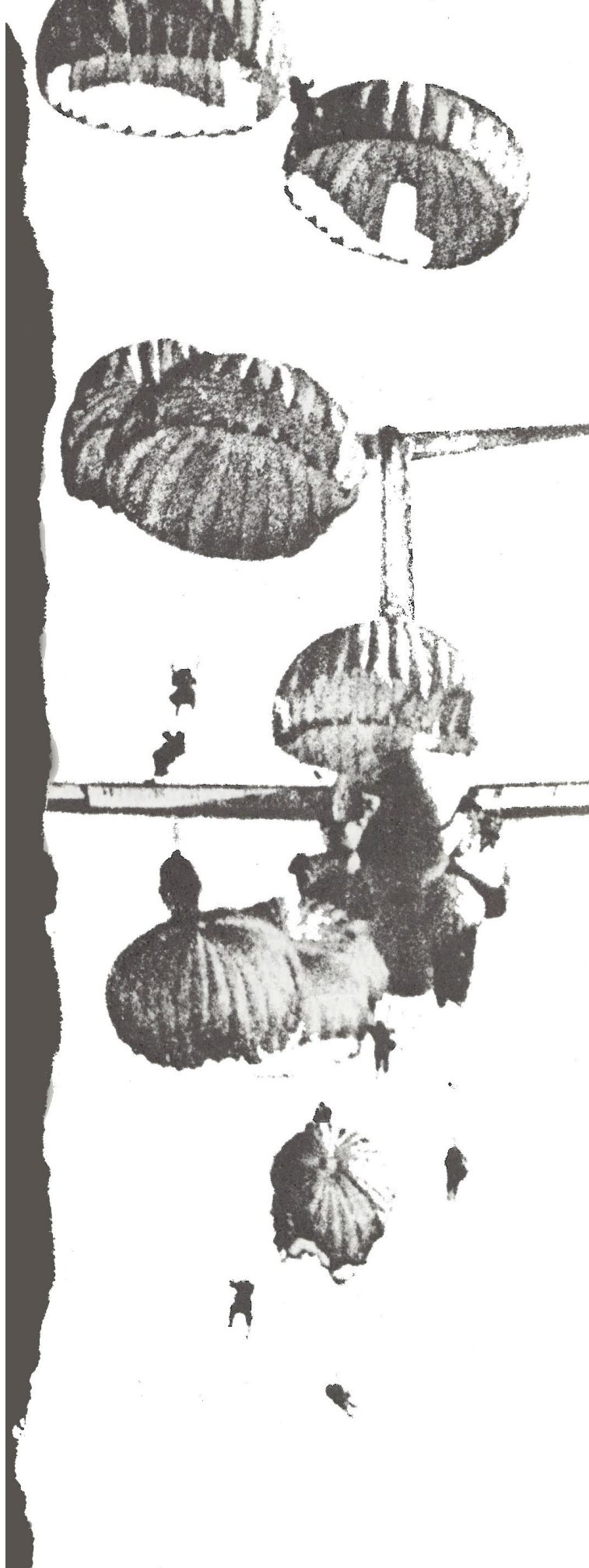
Operation Urgent Fury and Its Critics

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The US incursion into the island of Grenada was not a perfect military operation in anyone's estimation. Some critics even contend that, although the operation was an overall success, major flaws were uncovered in every area, including planning, intelligence, equipment and inter-service cooperation (see MR Summaries, pages 79-80). Did the operation reflect as much incompetence as alleged? This writer refutes some of these serious criticisms.

On 25 October 1983, US military forces, with several Caribbean allies, intervened on the island of Grenada. Operation *Urgent Fury* was initiated to protect the lives of US students, restore democratic government and eradicate Cuban influence on the island. Two US Army Ranger battalions, a brigade of the 82d Airborne Division, a Marine amphibious unit (MAU), the Navy aircraft carrier USS *Independence* and its battle group, Air Force transports and *Spectre* gunships, and a few Special Operations Forces combined to swiftly overwhelm the Cuban and Grenadian defenders.

The US assault commenced at dawn with nearly simultaneous assaults on the island's two airfields. Army Rangers parachuted into the Point Salines airstrip, while two Marine companies secured the Pears Airport and nearby Grenville. The Rangers encountered heavy antiaircraft fire, but they secured the



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runway and a group of grateful students at nearby True Blue Campus. Reinforced by paratroopers of the 2d Brigade, 82d Airborne Division, the Army elements attacked into the thick foliage around Salines to isolate and destroy the remaining opposition.

