

THE WAGES OF WAR
Iraqi Combatant and Noncombatant Fatalities in the 2003 Conflict

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EXECUTIVE SUMMARY

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Nations cannot wage war responsibly or intelligently without careful attention to its costs. An elementary part of coming to terms with these costs is an accounting of war fatalities. Among other things, this accounting is relevant to gauging the repercussions of a war, both locally and worldwide.

- Between 19 March and 1 May 2003, Operation Iraqi Freedom cost the lives of approximately 201 coalition troops; 148 of these were Americans.
- On the Iraqi side: a review and analysis of the available evidence shows that approximately 11,000 – 15,000 Iraqis, combatants and noncombatants, were killed in the course of major combat actions. (Iraqi casualties incurred after 20 April are not included in this estimate). Of the total number of Iraqi fatalities during the relevant period, approximately 30 percent (or between 3,200 – 4,300) were noncombatant civilians -- that is: civilians who did not take up arms.

These conclusions are based on an extensive review and analysis of operational data, demographic data, several hospital and burial society surveys, media interviews with Iraqi military personnel, battlefield fatality estimates made by US field commanders and embedded reporters, and media and non-governmental accounts of hundreds of civilian casualty incidents. (See *Executive Summary* section 6: “A note on methodology.”)

Expressed in terms of their mid-points, our estimates of Iraqi deaths are:

Total Iraqi fatalities:	12,950	plus or minus 2,150 (16.5 percent)
Iraqi noncombatant fatalities:	3,750	plus/minus 550 (15 percent)
Iraqi combatant fatalities:	9,200	plus/minus 1,600 (17.5 percent)

Notably, our estimates are framed in terms of “combatants and noncombatants,” rather than in terms of “civilians and military personnel.” This, because a significant number of civilians acted as combatants and some Iraqi military personnel fought and died out of uniform (and, thus, may have been mistaken for civilians). By some counts, between 5,000 and 7,000 of the Iraqis who died during the period of major combat operations were ostensibly “civilians.” However, based on demographic analyses, we count a significant minority of these as likely combatants. All of those we count as noncombatants in the estimate above were civilian.

1. Comparison of Operation Iraqi Freedom and Operation Desert Storm (1991)

Complicating any comparison of Operations Iraqi Freedom and Desert Storm are the disagreements that surround the estimation of Iraqi casualties in the 1991 Gulf War. We estimate that Iraqi fatalities in the 1991 war include more than 3,500 civilians and between 20,000 and 26,000 military personnel. (See *Appendix 2. Iraqi Combatant and Noncombatant Fatalities in the 1991 Gulf War*, which accompanies the main report.)

- Both the absolute number and the proportion of noncombatants among the Iraqi war dead was higher in Operation Iraqi Freedom (OIF) than in Operation Desert Storm (ODS), twelve years earlier. This, despite (i) the intervening years of technological development and enhancements to US warfighting capabilities (which cost US taxpayers ~ \$1 trillion) and despite the fact that (ii) far fewer aerial munitions were used in OIF than in ODS and a much higher proportion of these were guided.
- In absolute terms, US, British, and Iraqi combatant fatalities were substantially fewer in the 2003 war than in the first Gulf War. Iraqi fatalities in 2003 were perhaps only 37 percent as numerous; US and British fatalities, 48 percent as numerous. Yet, measured against the numbers of troops engaged on both sides during the two wars, casualty rates were actually higher in 2003 for all concerned.
- Looking at both the 1991 and 2003 wars, the only feature that marks the two wars as ostensibly “revolutionary” is the low ratio of US and British fatalities to Iraqi ones. These ratios are in the range of 70 – 90 to one. (By comparison, Israel was able to

achieve exchange rates of no better than 4-to-1 in its wars with Arab states.) Apart from the relatively low number of Anglo-American fatalities, both of the wars had death tolls that registered within range of many strategically significant wars of the past 40 years.¹ They do not stand out unambiguously as “low casualty” wars.

The casualties incurred during the 2003 war certainly do not compare with those experienced in some of the protracted conflicts of the past 25 years, such as the 10-year anti-Soviet war in Afghanistan or the eight-year Iran-Iraq war. However, Iraqi losses in 2003 were comparable to those experienced in some of the Arab-Israeli and India-Pakistan conflicts. Indeed, noncombatant fatalities during the month-long 2003 war actually outnumber those suffered during the three years of intensified conflict between Israelis and Palestinians -- the Al-Aqsa Intifada -- that began in September 2000. And total Iraqi fatalities in 2003 surpass those incurred during the past 15 years of the Arab-Israeli conflict.

2. Strategic significance of the Iraqi death toll

The strategic significance of the Iraqi death toll -- its relevance to US policy -- does not derive solely from its magnitude, nor can it be fully appreciated through simple linear comparisons. Instead, it should be assessed in light of what the United States hopes to achieve and what it hopes to avoid in Iraq, in the region, and worldwide. Relevant to this we might ask how the death toll affects postwar efforts to (i) stabilize Iraq, (ii) isolate and blunt the global terrorist threat, and (iii) build regional and global cooperation in pursuing these and other important security goals, such as nonproliferation.

