ARMAMENT REMAINS FROM HIS MAJESTY'S SLOOP

BOSCAWEN

A Thesis

by

BRINNEN STILES CARTER

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of
MASTER OF ARTS

August 1995

Major Subject: Anthropology
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August 1995

Major Subject: Anthropology
ABSTRACT

Armament Remains from His Majesty’s Sloop Boscawen. (August 1995)

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His Majesty’s Sloop Boscawen was built on Lake Champlain by British forces in 1759 as part of their successful campaign to drive the French Army from the Champlain Valley. This thesis describes and analyzes the armament remains found in and around the hull during its excavation in 1984 and 1985. Weaponry recovered from Boscawen includes small arms parts and ammunition, pole arms, and artillery munitions. The distribution of armaments indicates that muskets, other personal weapons, and artillery munitions were loaded into the center of the hold, while ammunition for small arms was loaded in the bow and stern. Attributes of individual arms remains show that non-regulation British, French, and Dutch muskets were most commonly represented on board. The variety of arms remains and ammunition types supports Boscawen’s historically-documented use as an active combat ship in 1759 and as an armed transport for the Royal Artillery in 1760.

A review of research reports on contemporary archaeological sites reveals serious deficiencies in the
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There are many people who deserve thanks for contributing to this work. Kevin Crisman offered the topic and data with no deadlines. Donny Hamilton introduced me to historical archaeology. James Bradford volunteered for the committee assignment after only one consultation. George Bass taught me an important lesson on how to handle difficult situations. The remainder of the Nautical Archaeology faculty raised my personal standards and critical analysis skills. Tina Erwin drew the artifact distribution maps, which are a credit to her eyes and mind. The crew of the two field seasons did a remarkable job with the artifact illustrations given the amount of time they had to complete the job. Nick Westbrook sat through the cold winter month in Fort "Ti" with me, generously helping locate the artifacts and sharing space in his tightly-packed office. Heidi Miksch gave me access to the iron artifacts in Troy, New York, where they awaited conservation. Special thanks go to Dennis Lewis, Kit Ravenshear (Museum Services, New Berlin, Pennsylvania), and De Witt Bailey (The Tower, London, England), who all proved that the information was out there and that they could help find it. Thanks also go to K.O. Emery (Woods Hole Oceanographic Institute, Falmouth, Massachusetts), Rudi
Roth (Farrow Close, Great Moulton, Norwich, England), Fred Lewis, Robert Cheel, Graham Priest, and Jay Gainor of Colonial Williamsburg. They all helped inform this work.

My family was penultimately important in seeing this project through. The Lewias: Gordon, Sandra, Peter and Janet, Jeffrey, David, and their families kept me warm with their thoughts (and venison) through a cold winter writing while John Carter kept the infrastructure intact. Thanks go to Abigail, Eric, and Julia, as well. Substantial financial support was given by Abigail and Julia. Finally, the two "J’s" in my life, Joan and Jennifer, gently kept the task on my mind, even when I wasn’t inclined. "Finish" was the word. My thesis is dedicated to them and in memory of my father Brinly (d. October 1990) who started the whole thing long ago.
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INTRODUCTION

This thesis serves three principal purposes. First, it is a description of the armament remains from His Majesty's Sloop Boscawen. Description includes a written summary of each item, photos, drawings, measurements, and provenance information. The second purpose of this work is to analyze the spatial arrangements of the arms-related artifacts. This may provide crucial information about how Boscawen was laded and how she was cleaned both during and after active duty. The final purpose is to discuss our current understanding of the Seven Years War campaigns on Lake Champlain and to explore potential routes to new insights about pre-Revolutionary War military conflicts in North America.

The thesis format is straightforward. The current state of theory and practice in historical archaeology is briefly summarized in the introduction. This is followed by an abbreviated history of the military actions on Lake Champlain that prompted the construction, sailing, and abandonment of Boscawen. This account focuses on Boscawen's armament and the role Boscawen played in the 1759 and 1760 campaigns. The wreck excavation methodology is not described since it has been covered in some detail

This thesis follows the style of Historical Archaeology.
by Cohn (1985). Sections Three and Four describe the artifacts. Section Five is an analysis of the distribution of the arms artifacts. The final section includes conclusions drawn from the distribution analysis and suggestions for moving towards a better understanding of both the soldiers that fought in these campaigns and the weapons they used.

Historical and shipwreck archaeology have growing bodies of substantive and theoretical works that contribute to this thesis. In terms of historical archaeology, this thesis is another in a long line of archaeological research reports that describe the material remains of North American colonial wars. Many of these battles were only part of the 17th- and 18th-century European wars that pitted England, all her far-flung colonies, and her allies against various other nations. Archaeologists have provided insights into campaign conditions unavailable by other means (Starbuck 1994). This thesis includes some of this otherwise-unavailable information.

In terms of shipwreck archaeology, the data and conclusions presented here will be incorporated into the overall evaluation of artifacts from Boscawen. Integrating the analyses of individual artifact categories with a detailed study of the hull will—in turn—generate a set of conclusions about the people who built, armed, sailed,
manned, and abandoned her. For this set of conclusions to augment our understanding of the period, written accounts of the campaigns have to be thoroughly understood. If these accounts are not considered, there is a substantial risk of "discovering" facts already well-known to historians. However, if the sequence of analysis moves back and forth between archaeological data to documentary data, several lines of evidence (e.g., architectural, artifactual, documentary) can be used to reassess interim conclusions as new data emerges (Kathleen Deagan 1994, pers. comm.).

While Revolutionary War archaeology has been popular with the public (Deagan 1982) and the archaeology of gender and ethnicity with archaeological professionals (Little 1994), the archaeology and history of Seven Years War sites has also been pursued, but generally at lower levels of public interest and funding. Despite the lower levels of funding, the inventory of Seven Years War military sites is growing. In the northeastern United States residents have known about local sites, and have mined them for artifacts (Starbuck 1994) practically from their original formation. For example, Fort Necessity--built and burned in 1754--was scavenged for weapons between the Seven Years War and the American Revolution (Harrington 1957).

Compared to the unsystematic collection of artifacts
from colonial military sites, archaeological excavations are a relatively new phenomenon. Excavations began at Fort Necessity in the 1930s (Harrington 1957), at Fort Ligonier (Grimm 1970), Fort Stanwick (Hanson and Hsu 1975), and Fort Michilimackinac in the 1960s (Stone 1974), and at Louisbourg, Nova Scotia, in the early 1960s. As increasing amounts of government money were dedicated to developing parks around the sites, archaeologists produced more detailed plans of the remaining original features. The amount of time and money devoted to a site often determines how much of the archaeological work is published. In the case of Fort Ligonier an extensive catalog of the artifacts was produced (Grimm 1970). However, only limited information about the stratigraphy, features, and artifact distributions was published. At some sites with more funding, such as Fort Michilimackinac, excavations and detailed analysis of artifacts are ongoing (Stone 1974; T.M. Hamilton 1976; Hamilton and Emery 1988).

The purpose of many of the early excavations was to support reconstruction of the forts as public parks or monuments (Deagan 1982), linked to the Historic Sites Act of 1935. In this regard, research monies supported writing local histories and reconstructing the physical appearance of forts (Harrington 1957), not linking the forts or examining their similarities and differences. Many
questions about the systems into which the forts were incorporated were not addressed. Additionally, limited numbers of historical sources were used to place the site in the general context of colonial expansion. This period has been termed the culture-historical period (Trigger 1989:186-196) in American archaeology, lasting from 1910 to approximately 1960. It was at the beginning of this period that Duke of Cumberland, Boscawen's sister ship, was pulled from Lake Champlain and put on display at Fort Ticonderoga (Crisman 1985).

The military hardware found on these late colonial sites--with the possible exception of gunflints--has not been studied by archaeologists with the same intensity as other parts of the artifact assemblages such as beads, pottery, pipes, tools, cooking utensils, and glassware. This is curious because the explicit purpose of the sites was military. In first-hand accounts (Moody 1976, for example) more was written about the weapons than any other single class of objects. Given the important role weapons played in the strategic considerations of most European colonists, it would seem most fruitful for archaeologists to analyze fully the armament remains before tackling artifacts about which less is written. Instead, specialists in historic arms are often left to publish the military hardware (T.M. Hamilton 1976). These specialists
do not always concentrate on archaeological provenance as a source of important information, resulting in the incomplete publishing of the archaeological contexts from which armament remains were recovered. The full range of archaeological data is not easily available to other archaeologists as long as these contexts are not described.

More recent excavations of the 16th-century Spanish military/colonial site of Santa Elena (South, et al. 1988) have used the principles of pattern recognition and detailed artifact recording to develop predictive models (South 1977). This practice uses principles first advocated by the positivist, "New Archeology" school of archaeological research begun in the 1960s (Binford 1962; Trigger 1989:294-312). An example of pattern recognition is found in the category "Lead Shot." South and his colleagues (South et al. 1988:86-87) compare diameter distributions and frequencies from two different provenance categories (features and zones) and conclude that while shot were being used throughout the town and fort, they were largely cast in Fort San Felipe.

The principle of pattern recognition is used in the analyses presented here to determine the lading of weapons on Boscawen. The patterns are identified less formally, principally because the smaller sample size and single-deposit nature of Boscawen does not require computer
analysis. Primary provenience data is included so that other investigators can re-analyze the armaments.

Shipwreck archaeologists have amassed a large inventory of data that parallels the data collected by historical archaeologists. These data have been used to refine material culture chronologies (de Lotbiniere 1984; Bass 1983) and to develop theories about changes in ship construction in the Mediterranean during Late Roman times (Van Doorninck 1972). An important division is developing within the nautical archaeology community. A distinction is now made between nautical archaeologists studying ship construction and nautical archaeologists studying the contents or cargo of wrecks. While this subject-driven division allows individual archaeologists to specialize, the attendant danger is that whole artifact categories from a shipwreck will be inadequately studied or published.

The key to preventing this is communication and planning. Many land archaeologists who specialize in problems that require intimate knowledge of particular types of artifacts (e.g., Spanish shipping and olive jars [Avery 1994]) need the data that nautical archaeologists collect to adequately address their research questions. Engaging these specialists in the study of shipwreck artifacts through interdisciplinary research recovers the maximum amount of data from the excavated artifacts (Deagan
1982, 1987). In some cases, the immense volume of artifacts from a shipwreck requires a team of investigators to simply describe them, much less thoroughly research each artifact. In the case of Roscawen, there is a team of at least five individuals studying the wreck, the results of which will be published in book format (Kevin Crisman 1994, pers. comm.). This final report will include conclusions incorporating data from all the individual artifact categories.

Historical research has always played an important role in historical archaeology and nautical archaeology. However, the weight that historical documents should be given in the interpretations made by archaeological investigators has been debated vigorously. On one hand, South (1977:Chapter 2) and others (Binford 1965) have argued that archaeologists should develop their problems largely on the basis of the archaeological data derived from excavations and ethnoarchaeology. This relegates documentary sources to an ancillary role. On the other hand, Harrington (1955) and Schmidt and Mrozowski (1983) view historical documents as the principal source of questions about the past, placing archaeology in a supporting or complimentary role. A more reasonable course is to weigh documents equally with archaeologically-recovered artifacts, using them as independent sources of
data. Documents not only describe events, they also express the authors' feelings towards events and their biases. Archaeology produces data that is largely free of this influence. The two types of data are often complementary (Deagan 1982).

Social historian Fred Anderson (1984) has suggested that the Seven Years War played a formative role in the assembly and training of a core of Americans with military experience. He uses first-hand accounts of the campaigns (emic data) to explore the attitudes and motivations of Massachusetts provincial soldiers in the British army. Many of these experienced American officers and men went on to take leadership roles in the Continental Army. The Americans' understanding of British regulars and officers derived from fighting side-by-side with them. Anderson (1984:28-48) proposes that there were substantial differences between British regular and provincial soldiers in terms of social rank, education, and the roles they played in the campaigns. He asserts that the uniformity of experience among British provincial troops promoted greater cohesiveness within Continental forces 15 years later. The differences in arms, military roles, and personal hygiene should manifest themselves in the archeological record; indeed, the differences are just beginning to be documented on land by military-sites archaeologists (Starbuck 1994;
Murphy and Starbuck 1995).

Unfortunately, *Boscowen* does not lend itself to this type of study when considered alone because a mixture of regular and provincial troops served on board (see below). *Boscowen* was also employed in a variety of roles, further confusing the archaeological record. While *Boscowen* may not provide the type of data necessary to address differences between regular and provincial troops, it does lend itself to making conclusions about how daily activities such as loading, unloading, and cleaning were performed. These conclusions might seem mundane, but they are derived solely from the armaments from this wreck. When *Boscowen*'s entire artifact assemblage is compared with assemblages from other contemporaneous sites, broader conclusions can be made about 18th-century military campaigns.
A BRIEF HISTORY OF BOSCAWEN

His Majesty's Sloop Bosawen was built on Lake Champlain during a successful British campaign to invade French Canada by seizing a key waterway: Lake Champlain and the Richelieu River (Figure 1). French land forces, maintained on the waterway for nearly a century (Coolidge 1991), were outnumbered. Facing vastly superior British forces, the Marquis de Montcalm, French commander-in-chief, had dictated a strategy for 1759: abandon the outlying Forts Carillon and Saint-Fredric and rely on the French naval force on Lake Champlain to slow or stop the advancing British forces.

Both William Pitt, the British Prime Minister, and General Jeffery Amherst, the commander of British forces in America, understood that capturing the heart of French Canada would require naval superiority on the three fronts in North America (The Champlain Valley, Lake Ontario, and the lower Saint Lawrence River). Pitt stated this in a letter to Amherst dated December 9th, 1758:

...you should not lose a Moments Time in having not only such [Boats] as are remaining, refitted, but in building an ample and sufficient Quantity of Boats to replace those, which may have been lost or destroyed, and in providing such an additional Number as shall be judged necessary...(Kimball 1906[I]:423).

In a similar letter to Lieutenant Governor DeLancey of New York, Pitt directed "that you do give every Assistance,
Figure 1: Lake Champlain Region, Tributaries, and Fortifications
...in the Execution of this most essential Service, ..." (Kimball 1906[I]:424). Later in that same month, Pitt reminded Amherst to "build Boats" and to "procure...Men sufficient for navigating the Vessels" (Kimball 1906[I]:442).

The effort to build, arm, and man vessels on the inland waterways involved a number of clearly-defined tasks. Ships carpenters were needed to build and rig the vessels. Rigging and hardware had to be purchased. Sailors had to be recruited. Cannon and swivel guns needed to be collected to make the vessels effective warships.

General Amherst’s freedom to decide how to attack the French was confirmed in Pitt’s letter dated March 10th. "His Majesty, placing great Confidence in your Judgement and Capacity, is pleased to leave it entirely to your Discretion, by what Avenues you will penetrate into the same [Canada]" (Kimball 1906[II]:65-66). To accomplish the goal of reducing Canada, General Amherst planned advances along the three water corridors leading to Montreal and Quebec: General James Wolfe would attack Quebec from the Lower Saint Lawrence, Colonel John Prideaux of the 55th Regiment would seize Lake Ontario and descend the Upper Saint Lawrence, and Amherst’s own troops would invade the heart of New France from Lake Champlain (Anderson 1984:18-20). General Amherst knew he needed large warships on all
the lakes. He was especially interested in the campaign he
would be leading: "...I shall have occasion for two Brigs
for the navigation of Lake Champlain,...I am told that
vessels from 120 to 130 Tuns are the proper ones for the
Lake" (Lewis 1984; W.O. 34/64:196).

RIGGING, SUPPLIES, CARPENTERS, AND CONSTRUCTION

To build large ships, naval hardware was needed. Royal
Navy Captain Joshua Loring, naval commander of the
inland fleet, collected the rigging supplies for the 1759
campaign in Boston during the winter of 1758 and spring of
1759. In May of 1759 Amherst asked Loring for only the
rigging for the vessels to be built on Lake Champlain, but
he expanded his plans late in the month and ordered Loring
to collect enough rigging to build two additional snows
(Lewis 1984:2; W.O. 34/64:198). The snows were Mohawk and
Johnson, built later that year on Lake Ontario. When
Loring arrived at Albany from Boston on May 31, General
Amherst sent him immediately to New York to secure further
rigging material for the four vessels (Kimball
1906[II]:126).

The purchase of rigging was time consuming, but not
difficult; the army already had enough for one vessel
stored in Albany, New York (Lewis 1984:2; W.O. 34/64:196).
Far more difficult was the task of recruiting provincial
shipwrights to construct the vessels. There was a well-
founded reluctance on their part to participate in building ships for the inland navy.

In Boston, Captain Loring and his associates recruited in the shadow of the 1756 campaign (Macleod 1989) when Stephen Cross and 17 other ships carpenters from Newbury, Massachusetts "agreed with John Irving Junr of Boston to go to Oswego [New York]...to build some vessels for the King's Service" (Cross 1939:335). Nine more carpenters from Boston and three from Newport, Rhode Island joined the company. The journey to Lake Ontario was uneventful, but their entire stay at Oswego was marred by continuous, French-directed Indian raids and sniping, sometimes right to the edge of the shipyard.

When the French captured Fort Oswego on Saturday, August 14th, Stephen Cross and his companions were imprisoned. They were first sent to Montreal, then on to France in the 500-ton ship Utard. The French packed 144 British prisoners into Utard's "lower hold...about four feet under the lower deck." To make matters worse, 70 of the men "were Soldiers of Shirlies Regiment [a British regular regiment]" which "by their Manners and behavior we Suppose were Convicts...with these we had not the best Agreement" (Cross 1940:23). Two months in French prisons followed the voyage.

The New England shipwrights eventually returned home,
but word of their capture and imprisonment certainly circulated in New England shipyards by late summer 1756. This may explain why in subsequent years it took extensive searching to find carpenters willing to work, despite the large number of shipyards in and around Boston.

British recruiters encountered the same problems in 1757, when only 12 carpenters could be induced to work in the shipyard at Fort William Henry on Lake George. Consequently Mr. Webb (no first name given), who was directing the shipbuilding, only partially finished two small galleys, and never even started the larger ships that had been planned (Pargellis 1968:244). In 1758 one hundred and fifty or more carpenters were employed in constructing the sloop *Halifax*, the small radeau *Invincible*, and hundreds of whaleboats on Lake George, all under the direction of Captain Samuel Cobb (Zarzynski, et al. 1994). It is unclear how Captain Loring, assigned to the task of recruiting for the naval campaign for the following year, had persuaded the carpenters to join (Goldenberg 1976:114-115; Knox 1914:392).