Meanwhile, Joint Task Force Commander Vice Admiral Joseph Metcalf III left one Marine company at Pearls and sent the rest of the Marine battalion landing team (BLT) to Grand Mal beach, north of the Grenadian capital of St. George's. The Marines landed by amphibious assault vehicle and helicopter on the night of 25 October. By the next day, St. George's was in US hands, Army units had rescued the US students at Grand Anse Campus and the backbone of the Cuban/Grenadian opposition had been broken. Significant scattered resistance went on for two more days, and some isolated sniping continued until 2 November.

During the eight-day campaign, 599 US and 80 foreign students were evacuated without injury. Civil order was restored. Cuban, Soviet and various Eastern bloc representatives were removed from the island. The casualty toll was relatively light. Eighteen US troops were killed in combat, one died of wounds, 115 were wounded and 28 suffered nonhostile injuries. The Cubans lost 24 killed, 59 wounded and 605 captured who were later returned to Cuba. The Grenadian People's Revolutionary Army (PRA) suffered 21 killed and 58 captured. There were 24 Grenadian civilians killed during the operation. Admiral Wesley L. McDonald, commander, US Atlantic Command, said, "In summary, history should reflect that the operation was a complete success."¹ Not everyone agreed.

The Critics

The Grenada operation attracted the attention of five prominent members of the US military reform community. In three separate analyses, various aspects of Operation *Urgent Fury* were considered, and some rather serious complaints were presented. The accounts accepted the basic strategy set by President Ronald Reagan but noted significant faults in the

execution of that strategy. Each report concentrated on slightly different subjects but, in general, all three provide harsh assessments of US operational plans and execution.

The first critique was presented at a Washington, D.C., news conference on 5 April 1984 under the aegis of the congressional Military Reform Caucus. The five-page report was prepared by legislative assistant and historian William S. Lind. Though no specific sources were given for the report, Lind remarked that he had garnered much of his information from paying close attention at various officers' clubs.²

A second review of the Grenada operation appeared in a copyrighted story in *The Boston Globe* on 22 October 1984. The story stated that Operation *Urgent Fury* was "a case study in military incompetence and poor execution." The authors were Major Richard A. Gabriel, US Army Reserve, and Lieutenant Colonel Paul L. Savage, US Army, Retired. These officers had written the controversial 1978 book *Crisis in Command: Mismanagement in the Army*. No verifiable documentation was included in the article; the authors stated that security strictures prevented a full disclosure of the sources.³

The third and most authoritative consideration of the US military performance in Grenada was copyrighted in 1984 but did not receive general attention until spring 1985. This commentary was included in Chapter 2, "How the Lessons of Defeat Remain Unlearned," in Edward N. Luttwak's *The Pentagon and the Art of War: The Question of Military Reform*. Luttwak, a senior fellow at the Strategic Studies Institute, Georgetown University, has served as a consultant to the US Department of State and the Department of Defense. He cited the US actions in Grenada, along with other examples of allegedly faulty US defense planning and execution. Luttwak listed the sources for his Grenada information as two articles from the May 1984 issue of the *US Naval Institute Proceedings* and news reports from October and November 1983 issues of various news publications.⁴

I do not question the patriotism, sincerity or conviction of these men. Their accounts are all built around kernels of truth. Unfortunately, each of the treatises contains errors of fact, hasty generalizations and conclusions based on shaky premises.



82d Airborne soldier in terrain typical of the island's interior.

The 1982 edition of Field Manual 100-5, *Operations*, says: "The operational level of war uses available military resources to attain strategic goals within a theater of war."⁵ This level includes the allocation of forces, the deployment of troops against selected enemy forces and terrain objectives, and the command and control of engaged combat units. Each of these operational components in Grenada received criticism. It was said that too many forces were employed, the forces were deployed piecemeal against peripheral objectives and the operation was inefficiently directed. Lind observed:

...the United States required seven battalions of troops, plus elements of two other battalions, to defeat fewer than 700 Cubans and a Grenadian army that hardly fought at all.