It is apparent that the blood cost of the war now weighs heavily on the relationship between the United States and other nations -- especially those in the Muslim and Arab world.² The extent of noncombatant casualties in particular has helped send international opinion regarding America's global role and policy to a 25-year nadir.³ This may impact negatively on the war against terrorism and on the effort to stem the growth of terrorist organizations and the spread of extremist ideologies.⁴

The war's death toll also has seriously exacerbated the postwar challenge inside Iraq. There, the repercussions of war fatalities are amplified and sustained by strong kinship, tribal, village, and ethnic ties, adding substantially to anti-American sentiments and constituencies.⁵ This pertains not only to noncombatant fatalities, but also to the death toll among combatants, who are not generally viewed by Iraqis as having been stooges of the Hussein regime. Many Iraqi combatants were conscripts who fought out of fear or for purely patriotic reasons (however misguided they may seem from a US perspective). At any rate, those Iraqis who bear a visceral grudge against the United States because of the war's effects may number in the millions -- beginning with the extended families of the estimated 40,000 Iraqis killed or injured. This constituency of

aggrieved individuals supplements other groups who may oppose US policy based on nationalist sentiments, allegiance to the old regime, tribal affiliations, or fundamentalist orientation. In this context, it is especially unfortunate that a key anti-Hussein community -- Iraqi Shiites -- may have borne the brunt of US power.⁶ Shiites comprised a majority of Iraqi conscripts -- at least, in the regular army. And the war's most intense and protracted fighting occurred in Shiite majority areas.

3. Regime change, urban warfare, and the role of ground forces

The fact that OIF cost as many or more noncombatant lives as did the 1991 Gulf War and the fact that the percentage of combatants killed did not markedly decline is best attributed to the specific objective for which the 2003 war was fought: regime change. This goal is far more ambitious strategically than the goals that defined Operation Desert Storm -- and it imposed more demanding and risky operational requirements on coalition forces.

Regime change required an engagement with Iraqi power that was more thorough and unrelenting than was the case in the first Gulf War. America's armed forces had to pursue Iraqi power to where it lived, flush it out, and then destroy, corral, or disperse it. This entailed more fighting in and around urban centers because these were also hubs of political power. Thus, regime change required that US armed forces get in among the Iraqi people to a greater extent than in 1991. Coalition forces had to close on key cities, gain control of vital assets and lines of communication, conduct repeated raids on centers of power throughout the country, and attrite or threaten the regime's military capabilities wherever they resided.

The type of tasks associated with forceful regime change bring ground forces to the fore. A clear measure of the augmented role of ground forces is the number of days that ground units conducted combat operations multiplied by the number of ground units involved; we call this measure "equivalent brigade-days of ground combat." While Operation Desert Storm involved less than 150 equivalent brigade days of ground combat, Operation Iraqi Freedom involved more than 400 (through 15 April).

The advance of coalition ground units decisively and comprehensively challenged Iraqi forces in ways that air power alone never could. This prompted intense, two-sided combat at the ground level. Compared to air assets, ground units are relatively vulnerable to detailed counter-attack and they tend to defend themselves more by firepower than by speed, stealth, or distance. When facing extreme tactical threat -- as they did every day in Iraq -- ground units often respond ferociously. This is a function both of their vulnerability and their immersion in a sea of deadly threat. Thus, it is not surprising that Iraqi hospitals were overwhelmed with casualties as the ground front advanced.

Still, it would be a mistake to simply attribute the casualty outcome of the war to the increased role played by ground forces. The goals of the war prioritized these instruments and defined their mission, which was virtually guaranteed to elicit desperate Iraq resistance and to entail substantial fighting in and around cities.

4. Air interdiction of ground forces: What happened to the Iraqi army?

Air interdiction of ground forces is distinguished from the close air support mission by its focus on targets that are some distance from one's own troops. Functionally, close air support missions help decide the immediate battle, while air interdiction missions shape the battlefield and help determine tomorrow's battle.

In Operation Iraqi Freedom, coalition fighters and bombers flew a total of about 20,700 sorties and struck more than 19,000 aim points, delivering 29,900 munitions of which 19,948 or 68 percent were of guided types and 9,251 were unguided.⁷ Interdiction of Iraqi ground units probably involved more than 12,000 of these aim points (or 60-plus percent) and more than 20,000 of the expended bombs and missiles (or 67-plus percent of the total).⁸ In this estimate, approximately 58 percent of the weapons used against the Iraqi army in the field would have been of guided types.