General Amherst wanted 70 ships carpenters in 1759, divided into companies of 35 men apiece. Each company was to have "...a good Overseer" (Lewis 1984:2; W.O. 34/64:198). Captain Loring had to scour the seaboard to find enough help. Carpenters in New York City were either
unwilling or unable to join the campaign. By June 2nd, Captain Loring had contacted Mr. Wentworth (again, no first name mentioned), a colleague in Boston, asking him to recruit and send to Albany a "master builder and as many of the seventy ships carpenters as possible" (Lewis 1984:2-3; W.O. 34/64:145-146). He clearly did not expect to raise the full compliment of carpenters in New England. Captain Loring asked General Amherst, in a letter dated June 2nd, to send a shipwright named Jacquet to Philadelphia for recruiting. Looking for experienced carpenters among the troops already in Albany he mentions a shipwright "...Collo Johnson who commands the New York Troops" (Lewis 1984:2-3).

Captain Loring arrived at the south end of Lake George late in June 1759 and immediately oversaw the raising of Halifax. By July 10th and 11th, the sloop had been raised and masted. Four days later Halifax's 14 six- and four-pounders were mounted and she was readying to sail (Knox 1914:382-388). On July 22, 1759, approximately 12,000 British and American forces rowed and sailed the 30 miles (48km) from the southern end of Lake George to its outlet at the northern end, 2.5 miles (4 km) southwest of Fort Carillon (now in Ticonderoga, New York). Workmen moved with the British army, prepared to construct ships, fortifications, buildings, and military hardware. There is no documentation of how many ships' carpenters moved with
the army as it advanced, but in September a compliment of 46 was counted (Lewis 1984:5).

While British troops consolidated their positions around Fort Carillon, Captain Loring inspected a deserted water-powered mill on the La Chute River between Lake George and Lake Champlain. Loring wanted mill-sawn timbers for the upcoming shipbuilding effort. He concluded that eight days would be needed to restore the mill to running condition (Lewis 1984:3). Captain Aaron Willard was charged with overseeing the reconstruction of the mill, a job he was evidently unable to do (Putnam 1886:27). Rufus Putnam was ordered to take over: "I, being ordered to build the Mills at this place, and tarrying on that business, am not able to give further account of the Army. During my stay...I was very hardly fatigued, having the whole care of the work upon me" (Putnam 1886:91-92).

Captain Loring oversaw provincial troops during the last week of July as they portaged the single-gun row galleys and accompanying provisions from Lake George to Lake Champlain. There were six gunboats to transport: two mounting three-pounders, one with a 12-pounder, and three with 24-pounders (Gavit 1983:218; Lewis 1983:204-205; Webster 1931:147-150).

The magazine at Fort Carillon exploded with a mighty roar late at night on July 26. One bastion had been mined
by the 400 remaining French soldiers as they withdrew to Fort Saint-Fredric under the cover of darkness. The stunned British held their positions around the now-deserted fort until the next day before taking it. The explosion and ensuing fire are noted in every account of the siege, a testament to their dramatic effect. Just as they had done at Fort Carillon, the French briefly defended Fort Saint-Fredric (at Crown Point, New York), blew it up, and moved down the lake to their fort at Isle aux Noix. The south end of Lake Champlain was now clear for construction of British forts and ships.

As previously mentioned, the French strategy—much disputed by various French officers—was to let their fleet on the lake, composed of the schooner Vigilante and sloops Musquelonguy, Brochette, and Esturgeon, delay the advancing British Army (Lewis 1983:203) in hopes that the war in Europe would end before the British could take all of French Canada. In all, the French fleet had 34 ships' guns, ten on Vigilante, a schooner, and the rest evenly divided among the smaller sloops. Musquelonguy was the most heavily armed sloop, carrying two brass 12-pounders and six iron six-pounders. The French fleet was manned by approximately 260 men; its strength was not yet fully known to the British.

General Amherst was in a hurry, but he was also
mindful of General Abercrombie's horrible defeat by
Montcalm's forces at the walls of Fort Carillon the
previous year. He was unwilling to risk defeat through any
kind of unpreparedness or rash action. In addition to the
vast army he had assembled, he wanted immediate naval
superiority on Lake Champlain. As his troops dug in on
Crown Point August 5, 1759, he wrote to Pitt that he had
"ordered all the French boats (batteaux)...fished up, and
the Brig and Boats...to be built for carrying
Guns...finished in all haste that I may be superior to the
Enemy's Sloops on the Lake" (Kimball 1906[II]:146).
Already pursuing this goal, he had written Captain Loring
two days previously: "I must Earnestly recommend it to
You, that You will make all the Dispatch possible in
Building the Vessel and Boats for the Guns according to the
Intended Plan" (Lewis 1984:4; W.O. 34/64:202). At this
point Amherst and Loring seem to have dropped the original
plans to build a second brig on the lake. They must have
felt that the combination of one large brig and a half-
dozen row galleys would be more than a match the French
vessels.

Before beginning construction, Captain Loring and his
carpenters had to find a dockyard site and build the
required construction and storage facilities. Loring chose
a small bay just north of the tip of the Ticonderoga
peninsula where a small, French-built redoubt stood. The bay was only 400 yards from Fort Ticonderoga, just within cannon range. Loring's carpenters built a wharf, a naval storehouse, an iron forge, saw pits for timber rendering, and ways for the soon-to-be-built vessels (Lewis 1984:4). The first vessel built in the yard was Amherst's brig, Duke of Cumberland. Her keel was laid on August 10th, 1759, and the vessel slid down the ways on the 30th (Lewis 1983:205, 207).

On August 17th Amherst summoned Captain Loring from Ticonderoga for consultation. They decided that without more ships to protect the fleet of bateaux, whaleboats, and canoe, the French would be able to move their schooner and sloops at will on the lake and harass advancing British boat columns. Loring suggested building a radeau (a large, flat-bottomed artillery barge with oars and sails) under the supervision of Major Thomas Ord of the Royal Artillery. Amherst and Ord agreed. The radeau was built at Crown Point and eventually carried six of Major Ord's 24-pounders. Construction of the radeau--christened Ligonier--began in late August and finished on September 29.

Late in August General Amherst learned from a deserter of the Languedoc Regiment that the French had an additional vessel--the sloop Waggon--on the ways at Saint Jean. Two
days after *Duke of Cumberland* was launched, Sergeant Joseph Hopkins and his scouting party of Rangers, returned with additional intelligence from Isle aux Noix. They confirmed that *Waggon*, pierced for sixteen guns, was now out of the stocks at Saint Jean and anchored in mid-channel off Isle aux Noix. Once again, General Amherst summoned Captain Loring to Crown Point. To counter the new vessel, they "concluded on building a sloop for 16 guns" (Kimball 1906[II]:193). *Boscawen* was thus conceived. Loring immediately returned to Ticonderoga to build her.

The sloop's rigging supplies and fastenings were already in the shipyard. However, timber was in short supply due to the impromptu building of *Ligonier*, as well as the heavy demands for timber for the fortifications on Crown Point. Despite the competition, enough timber was brought into the yard between September fourth and 14th to build the sloop. Loring also faced the problem of a reduced work force. Of the 46 ships' carpenters he had in the shipyard on September 14, only 28 were available to work on the new vessel. Fourteen were sick and four were caring for the sick (Lewis 1983).

Much of *Boscawen*’s construction is a mystery. Historical sources do not detail anything other than the general timetable of when tasks were completed. The hull remains documented during the 1984 and 1985 field seasons
(Cohn 1985) are the most specific and accurate record of her construction. The time needed for construction was remarkably short. Building orders were issued on the 3rd of September; on the 14th all the necessary timber was in the shipyard. By September 16, Captain Loring had taken "the Carpenters from the Brigg and put them to getting the timber for the Sloop" (Lewis 1984:6; W.O. 34/64:160). Since most of the timber was in the yard, "getting the timber" most likely means rendering logs into usable structural members and planking. The keel was laid on the same day and twenty-two days later (October 7) Boscawen was launched (Lewis 1984).

All accounts suggest there were clear divisions of labor in the boatyard at Ticonderoga. Trained ships' carpenters worked principally in the yard, assembling Boscawen's component parts, cutting beams to fit, or directing the sawing of her large structural timbers. Provincial troops were sent out into the surrounding forest to find timber appropriate for shipbuilding, accompanied by an experienced ships' carpenter (Cross 1939:344 ff.).

Provincial Colonel John Knox (1914:214) commented that Boscawen's construction "causes a great delay in our operations, to the unspeakable mortification of the general and the army." Despite this general consternation, the extra time did allow Captain Loring to collect cannon and
recruit men for the vessels (Lewis 1983), two tasks he and others had been working on for nearly a year.

ARMING AND MANNING BOSCAWEN

To fully analyze the physical remains of Boscawen’s armaments, it is critical to know first the kinds of small arms and ordnance Boscawen was reported to carry. Unfortunately, there are no records of the specific long arms that individual soldiers and sailors carried aboard. However, some members of the crew are documented, as are the standard uniforms and arms of regiments from which Boscawen’s sailors and marines were drafted. By combining these two proxy sources, it is possible to limit the list of possible long arms and accessories carried aboard (e.g., it is most likely that regular British soldiers would carry British Board of Ordnance-approved weapons [see Bailey 1971 and Appendix II for details on what Board of Ordnance-approved arms would look like]).

Arming Boscawen was a long-term effort. The supply line for military hardware (small arms, cannon, and munitions) stretched from England to the fronts in North America. By 1759 the arms shortage that had driven the British Board of Ordnance to accept sub-standard weapons for military use had eased (De Witt Bailey 1995, pers. comm.). In a letter dated December 9th, 1758, Pitt relayed the King’s order that 10,000 muskets and 6,000 tents be
sent to Amherst at New York (Kimball 1906[II]:442). Of the muskets and tents, 2000 of each were diverted to General Wolfe at Louisbourg (Kimball 1906[II]:6). The diversion of arms did not seem to affect the arming of Regulars and provincials on the other two fronts because General Amherst had also brought "500 light French Arms" from Louisbourg "to deliver...to the light Infantry of the Regiments here [in New York]" (Kimball 1906[II]:6). The practice of arming soldiers with the enemy's weapons has been documented during other wars (Gould 1983:135-136), and in this case it introduces the good probability that British soldiers carried French weapons on the Champlain campaign. Provincial soldiers also brought muskets from home which were not built to the regular standards of the British army (Kimball 1906[II]:42). In sum, individual soldiers largely determined what types of small arms were carried aboard Boscawen. Therefore, small arms will be discussed at the end of this section.

Most British artillery pieces were shipped from England, as well, but there are no records of cannon shipped specifically for the 1759 and 1760 campaigns. According to John Knox (1980:165) the Royal Artillery used several different-sized cannon in the 1759 campaign on Lake Champlain, including two 24-pounders, six 20-pounders, six 18-pounders, ten 12-pounders, seven six-pounders, three
three-pounders, six eight-inch howitzers, two five and a half-inch howitzers, eight Royal Mortars, four 10-inch mortars, and one 13-inch mortar. This is clearly not a complete list of the artillery brought to the front. On Ligonier alone there were six 24-pounders (Lewis 1983:209). Besides, arming Boscawen was clearly in the hands of Captain Loring and General Amherst rather than the artillery. Given the competition for resources among the different branches of the military on the campaign (Artillery, Navy, and Army) (Lewis 1983:207), it seems unlikely that the artillery pieces assigned to Boscawen were even counted on the Royal Artillery Regiment rolls.

In a letter dated June 2nd, Loring asked for instructions on whether to buy two six-pounders he had located in New York. Before he received a response, he was forced to leave New York with the supplies he had already gathered. When the British took control of Ticonderoga and Crown Point the search for cannon began again in earnest (Lewis 1984:5-7).

Ships’ guns were generally lighter than equivalent land artillery and were the principal type of cannon that Loring pursued. Originally, nine-pounders were to have been put aboard the brig and sloop, but the only usable ones were "to [sic] heavy for our Decks" (Lewis 1984:7; W.O. 34/64:160). Several six-pounder cannon left by the
French at Crown Point Loring felt were "very bad Guns, some of them there muzzles brooke and not all of a size, and very long." Loring wanted "eight or ten very fine Ships Guns, six pounders" at Fort Edward, of which he had two already (Lewis 1984:7; W.O. 34/64:161). Amherst subsequently turned down the offer of six long nine-pounders from a Mr. Wallace, one of the campaign's suppliers in New York (Lewis 1984:7-8; W.O. 34/64:214).

Amherst summarized the guns collected to date on September 23:

You have already of Six Pounders.................8

At Tienderoga there are four Guns of which you may take what You think fit 6 pounders 4
Your Six Pounders coming from the Alarm Posts 4
One Six Pounder from Fort Edward 1
17

Major Ord tells me You have of Four Pounders 20
Some of which I imagine are at Lake George

Three four Pounders are ordered from Fort Edward and there is one at Tienderoga.........4
24
(Lewis 1984:8)

The land and naval forces' need for artillery had stretched available supplies to the point that Amherst was "obliged to bring all the Guns from Fort Edward to this place [Crown Point], which will do for the present." On the 13th of September, General Amherst sent an aide de camp to Ticonderoga to take any non-essential "Artificers...from thence to the landing place" (Kimball 1906[II]:195). Many
of the guns, especially the ones from the alarm posts and outlying areas, were probably fitted with field carriages. Major Ord sent several artificers to Ticonderoga to assist with carriage and implement manufacturing (W.O. 34/64:170).

Workmen began loading provisions on Duke of Cumberland and Boscawen on October 1 (Kimball 1906[II]:197-198). A week later, one day after the sloop's launching, Loring's men had "all the provisions on Board the Sloop" and "everything (was) ready to receive the Guns on Board" (Lewis 1984:9). All the guns were loaded on Boscawen when they arrived from Lake George on the 10th (W.O. 34/64:226).

By all accounts, Boscawen carried four six-pounders, 12 four-pounders, and 22 swivel guns during the 1759 campaign, (Crisman 1985; Kimball 1906[II]:199; Lewis 1984; W/O 34/64:224) with 20 rounds of ammunition for each large artillery piece and an unspecified number of rounds for the swivels. Although the size of the swivels is not yet known, they were probably either large muskets or half-pounder cannon.

Manning the vessels on Lake Champlain was difficult. Pitt, in his letter of December 29, 1758, pressed General Amherst to "procure such...Men sufficient for navigation the Vessels" (Kimball 1906[I]:442). Lieutenant-Governor DeLancey of New York, already obliged to help Amherst with vessel construction and men, wrote to Pitt on March 25,
1759, saying "[Amherst] told me that he had before given Directions to have them [the sailors] provided in New England" (Kimball 1906[II]:77).

Recruiting men for naval service in New England proved to be costly and difficult. Governor Thomas Pownall of Massachusetts wrote to Pitt on March 16, 1759, that the colonists in Massachusetts have "the almost unconquerable Aversion...to go on Board King's Ships...." The strength of this aversion was clearly demonstrated by the concessions Governor Pownall had to grant in order to enlist men. He promised that sea service would be the same length as land service; that conscripts would not be taken to Europe or the West Indies but returned to Boston punctually at the end of their service and paid when dismissed, that all vessels from levied towns would be free from molestation and conscription if their quota of men was filled, and that Sea Service conscripts would count towards a town's Land Service quota (Kimball 1906[II]:71-72). Only with these provisions in place would the coastal merchants recruit sailors. With protections in place, Governor Pownall was able to raise over 200 seamen and send them to Admiral Saunders in Louisbourg in late April (Kimball 1906[II]:92).

Besides the problems stemming from the New Englanders' aversion to being "pressed" into the British armed forces
and shipped to other parts of the world, prosperous privateering along the coast and its promise of quick riches and a better "cut" of prize money lured many sailors away from military service (Goldenberg 1976:114). With most of the men raised in New England going to Louisbourg in 1759, the manning of ships on Lake Champlain appears to have taken a decidedly ad hoc form.

Word was sent to British posts down the Hudson Valley that sailors were needed to man the Duke of Cumberland, Boscawen, and the row galleys. Soldiers with maritime experience went forward to Ticonderoga and Crown Point and were assigned to the appropriate vessel. Amherst assigned sixty soldiers to serve as Boscawen's sailors and fifty regulars from the 55th (Lord Howe's) and 77th (Montgomery's Highlanders) to serve as Boscawen's marines. Alexander Grant, a lieutenant in Montgomery's Regiment and former ensign in the Royal Navy, captained Boscawen that year (Lewis 1984:9). While Boscawen's marines have a clear regimental affiliation, the sailors for the 1759 campaign were probably drawn from a mixture of provincial and regular regiments.

Raising men for the 1760 campaign began early in that year. Captain Loring, returning to Boston, was busy securing supplies for the summer's campaign. The supplies he needed were cheaper in Boston than in New York. In
addition, he listed for General Amherst the number of sailors he would need for the ships on the Lakes:

<table>
<thead>
<tr>
<th></th>
<th>Sailors</th>
<th>Soldiers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Snows on Lk Ontario</td>
<td>90</td>
<td>60</td>
</tr>
<tr>
<td>Duke of Cumberland</td>
<td>75</td>
<td>60</td>
</tr>
<tr>
<td>Boscawen sloop</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>3 small sloops</td>
<td>30</td>
<td>20 each</td>
</tr>
<tr>
<td>if for carrying stores and</td>
<td>20</td>
<td>-- each</td>
</tr>
<tr>
<td>provisions</td>
<td></td>
<td>(W.O. 34/65:6-7)</td>
</tr>
</tbody>
</table>

Recruiting sailors for the 1760 campaign on Lake Champlain went better than the year before. In all, 76 officers and men were recruited for the campaign over the course of the spring, of which 73 served on Lake Champlain under Alexander Grant, who was ordered to direct naval operations on Lake Champlain when Loring followed Amherst to serve on Lake Ontario. A comparison of the Muster Rolls, the Accounts of Service, and the projected numbers given above shows that Duke of Cumberland was 26 men short of a full compliment, Muskelonguy short by either two or twelve, and Brochette by three or thirteen (W.O. 34/51:67). Conspicuously missing from the Account of Service is any reference to Boscawen. This strongly suggests that Boscawen was originally not outfitted for use in 1760. When she was put in service as a transport vessel for the Royal Artillery, she was manned either by artillery soldiers or by provincials assigned to the artillery regiment (Lewis 1984:12-14).
A BRIEF HISTORY OF THE 1759 AND 1760 CAMPAIGNS

The following is a summary of the 1759 and 1760 naval campaigns (Figure 2) compiled from several articles (Charland 1960; Crisman 1988; Lee 1969; Lewis 1983, 1984). The summary concentrates on Boscawen's service and its implications for determining what arms were present aboard. The sloop was actively used in both campaigns, but for different purposes. The two types of service could lead to different types of artifacts being deposited in the hold and bilges. Troop transport in subsequent years (post-1760) could have a still different material signature.