Luttwak also thought the United States used too much force. He called most of the Cubans "construction workers" and said that only 43 were actually soldiers. He added "those few Grenadians who were actually willing to fight" to the opposition forces but commented that the Cuban/PRA forces had no real

tanks, artillery or air defenses. They had only a few wheeled "armored cars" and some light antiaircraft weapons. Gabriel and Savage stated that there were few enemy units and that the original US assault units were unable to cope with them.⁶

The US military missions in Grenada were established from the president's strategic objectives. The safety of the medical students, not the destruction of the Cuban/PRA forces, was the immediate objective. As a result, US forces were initially directed against those opposition forces posing the greatest threat to the US citizens on the island. The civilian presence discouraged the massive use of mortar, artillery or naval gunfire, and air munitions.

The second objective was the restoration of a democratic government. This necessitated the destruction of the PRA. There had to be an island left to restore, so collateral damage and civilian casualties had to be held to a minimum. Equally important, there had to be enough US troops on the ground to physically sweep and control the island to prevent any Cuban/

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PRA guerrilla campaign. The elimination of the Cuban presence—the third objective—implied the isolation, destruction, or capture and removal of the Cubans.

In essence, rescue operations had priority. The US rules of engagement required minimum force and minimum casualties.⁷ With these constraints, the force structure had to include enough troop strength to handle the likely opposition without resorting to massive firepower.

The determination of the enemy's strength on the island was hampered by a lack of firm intelligence, but open-source military periodicals indicated a potentially sizable force. There were 701 Cuban Revolutionary Armed Forces (FAR) troops on Grenada. Of these, 43 advised (and, in some cases, commanded) PRA units. Ten Ministry of Interior officers provided similar advice to the People's Revolutionary Militia (PRM). The Cuban construction engineer battalion was armed and organized as a military unit. The engineers lived in barracks, carried weapons and had received defense orders from Fidel Castro and their commander, Colonel Pedro Tortoló Comas. Air reinforcement from Cuba was possible.

The Grenadian PRA was composed of two infantry battalions, an antiaircraft battery and an artillery battery. This force had trained to deal with US airborne and amphibious tactics. Its armament included six *BTR60PBs* and some *BRDM2* armored vehicles (which are still used by the Soviets), seven 130mm towed artillery pieces and six twin 23mm towed air defense guns. The PRA was supplemented by seven PRM infantry battalions which had conducted major anti-invasion maneuvers in April 1983.

Soviet, Libyan, North Korean, East German and Bulgarian contingents were on the island. The Soviets, in particular, were rather well armed for “diplomats.”⁸

The total possible opposition to the US operation was 10 battalions plus combat support and combat service support units. US staff planning officers had to plan for the worst case. As it turned out, both the

Cubans (who had almost 12-percent casualties) and the Grenadian PRA fought hard for the first two days. The PRM did not contribute much to the island's defense.

Terrain and weather also influenced US force levels. Grenada is not a small, flat, desert island. Its area is 119 square miles (311 square kilometers). Grenada's volcanic, hilly terrain is heavily vegetated. Its population of about 110,000 occupies the land at a greater density than is found in Massachusetts or Connecticut. In the Caribbean, only Puerto Rico has more people per square mile. Almost 30,000 Grenadians live in and around St. George's. The rest are spread in small towns and clusters of farm huts. About 12 percent of the island is primary rain forest, with most of the rest either secondary forest or cultivated cocoa, banana and nutmeg groves. The central rock formations and heavy vegetation limit areas for helicopter landing zones. The hot, humid air averages 82 degrees Fahrenheit which would affect US troops. The only real coastal plain is in the Point Salines area, and most beaches are treacherous, even for small boats, let alone landing craft.⁹

Two factors influenced force planners. The large population required precision in ground operations. Foot reconnaissance would have to be used in lieu of reconnaissance by fire. Also, the defenders had many camouflage advantages. The precipitous topography would absorb a lot of infantry. Securing Grenada with vehicles or helicopter scouts would not be very effective. Too much could transpire unseen under the trees.

Troops available for the operation were limited by time constraints and mission requirements. The Caribbean area comes under the US Atlantic Command; the USS Independence and Navy/Marine amphibious group were already available. Special Operations Forces were selected for a few critical tasks.

US Atlantic Command planners could reinforce the MAU by sea or by air. Sea transport takes a long time, and the dispatch of additional MAUs was ruled out. Air reinforcement was quicker but



American students after their rescue by US Army Rangers, Point Salines, 25 October 1983.

required the seizure of one or more runways. Army paratroopers were the logical choice, and the Army Rangers had trained to rescue hostages. Thus, the airborne Ranger battalions were added. More infantrymen were needed to complete the clearance of the countryside, and the 82d Airborne Division was the closest source of nonmechanized troops. They also had the ability to parachute into Grenada if necessary, and their normal readiness level is higher than other available Army units.