Most of the effort against Iraqi ground troops was focused on Republican Guard divisions and on a handful of stalwart regular divisions that formed part of the defensive ring south of Baghdad.⁹ None of these divisions were at full strength, except perhaps the Medina (which was reinforced by elements of other divisions). All told, the Republican Guard plus several stalwart regular divisions probably comprised 85,000 troops. Another 35,000 Iraqi troops in five or six regular divisions played some role in the fight -- or, at least, came under attack before withdrawing -- in the north and the southeast.¹⁰ (We assume that there were another 60,000 Iraqi troops in the field who played little role in the fighting and drew relatively little coalition fire).

By contrast, in the 1991 Operation Desert Storm (ODS), coalition fighters and bombers flew almost 60,000 sorties and conducted more than 41,000 strikes of which more than two-thirds were directed against ground force targets, including not just troops but also their installations and depots.¹¹ Approximately 227,000 bombs and missiles were expended by US fixed-wing aircraft during ODS and 14,825 of these were of guided types.¹² The total percentage of weapons employed against ground force and related targets was approximately 73 percent. All told, about 165,000 munitions were delivered against ground force and related targets in Desert Storm; approximately 6,000 of these were precision weapons and 159,000 were unguided.¹³ The total number of Iraqi army personnel deployed in the theater of operations was probably about 360,000 at the start of the ODS air campaign -- an estimate that takes into account the fact that Iraqi divisions were substantially under strength. The personnel attrition for Iraqi ground units

that was attributable to the air war phase of the conflict averaged 2.5 percent of the total deployed at the beginning of the air campaign, according to interviews with senior Iraqi officer POWs.¹⁴

Comparing the two air campaigns:

- One third as many fighter and bomber sorties were flown in OIF as in ODS and only 13 percent as many air-delivered munitions were used. However, the proportion of guided weapons was much higher -- 67 percent versus 6.5 percent; indeed, their absolute number was 35 percent greater. Thus, the reduced effort implied by flying only one-third as many fighter and bomber sorties does not imply a commensurate reduction in impact.
- Approximately 64 percent fewer air-delivered munitions were employed per enemy soldier in OIF than in ODS. However, many more of the weapons used against ground troops in Operation Iraqi Freedom were guided weapons: about 58 percent versus less than 4 percent in Desert Storm. In absolute terms: almost twice as many precision or guided weapons were used against ground forces in OIF than in ODS. Thus, it should not be surprising if US air power was able to achieve levels of Iraqi unit destruction in OIF surpassing those achieved in Desert Storm, despite the use of much less ordnance.
- Although fewer munitions per active enemy soldier were used in OIF, they were delivered in a much shorter time period than in Operation Desert Storm: less than three weeks in OIF versus six weeks in ODS. Moreover, during Desert Storm, the intensity of air attacks on ground troops increased gradually and did not surpass their average level until the campaign's fourth week. In OIF, by contrast, US attacks on Iraqi ground units rapidly intensified, reaching and surpassing their average level in less than a week. Thus, Iraqi troops had much less time to adapt to the attacks.
- Also relevant was the fact that, in the 1991 Gulf War, Iraqi units were already well dug-in and dispersed when the air campaign began, having begun their field deployment as much as five months earlier. By contrast, in 2003, there were no clear signs of Iraqi military field deployments or preparations prior to mid February -- just a few weeks before fighting began.¹⁵

Several factors probably contributed to the rapid collapse of the Iraqi field army despite the use of fewer aerial munitions per soldier: the increased proportion of guided weapons, the more rapid application of air power, and the lower level of initial preparation on the part of the Iraqis.

How did Iraqi field units fare under air attack in terms of casualties? A postwar survey of seven battlefields conducted by *Time* magazine reporters suggests a low number of casualties for a fair cross section of the force.¹⁶ However, other sources suggest higher rates:¹⁷ testimony from five disparate Iraqi units ranging from company- to brigade-size indicate fatalities percentages

ranging from 5 to 33 percent. In several of these cases, most of the fatalities were suffered in a single devastating attack.

A hypothesis consistent with all the reports is that a small portion of Iraqi units (perhaps 5 percent) suffered attrition rates of more than 10 percent. A larger segment of the force (perhaps 15 percent) might have suffered rates ranging between 1 percent and 10 percent. This 20 percent of severely degraded units would have comprised (i) major elements of the Medina and Baghdad divisions, (ii) some of those units that had attempted to redeploy south of Baghdad after the war began, and (iii) air defense and artillery units across the force. The remainder of the force -- fully 80 percent of the units or more -- would have suffered rates of less than one percent, which would be consistent with the *Time* survey. This could produce an overall personnel loss of between 1.4 and 1.8 percent which, for a force of 120,000, would imply between 1,700 and 2,200 fatalities.