On October 11, 1759, Duke of Cumberland and Boscawen stood for the northern end of the lake in an attempt to outflank the three French sloops without being detected (Lewis 1984:210). During the night, they successfully passed Four Brothers Island without alerting the three French sloops stationed there. The next day the schooner Vigilante was spotted to the north and chased into Missisquoi Bay. Both English vessels ran aground on a bar at the bay's entrance. Boscawen was refloated easily, but Duke of Cumberland had to be lightened considerably by unloading stores and men before being pulled off the bar. Unable to continue pursuing Vigilante, Loring and Grant headed west towards the main channel leading to Isle aux Noix.
Figure 2: Route of *Boscawen* in the campaigns of 1759 and 1760.
Almost immediately the three bypassed French sloops were spotted to the south, returning north to warn French forces at Isle aux Noix of the British advance. Cut off, *Musquelonguy*, *Esturgeon*, and *Brochette* bore off into Cumberland Bay, on the west side of the lake. Loring and Grant gave chase, but light failed before the British ships could safely enter the bay. They anchored outside until the next morning, October 13th. Monsieur De La Bras, captain of the small French fleet, ordered the French vessels abandoned. When the British moved into Cumberland Bay the next morning, *Musquelonguy* was aground and the two other sloops were scuttled in shallow water.

Loring directed Alexander Grant to stay in Cumberland Bay and refloat *Musquelonguy*. Loring took *Duke of Cumberland* north out of the bay in search of *Vigilante*. By October 18th, Grant and his men had refloated *Musquelonguy* and recovered all the sunken stores from *Brochette* and *Esturgeon*, except for two cannon, a swivel gun, and some muskets that were not recovered until the 1960s (Van Gemert 1972:288; Dennis Lewis 1991, pers. comm.). General Amherst brought the army into Cumberland Bay the same day and ordered Lieutenant Grant to rejoin Loring with both *Musquelonguy* and *Boscawen*.

Facing an imminent winter, General Amherst decided to call off the rest of the campaign and return to Crown
Point. Eight days later the squadron arrived at their winter quarters at Crown Point. Almost immediately, Amherst sent Grant to Cumberland Bay with *Boscawen*, *Musquelonguy*, and several gunboats to raise the other two French sloops. He accomplished the task, returning to Crown Point without incident on November 16th. It is not clear why the French did not try to recover the sloops or challenge the British in their effort.

When Grant returned, all the vessels were moored at the King's Shipyard at Ticonderoga, naval stores were removed and placed in the naval warehouse at the yard, and pickets were placed in the ice around the vessels. A heavy guard was kept on the ships--including men posted aboard--to keep the French from burning them.

Late in March, 1760, officers were temporarily quartered on board *Boscawen* and *Duke of Cumberland* when their barracks in Fort Ticonderoga caught fire and were rendered uninhabitable. *Boscawen* was not put in service until late July. Colonel William Haviland, assigned by General Amherst to command the Lake Champlain theater, ordered *Boscawen* prepared to carry the Royal Artillery's ammunition and powder, replacing ninety-seven batteaux. She was not fully armed, as in the previous year. *Boscawen* sailed to the northern end of Lake Champlain on August 10, 1760, as part of a compliment of "1 brig, Sloops 4, Ruddoes
3, Prows 3, Long Boats 2, Batteues 263, Whale Boats 41, Canues 12" (Moody 1976:24). Artillery stores were unloaded out of range of the French fortifications at Isle aux Noix, and after an intense British bombardment the fort's garrison abandoned the place. Following the French retreat from all of their defensive positions along the Richelieu River, the now-substantial British fleet was used to move surplus small arms and artillery to Crown Point (Lewis 1984:14-15).

BOSCAWEN'S FATE: 1762-1984

Boscowen was the largest sloop on the lake. Both her deeper draft and the additional manpower needed to sail her made her one of the least desirable vessels to sail (Lewis 1984:16). Boscowen was also made of green lumber, notorious for poor preservation under even normal conditions. Given the ongoing shortage of sailors on the lake, the smaller, more maneuverable, and more easily-manned French sloops were probably the preferred vessels for transporting supplies and men.

In 1761 and 1762 Boscowen was used to transport troops and supplies back and forth from Saint Jean to Crown Point; each winter she was laid up in the King's Shipyard in Ticonderoga (Lewis 1984:15-16). From 1763 to 1770, Boscowen was probably initially used to move troops until the end of the Seven Years War (late summer 1763) and then
left in the Ticonderoga shipyard to settle to the bottom. By 1770 there was only one sloop sailing Lake Champlain; the rest had rotted in the dockyard and were out of service (Lewis 1984:17).

The period between 1770 and 1984 has not been researched, but it is probable that the wreck was salvaged for iron by local residents, a practice documented for other wrecks on Lake Champlain (Crisman 1987:110). Other important factors that initially affected the site were the yearly ice that covers the lake—gradually disarticulating any hull remains on or near the surface—weed growth, and silting of the lake by runoff from surrounding farms. The latter would account for the overburden found on the hull when excavation began in 1984.

Excavation of Boscawen’s remaining structure and associated artifacts was accomplished in two field seasons in the summers of 1984 and 1985 (Cohn 1985; Crisman 1985, 1988). The recovered artifacts were recorded, cataloged, photographed, and curated. The armament remains are now in the collection of the Fort Ticonderoga Museum. The iron remains have been conserved at Troy, New York, and at Texas A&M University’s Conservation Research Laboratory.

**BOSCAWEN’s WEAPONRY**

In general, there were three different countries from which small arms could have come: England, the
Netherlands, and France. In England weapons destined for military use had to be approved by the Board of Ordnance. The Board's official infantry weapon was the Land Pattern musket, affectionately called "Brown Bess" (Ravenshear 1994). While the Board usually strictly monitored the quality and quantity of arms produced, in times of war they sometimes lowered standards and purchased both English and Dutch civilian muskets (Blackmore 1961:47; Bailey 1971:7-15). Lower standard infantry weapons were often passed off to provincial militias, including the ones in North America (De Witt Bailey 1991, pers. comm.). As has already been noted, French infantry weapons were sometimes reissued to British troops if muskets were in short supply.

Small arms on board Boscawen during the 1759 season would have been generally limited to British-issued muskets, carbines, and pistols. The soldiers collected from the 55th (Lord Howe's) regiment were equipped with standard issue British Land Pattern muskets with bayonets, cartridges (or a powder horn, wadding, and balls), a ramrod, flints, a cleaning kit, and all the appropriate carrying bags (Peterson 1968:65-68). Montgomery's Highlanders (77th) were issued carbines which may or may not have been of Ordnance manufacture. John Knox (1914:361) noted that soldiers of Montgomery's Regiment and the Royal Highland Regiment (42nd) both were allowed to
keep their swords.

Seamen raised along the supply lines would have carried a variety of British and possibly French-made arms, depending on their regiment and assignment within their regiment. If any provincial troops were assigned to serve as seamen aboard the sloop, their muskets and pistols were more likely to be of non-regulation specifications and be of English or Dutch manufacture. When provincial troops enlisted, part of the bounty was a musket issued by the provincial government (Anderson 1984:67-68). The musket would be either a Land Pattern musket or an English or Dutch-made copy.

For artillery, *Boscawen* was armed with four six-pounders, 12 four-pounders, and 22 swivels in 1759. All of the requisite ammunition, loading implements, and powder for those artillery pieces would have been loaded aboard. Unfortunately, the size of the swivels was not recorded. It is also not clear what proportions of the different types of munitions (solid, grape, bar, chain shot) were assigned to each large artillery piece.

In 1760 the number of different kinds of powder, shot, shells, and accessories *Boscawen* carried would have been tremendous. During the advance, *Boscawen* probably had the full range of ammunition available to the British siege artillery in her hold. After the Richelieu River forts
fell, the full range of surplus French cannon and munitions would have been carried back to Crown Point. Little is known about armaments carried aboard the sloop in subsequent years, but certainly Boscawen’s sailors and soldiers were armed with muskets and swivel guns when transporting weapons and supplies across Lake Champlain, at least until the end of the Seven Years War in 1763.

COMPARATIVE FORTS AND SHIPWRECKS

Several comparative forts have been excavated in the northeastern United States. Fort Stanwick was a late colonial fort that ended up as an entrepot between Albany and the Great Lakes. Rogers Island was a strategic island in the upper Hudson River across from Fort Edward, a major British fort north of Albany. Fort Ligonier was a British frontier post on Loyalhanna Creek in western Pennsylvania that was only occupied during the Seven Years War.

Comparative shipwrecks include Machault, a French frigate sunk in the Restigouche River in 1760 while attempting to resupply Montreal. Invincible was a French-built British ship sunk in the Solent in 1758 during preparations for the campaign against Louisbourg, Nova Scotia. Both were employed by the French Navy and British Navy, respectively, and carried a range of military small arms and ordnance. Artifacts from these archaeological sites will be discussed in the following two sections.
INFANTRY WEAPONS

Artifacts unlock the past. The archaeology of historic-period sites invites comparisons of archaeologically-recovered artifacts and written documents, simultaneously revitalizing interest in and enhancing knowledge of the peoples of a particular era and their material surroundings. An essential element of archaeology is accurate description, illustration, and identification of artifacts. Identification of artifacts, which is largely dependent on observations made by the archaeologist, has to be verifiable. Ideally verification should be possible through published descriptions and illustrations alone. The locations of artifacts should be documented on detailed distribution maps.

The following two sections describe the armament remains from Boscawen in what might seem to be excruciating detail. This detail is necessary. Those interested in historic arms of the late Colonial period will recognize immediately that including detailed measurements is unusual among archaeological studies. Although they may be too technical for some, these details are the key to a host of potentially significant observations. Painstaking inspections of the weapons found on Boscawen have revealed differences between regulation arms and non-regulation arms (for example, civilian and military musket furniture were
cast to different specifications), differences between musket balls cast in the field and those cast in workshops, and variations in musket parts that are not yet fully understood.

Despite the best efforts of archaeologists, some artifacts have subtle features that are poorly represented by photographs or drawings. These minute details provide insights into the manufacture of arms and their deformation during use and subsequent abandonment. Written descriptions supplement the visual record by recording details and precise measurements that are only available to the first-hand observer. With both visual representations and formal descriptions researchers can accurately compare Boscawen’s armament remains with finds from other sites without having to examine the Boscawen collection in person.

A wide variety of small arms were available in the middle decades of the eighteenth century, ranging from finely-made British Army muskets and pistols to garishly-decorated, cheaply-made trade guns. A majority of the weapons-related artifacts from Boscawen come from small arms used by the British regular and provincial forces. A smaller number of the remains come from small arms made for the French army and their Indian allies. Ammunition for both small arms and ordnance are well-represented in the
collection from **Boscawen**. A small number of edged weapons are represented in the collection, as well.

Descriptions in the next two sections follow a general order. Small arms artifacts and pole arms are described in this section; ordnance-related artifacts are described in the following section. Within each artifact's description a set of information is presented, including an identification of the artifact, measurements, its location on the wreck (with reference to the appropriate grid drawing), significant features, and comparable artifacts from selected Seven Years War period sites. Each artifact is illustrated with a photo, drawing, or both. Most of the artifacts are only part of a weapon or only an accessory for a weapon. In those cases, the associated weapon is identified.

Flintlock muskets and rifles were the principal hunting and infantry weapons of the colonial period in North America (see Appendix III for an illustration of a musket's basic components). As a result, archaeological investigators recover massive quantities of musket-related artifacts from Colonial and post-Colonial military sites. Intact examples of pre-Revolutionary War period long arms are highly prized by collectors, since many flintlocks wore out, were destroyed, or were "upgraded" with the introduction of percussion weapons in the second quarter of
the 19th century. The few flintlocks that have survived offer insights into their original manufacture and use.

It is important to think of the musket as both a functional whole and as a symbol. The musket, as a symbol, no longer represents the threat of immediate violence; far deadlier weapons have superseded it. It is now a relic, evoking collective and individual memories of the past, including the intensification of armed conflicts as European nations expanded westward. However, in the late colonial period the symbolic power of a musket was immediate and could be invoked by merely brandishing one.

The musket’s symbolic power was intimately linked to its function; but this function—the killing of game or enemy soldiers—could only be realized with numerous accessories: shot, powder, wadding, ramrods, flints, reamers, and all the appropriate carrying pouches. The catalog that follows is wholly occupied with exploring the physical remains of muskets, pistols, and their accessories, as well as the equally deadly artillery pieces used in military campaigns.

Separating musket-related artifacts into arbitrary categories distorts their functional organization, but it has to be done in a limited way to adequately describe individual artifacts. In order to stay close to the musket’s basic functional organization, it’s important to
describe musket-related artifacts as if one found an assembled musket. First describe the musket: lock, stock, and barrel. Then describe the accessories that made it function.

Boscawen's limited life span makes the arms assemblage a useful comparative collection. Boscawen was only used for three years and served as a warship only in 1759. This means most of the artifacts were probably deposited between 1759 and 1762. Such firm dating is difficult to find on contemporary military land sites, which were often occupied for long periods or converted to other, non-military uses. Military sites on land also tend to have been heavily mined by avocational collectors in the years after their abandonment (Starbuck 1994), essentially destroying the archaeological contexts necessary for interpretation of the artifacts from the site. The "time capsule" effect so often discussed in general terms when considering shipwrecks (Muckelroy 1978:7-8) can generally be applied to Boscawen, with some qualifications.

Disturbance of the site after the vessel's abandonment was limited to three potential sources. Local residents may have salvaged the iron fitting from Boscawen's upper structure, although there is no documentation of this occurring. The "Great Bridge" connecting Fort Ticonderoga and Mount Independence in the American Revolutionary War
(1777) ran alongside the sunken hull. There was also renewed shipping activity in the area between 1775 and 1777. These military activities could have contaminated the site with nearly contemporaneous material. Finally, occasional lead ammunition probably fell into the overlying sediments from hunting on the surrounding farmlands.

Unfortunately, Boscawen does not have the artifact diversity of contemporary land sites in terms of armament remains. Soldiers and sailors did not live aboard the sloop for long periods of time. When the sloop was moored off Fort Ticonderoga or Crown Point, fighting crews were not necessary and may have been allowed to camp on shore. When Boscawen was out of service during the winter, most of her supplies and ammunition would have been removed.

Because of Boscawen’s well-defined structure (i.e. the intact hull), most arms put in the hold were not lost. No complete muskets or pistols were left in the hold or bilges when Boscawen was abandoned. Only a fraction of the original weapons transferred into and out of the hold remained to be preserved in the sunken ship. The fragmentary arms that remained were not subject to scattering by currents or sediment slumping because the bottom in the shipyard is relatively soft and flat.

Artifact preservation is better in Lake Champlain’s muddy bottoms than many other places in the world. On
land, many organic artifacts do not survive. Unless curated, fluctuating humidity, oxygen, and sunlight promote rapid bacterial and fungal degradation of organic materials. In underwater contexts, the same organic artifacts can survive 3,500 to 13,000 years or more (Purdy 1991:2-6). Lake Champlain's bottom sediments provide a cold, anaerobic environment with constant humidity. This environment is perfect for the long-term survival of organic remains. The only highly active, destructive forces in the lake are the yearly winter ice and the roots of aquatic plants. Once a ship's structure is buried below the level of this ice formation and root growth, the rate of degradation slows dramatically.

Lake Champlain is also a favorable environment for metal preservation. Waterborne salts, the bane of metals on oceanic shipwrecks (D. Hamilton 1976:7), are not present in Lake Champlain. Some galvanic degradation may have occurred where metal artifacts of differing nobility were deposited near each other, but without the strong electrolytic connection provided by seawater this type of corrosion was probably minimal. However, because no initial encrustation layer forms on the surface of metal objects in freshwater environments, any corrosion tends to erase surface features that may be diagnostic. It is reasonable to expect good preservation of metal artifacts
and excellent preservation of organic artifacts from all wrecks in northern freshwater lakes.

While the preservation of both organic and metallic artifacts in northern freshwater lakes is an asset to archaeologists and historians alike, it should be accompanied by a cautionary statement. The catalog that follows is only one of several broad categories of artifacts. The detailed description of these artifacts is essential to constructing the best inferences about the human behaviors and natural processes that created them and arranged them as they were found. A complete description and analysis of all artifacts from Boscawen could potentially fill thousands of pages. Wrecks with larger inventories of artifacts require exponentially larger amounts of time and effort to adequately describe, analyze, and interpret. Removing artifacts from such a stable environment should only be done when adequate provisions have been made for documenting and curating the artifacts and preserving the descriptions of their contexts, with the scale of hundreds of years in mind.

**Musket Lock Mechanism** (artifact [art.] #03-334):
Length: 5.7 inches (170.2 mm)
Height: 1.25 inches (31.7 mm)
Material: Forged Iron
(Figures 3, 4, 92)

This lock is similar to those found on British Long and Short Land-Pattern muskets (Darling 1970:41). The
Figure 4: Musket Lock Mechanism (Photo) (art. #03-334)
moderately corroded outer surface retains some of the common surface decorations of the lock, including the crown forward of the cock. A double line borders the lock plate, the top jaw of the cock, and the frizzen. Some faint engraving is visible behind the cock, but it was either filed off or has corroded beyond recognition.

Conspicuously missing are the GR symbol and the deeply-stamped broad arrow normally found in front of the cock on Land Pattern muskets. The lock was secured to the stock by two screws. These screws are now bent, suggesting the lock was removed from the musket before being discarded or lost. The flint is also missing. The jaw screw on the cock is slotted only, not transversely pierced for the insertion of a turning bar. The upper jaw’s rear support is flat and perpendicular to the lock plate, a feature of the Land Pattern lock (Peterson 1956:161; Darling 1970:41). On the basis of the artifact drawing, De Witt Bailey (1991, pers. comm.) has identified the lock as a civilian-pattern model made after 1740, but before 1755, when the profile of the lock plate was straightened. Bailey suggests that it is a lock manufactured by John Wilson of London. However, without a name engraved on the exterior of the plate such an identification is not positive.