Force planners allocated the two Ranger battalions with Air Force airlift, the MAU, Air Force *Spectre* gunships and the USS *Independence* attack aircraft to the assault echelon. Air Force Military Airlift Command (MAC) planes would deliver the Caribbean peacekeeping force and two brigades of the 82d Airborne Division for reinforcements. The actual force ratios during the campaign proved adequate. However, the pace of US reinforcement indicates that the assault elements fought and won the major engagements without any overwhelming

superiority in numbers or excessive use of firepower. US troop strength peaked as the Rangers were withdrawn. The redeployment schedule was dependent on the MAC airflow. The 82d Airborne Division was not flown in to meet unexpectedly heavy resistance. The first units were already en route as the assault elements landed.¹⁰

A second criticism of the Grenada operation concerned the disposition of the forces employed. Lind thought the plan should have been one "in which overwhelming force is used to seize all critical junctures in an enemy's system at the outset." Luttwak wanted "a sudden descent in overwhelming strength that would begin and end the fighting in one stroke."¹¹

Mission considerations placed the two known student concentrations at the top of the list of geographical objectives. Enemy unit positions guarding these objectives were also designated for seizure. There was no enemy "rear" area because the Cubans and Grenadians were in discontinuous locations, tied into land features and important facilities. Most of

Ground Unit Force Ratios in Grenada

25 October - 2 November 1983

US/Caribbean

Cuban/Grenadian

25 October	1 USMC battalion (+) 2 USA Ranger battalions 1 USA airborne battalion 1/2 battalion CPF	1 Cuban engineer battalion 2 PRA infantry battalions 7 PRM infantry battalions
	4 1/2 battalions	10 battalions
	1 USMC battalion (+) 2 USA Ranger battalions 2 USA airborne battalion 1/2 battalion CPF	2 2/3 Cuban engineer battalion 2 PRA infantry battalions PRM (snipers; fragments)
	5 1/2 battalions	2 2/3 battalions
26 October	1 USMC battalion (+) 2 USA Ranger battalions 2 USA airborne battalion 1/2 battalion CPF	1 1/3 Cuban engineer battalion 1 PRA infantry battalions PRM (fragments)
	6 1/2 battalions	1 1/3 battalions
27 October	1 USMC battalion (+) 2 USA Ranger battalions 3 USA airborne battalion 1/2 battalion CPF	1 PRA infantry battalions PRM (fragments)
	7 1/2 battalions	fragments
28 October		

28 October force levels maintained until 2 November, with steady erosion of Grenadian PRA units.

USA—US Army

CPF—Caribbean Peacekeeping Force

PRM—People's Revolutionary Militia

USMC—US Marine Corps

PRAF—People's Revolutionary Armed Forces

the enemy force was located in the south although aerial photographs showed a Cuban *An-26 Curl* aircraft at Pearls Airport. The seizure of both airfields would cut off any possible Cuban reinforcements.

The terrain limited the amphibious entry points to three beaches—the Grand Mal, Grand Anse and Great River/Conference Bays. However, the MAU could use

helicopters to lift into company-sized landing zones scattered around the island. The two available airborne drop zones—the airfields—were extremely tight. Only the Point Salines airstrip could accommodate MAC C141B *StarLifter* and CSA *Galaxy* aircraft.¹² Pearls Airport would be a possible secondary site for C130H *Hercules* transports.



82d Airborne troops talk with a Cuban doctor in detention area, 26 October 1983.

The US dispositions allowed Metcalf and his ground deputy, Major General H. Norman Schwarzkopf, the flexibility to move most of the Marine BLT around Grenada after Pearls was taken. The BLT (-) attack on 26 October, combined with Army attacks at Calliste and the Grand Anse raid, broke the back of the Cuban/Grenadian resistance. It was suggested that the movement of the BLT (-) to the St. George's area was too slow, and a "platoon or two" could have been sent by helicopter during the afternoon of 25 October.¹³ This move might have run afoul of the St. George's PRA anti-aircraft gunners which had downed a *Black Hawk* and two *Sea Cobra* helicopters by 1200 on 25 October.