The hypothesis allows that unit personnel attrition was proportionately lower in OIF than in ODS -- perhaps 1.6 percent on average *versus* 2.5 percent -- but that the attrition *rate* (percentage of personnel killed over time) was higher: 1.6 percent achieved in less than three weeks versus 2.5 percent achieved in six. Most important to understanding the contribution of ground force interdiction to the early, catastrophic collapse of the Iraqi field army is that these air attacks, concentrated in the second week of the war, may have cost the Iraqis 1 percent of their active fighters over a period of seven days beginning just one week into the war. Moreover, with the air interdiction campaign heavily focused on a minority of Iraqi units, it would have produced (and did produce) localized experiences of sudden and great devastation. This would have communicated throughout the force quickly, both by word and by the fact of some units beginning to take flight, and could have had a cascading effect.

5. Other operational features of interest

The use of aerial cluster bombs: Many more aerial cluster bombs were used in Operation Desert Storm than in OIF -- both in absolute terms and in proportion to the total number of weapons expended and the size of the force attacked. The 1991 Gulf War saw US air forces employ approximately 57,000 aerial cluster bombs -- about 25 percent of all the aerial bombs and missiles used in the war. By contrast, in Operation Iraqi Freedom approximately 1,500 aerial cluster bombs were used by both US and British air forces -- about 5 percent of all the aerial bombs and missiles employed by the Anglo-American coalition.¹⁸ In Desert Storm, one cluster bomb was dropped for every six Iraqi soldiers in the field; in OIF, one was dropped for every 80 Iraqis who fought (or one for every 120 or so who spent some time in the field). Notably, in ODS none of the aerial cluster bombs were guided, while in OIF approximately 80 percent were guided. Cluster munitions are area weapons that spread bomblets over 10 to 18 acres: more accurate delivery would probably mean a higher casualty rate among the personnel of the targeted

unit. Moreover, if an army is relatively well dispersed in smaller units (company size or smaller), increased reliance on guided delivery of cluster bombs probably means a higher casualty percentage overall.

*The role of artillery in Operation Iraqi Freedom:*¹⁹ The artillery of the 3rd US Infantry and 101st US airborne divisions together with V Corps artillery assets fired more than 17,500 shells, more than 1000 Multiple Launch Rocket System (MLRS) rockets, and 400 Army Tactical Missiles (ATACMS). These units represent a large majority of the US Army artillery assets in the field during the period covered by this report. In addition, the Marine Corps claims to have fired more than 20,000 artillery shells. British total might easily have been in the range of 6,000 to 8,000 rounds, given that the 75 howitzers they deployed for OIF constituted between 20 percent and 25 percent of the artillery at the disposal of coalition forces. This implies that the total quantity of big caliber artillery shells and ground-based missiles used in the war significantly exceeded 40,000. During the 1991 Gulf War, well-over 100,000 artillery shells and surface-to-surface missiles and rockets were employed.)

6. A note on methodology

Our estimate of Iraqi war dead is based on an analysis and synthesis of several types of data:

- Journalistic surveys of hospital and burial society records, with a primary focus on determining the number of civilian war fatalities. These are supplemented by reports and compilations of individual casualty incidents. (*See* Section 3, main report.)
- Observations and estimates of fatalities in combat by military commanders and embedded journalists, with an ostensible focus on combatant fatalities. These include 200 media reports. (*See* Section 4, main report; and, *Appendix I*, main report.)
- Journalist interviews with Iraqi commanders and military personnel that detail their experience of the effects of coalition firepower. (*See* Section 4.3, main report.) And,
- Official Operation Iraqi Freedom (OIF) combat statistics as well as data from other recent US military operations, which has special relevance to estimating the effects of coalition artillery and air power.

The organization of the study is largely determined by the nature of the evidence. In its two principal sections it successively examines noncombatant and combatant fatalities.

- As noted above, the estimation of noncombatant casualties depends principally on three journalistic surveys of hospital and burial records. These are examined, first, for the Baghdad area and then for areas outside Baghdad.
- The estimation of nation-wide combatant casualties comprises three data reviews: The first draws on field observations and casualty estimates by US military personnel and embedded reporters. The second assesses the impact of aerial bombardment, drawing principally on operational data and casualty reports made by Iraqi officers and enlisted personnel. The third assesses the likely fatal effects of coalition long-range artillery, drawing on operational data and metrics for artillery effectiveness. No one of these data reviews provides a complete picture. Their fusion, however, serves as a basis for extrapolating total Iraqi combatant fatalities.

The civilian fatality surveys reviewed for this report ostensibly exclude combat personnel from their scope. In our estimate, however, they inadvertently incorporate a significant number of combatants who fought and died out of uniform. We employ demographic data to estimate the true proportion of civilian noncombatants in this population. (*See* Section 3.1.4, main report.)

The estimates of Iraqi fatalities in combat made by embedded reporters and US military personnel in the field ostensibly excluded noncombatants. This, too, is a proposition that cannot be accepted at face value. In our review of this data we assumed that some proportion of the *observed and reported* Iraqi “combatant” fatalities were actually noncombatant fatalities.