The lock was found 3.4m (10 feet) from the keel in unit 614. While most armament artifacts were found within
the degraded hull and were almost certainly associated with the vessel, the lock’s position outside the extant structure throws such an association into doubt. It could have been caught in Boscawen’s upper works, now missing. More likely, it could have been thrown or dropped into the lake sometime after Boscawen was allowed to rest on its bottom in 1763 (W.O. 34/50:140).

Three lock plates of similar curvature were found at Fort Stanwick, New York (Hanson and Hsu 1975:65-67), all 17.2 cm (6.77 inches) long and 3.2 cm (1.26 inches) high. One slightly smaller lock plate at Fort Stanwick still had its French flint secured in the cock jaws. Two similar lock plates were found at Fort Ligonier, Pennsylvania, with lengths of 7.1 (180.3mm) and 7.2 inches (182.9mm) (Grimm 1970:91, Plate 17). Grimm identifies these two locks as "Brown Bess" locks, but the lengths suggest either a pre-Land Pattern infantry musket, a Short Land Pattern musket, or an English Militia and Marine musket (Neumann 1967:56, 60, 66, M.11). Typically, the Long Land Pattern muskets had lock plates 6.75 (171.5mm) to 6.875 inches (174.6mm) long (Neumann 1967:58-59).

No similarly-dimensioned lock plates were found at Fort Michilimackinac. A Wilson lock plate found at Fort Michilimackinac has many of the same features as the Boscawen example, but it is much smaller and was probably
made for the fur trade, as indicated by the Hudson's Bay stamp found immediately forward of the cock (T. Hamilton 1976:21). No lock plates survived from Machault, a result of the saltwater environment in which it sank (Bryce 1984:11).

The Boscawen lock is probably from a Militia and Marine musket. As the name implies, these muskets were built to arm the English and provincial militias and for use aboard ships. They were generally one grade below Land Pattern weapons in quality. Tight quality control of Land-Pattern muskets (De Witt Bailey 1991, pers. comm.; Kit Ravenshear 1991, pers. comm.) would preclude this example's use on a Land-Pattern weapon, which would have been stamped with the broad arrow, royal cipher, armorer's mark, and date. The lock could have come from a weapon carried by a soldier in the colonial regiments raised to serve in the Lake Champlain theater. It could also be the personal weapon of a colonial soldier conscripted for naval duty.

**Iron Frizzen** (art. #03-099):
Width: 1.25 inches (31.75mm)
Height: 1.875 inches (47.6mm)
Maximum thickness of strike plate: .25 inch (6.35mm)
Screw plate width: .5 inch (12.7mm)
(Figures 5, 6, 81)

The frizzen was made with a square top. The head of its attachment screw is corroded to the attachment hole. The presence of this screw head indicates the frizzen was
Figure 5: Iron Frizzen (Photo) (art. #03-099)
Figure 6: Iron Frizzen (art. #03-099)
broken from the lock mechanism after the shaft of the screw had firmly corroded to the attachment loop, rather than being unscrewed prior to being lost. A comparison with photographs of intact examples shows the Boscawen frizzen to be missing a small amount of metal from its forward, travel-limiting lobe. The frizzen bears a remarkable resemblance to frizzens from both an English sealed-pattern, Queen Anne period musket dated 1720 and a dog-lock musket dated 1715 (Blackmore 1961:73). Two examples from Neumann (1967:54, 78), identified as a Queen Anne Infantry musket (1710) and a German Infantry musket (1750-1782) have the same squared top. De Witt Bailey (1991, pers. comm.) identifies the frizzen as being from either a British Sea Service musket or a Dutch musket.

The Boscawen frizzen has a very erect, flat striking face, like the earlier dog-lock frizzen. The differences between the 1710, 1715, and 1720 models are subtle, rendering the positive identification of the Boscawen frizzen impossible due to individual variation within the types. The frizzen’s striking face was far less eroded than the rest of the frizzen. As part of the manufacturing process a steel striking face was welded on the upper arm of the wrought-iron frizzen. The steel face yielded a better spark and lasted longer than wrought iron alone. As the frizzen was repeatedly struck by the flint and small
shavings were shaved off, the resulting heat tempered the
steel. This is probably why the steel face is less eroded.

The frizzens was found in unit 404, just forward of the
mast step. It is probably part of the ammunition and
scrapped weapons removed from Isle aux Noix in 1760. No
similar frizzens have been found during excavations at
Forts Stanwick, Ligonier, or Michilimackinac, nor were any
similar frizzens recovered from Machault.

**Gun Barrel** (art. #03-501):
Length overall: 47.375 inches (1203.3mm)
Length of Breech plug tang: 2.25 inches (57.2mm)
Outside Diameter at Breech: 1.5 inches (38.1mm)
Outside Diameter at Muzzle: approximately 1 inch (25.4mm)
Original Bore: .69 inch (17.5mm)
Length of Octagonal section: 8 inches (203.3mm)(clearly
discernable)
(Figures 7, 77, 78)

This is probably a mid-18th century French musket
barrel. It has the characteristic breech section with an
octagonal exterior, one integral anti-turning lug, a single
top-mounted bayonet stud, and is approximately 46 inches
(1168.4mm) long (Neumann 1967:42-43). The length of the
octagonal section does not, however, exactly match the
length of 7 inches (177.8mm) given by Neumann (1967:34-35)
as typical of this type. Corrosion has pitted the entire
exterior of the barrel and revealed the wrought iron’s
grain and the octagonal section near the breech appears to
have extended towards the muzzle.

The muzzle end is severely thinned and appears to be
split. The bayonet lug is still visible 1.25 inches (31.75mm) behind the muzzle on the barrel top. The lug is .25 inch (6.35mm) long. What remains of another lug is visible four inches (101.6mm) from the muzzle end on the bottom of the barrel. This lug is .375 inch (9.5mm) long. Its original width is undeterminable. This second lug is typical of early 18th-century French muskets, which had a single, centrally-located barrel band and only one metal protrusion on the bottom of the barrel, called a turning lug. Fit into a mortise on the stock, the lug prevented barrel rotation when a soldier used the bayonet.

Barrels of these French muskets were originally 48 inches (1219.2mm) long, more than .875 inch (22.2mm) longer than this example is now. The breech plug tang tapers from .25 inch (6.4mm) to .5 inch (12.7mm), bottom to top. Viewed from the top, the barrel bends .25 inch (6.4mm) out of alignment, right to left. This bend could be the reason this barrel was abandoned or the result of being stepped on while below decks on Boscawen.

French muskets were standardized in 1717. Updated models were introduced in 1728, 1746, 1754, 1763, 1766, 1768, 1770, 1771, 1773, 1774, and 1777 (Each issue had four models: Infantry, Artillery, Dragoons, and Navy) (Neumann 1967:34-36; Peterson 1956:172-176). According to Neumann’s and Peterson’s descriptions, the Boscawen barrel most
resembles the 1728 and 1746 models.

The Boscawen barrel was located just aft of the mast step, straddling excavation units 308 and 309. Lack of compatible gun furniture and hardware around the barrel clearly suggests that it was not part of an intact musket when abandoned. It was probably part of the weapons and munitions scrap brought from Isle aux Noix in 1760. It is likely the barrel was abandoned as a result of the muzzle wearing thin or possibly from being bent.

Neither Fort Stanwick nor Fort Ligonier produced similar barrels. From the total of thirteen barrel fragments found at Fort Michilimackinac, only one barrel fragment has a comparable diameter. The remaining barrel fragments have bores between .552 (14mm) and .655 inches (16.6mm), which suggest French trade guns or carbines (T. Hamilton 1976:32) rather than military service muskets. Machault yielded five gun barrels. One of the barrels is octagonal for 23cm (9.1 inches) (Bryce 1984:27). This same barrel is loaded with two balls 16.7mm (.66 inch) in diameter, one ball 16mm (.63 inch) in diameter, and wadding. The remaining barrel fragments from Machault were too corroded to give detailed information, but their bores were 20mm (.79 inch), 17.9mm (.70 inch), and 17.5mm (.69 inch) (2 examples) (Bryce 1984:27-28). The former is most likely from a British musket, but the latter two examples
are probably French.

**Gun Barrel Fragment** (art. #03-531):
Length: 9 inches (228.6 mm)
Outside Diameter: .99 inch (25.3 mm) to 1 inch (25.4 mm)
Bore: .875 inch (22.2 mm) (probably originally .75 inch [19 mm])
(Figures 8, 84)

This short, smooth-bore barrel fragment came from a British musket. British muskets were known for their integral stock attachment lugs. The brazed lug on this fragment is 2.875 inches (73 mm) from the nearest barrel end and protrudes .25 inch (6.4 mm). One end of the barrel was collapsed by a severe, diagonal blow with a sharp blade. Corrosion has revealed the grain of the metal, which is aligned longitudinally. The barrel's top has a gnarled, uneven grain where the tube was welded. The barrel, originally a flat sheet of iron, or skelp, was formed around a swage and hammer-welded. The resulting blank was then bored to the right diameter.

Wear on the lug hole of the *Boscawen* barrel fragment suggests it held a shoulder-strap swivel, making it the second lug from the muzzle. Land Pattern muskets had a double lug for attachment of the cast ramrod pipes. Therefore, this fragment is probably not from a Land Pattern weapon. It was found between the pumpwell and the mast step within excavation unit 409, and lay in the same general area as most of the other musket parts.
Figure 8: Gun Barrel Fragment (art. #03-531)
The fragment of a similar barrel was found at Fort Stanwick in a trench outside the ravelin (Feature 76), which was dated 1758-1781 (Hanson and Hsu 1975:68). At Fort Stanwick old musket barrels were used as tent pegs, one possible use for the Boscawen barrel fragment. Three complete barrels were found at Fort Ligonier, all 42 inches (1066.8mm) long (Grimm 1970:91) with four integral mounting lugs and a top-mounted bayonet stud, indications of their British origin. Grimm does not give the bore of the barrels or a drawing of the lug design, making them hard to compare to the Boscawen fragment.

Brass Trigger Guard (art. #03-282):
Maximum width: .75 inch (19.1mm)
Minimum width: .61 inch (15.5mm)
Length (finial ball end to screw hole): 4.55 inches (115.6mm)
Finiyal Ball width: .275 inch (7mm)
Lug Height: .675 inch (17.1mm) (Figures 9, 10, 82)

This trigger guard fragment was broken off at the rearmost screw hole and comes from a British Land-Pattern musket. The outside of the Boscawen example shows some casting marks, but has a generally smooth, polished finish. The trigger guard swells visibly between the finial and the broken end. There is a small, raised shoulder just forward of the finial ball.

The upper side has a much rougher finish, with prominent casting bubbles and grinding or filing marks.
The lug, used to pin the trigger guard to the stock, is the remnant of a cast, longitudinal rib. After cooling, the rib was ground to its final shape: first laterally, then

Figure 9: Brass Trigger Guard (art. #03-282)

Figure 10: Trigger Guard (Photo) (art. #03-282)
longitudinally. The shaping marks are coarse, done with a rough grinding wheel or hand file, and the lug is rounded. There are no marks to indicate parts matching. There is a good chance these marks are on the missing forward half of the guard.

The trigger guard was found just forward of the mast step in unit 406. The closest arms-related artifact was an iron butt plate (art. #03-250). This association is typical of the heterogeneous nature of arms associations on Boscawen. The trigger guard was probably discarded there because it was broken or accidentally left in the bilge during transport.

Trigger guards with exactly the same break were found at both Fort Stanwick (Hanson and Hsu 1975:66) and Fort Ligonier (Grimm 1970:Plate 16/4, 10). Examples from Fort Ligonier have the same tapered shape, with a small ball for a finial. Four of the examples from Fort Stanwick were marked, all with either roman numerals or a single letter (Hanson and Hsu 1975:66). While the Boscawen fragments can most likely be attributed to the period between 1759 and 1763, the Fort Stanwick trigger guard fragments come from post-1763 contexts. Examples from Fort Ligonier date to the occupation period 1758-1766 (Grimm 1970:10-11).

Two musket stocks with most of their accompanying furniture were found on Machault. The single, articulated,
complete trigger guard had a pear-shaped finial, a "W" stamped under the finial, and an "s" stamped on the front lug (Bryce 1984:20). The solid rear section of the trigger guard arch on the Machault example is an early form and was from a pre-1740 Land Pattern musket. The pear-shaped rear finial was changed to a small ball in the 1740s. Each of the Machault musket stocks' remaining parts will be discussed with comparable parts from Boscawen.

**Two Musket Stock Fragments** (art. #02-418):
Wood Identification: Undetermined, probably both Walnut (Figures 11, 12, 83)

The larger fragment comes from the area on a musket around the breech. The interior is rounded rather than faceted, indicating it probably came from an English musket. The breech tang and barrel fit into the appropriately-shaped, large hollow on the fragment's top side. A carved mortise remains where the backing plate for the lock would have fit. The integral, bored ramrod hole is visible, although the wood has warped considerably through the conservation process.

The smaller stock fragment from Boscawen is in poor condition. It appears to have come from just forward of the lock mechanism on a musket, but behind the first ramrod pipe. A small section originally embraced the barrel.

The two musket fragments were found just aft of the mast, in relatively close association with five other stock
Figure 11: Two Musket Stock Fragments (art. #02-418)
Figure 12: Two Musket Stock Fragments (Photo) (art. #02-418)

fragments (unit 408). All but one of the musket stock fragments (art. #02-301) were found in this unit. These particular two fragments are probably pieces of a broken-up musket. Measurements were not taken of the fragments because the fragments were severely damaged prior to recovery and would not provide any useful information for comparative purposes.

No musket stock fragments were found at either Fort Ligonier or Fort Stanwick. Large portions of several
Musket stocks were found on Machault, but they came only from Land Pattern muskets (Bryce 1984:20). The forward end of the British musket stock from Machault has a similar shape, but only 1-2cm (.39-.78 inch) can be overlapped and compared to the Boscawen example (Bryce 1984:18).

**Musket Stock Fragment** (art. #02-320):
Wood Identification:  Probably walnut (Figures 13, 83)

The right side of this fragment has a carved mortise to accept the forward end of a lock mechanism and the fragment widens at this point to strengthen the stock and accommodate the breech. Correspondingly, the wood around the notch is raised in an oval. The ramrod tube is straight and extends through the piece. I did not measure this piece because of its reduced size. It is smaller than it was when first recovered, but the fragment’s original size is apparent from photos taken immediately after it was recovered. It was recovered in unit 408.

**Musket Stock Fragment** (art. #02-302):
Wood Identification:  Ash (Figures 14, 15, 83)

This fragment comes from the junction of the lock and barrel and has no ramrod hole. There is a carved mortise for the now-missing lock backing-plate. The size of the backing-plate mortise is too large for a Land Pattern musket or a French regular musket. The fragment has
Figure 13: Musket Stock Fragment (art. #02-320)
Figure 14: Musket Stock Fragment (art. #02-302)
Figure 15: Musket Stock Fragment (Photo) (art. #02-302)
shrunk over ten percent from its original dimensions (Figure 14), checking and cracking the artifact’s surface in the process. Two lock plate holes extend laterally through the piece. Originally, rivets or screws secured the backing plate and the lock together on the stock. One screw also passed through the breech plug tang, holding the breech in the stock (see gun barrel #03-501 above). This stock fragment was also recovered from unit 408.

**Musket Stock Fragment** (art. #02-319):

Wood Identification: Walnut

(Figures 16, 17, 83)

This stock fragment comes from the middle section of the stock, where the ramrod enters the stock through the reinforced ramrod pipe, or tailpipe. The ramrod hole penetrates the entire piece longitudinally. The wood itself widens and thickens from muzzle end to breech end. There is a distinct "G" impressed on the side of the stock. British Crown ownership of military hardware can be indicated by the first initial of the king or queen, in this case George II. Blackmore (1961:45) states that the bigger the swell around the tailpipe, the older the Land Pattern musket. If this fragment is from a Land Pattern musket, as is suggested by the presence of the incised "G," the musket would be from an older model. The overallcrudeness of carving around the swelled area is atypical of regulation Ordnance arms, suggesting that this may have
Figure 16: Musket Stock Fragment (art. #02-319)
Figure 17: Musket Stock Fragment (Bottom and Top View) (art. #02-319)
been a Militia and Marine musket or a civilian weapon. It was recovered from unit 408.

**Musket Stock Fragment** (art. #02-300):
Wood Identification: Ash
Width: 2.1 inches (53.3mm)
Height: 3.89 inches (98.8mm)
(Figures 18, 83)

This musket butt was found articulated with a butt plate and trigger guard (art. #03-429) in unit 408. The stock broke at the back end of the lock mechanism, its weakest point. Both sides of the recovered stock fragment are engraved with now-illegible figures (or possibly letters), as is the butt end. The number "VIII" was carved in the wood underneath the butt plate. The top of the musket butt tapers into the comb.

The groove carved for the rear trigger guard lug is longer than the lug on the articulated trigger guard. There is a lateral notch on the top of the musket butt where, originally, a small pin was driven through a pre-drilled hole in the musket butt and butt plate to secure the top tab of the plate to the stock. There is a carved mortise for the escutcheon plate and a vertical hole drilled completely through the stock fragment for its retaining screw. The escutcheon plate found on Machault (Bryce 1984:20) would fit into this mortise.

Overall shrinkage of the wood is noticeable with the furniture in place. The longitudinal shrinkage is not
severe, but as the stock shrank large cracks opened on the sides. In addition to the cracks there are several gouge marks, probably made while the wood lay in the bilge. The stock’s wood grain is aligned vertically. Vertical grain also characterizes the more complete stock recovered from Machault (Bryce 1984:18-21). In the case of Machault, all brass hardware from the tailpipe rearward was found articulated with its respective stock. No stock fragments were recovered from Forts Ligonier, Stanwick, or Michilimackinac.