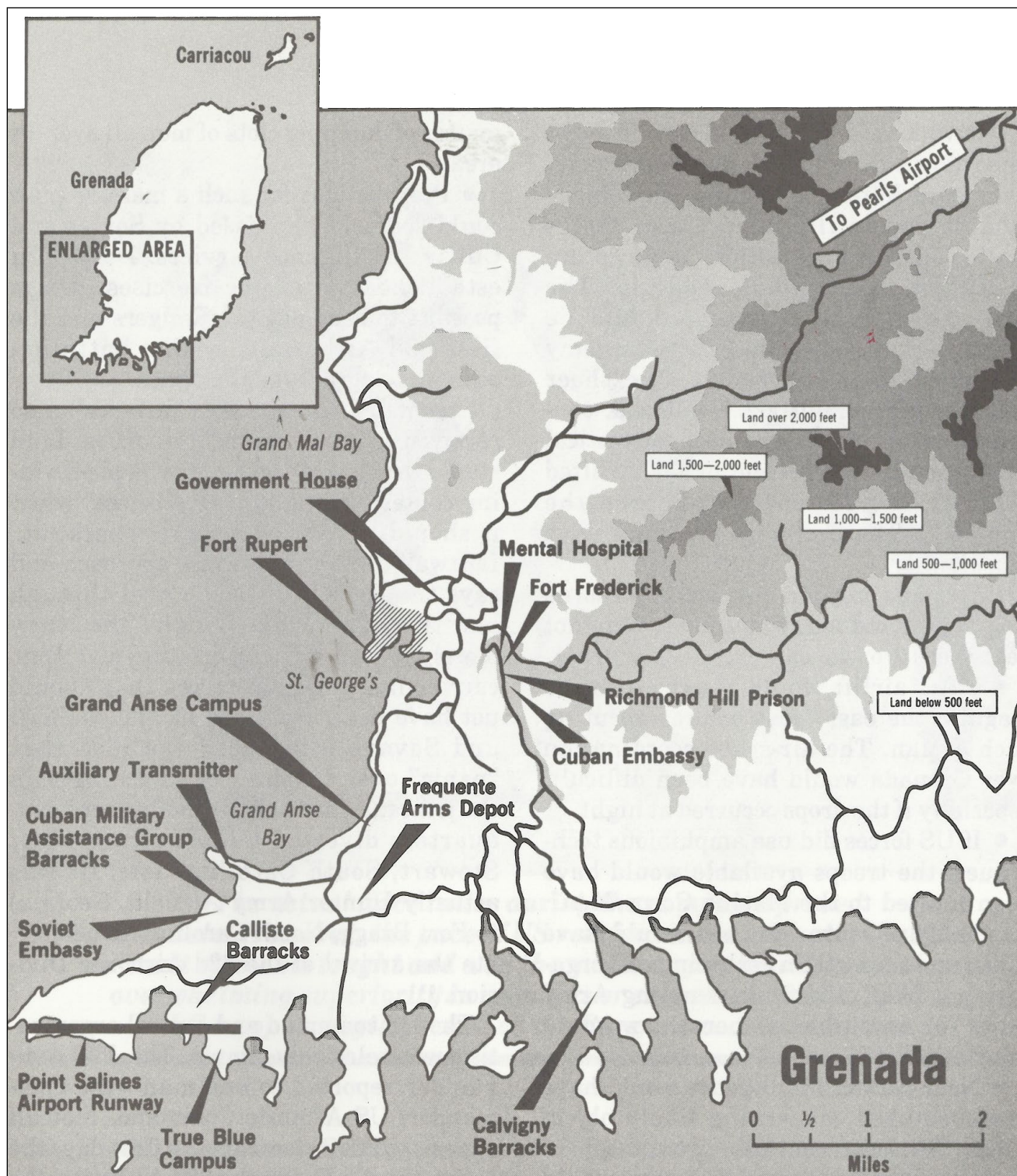
Lind preferred a scheme of maneuver involving only the Marines. The main effort of the BLT would have been a landing at Grand Anse, followed by a move across the southwestern peninsula to cut off Salines from St. George's. "...this would have isolated the Cubans from the rest of the island and made any defense on their part meaningless."¹⁴ Unfortunately, it would have also left the True Blue and Lance aux

Épines student concentrations well behind Cuban lines. The St. George's facilities would also have remained in firm PRA control.