A second likely problem with the estimates of Iraqi combat fatalities made by field observers is *casualty inflation*. To help control for this problem, we gave greatest weight to estimates by eyewitnesses and to estimates that covered events of limited scope for which substantiating detail was available. Estimates by military or civil authorities above the division level are excluded from our count *except* when they are consistent with estimates made by those closer to the battlefield. Even estimates by lower-level commanders and embedded journalists are adjusted, usually downward, in light of narrative details and other background information.

Our methodology is further described in Section 2 of the main report and in *Appendix 1. Survey of reported Iraqi combatant fatalities in the 2003 War*.

Notes

1. Among the wars with casualty rates lower or comparable to the 1991 and 2003 Iraq wars are:

1956 Suez War: 3,000 military; 1,000 civilian;
1962 Sino-Indian War: 1,000 military; 1,000 civilian;

1965 India-Pakistan: 6,000 military; as many as 12,000 civilian;
1967 Arab-Israeli war: 19,600 military; less than 1,000 civilian;
1971 India-Pakistan: 11,000 military;
1973 Arab-Israeli war: 16,401 military; less than 1,000 civilian;
1978 Cambodia-Vietnamese war: 10,000 military; 14,000 civilian;
1982 Falklands Island War: 1,200 military;
1982 Israeli Invasion of Lebanon: 17,000 total;
1989 Sino-Vietnamese War: 20-30,000 military;
1999 India-Pakistan Kargil War: 1,200 military.

Sources: *Armed Conflicts Report 2000*; *Armed Conflicts Report 2002* (Waterloo, Ontario, Canada: Project Ploughshares, 2000, 2002); Jacob Bercovitch and Richard Jackson, *International Conflict : A Chronological Encyclopedia of Conflicts and Their Management 1945-1995* (Washington DC: Congressional Quarterly, 1997); William Eckhardt, "War-related Deaths Since 3000 B.C.," *Bulletin of Peace Proposals*, Vol. 22, No. 4 (1991), pp.437-443; and Melvin Small & Joel David Singer, *Resort to Arms : International and Civil Wars 1816-1980* (London: Sage Publications, 1982).

2. Michael Dobbs, "Arab Hostility Toward US Growing, Poll Finds," *Washington Post*, 4 June 2003, p. 18; Paul Garwood, "Civilian Deaths Anger Arabs," *Newsday*, 20 May 2003, p. 3; "Those awkward hearts and minds," *The Economist*, 1 April 2003; Michael Dobbs and Mike Allen, "Images of Destruction Inflict Setback for U.S. Propaganda War," *Washington Post*, 30 March 2003, p. 26; and, Emily Wax, "Outrage Spreads in Arab World; Civilian Deaths in Baghdad Market Called a 'Massacre'," *Washington Post*, 30 March 2003, p. 19.

3. Primary sources: German Marshall Fund and Compagnia Di San Paolo, *Transatlantic Trends 2003* (Washington DC: Marshall Fund, September 2003); *Views of a Changing World 2003* (Washington DC: Pew Global Attitudes Project, June 2003); and, *Post War Iraq Poll* (London: Gallup International Association, May 2003).

Secondary sources: Richard Bernstein; "Two Years Later: World Opinion; Foreign Views of US Darken after Sept. 11," *New York Times*, 11 September 2003; Robert Wielaard, "Poll: After Iraq War Europe sours on US, notably longtime ally Germany," *Associated Press*, 3 September 2003; and, Paul Richter, "7 of 8 Islamic Nations in Poll Fear US Attack; More than 50% surveyed in those countries are 'very worried' or 'somewhat worried' about a perceived military threat," *Los Angeles Times*, 4 June 2003, p. 3.

4. Richard Norton-Taylor, "Iraq war has swollen ranks of al-Qaida," *Guardian*, 16 October 2003; Press Conference, "Remarks by Dr John Chipman, Director, The International Institute for Strategic Studies," (London: International Institute for Strategic Studies, 15 October 2003); Robert Macpherson, "Blair was told Iraq war might help terrorists: intelligence committee," *Agence France Presse*, 11 September 2003; Douglas Davis, "UK report says Iraq war harmed antiterrorism effort," *Jerusalem Post*, 1 August 2003; *Foreign Policy Aspects of the War against Terrorism*, Tenth Report of the Foreign Affairs Committee (London: Foreign Affairs Committee, House of Commons, 31 July 2003); Don Melvin, "Report: Iraq war hurt world order; U.N., EU 'wounded' as U.S. faces aftermath, group says," *Atlanta Journal and Constitution*, 14 May 2003, p. 6; and, Kathy Gannon, "Global antiterror drive moves forward, but

analysts warn Iraq war may have created new radicals,” *Associated Press*, 3 May 2003.