Musket Butt Plate and Trigger Guard (art. #03-429):

Butt plate length: 5.46 inches (138.7mm)
Width: 2.2 inches (55.9mm)
Height: 4.70 inches (119.4mm)
Finial ball diameter: .35 inch (8.9mm)
Upper screw hole diameter: .465 inch (11.8mm)
Lower screw hole diameter: .35 inch (8.9mm)

Trigger guard length: 4.82 inches (122.4mm)
Width: .675 inch (17.1mm)
Lug height: .32 inch (8.1mm)
(Figures 19, 20, 83)

These cast-brass furniture pieces were found articulated with the musket stock fragment previously described (art. #02-300). There are star-shaped scratches on the back face of the butt plate. Two pock marks pit the same surface. The number "VIII" is scratched roughly into both the underside of the butt plate tang and the trigger guard. The trigger guard broke at the same point as the wooden stock, through the escutcheon plate screw. The
Figure 19: Musket Butt Plate with Brass Furniture (see figure for artifact numbers)
on the trigger guard was drilled twice to get the proper fit for the attachment pin. One of the holes was poorly placed, allowing the securing pin to break out of the lug's edge during fitting. Double drilling suggests either an initial fitting error or the fitting of used hardware to a new stock during the gun's service.

The butt plate tang's finished surfaces show little to no scratching. Both screw holes on the butt plate are countersunk. The screw hole used to fasten the butt plate corner to the stock is drilled slightly to the right of center. Both butt plate and trigger guard have ball-shaped finials. This contrasts with the furniture from a Land Pattern musket found on Machault, which has a ball-shaped finial on its butt plate tang and a pear-shaped finial on its trigger guard.

The Boscawen example is also slightly different than examples given in Neumann (1967:58-62) and Peterson (1956:161); it has a thin neck extending .25 inch (6.35mm) from the ball before widening. Several American muskets, copying the British design, have a similar ball-type finial on the trigger guard (Neumann 1967:46, 5-6, 98, M.69, 102, M.73). The Boscawen butt plate tang is .375 inch (9.5mm) shorter in length than the six inches (152.4mm) given for two Long Land Pattern examples in Neumann (1967:58), dated 1733 and 1728. The tang is also .375 inch (9.5mm) larger

Several other details set the Boscawen butt plate and trigger guard apart from their Land Pattern counterparts. The ball on the butt plate tang is larger (.375" diameter [9.5mm]) than its Land Pattern counterpart. There is also a clear swelling of the final step before the finial. No such swelling can be seen on Land Pattern muskets. The vertical section of the butt plate is too short for the stock by .5 inch (12.7mm), a discrepancy in fitting not recognized on any contemporary Land Pattern arms. Finally, the trigger guard has straight sides, unlike the slightly-swelled Land Pattern trigger guards.

Five cast-brass butt plates were recovered at Fort Stanwick, all from "Land Pattern muskets" (Hanson and Hsu 1975:68). The single example for which measurements are given (Length: 12.3cm [4.84 inches], Width: 4.9-5cm [1.93-1.97 inches], Thickness: 2-3cm [.79-1.18 inches]) is close to the same width as the narrower of the two Boscawen examples (see below, art. #02-301). Unfortunately, the other similar butt plates are not completely described and
the photograph of a single example reveals little (Hanson and Hsu 1975:Figure 44p). None of the finials are described. Given the stated measurements and lack of detailed description, the Fort Stanwick examples could be from either muskets or carbines. These artifacts probably should be reexamined and their identification reviewed.

Of nine butt plates recovered from Fort Ligonier, two are attributed to Long Land Pattern muskets. One was from a gun of the Queen Anne or George I period (Grimm 1970:91). Identifications were not attempted on other butt plates because of their fragmentary condition. The accompanying photograph (Grimm 1970:Plate 16[1,2,3]) shows three butt plates, but there is no specific identification of each example. Example two from the same plate is similar to the Boscawen butt plate, but has one fewer step.

No measurements are given for the example from Machault, but the butt plate has a "four-step tang with tiny ball finial" (Bryce 1984:19). A photograph of the tang reveals no swelling on any of the steps. The Machault example also is well-fit to the height of the stock (Bryce 1984:18, Figures 18-19).

At the time of the Seven Years War, gunmakers copied the furniture designs of expensive Land Pattern arms. The result was production of a vast quantity of Land Pattern-like muskets. Almost every feature of the
furniture and stock was copied, from the nose band for the
stock to the butt plate. The Boscawen musket butt has the
appearance and finish of a non-Ordnance manufactured
weapon, a good copy of the basic Long Land Pattern musket.
De Witt Bailey (1991, pers. comm.) comments that the
characteristics of this particular assemblage suggest "that
this may be one of the Liege-made copies supplied to the
Board of Ordnance on contract in 1740-1, or 1745. This
would be consistent with the Board’s policy of supplying
second-rate arms for colonial service troops."

**Two Iron Wood Screws** (art. #03-446):
Lengths: .75 and 1 inch (19.1-2.4mm)
Head diameter: .25 inch (6.35mm)
Thread size: Indeterminable
(Figure 20)

Wrought iron wood screws attached the butt plate (art.
#03-429) to the musket butt (art. #02-300). They retain
their original slotted heads. Three butt plate screws were
found at Fort Ligonier (Grimm 1970:128).

**Musket Stock Fragment** (art. #02-301):
Wood Identification: Walnut
Butt Plate Dimensions:
Tang Length: 4.55 inches (115.6mm)
Width: 2.15 inches (54.6mm)
Height: 5.4 inches (137.2mm)
(Figures 21, 22, 83)

This musket stock fragment, found in unit 408, is
similar to a previously-described fragment (art. #02-300).
However, the trigger guard fragment is missing and not as
Figure 22: Musket Butt and Butt Plate (Photo) (art. #02-301)
much of the stock is preserved. The forward end of the wood is in poor condition, having been smashed several times. Torn wood fragments line a groove on the lower right-hand side, indicating that a downward, shattering blow ripped the side of the stock.

Despite the evidence of heavy blows, the stock fragment was found with its brass butt plate attached. The butt plate was originally secured with two iron screws. A detailed mortise was carved in the stock, into which the butt plate was fit. The butt plate appears to have been carefully fitted to the wooden stock.

Two features suggest a non-Land Pattern British weapon. First, the butt plate tang is short, made without a pinned attachment lug and ending in a point without a finial. This style of tang was not used on regular muskets until 1794, and then only on the lower quality India Pattern musket (Blackmore 1961:135). The Short Land Pattern musket has a similar butt plate, but the tang is a different style (Blackmore 1961:135, Figure 16; Darling 1970:51, Figure 42). Second, the stock is considerably narrower than the other musket butt found on the wreck. Its more gracile shape suggests a shorter, smaller weapon, such as a carbine or musketoon. The butt tang length matches those of three English Light-Dragoon carbines and one English Artillery carbine represented in Neumann
(1967:116-117), all dating to the period 1750-1765.

De Witt Bailey (1991, pers. comm.) confirmed the identification of this musket butt as coming from a smaller weapon, stating that it is "apparently from [a] musket of the pattern supplied to the New Jersey and New York provincial governments in 1755-8 by Richard Wilson, gunmaker of London;" in design, the "arms were similar to regulation arms, but lighter...and less ornate. The butt-plate of this fragment conforms exactly [to those] used on the Wilson-contract muskets."

The presence of the Royal Artillery aboard *Boscawen* is documented in 1760 (Lewis 1984:14). Regimental equipment would have included stands of small arms for defending artillery batteries. It is also possible that Light Infantry troops were moved in *Boscawen* during the period after the war. In light of Bailey’s identification, this could represent a weapon captured from a British provincial regiment by the French during the early part of the Seven Years War that was subsequently recovered from one of the French forts along the Richelieu River. It also could have belonged to one of the vessel’s crew, although this seems the least likely of the alternatives. The musket butt’s archaeological context suggests it went down with the ship.

**Iron Musket Butt Plate** (art. #03-250):
Tang Length: 2 inches (50.8mm)
Width: 2 inches (50.8mm)
Height: 5 inches (127mm)
Thickness: .625 inches (15.9mm)
(Figures 23, 82)

Any surface markings this butt plate might have had have been destroyed by corrosion. Two screw holes remain, although they have been enlarged. The tang and upper bend of the plate have been flattened, possibly as a consequence of being wedged between ballast stones or being stepped on. The tang has no attachment lug and its decorative scallops are not as dramatic as in the brass examples (see above). The plate is currently in two pieces. It was recovered in unit 406, abaft the maststep.

This butt plate probably came from a French-issued Infantry Musket made between 1746 and 1763. It probably cannot be dated later than 1760. According to Neumann (1967:72), French muskets during this period were made with mixed iron furniture from earlier models, but typically had butt plates with a short tang of 1.75 inches (44.5mm). Several American muskets of the same period also have a characteristicly short tang. De Witt Bailey (1991, pers. comm.) suggests that the plate is probably civilian because the screw hole placement is off-center. It seems most likely that this example came from a French civilian musket, possibly used by French-Canadian troops.

No iron butt plates are represented at Fort Stanwick or on Machault. Preservation on those sites was generally
Figure 23: Iron Musket Butt Plate (art. #03-250)
not good enough to preserve this type of thin iron plate. Grimm (1970:91) found what might have been an iron butt plate at Fort Ligonier, but was hesitant about positively identifying it.

**Brass Musket Stock Nose Band** (art. #03-061):
Length: .56 inch (14.2mm)
Thickness: .027 inch (.69mm)
(Figures 24, 25, 81)

This convex band has two distinct recurved tabs. The .236 inch (6mm) tab has horizontal pounding marks .118 inch (3mm) long, thinning out the tab’s edge. The .118 inch (3mm) tab has seven vertical marks impressed on its inside edge and is cut square with a thin, wedge-shaped profile. Both sides of the band are scratched and marked. This example was found in unit 403.

These bands were cut to fit and rivetted to the muzzle end of a stock to prevent splitting. Early Land Pattern muskets were fitted with this kind of thin, brass band on a regimental level, after delivery from the Board of Ordnance (Darling 1970:20). In the 1750s, a thicker, cast brass cap was fitted in place of the thin, sheet-brass band. However, attributing this musket band solely to Land Pattern muskets is premature. Almost all muskets represented in Neumann (1967), Blackmore (1961), Darling (1970), and Peterson (1956) have some kind of stock band illustrated. It is more likely this band is from an
Figure 24: Brass Musket Stock Nose Band (Photo) (art. #03-061)
English or American musket than from a continental weapon because regulation French, Dutch, and German muskets were generally given a more massive band that often encircled the barrel, as well as the muzzle end of the stock. Of 30 French, Dutch, and German muskets shown in Neumann (1967:68-88), 22 have bands that encircle the barrel. This contrasts dramatically with the English and American muskets Neumann illustrates which have--with one or two exceptions--either no nose band or one that covers only the
muzzle end of the stock. More detailed documentation of muskets and carbines in collections would help clarify the origin of this band. It seems likely the band is from an English or Dutch musket or fusil.

**Sheet Brass Musket Stock Nose Band** (art. #03-548):
Length: .85 inch (21.6mm)
Thickness: .01 inch (.25mm)
(Figures 26, 77)

Uncovered in unit 308 and cut from sheet brass, this stock band has a single hole punched from the outside to the inside. The hole was probably made at the time the band was fitted to the stock. The stock to which this band was fixed would have been notched along the bottom to accommodate the ramrod and a rivet driven through the band’s center to make it conform to the stock’s notch. The edges are thinned to a sharp edge. One side has long, length-wise pounding marks while the opposite edge has diagonal shaping marks. A small "4" is scratched on the outside.

Two bands of similar length (22-25mm [.866-.984 inch]) were found at Fort Stanwick (Hanson and Hsu 1975:68), both with a single hole. One of the two retained its original attachment rivet. The exact shape of the bands cannot be determined from the photograph given (Hanson and Hsu 1975:66, Figure 43f). No stock tip bands are described from Fort Ligonier, but one piece of brass sheeting was
found (Grimm 1970:115, Plate 40/2). Although this sheeting could have been a nose band, brass sheeting was also used for reinforcing cracked or broken musket stocks (Neumann 1967:106).

**Machault** yielded at least one sheet brass musket stock nose band similar to the **Boscawen** band. The bands from **Boscawen** and **Machault** have the same general shape and a single rivet hole (Bryce 1984:11-12). The **Machault** example
is attributed to a fusil grenadier from the ship's arsenal. One of the butts from a similar musket was engraved with the name of the ship. According to Bryce (1984:12), the fusil grenadier has features "from trade guns as well as French military arms." Considering the widespread use of these bands and their occurrence on ships of different nationalities, it would not be prudent to attribute this band to any particular weapon.

**Brass Carbine-attachment Ring** (art. #03-421):
Inside diameter: 1.125 inches (28.6mm)
Outside diameter: 1.5 inches (38.1mm)
(Figures 27, 78)

The polished ring has a visible casting seam on one third of the outer surface. Two flat spots border each other on the ring's outer surface. Carbiners and musketoons destined for the light infantry, dragoons, and artillery were equipped with a sliding side bar and ring. The side bar was attached over the lock backing plate on the same two screws, capturing the ring. In use, the captured ring was clipped on a snap shackle that hung on the right side of a mounted soldier. The belt holding the snap shackle crossed the soldier's chest and transferred the gun's weight to his left shoulder (Rogers 1975:124, 191, Frontpiece). While a soldier was mounted, the carbine's butt rested in a basket just in front of the soldier's right foot (Peterson 1968:76). When dismounted the carbine
was either carried, in which case it hung muzzle-down by its ring and bar, or tied to the saddle.

The ring was found in the top sediment layer of unit 310. It is relatively distant from the other longarm remains and while it may represent the storage of artillery and cavalry weapons separate from infantry weapons, it could as plausibly be from later military activity on the lake, as suggested by its position high in the sediments. Several rings of similar diameters were found at Fort Stanwick, but they are wrought iron and were probably used to reinforce wood (Hanson and Hsu 1975:151).

**Brass Ramrod Pipe** (art. #03-252):
Length: 1.38 inches (35.1mm)
Thickness: .024 inch (.61mm)
Rivet hole diameter in Lug: .1 inch (2.5mm)
(Figures 28, 29, 82)

This ramrod pipe was made with three sets of transverse bands and five longitudinal flat facets accenting the bottom. The attachment holes are drilled from one side, not punched, and are intact. At some point the ramrod pipe was flattened.

The pipe was made by first hammering the pattern into brass sheeting, then bending the sheeting around a swage. According to Neumann (1967:96), American ramrod pipes were usually made out of sheet brass, while European ramrod pipes normally were cast brass. The condition of the **Boscawen** example indicates it was lost from a gun when its
attachment pin pulled out of the stock. It subsequently settled into what became excavation unit 406 and was crushed. The style of this pipe suggests that it is French.

Twelve sheet-brass pipes were discovered at Fort Ligonier, but decoration and stylistic variations are not mentioned (Grimm 1970:93-94, Plate 18). A review of the photos shows no ramrod pipes with the same decorative pattern as the example from Boscawen. Three sheet brass ramrod pipes were found at Fort Stanwick. They range from 2.8cm (1.102 inches) to 3.7cm (1.456 inches) long. No decorative details are visible in the published photo (Hanson and Hsu 1975:68, Figure 44c).

Figure 28: Sheet Brass Ramrod Pipe (Photo) (art. #03-252)
Figure 29: Sheet Brass Ramrod Pipe (art. #03-252)

**Brass Ramrod Pipe** (art. #03-270):
Length: 1.61 inches (40.9mm)
Thickness: .0625 inch (1.6mm)
Bore: .435 inch (11mm)
Lug dimensions: Length--.59 inch (15mm)
Width--.15 inch (3.8mm) Height--.17 inch (4.3mm)
(Figures 30-32, 82)

This pipe was cast. The exposed part of the bottom was then polished and the upper part left unfinished. A thick band accents either end of the pipe and its bore is not tapered. Extensive grinding around the lug indicates that the original casting required filing to arrive at the proper fit to the stock. After grinding, the number XIII was incised on the unfinished section for parts matching.
Figure 30: Cast Brass Ramrod Pipe (art. #03-270)

Figure 31: Cast Brass Ramrod Pipe, Side View (Photo) (art. #03-270)
Figure 32: Cast Brass Ramrod Pipe, Top View (art. #03-270)

The letter "B" is stamped into the lug, on either side of the hole drilled for the attachment pin. This pipe was the forepipe from an early Long Land Pattern musket. It is the only clear evidence for Land Pattern arms aboard Boscawen. It was recovered from unit 406.

Four similar pipes were found at Fort Ligonier (Grimm 1970:93-94, Plate 18). Nine similar examples were recovered from Fort Stanwick, ranging from 31-40mm (1.22-1.574 inches) long (Hanson and Hsu 1970:68). No markings were mentioned for the examples from either Fort Ligonier or Fort Stanwick.

Machault yielded four examples, none of which were
found attached to their stocks (Bryce 1984:19). Of the Machault examples, one has an "attachment lug with a hole and a series of short parallel lines stamped on its back" (Bryce 1984:21). This statement is not clear, but the parallel lines are probably the same type of matching numbers found on the unfinished upper section of the Boscawen example.

Grimm (1970:94) states that the thicker pipes are for iron ramrods while thinner, sheet brass pipes were for wooden rods. Although this might hold for trade guns, cast brass guides were used throughout the eighteenth century on Land Pattern muskets, regardless of whether the ramrod was wood or steel. Additionally, muskets made for use in Europe were far more likely to have cast ramrod pipes. Craftsmen reduced the bore diameters for Land Pattern pipes as newly-made Long Land Pattern muskets were assembled for steel rammers. Older Long Land Pattern muskets were retrofitted for steel ramrods by brazing a ferrule into the forepipe and securing a spring in the tailpipe to prevent rattling (Blackmore 1961:47-48). Such a conversion process would leave the two middle pipes untouched. It would be impossible to tell whether an early Long Land Pattern musket was converted to a steel ramrod without the tailpipe or forepipe. Therefore, it is impossible to assign this ramrod pipe a definite age.
Brass Ramrod Pipe (art. #03-328):
Length: 1.43 inches (36.3mm)
Thickness: .025 inch (.64mm)
Bore: .375-.40 inch (9.5-10.2mm) (Tapered)
Lug height: .2 inch (5.1mm)
Attachment Hole Diameter: .1 inch (2.5mm)
(Figures 33, 34, 83)

This example is similar to the sheet brass ramrod pipe above (art. #03-252), but its surface is in better condition. Although the two are almost identical in decorative features and they are probably both French, this example has bevels on the fore and aft ends of the attachment tabs. This would have made it easier to fit into its mortise on the stock. Undoubtedly the mortise in the stock had to be cut by hand, requiring a thin chisel. It would have been difficult to cut the mortise corners completely square. Clipping the corners of the ramrod pipe lugs allowed the mortise corners to be rounded, resulting in both easier carving and fitting.