The single Marine battalion might have encountered slow going in the thickly undergrown Calliste/Frequeute area, and the Marines' ability to contain the Cuban and PRA battalions across a mile of jungle foliage is questionable. Without an airstrip, the Marines would have to rely on seaborne reinforcement if they ran into trouble. The Cubans and the PRA, secure in their barracks and located near arms caches, could have held out for some time. This scheme might have worked over time, but the mission was to seize Grenada, not besiege it.

Luttwak desired a wholly Army operation and opined that:

...had Urgent Fury been planned by Army officers competent in land warfare, their natural tendencies would have been to stage a coup de main, using as many battalions of the 82d Airborne Division as could be airlifted, as well as the Rangers.



Luttwak said US troops should have come down directly on each objective, using parachutes, air landing, amphibious assault and infiltration. These forces would “suppress opposition” and capture all target areas simultaneously. The enemy command structure would be crushed

at the very outset; the enemy troops would be stunned by the “sheer magnitude of the attack.” Luttwak concludes: “Then there is no need for tactical movement on the ground or for airlifted vehicles, nor for coordination on the ground.”¹⁵ There are six problems with this plan:



US Army Rangers deploying from Point Salines area, 26 October 1983.

- ◆ Grenada only has two usable airborne drop zones, and many objectives were not near these drop zones.
- ◆ MAC airlift would require time to stage to the east coast before executing such a plan. The air-space coordination over Grenada would have been difficult, especially if the drops occurred at night.
- ◆ If US forces did use amphibious techniques, the troops available would have been limited to the Marine Corps MAU. Assembly of more Marines would have taken more time than gathering and organizing a MAC airlift. Assembling Army units for amphibious operations would take longer still.
- ◆ Near-perfect intelligence would have been required concerning likely objectives. Without vehicles, ground movement or coordination, US forces would have been unable to protect the 237 students who were not near the school campuses, Pearls or the St. George's area. Enemy forces missed in the initial assaults would have been free to withdraw to the central mountain forests. This scheme would have lacked any operational flexibility.
- ◆ Airborne, amphibious, air assault and infiltration maneuvers all require careful coordination. It is not just a simple matter of dumping clots of men all over an area.
- ◆ Preparations for such a massive plan could scarcely be missed by Soviet and Cuban intelligence services. Due to an established pattern of exercises, it was possible to send out the Rangers and the first 82d Airborne Division battalion without telegraphing the punch.



Members of the Caribbean Multinational Force board UH60 Black Hawks to take up guard positions, 25 or 26 October 1983.

Command and control “failures” also received attention from the critics. Lind stated that the operation was “a pie-dividing contest among all the services” when it should have been a naval operation. Luttwak takes the opposite approach and says the operation was “naval through and through” even though “the Navy merely provided transportation and some carrier-launched airstrikes that should not have been necessary at all.” Gabriel and Savage introduced the idea that “panic” over Cuban ground strength in the joint task force (JTF) and higher headquarters diverted C130Hs from “Fort Stewart, South Carolina” (sic) (it was actually Hunter Army Airfield, Georgia) to Fort Bragg, North Carolina, to accelerate the arrival of the 82d Airborne Division.¹⁶

The US command and control organization was relatively simple. The JTF commander reported to one man—the commander, US Atlantic Command. Metcalf

supervised five elements the first day (the Navy, the Air Force, the 82d Airborne, the MAU and Special Operations Forces), well within a normal span of control. This was reduced to four subordinate units by 1600 that day.

There was speculation that the Army Rangers wanted “in” on Operation *Urgent Fury* to justify a third Ranger battalion.¹⁷ In fact, the Navy and Marine task forces offshore were not capable of fulfilling the special operations requirements and facing three active battalions and possibly seven militia battalions. Each of the services did things essential to their nature. The Navy secured the seas, provided carrier air power and landed the Marines. The Marines conducted three landings in seven days, both by LVTP7 and helicopter. The Army seized an airfield by airborne assault and fought the bulk of the Cuban/PRA ground forces. The Air Force airlifted supplies and reinforcements

and employed powerful *Spectre* gunships. Each service freed the others to accomplish their unique missions.