5. Sources on Iraqi popular response to casualties, collateral damage, and occupation:

Anna Badkhen, “Iraqi raids: Once-supportive, critical villagers now openly anti-American,” *San Francisco Chronicle*, 10 October 2003;

David Filipov, “Anger and Faith Fuel Iraqi Resistance,” *Boston Globe*, 9 October 2003, p. 1;

Patrick Bishop, “Americans are objects of hatred in Falluja's mosques,” *Daily Telegraph* (London), 15 September 2003, p. 10;

Hector Tobar, “Occupation's Ordeals Ravage Iraqi Psyche,” *Los Angeles Times*, 8 July 2003, p. 1;

Jack Fairweather, “Iraqi anger at scene of 'a great victory' for US soldiers,” *The Irish Times*, 14 June 2003, p. 10;

Anthony Shadid, Iraq's Once-Privileged Sunnis Increasingly See US as Enemy,” *Washington Post*, 1 June 2003, p. 1;

Phil Reeves, “On the Streets of Baghdad: Iraqis and Americans Are Trapped in Web of Mistrust and Fear Where,” *The Independent* (London), 24 May 2003, p. 1;

Mark Baker, “Iraqi Welcome For US Turns To Fury,” *The Age* (Melbourne), 5 May 2003, p. 9;

Ed O'Loughlin, “Liberators' Find They Are Not Wanted,” *The Age* (Melbourne), 3 May 2003, p. 14;

Marcella Bombardieri, “For Civilian Victim's Kin, No Respite from Sorrow,” *Boston Globe*, 22 April 2003, p. 1;

Rajiv Chandrasekaran, “Thanks for Ousting Hussein, 'Now Please Go Home',” *Washington Post*, 22 April 2003, p. 9;

Owen Bennett Jones, “Resentment on streets of Baghdad,” *BBC News*, 14 April 2003;

Suzanne Goldenberg, “The hell that once was a hospital,” *Guardian* (London), 12 April 2003, p. 6;

Margaret Coker, “Anti-US feelings run deep for many; Anger, resentment strong among those who view U.S. troops as occupiers, not liberators,” *Atlanta Journal and Constitution*, 10 April 2003, p. B1;

Keith B. Richburg, “In Basra, Growing Resentment, Little Aid; Casualties Stoke Hostility Over British Presence,” *Washington Post*, 9 April 2003, p. 23;

Robert Collier, “Iraqi civilian deaths stirring up anti-American sentiment among villagers,” *San Francisco Chronicle*, 26 March 2003, p. W3;

Anthony Shadid, "Missile Strike Shatters a House, and a Family; Attack on Neighborhood Evokes Anger at US," *Washington Post*, 25 March 2003, p. 11; and,

Luke Harding, "'This makes us love Saddam, not America'," *Guardian* (London), 24 March 2003.

6. Bassem Mroue, "In Iraq's ancient city of the dead, war brings new arrivals," *Associated Press*, 20 April 2003.

7. *Operation Iraqi Freedom: By the Numbers* (Shaw AFB, South Carolina: CENTAF, Assessment and Analysis Division, 30 April 2003).

8. According to CENTAF's *Operation Iraqi Freedom: By the Numbers*, 15,592 aim points involved air interdiction of ground forces, close air support missions, attacks on maritime units, and support of special operations. Although *By the Numbers* does not further disaggregate this number, its presentation of planned and requested aim points suggests that somewhat less than 25 percent of the 15,592 aim points would have been devoted to purposes other than interdiction of ground forces. Our estimate that 20,000 bombs and missiles were used in attacking the Iraqi field army assumes that most of the war's B-52 strikes and most of the unguided munitions were used to this end.

9. For some accounts of US aerial bombardment of Iraqi ground units see: "Intensive US bombing targets Republican Guard: general," *Agence France Presse*, 31 March 2003; Peter Baker and Rajiv Chandrasekaran, "Iraqi Militia, Elite Forces Roll South Into Fierce Attack by US Warplanes," *Washington Post*, 27 March 2003, p. 1; Robert Burns, "Allied Air strikes Target Republican Guard," *Associated Press Online*, 30 March 2003; Patrick Cockburn, "Saddam's Army Retreats to Mosul with Heavy Losses; Northern Front," *The Independent*, 3 April 2003, p. 4; Phillip Coorey, "Half the Republican Guard eliminated and 'we're not finished'," *Daily Telegraph*, 1 April 2003, p. 2; Bradley Graham, "U.S. Air Attacks Turn More Aggressive; Risk of Civilian Casualties Higher as Range of Targets Is Broadened, Officials Say," *Washington Post*, 2 April 2003, p. 24; Bradley Graham and Vernon Loeb, "An Air War of Might, Coordination and Risks," *Washington Post*, 27 April 2003, p. 1; Rebecca Grant, "Saddam's Elite In the Meat Grinder: Republican Guard divisions looked pretty bold until they got sliced and diced by coalition air power," *Air Force Magazine* (September 2003); Terry McCarthy, et al, "What Ever Happened To The Republican Guard? A *Time* investigation suggests most of the elite Iraqi forces survived the U.S. bombardment," *Time Magazine*, 12 May 2003, p. 38; and, Paul Richter, "Bombing Is Tool of Choice to Clear a Path to Baghdad; Heavy strikes are meant to grind down top-level forces before an assault," *Los Angeles Times*, 1 April 2003, p. 1.