Examples from Fort Ligonier demonstrate another method of simplifying the fitting of ramrod pipes. Two examples show a gentle curve on the lug from one end to the other (Grimm 1970:Plate 18). Consequently, the groove into which the pipe fit could be shallower on the ends than in the middle. A tapered attachment lug made carving the receiving mortises even less demanding.

The intact attachment lug hole suggests that this pipe was lost in the bilge (unit 407) when its attachment pin
Figure 33: Sheet Brass Ramrod Pipe (art. 03-328)

Figure 34: Sheet Brass Ramrod Pipe (Photo) (art. 03-328)
pulled free. It appears to have been crushed in the same way as the previously-mentioned pipe (art. #03-252).

**Brass Ramrod Pipe** (art. #03-457):
Length: 1.355 inches (34.4mm)
Thickness: .045 inch (1.1mm)
Bore: .455 inch (11.6mm)
Lug height: .1 inch (2.54mm)
Lug hole diameter: .1 inch (2.54mm)
(Figures 35, 36, 83)

This sheet brass pipe is five-faceted and has raised bands on the ends. The attachment lug has two punched holes in it and was not pre-drilled for fitting to the stock. While the pipe was held in place on the stock, attachment pins—probably iron—were driven through the thin sheet brass flanges. Without pre-drilled holes to match up, fitting ramrod pipes to stocks would have been much easier. The double attachment indicates some concern about the strength of this fitting method. This pipe probably came from a mid-quality French trade musket. The pipe was recovered from unit 408.

One similar pipe is pictured from Fort Ligonier (Grimm 1970:Plate 18). It is faceted and has two attachment holes on its lug. Some of the longitudinal facets carry over onto its transverse-banded ends, indicating a cruder forming method than that exemplified by the Boscawen example. A comparable ramrod pipe was found on Machault. It was made with dramatic transverse banding and has four pierced holes through its attachment lug. Pipes similar to
Figure 35: Sheet Brass Ramrod Pipe (art. #03-457)

Figure 36: Sheet Brass Ramrod Pipe (Photo) (art. #03-457)
the one from Machault are found on trade guns of the period (Bryce 1984:27).

**Brass Ramrod Tailpipe** (art. #03-474):
Length: 4.685" (117.4mm)
Point width: .69" (17.5mm)
Thickness: .035" (.89mm)
Bore: .355" (9mm)
(Figures 37, 38, 89)

This lance-shaped, sheet-brass tailpipe provided support for the ramrod as it emerged from a drilled hole in the stock. The pointed end faced backward and fit into a mortise carved in the stock. The mortise kept the brass flush with the surrounding wood. Longitudinal grooving on the interior of the point indicates it was hand-shaped—probably in a swage—with a hammer and shaping chisel.

The tailpipe has five flat longitudinal facets and two transverse decorative bands that encircle the forward end. The top lug (or flange) is hatched where it would fit on the stock. The hatching seems to be the result of flattening the flange during the fitting process. A single hole was drilled in the lug prior to fitting. The pipe is otherwise unmarked. The tailpipe was recovered in unit 506. The pipe is probably from a Germanic-style musket produced for civilian use and could be German, British, Dutch, or French (De Witt Bailey 1991, pers. comm.).

One five-faceted tailpipe was recovered from Fort Ligonier (Grimm 1970:91-92, Plate 18). It is made of sheet
Figure 37: Sheet Brass Ramrod Tailpipe (art. #03-474)

Figure 38: Ramrod Tailpipe (Photo) (art. #03-474)
brass, with a bore of .3 inch (7.62mm). It has two holes drilled through the attachment lug, but is otherwise identical to the example from Boscawen. This find suggests that the Boscawen example is more likely French or British.

**Brass Ramrod Pipe** (art. #03-529):
Length: 1.31" (33.3mm)
Thickness: .012" (.3mm)
Bore: .4" (10.2mm)
Lug height: .15" (3.8mm)
Hole diameter: .1" (2.54mm)
(Figures 39, 40, 77)

Similar to one other ramrod pipe (art. #03-457), this pipe came from unit 307. Only two details are different.

Figure 39: Sheet Brass Ramrod Pipe (art. #03-529)
The flange is slightly wider and the attachment holes are further apart. These two ramrod pipes certainly could have come from the same type of French trade gun, possibly even from the same armory.

**Brass Ramrod Pipe** (art. #03-561):
Length: 1.51" (38.3mm)
Thickness: .035" (.89mm)
Bore: .41" (10.4mm)
(Figures 41, 42, 85 or 86)

This is another sheet brass ramrod pipe, but it lacks facets along the barrel or bands on either end. It only has a single, raised ring on either end formed by the doubling back of the sheet on itself. On the top are
Figure 41: Sheet Brass Ramrod Pipe (art. #03-561)

Figure 42: Sheet Brass Ramrod Pipe (Photo) (art. #03-561)
several fitting marks. First, there is a set of three notches on the flange just above a set of diagonal hatch marks. The hammer used to flatten the flange must have had a checked pattern on its face. The pipe was found in the stern of Boscawen’s hull (no unit is mentioned in the field notes).

The number "XXVI" is scratched on the part of the pipe's barrel that would have been hidden against the stock. There are three prominent dents on the lower half of the barrel, that is otherwise free of markings. The attachment lug is .2 inch (5.1mm) shorter than the barrel on the ends, with prominent forming marks. One end has diagonal lines, the other diagonal cross-hatching. The attachment pin was driven through the flange from the numbered side to the plain side. The pin expanded the metal around the hole as it was driven. The resulting friction fit helped keep both the pin and pipe in place.

Similar ramrod pipes are represented in the collection from Fort Ligonier. Three plain-barreled examples (Grimm 1970:Plate 18) are the same overall length as the Boscawen example, but the attachment lugs extend the full length of the pipes: two in a tapered profile, the other with squared corners. The Fort Ligonier examples were not assigned to a specific weapon. Several examples were found at Fort Stanwick, but they are not described in enough detail to be
compared. Three plain, rolled-brass pipes with "narrow raised bands near each rim" were found on Machault (Bryce 1984:15, Figure 3). No further description of the pipes is given, but they are represented in a photograph. They seem to be nearly identical to the example from Boscowen.

Wooden Ramrod Fragments (art. #02-135, 10 examples)
Wood identification: black walnut (Juglans nigra) and ash (Fraxinus sp.)
Diameters of ash fragments: .32 inch (8.1mm) to .35 inch (8.9mm)
Diameter of walnut fragment: .3 inch (7.6mm)
(Figures 43, 44, 86)

All of these fragments came from unit 413. There are two distinct wood species, suggesting fragments from at least two ramrods, possibly from muskets made in England or North America. Wooden ramrods were slowly phased out for Long Land Pattern muskets during the 1750s and 1760s when steel ramrods were found to be superior in both durability and strength (Blackmore 1961:46). However, Short Land Pattern muskets and carabines retained wooden rammers at least through the Seven Years War. Many older weapons were sent to North America during the Seven Years War, which may account for the fragments found on Boscowen. Given the fragmentary nature of these remains, the ramrods were probably broken before they were discarded in Boscowen’s bilges.

No wooden ramrod fragments are described from Fort Stanwiclk or Fort Ligonier. Small bits of wood were found
Figure 43: Ramrod Fragments (art. #02-135)
Figure 44: Ramrod Fragments (Photo) (art. #02-135)
inside two of the five brass ramrod tips found at Fort
Ligonier, but they are too small to compare to the Boscawen
fragments (Grimm 1970:94). Two iron ramrod fragments and a
single length of wooden ramrod were recovered from Machault
(Bryce 1984:15, 19). No diameter is given for the wooden
ramrod and the wood is not identified. It was found in
place, sticking out of the stock of a French musket.

Ramrod Ends (art. #02-145)
Wood Identification: ash (Fraxinus sp.)

Tipped example--Length: 5 inches (127mm)
Brass tip length: 1.59 inches (40.4mm)
Outside brass tip diameters: .59 inch (15mm) (Top),
                      .45 inch (11.43mm) (Shaft end of brass)
Shaft Diam.: .437 inch (11.1mm)

Untipped example--Length: 4.44 inches (112.8mm)
Shaft Diam.: .475 to .32 inch (12-8.1mm) (Tapered)
(Figures 45, 46, 86)

One of the two wooden ramrod ends is sheathed in brass
.031 inch (.79mm) thick. A covering plate was soldered
over the broad end of the tip. The number "8" is imprinted
on the side of the tip perpendicular to the rod's axis.
Another "8" formed out of dots is visible on the neck end
of the tip. There appear to have been other marks in the
brass that are now unidentifiable. The ramrod must have
been well used because scarring and rounding of the tamping
end edges is extensive. It is possible that the rod was
broken during use. The shaft is highly distorted,
probably a result of post-recovery drying.
Figure 45: Ramrod Fragments (art. #02-145)

Figure 46: Ramrod Fragments (Photo) (art. #02-145)
The ramrod fragment without a cap has a cut shoulder .125 inch (3.2mm) from the tamping end and another partial shoulder .06 inch (1.5mm) from that end. There are no other diagnostic marks. Both examples came from unit 413.

**Ramrod Fragments** (art. #02-184, n=8)
Wood Identification: ash (*Fraxinus sp.*), and black walnut (*Juglans nigra*)
(Figure 82)

Even though several ramrods are represented by these fragments from unit 405, the fragments are not diagnostic.

**Brass Ramrod Tip** (art. #03-431)
Length: 1.25 inches (31.8mm)
Outside Diameter: .625 to .5 inch (15.9-12.7mm) (Tapered)
Thickness of Brass: .0325 inch
(Figures 47, 48, 83)

No wood was found in this tip. The maximum diameter of the tip suggests it was used in a .65-.68 inch (16.5-17.3mm) bore gun. The tip reveals one process for making a brass ramrod tip and attaching it to the wooden shaft. First, sheet brass was cut to the proper dimensions, rolled into a tapered cylinder around a swage, and brazed. A wooden ramrod shaft was inserted in the smaller end of the brass tip until it rested on the shaft’s pre-cut shoulder. A .625 inch (15.9mm) diameter iron washer was then fitted in the larger end, and a fastener driven through the washer into the end of the shaft. The tight-fitting washer and expanded wood centered the cap on the end of the ramrod, preventing the tip from wobbling
when pushing cartridges into place. Finally, a brass cap was soldered onto the larger end of the brass tip, covering the washer and finishing the tip.

Pushing was the principal force exerted on the tip. The ramrod tip's narrower end would have to fit securely on the pre-cut shoulder of the wooden rod, taking the main tamping forces. Any force put on the tip while the ramrod was being removed from a musket barrel would have been transferred to the wooden rod through a pin fixed in a single hole on the side. The pin is now missing. The length of wood inside the tip would have been measured carefully for a good fit.

Figure 47: Brass Ramrod Tip (art. #03-431)
Figure 48: Brass Ramrod Tip (Photo) (art. #03-431)

The flat, round, brass end cap normally soldered onto the larger end of the tip (see art. #02-145) is missing. The ramrod shaft was probably driven through the end cap, dislodging it. The shaft then was pulled back through the barrel, wedging the iron washer in its current position. In the process, the pin fastened in the barrel's side was lost, as was the nail securing the iron washer. It was then deposited in unit 408.

Six brass ramrod tips (with end caps) were found at Port Stanwick, one .70 inch (17.8mm), two .64 inch (16.3mm), and three .63 inch (16mm) in diameter. Hanson and Hsu (1975:70) attribute these all to "larger caliber
weapons, probably .75 cal. ... Land Pattern Muskets." The single .70 inch (17.8mm) tip was probably used in a musket. The five smaller examples are from .05-.06 inch (1.3-1.5mm) in diameter, and thus were smaller than standard carbine bore (.69 inch [17.5mm]). Moreover, the difference between the larger tip's diameter and musket bore is the same as the difference between the smaller tips' diameters and carbine bore. It would be more appropriate to attribute the smaller tips to carbine ramrods than to musket ramrods.

Five ramrod tips were found at Fort Ligonier. They ranged from 1.1 to 1.4 inch (27.9-35.6mm) in length and were .56 inch to .64 inch (14.2-16.2mm) in diameter. Grimm (1970:94) does not provide a breakdown of individual diameters, but it seems unlikely that any of the rammers were meant for musket-bored (.75 to .80 caliber [19.1-20.3mm]) guns. The examples from Fort Ligonier could have been from either pistols, small-bore fusils used by British officers, or muzzle-loading rifles used by American militiamen (Neumann 1967:96, 138-142).

One tapered brass ramrod tip was found on Machault, its outer diameter ranging from .68 inch (17.3mm) and .70 inch (17.8mm) with an overall length of 1.2 inches (30.5mm). Like the example from Boscawen, the Machault tip has lost its end cap (Bryce 1984:26-27, Figure 36). The hole through which the securing pin was driven is more
centrally located on the barrel than on the Boscawen example.

Iron Musket Worm (art. #03-316):
Length: 1 inch (25.4mm)
Diameter: .625 inch (15.875mm)
Tine size: .125 inch (3.2mm) square (Figures 49, 85)

Each of the two tines on this worm makes one complete turn (360 degrees) and changes from square to round as it twists, tapering to a point. This device was used to "worm out" the wadding of rounds that failed to fire and was usually part of a maintenance kit for the musket. A worm, priming hole pick, and screwdriver were issued for every musket.

To use the wormer, a soldier attached the worm to the reverse end of the ramrod and turned it so the tines grabbed the wadding, in this case counter-clockwise. The wadding was then drawn out of the barrel. The twisting action probably contributed to the change from wood ramrods to steel. Steel is far more torque-resistant and is less likely to break with a hard twisting motion. As an additional bonus, steel could be bent back into shape if stepped on or dropped. Wood is not as easily repaired. The wormer was found in the same general vicinity (unit 412) of the pieces of musket shot, suggesting that the kits to which the worm belonged were possibly stored near the ammunition.
Figure 49: Iron Musket Worm (art. #03-316)

No examples of musket worms were found at Fort Ligonier. Two similar worms were recovered at Fort Stanwick, both belonging to Hanson and Hsu's (1975:69-70) Type II. The tines of the Fort Stanwick examples are made of the same size square stock, but make one and a half full twists (540 degrees) before coming to a point. It is not clear from the photograph (Hanson and Hsu 1975:Figure 44f) whether the base is similar to the base of the Boscawen musket worm.

Iron Bayonet Tip (art. #03-067):
Length: 3.125 inches (79.4mm)
Width: .75 inch (19.3mm)
This bayonet fragment has the same dimensions as the tip of the single complete bayonet (art. #03-337) found on Boscawen. It could also be a wedge from slotted bolt used to secure ship timbers, but corrosion precludes it being securely assigned to either category. It was recovered from unit 414, in close proximity to numerous arms-related artifacts.

Bayonet Fragment (art. #03-336):
Length: 4.9 inches (124.5mm)
Shaft Diameter: .5 inch (12.7mm)
Blade Thickness: .37 inch (9.4mm)
Blade Length: 3 inches (76.2mm)
(Figures 51, 52, 86)

This bayonet fragment from unit 414 was broken in two places. First, around the base of the shaft where the socket barrel was welded. The second break is three inches from the blade hilt. The blade has a triangular profile, giving it extra strength. Triangular-bladed bayonets of this style were standard British issue from 1750 to 1810. Bayonets made in the British style were also made in America (Neumann 1967:48, 50, IV.6/4), but this is probably a British bayonet (De Witt Bailey 1991, pers. comm.). The fragment from Boscawen has a robust neck and distinct hilt.

Thirty one British-style bayonet fragments were found at Fort Stanwick, where they were scattered all over the site (Hanson and Hsu 1975:65, 70). Of the 36 bayonet
Figure 50: Bayonet Fragment (art. #03-067)
Figure 51: Bayonet Fragment (art. #03-336)
Figure 52: Bayonet Fragment (Photo) (art. #03-336)
fragments found at Fort Ligonier, 35 came from British-style bayonets. Several of the examples are nearly complete, offering insight into the reconstructed appearance of the fragment from Boscawen. The single intact blade from Fort Ligonier was 17.2 inches (436.9mm) long. Typical bayonet sockets varied between 4 and 4.3 inches (101.6-109.2mm) in length, with a .92 to 1 inch (23.4-25.4mm) bore (Grimm 1970:48-49). Based on measurements from the Fort Ligonier bayonets, the bayonet from Boscawen would have had an overall length of approximately 22 inches (558.8mm).

Bayonet (art. #03-337):
Length Overall: 15 inches (381mm)
Length of sharpened section: 4 inches (101.6mm)
Extant Blade Length: 11 inches (279.4mm)
Blade Width: 1 inch (25.4mm)
Blade Thickness: .25 inch (6.4mm)
Shaft Diameter: .5 inch (12.7mm)
Socket Diameter: 1 inch (25.4mm)
Outside Socket Diameter: 1.125 inches (28.6mm)
Socket Length: 2.875 inches (73mm)
Lug Groove Width (average): .25 inch (6.4mm)
(Figures 53, 54, 80)

The blade on this bayonet is rectangular, with the last four inches of the blade sharpened to a diamond-shaped cross section. The junction of blade and shaft is encircled with a shoulder .18 inch (4.6mm) wide, presumably to limit potential insertion depth. Insertion would also be limited by the muzzle of the musket and the curve of the shaft between the bayonet’s blade and attachment barrel.
Figure 54: Bayonet (Photo) (art. #03-337)
The attachment lug groove has a zig-zag shape to prevent the bayonet from coming off the muzzle during the thrusting motion. The bayonet socket was designed for a tight, friction fit on the muzzle. This artifact was found beneath the hull's outside planking between units 401 and 402.

The rectangular/diamond shape and blade length indicate German or Dutch origin, although in overall dimensions the bayonet is very similar to early Land Pattern examples and several pre-Land Pattern British bayonets (Dennis Lewis 1990, pers. comm.). Similar bayonets appear in Peterson (1956:Plates 301 and 308), Blackmore (1961:Figures 14 and 77), and Neumann (1967:Figures IV.8 and 50). De Witt Bailey (1991, pers. comm.) identifies the bayonet as a "'Dutch' or 'British flat' bayonet...supplied with the Leige-made muskets supplied to the Board of Ordnance in 1740-1, 1745."

Blackmore (1961:47-49) confirms that in 1741 16,000 Dutch muskets and bayonets were imported to the Tower Armory. Three thousand of the Dutch muskets and bayonets, probably from the later Dutch shipment, were exported to South Carolina in 1754; Georgia received 500 in 1756. Graham Priest (1995, pers. comm.) adds that in 1752 flat bayonets were used on Sea Service muskets.