The charge that the operation was too "Navy" in nature ignores basic US doctrine on amphibious operations. McDonald summarized the doctrine by noting that the landing force commander controls operations until follow-up (by doctrine, Army) forces are established ashore. Metcalf, assisted by Army deputy Schwarzkopf, exercised overall command from the sea until the Army took over the entire island from the Marines for consolidation.¹⁸ Metcalf's position enabled him to divert readily most of the Marine BLT to the St. George's area on 25 October. This action tore the heart out of the PRA resistance. That the Navy directed Operation *Urgent Fury* should come as no surprise: Grenada is an island.

The allegation that a panic in the command structure resulted in a redirection of the airflow and that "three quarters of the Ranger force never left Fort Stewart (actually Hunter Army Airfield)"¹⁹ was not true. Both Ranger battalions (minus a few headquarters people and some brand new arrivals) jumped from five

MC130Es and 18 *C130Hs* at Point Salines and played major roles in the fighting and rescue operations. The lead battalion of the 82d Airborne Division (already in the air as the Rangers jumped) arrived aboard C141Bs, not C130Hs.²⁰ Rather than accelerate the deployment airflow of follow-up battalions to meet Cuban/PRA resistance around Salines, the JTF commander moved the BLT (-) to Grand Mal beach, using darkness to cover the maneuver. It was a prudent, calculated decision without any evidence of panic except perhaps on the part of the dismayed PRA units north of St. George's.

Few military operations are free of flaws and human errors, and the operational planning and execution of Operation *Urgent Fury* were not perfect. There is plenty of room for constructive criticism of the Grenada operation based on impartial analysis of available information. The US armed services should appreciate the sincere interest of men who provide this constructive criticism. Unfortunately, good intentions do not remedy a lack of accuracy. Nor should the final outcome be overlooked by anyone—the mission was accomplished. ■

NOTES

1. Admiral Wesley L McDonald is quoted in *Lessons Learned as a Result of the US Military Operations in Grenada, Full Committee Hearing of the House Committee on Armed Services*, House Committee on Armed Services, 98th Congress, Second Session, Washington, D.C., 24 January 1984, p 17. See also "Grenada: Will Lessons Learned Be Taught?" *Army Times*, 5 November 1984, pp 30-32 and 36; Benjamin F. Schemmer, "JCS Reply to Congressional Reform Caucus' Critique of the Grenada Rescue Operation," *Armed Forces Journal International*, July 1984, pp 13-18 and 99; *Hearings on Organization, Structure and Decisionmaking Processes of the Department of Defense: Part 8: Hearing Before the Senate Armed Services Committee*, US Senate, 98th Congress, First Session, Washington, D.C., 9 November 1983, p 337; Bruce Marcus and Michael Taber, *Maurice Bishop Speaks: The Grenada Revolution, 1979-83*, Pathfinder Press, N.Y., 1983, pp 319-21; Hugh O'Shaughnessy, *Grenada: Revolution, Invasion and Aftermath*, Hamish Hamilton, London, Eng., 1984, pp 15-16; "Grenadian Arms Cache Diverse, Substantial," *Army Times*, 28 November 1983, p 38; *D-Day in Grenada*, edited by Kesaharu Imai, World Photo Press, Tokyo, Japan, 1984, pp 21 and 82; "Paratroopers Get Gratitude, Aid," *Army Times*, 14 November 1983, p 26; "Jumping Into a Hot DZ at 500 Feet," *Ibid.*, pp 1-2, 10 and 66; Lieutenant Colonel Michael J. Byron, "Fury From the Sea: Marines in Grenada," *US Naval Institute Proceedings*, May 1984, pp 125-26; "Marines on Grenada Met Light Resistance," *Army Times*, 28 November 1983, p 29; Christopher C. Wright, "U.S. Naval Operations in 1983," *US Naval Institute Proceedings*, May 1984, pp 52-67 and 285-95; James W. Canan,

"Blue Christmas Coming Up," *Air Force Magazine*, January 1984, pp 78-79; and Henry Zeybel, "Gunships at Grenada," *National Defense*, February 1984, pp 53-55.

2. L James Binder, "Grenada Post-Mortem: A 'Report' That Wasn't," *Army*, June 1984, p 12; "Study Faults US Military Tactics in Grenada," *The Washington Post*, 6 April 1984, p A-3; "Study Criticizes Invasion Tactics in Grenada," *Christian Science Monitor*, 6 April 1984, p 1; and Schemmer, *op. cit.*, p 12, features William S. Lind's remarks on his research techniques.

3. "US Concealed Grenada Loss, Report Charges," *The New York Times*, 22 October 1984, p 10.