10. Key targets of air interdiction included the Adnan, Al Nida, Baghdad, Hammurabi, Medina, and Nebuchadnezzar Republican Guard divisions. Among regular Iraqi army units, targets of substantial air interdiction included elements of the 6th and 10th armored divisions; 1st, 5th, 15th, and 51st mechanized divisions; and 11th, 15th, and 16th Infantry divisions. Although the personnel strength of the Iraqi military was often cited to be in excess of 400,000 prior to the war, scant evidence has been offered to support this figure. Certainly, there is no evidence to suggest that Iraq put an army of this size in the field to meet the Anglo-American invasion. The post-war testimony of Iraqi officers and the experience of coalition forces suggest an Iraqi field force of distinctly under strength units. We accept no more than 180,000 as

the number of regular army, Republican Guard, and Special Republican Guard troops who deployed for the war. This represents an Iraqi force only 70 percent as strong as the official structure and organization of the Iraqi military would suggest. Moreover, fully one-third of Iraqi field units proved essentially irrelevant to the fight. Regarding Iraqi field strength, Anthony Cordesman concludes that “Estimates that most divisions had 50 percent to 75 percent manning and substantial equipment shortages seem to have been accurate...” Cordesman, *The Lessons of the Iraq War: Main Report* (Washington DC: CSIS, July 2003), p. 45. Also see: Shlomo Brom, “The Strike against Iraq: A Military Overview,” *Strategic Assessment* (November 2002), a publication of the Jaffe Center for Strategic Studies; and, Cordesman, *Iraq’s Military Capabilities in 2002: A Dynamic Net Assessment* (Washington DC: CSIS, September 2002).

11. The *Gulf War Air Power Survey Summary Report* cites only 56.3 percent of strikes as having being directed at surface forces, but also notes that 15 percent of the strikes were uncategorized at the time of the study’s completion. The authors conclude that “most of these uncategorized strikes were A-10, F/A-18, or A/V-8 sorties that, in all likelihood, were targeted against Iraqi ground forces” (Figure 12, p. 65). Taking this into account we adopt “more than two-thirds” as a conservative representation of the proportion of strikes directed at ground forces. Sources: Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey: Summary Report* (Washington, D.C.: U.S. Government Printing Office, 1993), p. 65; and, *Gulf War Air Power Survey, Volume V: A statistical compendium and chronology* (Washington DC: Department of the Air Force, 1993), “Table 177. Strikes by AIF Categories,” p. 418.

12. This counts guided bombs, anti-radiation missiles, air-to-surface missiles, and air-launched cruise missiles. In addition, 298 Tomahawk missiles were fired by sea craft and helicopters employed 482 Hellfire and TOW missiles. Eliot Cohen, director, *GWAPS, Volume V: A statistical compendium and chronology* (Washington DC: Department of the Air Force, 1993), “Table 191. Desert Shield/Storm: Total USAF, USN, and USMC Weapons Cost and Utilization,” pp. 533-544.

13. These are derived sums. The number of precision weapons used against ground forces is based on the number of precision strikes flown against ground forces (GWAPS, Vol. 5, tables 183 and 184, pp. 514-515) and the average number of weapons used per precision strike. The estimate was also checked for plausibility against the number of Maverick missiles employed in the war (GWAPS, Vol. 5, table 191, pp. 553-553), although other precision weapons were used against ground forces as well. The total number of weapons employed against ground forces was estimated based on the number of sorties flown by different aircraft against ground force targets and the size and composition of their typical weapon loads (GWAPS, Vol. 5, table 185, p. 517; GWAPS, Vol. 4, Weapons, Tactics, and Training, “Chapter 2. Aircraft and Weapons”). Many of the bombs employed against ground forces were delivered by B-52s, which are known to have dropped 27,000 tons of munitions on these targets. An independent source of information on aircraft weapon loads is *GlobalSecurity.org* at www.globalsecurity.org/military/systems/aircraft.

14. Les Aspin and William Dickinson, *Defense for A New Era: Lessons of the Persian Gulf War*, Interim Report of the Committee on Armed Services, House of Representatives (Washington DC: HCAS, 30 March 1992), “Table I: Accounting for the Iraqi Army.”

15. Scott Peterson, "Iraq prepares for its defense," *Christian Science Monitor*, 28 February 2003, p. 1; Kim Sengupta, "Iraq Crisis: Saddam's Elite Troops Are on the Move, Says US," *Independent*, 28 February 2003, p. 5; and, Robert Collier, "Scale of Iraqi strength is a mystery; No clear sign of military preparations," *San Francisco Chronicle*, 20 January 2003, p. 1.