A nearly identical bayonet was found at Fort Ligonier
with a 12.2 inch (309.9mm) blade, 2.92 inch (74.2mm) long socket, and made for a bottom-lugged musket (Grimm 1970:49, 77, Plate 19[4]). The above-cited examples from Peterson, Blackmore, and Neumann are all attributed to German sources. Grimm (1970:49), on the other hand, says "The Type Two bayonet was probably for use with a musket earlier than the Brown Bess," presumably referring to an English musket. The Boscawen bayonet and the Fort Ligonier bayonet are probably both Dutch imports. On sites dating to the Revolutionary War the bayonets could be German, as they are identified by Neumann (1967) and Peterson (1956). However, both Neumann and Peterson focus on weapons of the Revolutionary War, when German soldiers and their weapons were integrated into the British Army in North America. No German troops fought in North America during the Seven Years War, reducing the chance that German weapons would be found on American military sites from that period.

The identification of the Fort Ligonier bayonet as a pre-Land Pattern type (Grimm 1970:49) is almost certainly a mistake, probably because the excavator was not aware of the records of Dutch imports and their characteristics. The substantial numbers of Dutch-made muskets in circulation makes it more likely that both the Boscawen and Fort Ligonier bayonets reached the colonies through British channels. Some Dutch-made arms probably would have been
issued to provincial regiments in the Seven Years War.

**Bayonet Scabbard Tip** (art. #03-109):
Length: .85 inch (21.6mm)
Head diameter: .375 inch (9.5mm)
Post length: .25 inch (6.4mm)
Post diameter: .25 inch (6.4mm)
(Figures 55, 86)

![Diagram of Bayonet Scabbard Tip]

Figure 55: Bayonet Scabbard Tip (art. #03-109)

Scabbard tips have a dual function. They guard against the bayonet tip accidently pushing through the end
of the scabbard and they provide a decorative accent to the end of a dark leather sheath. Bayonet scabbards were made by sliding a leather sheath around a wooden scabbard liner. This type of bayonet scabbard tip was secured between the two halves of wooden liner. Craftsmen then pulled the pre-sewn leather sheath over the wooden liner, tying one end tightly around the neck of the tip. In order to secure the tip between the liner halves, it appears that a small iron brad was soldered into the tip’s concealed end, which was then pushed or lightly hammered into the scabbard liner.

The *Boscawen* example is from unit 413.

**Bayonet Scabbard Tip** (art. #03-489):
Length: .875 inch (22.2mm)
Post diameter: .25 inch (6.4mm)
Post length: .25 inch (6.4mm)
Shoulder Diameter: .375 inch (9.5mm)
Neck Diameter: .16 inch (4.1mm)
Head Diameter: .42 inch (10.7mm)
(Figures 56, 84)

This scabbard tip is similar to the previously-described example. However, there is no solder on the post or any remains of a brad for connecting it to the scabbard liner. Both *Boscawen* examples fall stylistically into Hansen and Hsu’s Type 2a (1975:71). In this case, it is preferable to identify the scabbard tips from Fort Stanwick as De Witt Bailey (1991, pers. comm.) has for the *Boscawen* examples: fragments from British regulation issue bayonet scabbards dating to circa 1750. It was found in unit 410.
Gunflints are some of the most durable artifacts found on colonial sites. Specialized terminology has evolved for the description of flints. The first comprehensive description of gunflint manufacture was by Skertchly (1879). Unfortunately, through the last three decades of
Figure 57: Gunflints from Roseawan (see page 136 for artifact numbers)
Figure 58: Parts of a Gunflint
Table 1: Measurements of Plints from Boscawen

<table>
<thead>
<tr>
<th>ARTIFACT NUMBER</th>
<th>UNIT NUMBER</th>
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<th>WIDTH</th>
<th>THICKNESS</th>
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<td>1.2(30.5mm)</td>
<td>.28(7mm)</td>
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<td>05-054 (a)</td>
<td>413</td>
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<td>1.56(39.7mm)</td>
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<td>1.21(30.7mm)</td>
<td>.4(10.2mm)</td>
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<tr>
<td>05-054 (c)</td>
<td>413</td>
<td>1.31(33.3mm)</td>
<td>1.51(38.4mm)</td>
<td>.44(11.1mm)</td>
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<td>402</td>
<td>.8(20.3mm)</td>
<td>1.43(36.3mm)</td>
<td>.42(10.5mm)</td>
</tr>
<tr>
<td>05-071 (a)</td>
<td>413</td>
<td>.825(20.9mm)</td>
<td>1(25.4mm)</td>
<td>.215(5.5mm)</td>
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<tr>
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<td>.49(12.3mm)</td>
<td>.2(5.1mm)</td>
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<td>Broken</td>
<td>.39(9.9mm)</td>
</tr>
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<td>307</td>
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<td>1.54(39.1mm)</td>
<td>.435(11mm)</td>
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<td>1.44(36.4mm)</td>
<td>.29(7.4mm)</td>
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<td>1.04(26.5mm)</td>
<td>.225(5.7mm)</td>
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</table>
gunflint research, no universal terminology has been agreed upon for the description of flints. The most technical report on gunflints (i.e. their chemical composition, origin, manufacture, and sparking characteristics) is Hamilton and Emery (1988). For descriptive purposes, their terms are the clearest and most comprehensive to be published.

The edge is the striking surface of the flint (Figure 58). The longest taper of the flint usually ends in the edge. The heel is the surface opposite the edge. The back, or face is the upper surface of the flint and the bed is the lower, generally unfaceted surface. Length is the measurement from edge to heel. Width is the measurement side to side, thickness the maximum measurement face to bed.

Length, width, and thickness measurements for the flints recovered from Boscawen are compiled in Table 1. Flintlock muskets used flint (or chert) struck against steel to ignite their priming charges. Gunflints were knapped according to two fundamentally different processes. In the more efficient process used late in the 18th century and extensively in the 19th century, long blades were struck off flint cores (Skertchly 1879). Individual blades were then broken to appropriate lengths, the two sharp edges of each long blade becoming the edge and heel of the gunflint.
Gunflints made from fractured blades are sometimes called blade flints. As a result of this process, sometimes the edge-to-heel dimension of a gunflint is referred to as the width and the side-to-side dimension as the length.

The other method of making gunflints is qualitatively different. Gunflints were broken individually from a core, leaving each with a prominent bulb of percussion on the back of the flint. These flints are called gun-spalls (Witthoft 1966). Gun-spalls were commonly used from the introduction of flintlock muskets until the American Revolution.

The formal typing of gunflints began in the 1960s (Woodward 1960, Witthoft 1966) and was most extensively defined by Stone (1974:247-261), who divided flints into three different series on the basis of flaking technique, shape, wear, color, and the presence of rind material. Series A consists largely of French blade flints. There were four sub-types, all variations of the blade-derived gunflint and all made from a honey-colored flint. Series A blades have three transverse flake scars on the back of the flint and secondary flaking of the heel and sides (Stone 1974:247-248). None of this type were found on Boscawen.

Boscawen yielded a single example of Stone's (1974:248-249) Series B (art #05-071). This blade-flint type has a two transverse flake scars on the back, no
transverse flake on the heel side of the bed, and a rounded, retouched heel. Series B flints are normally light to medium brown.

Stone's Series C consists of individually struck gun-spalls. At Fort Michilimackinac they ranged from brown--through light grey--to black (Stone 1974:257-261). The remainder of recognizable gunflints from Boscawen belong to this series. The series is subdivided into varieties. Fifteen examples of Stone's Variety A came from the wreck. They all were medium brown to medium grey. One set of spall-type gun flints, comprised of four examples, was struck from honey-colored flint indistinguishable from the material used in the blade flints.

Only two examples from Boscawen (art. #05-071, 05-174) show no signs of use on their edge. Most other examples are only lightly to moderately used. Three examples (art. #05-102, 05-179, 05-187) are only fragments. A single example (art. #05-175) seems to be of aboriginal origin. It has a flaking pattern and shape far more similar to a Native American scraper than to that of a European-made gunflint. The long, longitudinal flake scars on the back, stretching from nearly the heel to the edge, are uncharacteristic of continental gunflints. It is possible this was made by the Abenakis or Mohawks, tribes native to the Champlain Valley area. During the American Revolution
a large vein of dark grey to black chert was discovered by troops on Mount Independence, directly across the lake from Fort Ticonderoga (Hanson and Hsu 1975:71). It is likely the native populations were already aware of this deposit and made use of it long before 1776.

Many of the gun-spalls were made from mottled material. Inclusions ranged from white specks in brown flint to black spots in light grey flint. Other flints are banded, the material changing from brown to grey or alternating between light grey and dark grey.

Flints recovered from Boscawen are a wide variety of sizes, the smallest measuring .48 inch (12.2mm) wide and the largest measuring 1.71 inches (43.4mm) wide. Length measurements are not used to judge overall size because they do not account for use-wear; width is a better measure for both blade- and spall-type flints. There seem to be groupings of width measurements around 1 inch (25.4mm), 1.23 inches (31.2mm), and 1.4 inches (35.7mm). These concentrations largely correspond with those observed on the contemporaneous British wreck of Invincible (Bingeman 1985:203).

Eighteenth-century gunflints were graded according to size. Small flints were manufactured for pistols, large ones for muskets and strike-a-lights. This system was formalized for English blade flints and described in detail
by Skertchly (1879). Although small flints were not practical for use in a musket, any flint that fit in the cock probably would have been used in a pinch.

Two thousand, four hundred and thirty six gun flints were recovered in and around Fort Michilimackinac (Stone 1974:247). Gun-spalls comprised 86.08 percent of the finds. The remainder were blade flints. The percentage of blade flints found on Boscawen was even smaller than that observed at Fort Michilimackinac. However, this does not seem extraordinary given the later occupation of Fort Michilimackinac. Blade-style flints were considered superior to the spall-type and were phased into use during the American Revolutionary War, especially among the French-supplied American troops. One of the distinguishing features of sites from the Seven Years War is a high proportion of spall-type flints (Starbuck 1994).

**Musket Balls and Shot** (artifact numbers are given in Appendix II):
(Tables 2)
(Figures 59, 75-78, 80-88, 90)

The 191 lead shot considered here range from .1 to .79 inch (2.5mm-20.1mm) in diameter. The category includes bird shot, buck shot, and a variety of musket ball sizes that could have been used in pistols, carbines, or muskets. Bird shot (<.3 inch [7.62mm], 66 examples) is largely represented by shot between .12 and .19 inch (3mm-4.8mm) in
| UNIT | .12 | .22 | .24 | .25 | .27 | .31 | .32 | .33 | .34 | .35 | .36 | .40 | .42 | .43 | .47 | .50 | .52 | .53 | .54 | .55 | .56 | .57 | .58 | .60 | .62 | .63 | .64 | .65 | .66 | .67 | .68 | .69 | .76 | TOTAL |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 304  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 2   |
| 305  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 3   |
| 306  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 1   |
| 308  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 1   |
| 401  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 402  | 1   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 403  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 404  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 405  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 406  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 407  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 408  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 409  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 410  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 411  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 412  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 413  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 414  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 415  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 504  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 507  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 515  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| SUM  | 2   | 5   | 2   | 2   | 1   | 1   | 1   | 2   | 2   | 2   | 2   | 2   | 2   | 1   | 1   | 2   | 1   | 1   | 2   | 1   | 1   | 2   | 1   | 1   | 1   | 2   | 1   | 1   | 1   | 2   | 1   | 1   | 1   | 191 |

Metric conversions for Table 2: .12-.19 inch (3.05-4.83mm), .22 (5.59mm), .24 (6.11mm), .25 (6.35mm), .27 (6.86mm), .31 (7.37mm), .32 (8.13mm), .40 (10.16mm), .42 (10.67mm), .43 (10.92mm), .47 (11.94mm), .50 (12.7mm), .52 (13.21mm), .53 (13.66mm), .54 (13.72mm), .55 (13.97mm), .56 (14.22mm), .57 (14.48mm), .58 (14.73mm), .60 (15.24mm), .62 (15.75mm), .63 (16mm), .64 (16.26mm), .65 (16.51mm), .66 (16.76mm), .67 (17.02mm), .68 (17.27mm), .69 (17.53mm).
diameter. Large-game shot (.3-.49 inch [7.62mm-12.4mm], 22 examples) is relatively poorly represented, the one possible exception being a cluster of six .35 inch (8.9mm) buck shot. Lead balls used as single loads (> .5 inch [12.7mm], 101 examples) could have been used in pistols or muskets with a variety of bores. The clusters of various diameter shot are discussed below.

The lead shot from Boscawen represent three distinct methods of manufacture. The least common method, rolling, is represented by five examples (art. #03-167, 03-289, 03-423, 298, 497). To make rolled shot, a small cube of lead is clipped from lead sheeting of a thickness close to the desired shot diameter. The cube slowly loses its edges as it is rolled between two thick, flat, metal sheets (T. Hamilton 1976:34-35). This method is one of the oldest for making shot. Smaller shot are easier to make by this process than larger shot because less lead has to be rounded off the corners. The Boscawen examples range from .125 to .225 inch (3.2-5.7mm) in diameter and are easily recognizable by their lumpy appearance.

Dropping is the second method of shot manufacture. Nearly all shot less than .2 inch (5.1mm) (49 examples) were made by the dropping method. In this process, lead was melted in a crucible over hot coals. When liquified, the lead was poured through a colander with a specific
hole size. As the lead passed though the holes, it formed small droplets. The droplets fell into a pan of water placed under the sieve and solidified. This process produced shot consistent in diameter and close to perfectly round. Occasionally dimples formed on the shot as it struck the water; teardrop-shaped shot is not unusual, either. Prince Rupert, cousin of Charles II and James II of England, has been credited with the discovery of this technique (Baird in T. Hamilton 1976:35).

A single example (art. #03-497) is teardrop shaped, showing that surface tension did not always have time to round the shot before it solidified. Late in the eighteenth century shot was made in shot towers, buildings over 50 feet (15.24m) high and usually made of brick. Increasing the length of the fall through air allowed the molten lead to form nearly perfect spheres and solidify before hitting the water. This shot was named drop shot and was not developed until 1769 (T. Hamilton 1976:35).

The largest number of lead shot and musket balls from Boscawen were cast. Lead balls could be cast both in an armorer's shop and in the field. Casting was done in split molds. Molds were usually bronze or cast iron and were made so a variety of ball diameters could be cast from a single mold. The mold halves were clamped together and molten lead poured in the top. After the lead cooled
sufficiently to solidify, the molds were split, leaving the cast balls connected to a lead strip.

Typically, a strip of excess lead, or sprue, formed in a groove on the top of the mold. Often a noticeable clip mark remains on each ball where this strip was cut free. In an armorer's shop, musket balls and cast shot could be tumbled in sand to eliminate remaining clip marks and other mold imperfections. Tumbling was not done in the field. Excavations on Rogers Island, New York, have uncovered a large area used by contemporaneous British forces for this type of field casting (Starbuck 1994).

Molds would often align poorly, leaving other marks besides the clip marks. Poor mold alignment produced either a ball with a pronounced mold ring or a ball that looked like two hemispheres pasted together unevenly. Of the total cast lead balls recovered from the Boscawen, only 27 examples had mold rings. Fourteen others were misaligned. Smoothbore muskets are notoriously inaccurate in battle and defects like these must have decreased their accuracy even further.

Musket balls can be altered in several ways during their useable life. The most common and deadly use of a lead ball, or shot, is as ammunition. None of the shot was actually fired. Four of the cast lead shot were bitten (art. #03-200, 03-351, 03-359, 03-539). Their diameters
are .57 inch (14.5mm), .40 inch (10.2mm), .47 inch (11.9m), and .34 inch (8.6mm), respectively. A bullet was often put between a soldier's teeth when a soldier was going to be subjected to high quantities of pain, either during surgery or during lashings. This helped prevent him from shouting or biting off his tongue (Starbuck 1994). The diameters of the Bosca wen examples suggest that regulation rounds were probably too large to have been used for this purpose.

Several other unique features were represented among the ammunition. One example (art. #03-362) approached regulation diameter, but was only an 85 degree wedge. It is unclear how this wedge was used. Two of the .69 caliber (17.5mm) balls (art. #03-322, 03-338) had holes in the side, probably voids in the original casting. One example (art. #03-365) had a large dimple in its side, indicating that not enough lead was poured into the mold during casting. The overall distribution of shot on Bosca wen is described and discussed below.

Musket balls and shot were found at Fort Stanwick, Fort Ligonier, and Fort Michilimackinac, but no thorough descriptive or distributional information is published for comparison with the Bosca wen material.

Machault also yielded shot and balls. The most interesting find was the wide distribution of small shot in the bottom of her bilge. The shot was not limited to the
pump well as seen on Boscawen, but more evenly distributed (Bryce 1984:54-55). The number of shot found on Machault suggests that there was demand in the New World for shot of a diameter appropriate for shooting small game. This buttresses an account of game and fish being taken on and around Crown Point during the campaign (Wood 1882).

**Powder Flask** (art. #03-133)
Length: 5.38 inches (136mm)
Width: 3.44 inches (86mm)
Body Thickness: 1.5 inches (38mm)
Metal Thickness: .03 inch (.76mm)
(Figures 60, 61, 62, 74)

The powder flask is brass and is composed of three pieces: two halves made of pressed sheet brass and a brass mouth-ring connected to the joined halves by three brass rivets and solder. The seams are sealed with either tin or lead. The sealing metal has melted or corroded away from the seams around the flask’s shoulders. Some type of blow caused a pronounced dent on one shoulder of the flask, separating the two halves just above the dent. The mouth has also been dented severely. Threads were pressed into the mouth-ring to hold the screw-in charger assembly.

The whole flask is covered with scratches and small dents, indicating hard use. The original use of this type of brass flask is obvious: it was for carrying powder or small lead shot. This flask is of good workmanship and was an expensive piece of equipment. Despite the flask’s
Figure 60: Powder Flask (art. #03-133)
Figure 61: Powder Flask (Photo) (art. #03-133)
Figure 62: Powder Flask (Side View) (art. #03-133)
value, it was deposited in sediment level E of unit 302.