4. Edward N. Luttwak, *The Pentagon and the Art of War: The Question of Military Reform*, Simon & Schuster, N.Y., 1984, p 309. In a substantive footnote, Luttwak refers to the Rangers as "1st and 2nd Battalions of the 75th Infantry Brigade."

5. Field Manual (FM) 100-5, *Operations*, Department of the Army, Washington, D.C., 1982, p 2-3.

6. Schemmer, *op. cit.*; Luttwak, *op. cit.*, pp 51 and 53; and "US Concealed Grenada Loss, Report Charges," *op. cit.*

7. *Lessons Learned as a Result of the US Military Operations in Grenada, Full Committee Hearing of the House Committee on Armed Services*, *op. cit.*, p 27; and *Hearings on Organization, Structure and Decisionmaking Processes of the Department of Defense: Part 8: Hearing Before the Senate Armed Services Committee*, *op. cit.*, p 344.

8. *The Grenada Papers*, edited by Paul Seabury and Walter A. McDougall, Institute for Contemporary Studies, San Francisco,

Calif., 1984, pp 43-44 and 184-85; Marcus and Taber, *op. cit.*, pp 284 and 317; Timothy Ashby, "Grenada: Soviet Stepping Stone," *US Naval Institute Proceedings*, December 1983, pp 30 and 32-33; "The Military Balance, 1983/84," *Air Force Magazine*, December 1983, p 125; *Situation in Lebanon and Grenada, Hearings Before a Subcommittee of the House Committee on Appropriations*, House Committee on Appropriations, 98th Congress, First Session, 8 November 1983, p 39; Honorable William Broomfield of Michigan Extension of Remarks, *The Congressional Record*, House, 98th Congress, Second Session, 26 April 1984, pp E1804-5; and "Grenadian Army Studied US Assault Tactics," *Army Times*, 28 November 1983, p 38.

9. National Foreign Assessment Center, *World Factbook*, US Government Printing Office, Washington, D.C., 1981, pp 76-77; *The Caribbean Year Book, 1977-1978*, edited by Colin Rickards, International Publishing Service, N.Y., 1977, pp 401 and 409; Helmut Blume, *The Caribbean Islands*, translated by J. Maczewski and A. V. Norton, Longman, N.Y., 1974, pp 350-52; and Defense Mapping Agency, Hydrographic Center, *Sailing Directions (Enroute) for the Caribbean Sea*, US Government Printing Office, Washington, D.C., 1976, pp 219-24.

10. Schemmer, *op. cit.*, pp 12-14; and Luttwak, *op. cit.*, p 53.

11. Schemmer, *op. cit.*, p 12; and Luttwak, *op. cit.*, p 56.

12. Marcus and Taber, *op. cit.*, p 321, reprinted Fidel Castro's 23 and 24 October defense orders to his construction engineer

battalion. See *D-Day in Grenada, op. cit.*, p 82; and *The U.S. War Machine*, edited by Ray L. Bonds, Crown Publishers, N.Y., 1983, pp 186-89. The possible drop zones were evaluated by the use of calculations in accordance with FM 57-38, *Pathfinder Operations*, Department of the Army, Washington, D.C., 1973, Change 2, pp 39-40. The arithmetic assumed 64 jum pers per C130, with a dual-door exit at 1/2 second per paratrooper.

13. Luttwak, *op. cit.*, p 54.

14. Schemmer, *op. cit.*, p 13.

15. Luttwak, *op. cit.*, pp 54 and 56-57.

16. *Ibid.*, p 56; Schemmer, *op. cit.*; and "US Concealed Grenada Loss, Report Charges," *op. cit.*

17. Schemmer, *op. cit.*

18. *Hearings on Organization, Structure and Decisionmaking Processes of the Department of Defense: Part 8: Hearing Before the Senate Armed Services Committee, op. cit.*, pp 289-90; Benis M. Frank and Henry I. Shaw Jr., *History of United States Marine Corps Operations in World War II: Victory and Occupation*, US Government Printing Office, Washington, D.C., 1968, Volume 5, pp 661; and Vice Admiral George Carroll Dyer, *The Amphibians Came to Conquer: The Story of Admiral Richmond Kelly Turner*, US Government Printing Office, Washington, D.C., 1972, pp 225 and 636.

19. "US Concealed Grenada Loss, Report Charges," *op. cit.*

20. *D-Day in Grenada, op. cit.*