16. Terry McCarthy with Brian Bennett, Jim Lacey, Simon Robinson, Mark Thompson, and Michael Weisskopf, "What Ever Happened To The Republican Guard?", *Time Magazine*, 12 May 2003, p. 38.

17. William Branigin, "A Brief, Bitter War for Iraq's Military Officers; Self-Deception a Factor in Defeat," *Washington Post*, 27 April 2003, p 25; Mark MacKinnon, "Firepower broke Iraqi army, survivor says; Even vaunted Republican Guard wilted under overwhelming air, land assault," *Toronto Globe and Mail*, 23 April 2003, p. 11; Scott Peterson and Peter Ford, "From Iraqi officers, three tales of shock and defeat," *Christian Science Monitor*, 18 April 2003, p. 1; Carol Rosenberg, "Iraqi Military Commanders Told to Abandon Posts," *Knight Ridder News*, 19 April 2003; and, Jonathan Steele, "Body counts: The western media focused on the number of civilians killed in Iraq, but the country's ill-prepared armed forces suffered far greater losses," *The Guardian*, 28 May 2003, p. 19.

18. The cluster bombs used in ODS were the CBU-52/58/71 (quantity: 17,831), CBU-78 (209), CBU-87 (10,035), CBU-89 (1,105), and MK-20 Rockeye (27,987). The cluster bombs expended during OIF were AGM-154 JSOW (253), CBU-103/105/107 WCMD (908), CBU-87 (118), and CBU-99 (182) -- plus approximately 70 units dropped by the RAF. Sources: *Operations in Iraq: First Reflections Report* (London: UK Ministry of Defense, July 2003), p. 24; Eliot Cohen, director, *Gulf War Air Power Survey, Volume V: A statistical compendium and chronology* (Washington DC: Department of the Air Force, 1993), "Table 191. Desert Shield/Storm: Total USAF, USN, and USMC Weapons Cost and Utilization," p. 533; and *Operation Iraqi Freedom: By the Numbers* (Shaw AFB, South Carolina: CENTAF, Assessment and Analysis Division, 30 April 2003), "Munitions Expended," p. 11.

19. Books, reports, journals, and trade publications: Ministry of Defence, United Kingdom, *Operations in Iraq: First Reflections* (London: MOD UK, July 2003); *Redlegs in the Gulf*, special edition, *Field Artillery* (October 1991); "Field Artillery Desert Facts," *Field Artillery* (October 1991), p. 2; Anthony H. Cordesman, *The Lessons of the Iraq War: Main Report*, working draft (Washington DC: CSIS, 21 July 2003, p. 115; Major Kenneth Graves, "Steel Rain: XVIII Airborne Corps Artillery in Desert Storm," *Field Artillery* (October 1991), p. 49; Sgt. Jose E. Guillen, "Barbara's trusty big gun: It's slated for replacement, but it was 'the right weapon' for OIF," *Scout* newsletter, Camp Pendelton, California; John M. Matsumura, Randall Steeb, and John Gordon, *Assessment of Crusader: The Army's Next Self-Propelled Howitzer and Resupply Vehicle* (Santa Monica: RAND, 1998); Captains Rhett A. Taylor, Matt T. Wegner and George T. Tatum and Sergeant First Class Wayne Bui, "MLRS AFATDS and Communications Lessons Learned in OIF," *Field Artillery* (July/August 2003), p. 36; Ann Roosevelt, "'Five Ways To Die' Army Increasing Precision Munitions," *Defense Week*, Volume 24, Number 34, 2 September 2003; Robert H. Scales, Jr., *Firepower in Limited War* (Novato, CA: Presidio, 1995), "Chapter 6, The Gulf War," page 235-274; and, Colonel Thomas G. Torrance and Lieutenant Colonel Noel T. Nicolle, "Observations from Iraq: The 3d Div Arty in OIF," *Field Artillery* (July/August 2003), p. 30.

Newspaper sources: C. Mark Brinkley, "Marines attack dug-in Iraqi army units around Basra," *Marine Corps Times*, 22 March 2003; C. Mark Brinkley, "Marines dispense with Baghdad Division, advance toward capital," *Marine Corps Times*, 3 April 2003; Jim Dwyer, "Under Blizzard of Bullets, a Battle Inches On," *New York Times*, 1 April 2003, p. 1; Dexter Filkins, "Little Resistance Encountered as Troops Reach Baghdad," *New York Times*, 5 April 2003, p. 3; Scott Bernard Nelson, "Little Slows Marines in Roll to Baghdad," *Boston Globe*, 5 April 2003, p. 17; and, Michael Wilson, "Marines Meet Potent Enemy In Deadly Fight," *New York Times*, 24 March 2003, p. 1.