An exact duplicate is shown in Riling (1956:482). The photograph shows a gate charger attached to an identical flask, originally pictured in a catalog produced by Sykes of Sheffield, the manufacturer, and dated to the first decade of the 19th century (Riling 1956:187). To use this type of charger, one finger was held over the charger’s mouth and the spring-loaded gate was opened with the thumb of the same hand. When the charger was full, the gate was released and the pre-measured amount of powder poured into the muzzle of the musket, carbine, or pistol. Riling mentions only that "The same decoration of beaded band, which defines the shape of the flask, will also be noted on other early production flask specimens" (Riling 1956:299). The 1800-1810 date for this flask given by Riling and confirmed by De Witt Bailey (1991, pers. comm.) is problematic for Boscawen and will be discussed below. No powder flasks were found at Fort Ligonier. However, one powder horn core, one cap, and one suspension ring were found (Grimm 1970:123). No powder flasks were found at Forts Stanwick or Michilimackinac.

POLE ARMS

Pike Head (art. #03-514):
Length overall: 10.5 inches (266.7mm)
Blade length: 6.75 inches (171.5mm)
Max. blade width: 1.5 inches (38.1mm)
Max. blade thickness: .25 inch (6.35mm)
Neck dimensions: .5 inch (12.7mm) wide by .25 inch (6.35mm) thick
Socket Depth: 2.5 inches (63.5mm)
Socket wall thickness: .9375 inch (3/32 inch [23.8mm])
(Figures 63, 84)

The metal grain of the pike head twists one quarter turn at the neck. The blade appears to have been beaten out from only one side. On the conical socket there is a single, off-center hole one inch (25.4mm) from the end into which a pin was driven to hold the shaft. The shaft hole, at its widest, would accommodate a 1.125 inch (1 1/8 inch [28.6mm]) shaft. The socket accepted the shaft much as a modern shovel would its handle. The shaft would have been between seven and 13 feet (2.13m-3.91m) long (Peterson 1968:101).

Pikes had gone out of common use in European land warfare, but were used extensively in the American theater. During the late colonial period pikes were used in both trench warfare and during the boarding or defending of ships at sea (Peterson 1956:293). The Boscawen pike head does not bear any resemblance to the two-tanged pike heads found at Fort Stanwick (Hanson and Hsu 1975:71). However, it does resemble two pike heads found at Fort Ligonier. The Fort Ligonier examples were surface finds "many years ago" and were donated to the Fort Ligonier Museum (Grimm 1970:111). Both examples from Fort Ligonier are 9 1/4 inches (235mm) long.
Figure 63: Pike Head (art. #03-514)
SUMMARY

Relatively few small-arms remains came from Bosawen, making detailed study of the collection easier. This study has revealed that most of the small arms represented by the artifacts were either non-Land Pattern British, Dutch, or French. They were largely the cast-off pieces of broken weapons. In addition, it is clear that more can be done towards identifying and classifying arms found on other late colonial military sites. The high standards of regularity demanded of British Ordnance suppliers (De Witt Bailey 1991, pers. comm.; Kit Ravenshear 1991, 1994, pers. comm.) makes the job of distinguishing between regulation and non-regulation arms much easier. The following section describes the artillery-related remains. Although only munitions are represented, several conclusions can be reached about Bosawen's ordnance, the lading process, and artillery stores transported in her hold.
ORDNANCE REMAINS

Ordnance--more specifically cannon, howitzers, and mortars of various bores and capabilities--formed a deadly part of both the offensive and defensive arsenals of eighteenth-century armies and navies. On defense, cannons were used to mow down rows of men advancing on fortified positions. On offense, artillery regiments battered fortifications with cannons from temporary earthworks. Mortars and howitzers could lob solid shot, exploding shells, and fire bombs into a fort's interior, riddling barracks with metal fragments and setting fire to wooden buildings. Artillery was used at sea for many of the same purposes, with the exception of lobbing exploding shells. This function was reserved for bomb ketches until the 19th century. Shipboard ordnance was used to destroy enemy ships with a range of specially-designed munitions (McConnell 1988:287-329; Bryce 1984:51-58), bombard land emplacements, and cover amphibious landing or withdrawals.

The line between land and naval artillery blurred during the inland campaigns in North America. When no Sea Service artillery pieces were available for the inland fleets, Land Service artillery pieces, normally only used by the Royal Artillery, were adapted for shipboard use. Naval gun carriages were manufactured by Royal Artillery artificers so the Land Service cannon could be deck-
mounted. On occasion Royal Artillery engineers were even called on to build and arm radeaux, or floating batteries, with little help from ship's carpenters or naval artificers (Lewis 1984).

The quantity and diversity of ordnance artifacts from Boscawen is limited, but enough artifacts remain to make archaeologically-derived inferences about the kind of large weapons Boscawen carried. The method of lading artillery supplies on the sloop is suggested, as well. It will be possible to draw some conclusions about Boscawen's role in the war by comparing the artillery remains with the recorded armament of Boscawen during her use as a fighting and transport vessel.

Although no cannon or large fragments of gun carriages were found, four types of artillery munitions were found aboard Boscawen (see Appendix III for illustrations). Solid shot is what is commonly thought of as a cannonball. In the 18th century solid shot was normally cast iron. It was manufactured to nearly the bore diameter of the cannon for which it was intended (see discussion section below). Grape shot was a cluster of cast iron balls bundled together for firing out of a cannon. British grape shot were stacked into a cylindrical cloth sack, grouped around a central pin, and attached to a wooden disk, or sabot (McConnell 1988:315). Canister shot were similar to grape
shot, but the balls were stacked in a tin-plated, sheet-iron cylinder (canister) before being attached to the sabot. Shells were hollow iron spheres filled with powder and fused to explode when they hit their target. Other types of specialized projectiles were used in ship-to-ship combat, but none of these was recovered from Boscawen.

**Swivel Gun Shot and Grape Shot** (For individual artifact numbers and relevant features consult Appendix I. The 68 examples will be handled as a group in Table 3.): (Figures 64, 76, 78, 79-82, 84-86, 89, 90)

Until recently grape, canister, and swivel shot from archaeological sites has been only cursorily examined, and the weapons in which they were used have been overlooked. At Fort Stanwick 588 iron balls were recovered, but they have not been described in detail. The shot from this land site fell into three sizes: 20-22mm (.787-.866 inch), 31.1 percent; 24-28mm (.945-1.1 inches), 45.2 percent; 37-40mm (1.457-1.575 inches), 6.1 percent. Hanson and Hsu (1975:78) make no attempt to determine which caliber cannon the shot came from or explore the distribution of shot on the site.

Of the 17 "canister" shot found at Fort Ligonier, seven examples come in five sizes: .7 inch (17.8mm) (1 example), .82 (20.8mm) (1 example), .88 (22.4mm) (2 examples), .94 (23.9mm) (2 examples), and 1.1 (27.9mm) (1 example) (Grimm 1970:76). Again, nothing is said about the
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Figure 64: Iron Grape and Swivel Shot from Boscawen
(Representative samples)
shots' distinguishing characteristics, the cannon in which they were used, or their distribution on the site. Iron shot from Machault present the same problem. Fifty-six cast-iron and 14 cast-lead balls were recovered. The size range, 2.4cm to 3.2cm (.945-1.26 inches), is given, but no other distributional information is presented (Bryce 1984:54).

The lack of easily-accessible published information on standard 18th-century grape, canister, and swivel shot has kept archaeologically-recovered iron shot from being assigned to specific weapons. Fortunately, information has now been compiled from Royal Artillery Institute records that includes the standard sizes of British artillery ammunition, including the diameters of solid, grape, and canister shot used in each size cannon. Tables of these sizes were compiled from several notebooks dating to within 10 years of Boscawen's service (McConnell 1988:288-290). This makes identifying all the ammunition from Boscawen easier.

Large 68-pounder, 42-pounder, and 32-pounder cannon were not used on Lake Champlain in the 1759 and 1760 campaigns. Cannons used by the British included half-, one-, one and a half-, three-, four-, six-, nine-, 12-, 18-, and 24-pounders. Table 3 presents the size and spatial distribution of iron grape, canister, and swivel
shot found on Boscawen. Although the recorded sizes of the Boscawen shot reflect only an approximation of their original sizes, almost all the Boscawen shot falls within .05 inch (1.3mm) of the standard sizes recorded in contemporary notebooks. These notebooks are summarized in Tables 4 and 5, showing standard grape and canister shot diameters for the smaller cannon used on Lake Champlain during the 1759 and 1760 campaigns. Comparing these three tables allows one to assign each Boscawen shot to a limited number of potential weapons.

Unfortunately, two factors limit the usefulness of direct measurements on the iron shot. First, both the accumulation of a thin corrosion layer and the partial-to-complete disintegration of some examples makes positive identification of original sizes difficult for the entire collection. Eighteenth-century craftsmen measured shot by weight and generally expressed shot diameters in hundreds of an inch. It is difficult to assign the shot to specific weapons without precise diameter measurements or weights. Second, a single shot size could be used in different configurations to fit different size cannon. Therefore, only an educated guess can be made about the weapon that used the shot.

Several features found on the iron shot merit attention. The overall surface condition of the iron shot
Table 4: Standard British Grape Shot Diameters (after McConnell 1988)

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</tr>
<tr>
<td>9-pounder</td>
<td>1.8 (45.72mm)</td>
</tr>
<tr>
<td>6-pounder</td>
<td>1.526 (38.68mm)</td>
</tr>
<tr>
<td>4-pounder</td>
<td>1.386 (35.2mm)</td>
</tr>
<tr>
<td>3-pounder</td>
<td>1.211 (30.76mm)</td>
</tr>
<tr>
<td>1 1/2-pounder</td>
<td>.961 (24.41mm)</td>
</tr>
<tr>
<td>1-pounder</td>
<td>.873 (22.17mm)</td>
</tr>
<tr>
<td>1/2 pounder</td>
<td>.693 (17.60mm) (LEAD)</td>
</tr>
</tbody>
</table>

Table 5: Standard British Canister Shot Diameters for Land Service, 1755 (after McConnell 1988)

<table>
<thead>
<tr>
<th>CANNON SIZE</th>
<th>STANDARD SHOT DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-pounder</td>
<td>.873 (22.17mm)</td>
</tr>
<tr>
<td>6-pounder</td>
<td>.822 (20.88mm)</td>
</tr>
<tr>
<td>3-pounder</td>
<td>.827 (21.01mm)</td>
</tr>
<tr>
<td>1 1/2-pounder</td>
<td>.827 (21.01mm)</td>
</tr>
</tbody>
</table>
ranged from good (art. #03-267) to poor (art. #03-170). Fifteen examples from *Boscawen* had visible sprue marks and mold rings, of which eight examples were .875 inch (7/8 inch [22.2mm]) in diameter. One mold ring protruded .0625 inch (1/16 inch [1.6mm]) (art. #03-559), while others were barely visible (art. #03-140, 03-236). Diameters of these shot ranged from .875 inch (7/8 inch [22.2mm]) to 1.5 inches (1 1/2 inches [31mm]).

Five examples (art. #03-236, 03-239, 03-406, 03-490, 03-553), have clear offsets, reflecting uneven joining of the two mold halves during casting. Four of the five have an approximate .031 inch (.8mm) offset. Two (art. #03-236, 03-490) of the four are .875 inch (22.2mm) in diameter. One example (art. #03-553) is .625 inch (15.9mm) in diameter with a .0625 inch (1.6mm) offset. The .625 inch (15.9mm) example is by far the smallest iron shot found. No equivalent size is mentioned in contemporary written records for this tiny iron shot, but it might be half-pounder grape shot.

Four examples (art. #03-087, 03-170, 03-466, 03-503) represent the most unique kind of shot found on *Boscawen*. Their diameters range between 1 inch and 1.125 inches (25.4mm-28.6mm) in diameter. The examples are spherical, but have two parallel flat spots, the result of fracturing. The resulting shot looks like a cylinder, bulging in the
mid-section. None of the shot has the sprue marks that characterize their individually-cast counterparts. These shot were likely cast in a gang mold. A large opening between adjoining balls on the two mold halves allowed whole strings of balls to be cast in a single pour. Individual shot would be cracked from the "chain" of balls after the gang cooled. Cast balls from this process are generally of poorer quality than their individually cast counterparts, but were faster and cheaper to produce. All three Boscawen examples show some offset, the result of poorly-aligned mold halves.

Corrosion has heavily eroded 19 examples of shot from Boscawen, nine of which were probably originally .875 inch (22.2mm) in diameter. Heavy corrosion formed holes in the side of two balls (art. #03-311, 03-136), probably taking advantage of natural flaws in the metal or voids created during casting. Another seven were welded by corrosion to other balls (art. #03-311, 03-239) in the form of two pairs and one trio. Two of these seven examples were black with corrosion, but had a solid, silver-colored compound in the recessed parts of their surfaces. Used in swivel guns and as clustered grape shot, cast iron and lead balls were deadly. Swivel guns normally were used only on ships or as wall pieces (large muskets) to defend forts. They were effective anti-personnel weapons
when loaded with a single large ball or several smaller balls. However, their accuracy was limited and they were generally used only at ranges up to 300 yards (270m) (McConnell 1988:315-323). The large number of .87 inch (22.2mm) shot suggests that either one-pounder grape shot or 12-pounder case shot was carried aboard.

**Cannon Balls** (art. #03-210, 03-235, 03-238, 03-265, 03-292):
(Figures 65-69, 80, 81, 85, 91)

All of **Boscawen**’s cannonballs were found in the first season of excavation. Table 6 gives the standard bores and shot diameters for British cannon used in 1759 and 1760. Of the five cannonballs found on **Boscawen**, three were for a four-pounder, one was for a six-pounder, and one fit a twelve-pounder cannon. The smaller two sizes were likely for **Boscawen**’s own four- and six-pounder cannon (Crisman 1985), while the 12-pounder ball was more likely lost when the sloop was used to carry munitions for the three artillery radeaux on the 1760 campaign (Lewis 1984).

The 12-pounder ball (art. #03-238) has the British broad arrow clearly marked on its side. One of the smaller balls (art. #03-292) is nearly the same diameter (3.5 inches [88.9mm]) as the tabulated shot size for a British six-pounder cannon. This six-pounder ball has some surface corrosion, which encased and preserved fragments of dunnage originally used to line the bilge. The three remaining
Table 6: Standard British Cannon Bores and Solid Shot Diameters (after McConnell 1988)

<table>
<thead>
<tr>
<th>CANNON SIZE</th>
<th>BORE DIAMETER</th>
<th>SHOT DIAMETER</th>
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</thead>
<tbody>
<tr>
<td>1/2-pounder</td>
<td>1.602 (40.69mm)</td>
<td>1.526 (38.76mm)</td>
</tr>
<tr>
<td>1-pounder</td>
<td>2.019 (51.28mm)</td>
<td>1.923 (48.84mm)</td>
</tr>
<tr>
<td>1 1/2-pounder</td>
<td>2.311 (58.7mm)</td>
<td>2.201 (55.91mm)</td>
</tr>
<tr>
<td>2-pounder</td>
<td>2.544 (64.62mm)</td>
<td>2.423 (61.54mm)</td>
</tr>
<tr>
<td>3-pounder</td>
<td>2.912 (73.96mm)</td>
<td>2.773 (70.43mm)</td>
</tr>
<tr>
<td>4-pounder</td>
<td>3.206 (81.43mm)</td>
<td>3.053 (77.55mm)</td>
</tr>
<tr>
<td>5 1/4-pounder</td>
<td>3.509 (89.13mm)</td>
<td>3.342 (84.89mm)</td>
</tr>
<tr>
<td>6-pounder</td>
<td>3.669 (93.19mm)</td>
<td>3.494 (88.75mm)</td>
</tr>
<tr>
<td>9-pounder</td>
<td>4.2 (106.68mm)</td>
<td>4 (101.6mm)</td>
</tr>
<tr>
<td>12-pounder</td>
<td>4.623 (117.42mm)</td>
<td>4.403 (111.83mm)</td>
</tr>
<tr>
<td>18-pounder</td>
<td>5.292 (134.42mm)</td>
<td>5.04 (128.02mm)</td>
</tr>
<tr>
<td>24-pounder</td>
<td>5.824 (147.93mm)</td>
<td>5.547 (140.89mm)</td>
</tr>
<tr>
<td>32-pounder</td>
<td>6.410 (162.81mm)</td>
<td>6.105 (155.07mm)</td>
</tr>
<tr>
<td>42-pounder</td>
<td>7.018 (178.26mm)</td>
<td>6.684 (169.77mm)</td>
</tr>
</tbody>
</table>
Figure 65: Four-Pounder Iron Cannonball (art. #03-210)
Figure 66: Four-Pounder Iron Cannonball (art. #03-235)
Figure 67: 12-Pounder Iron Cannonball (art. #03-238)
Figure 68: Four-Pounder Iron Cannonball (art. #03-265)
Figure 69: Six-Pounder Iron Cannonball (art. #03-292)
balls range from 3 to 3.1875 inches (76.2mm-81mm) in diameter. While these measurements do not exactly conform to the measurements given in Table 6 for four-pounder solid shot, they all are smaller than the bore measurement of 3.204 inches (81.4mm) given for four-pounder cannon.

Each ball is in relatively good condition other than some surface erosion. All the cannonballs except one three-inch example (art. #03-210) have mold and sprue marks. The one exception (art. #03-210) has a faint mark on the side, possibly a fleur-de-lis. The halves of another four-pounder ball (art. #03-235) are slightly offset. The six-pounder cannonball (art. #03-292) was cast in a horizontal mold, leaving the sprue mark 90 degrees from the mold ring. The cannonballs (art. #03-210, 03-235, 03-238, 03-265, and 03-292) were found in units 511, 402-403, 411, 412, and 412, respectively.

During the Seven Years War, four-pounder cannon were being phased out of standard use in the British Army. By 1800 both the three-pounder and four-pounder guns were declared obsolete for land service (Hughes 1969:30). Despite this trend, the four-pounder was popular in naval service during the Seven Years War (McConnell 1988:92). The reason for this may have to do with compatibility with French naval munitions.

In 1732 the French standardized their cannon with the
decreed that "Henceforth, the only cannon to be manufactured are those with calibres of 24, 16, 12, 8 and 4 \textit{livres}\" (Jobe 1971:62). The \textit{livre} is equal to 1.079 British pounds (Bryce 1984:8). If a British ship used similarly-calibered guns, ammunition and loading implements could be scavenged from captured French ships. The popularity of four-pounders in naval service also raises the possibility that several of the \textit{Boscawen} cannon balls may be French.

A wide variety of cannonballs was found at Forts Stanwick and Ligonier. From Fort Stanwick a total of 32 iron cannon balls were recovered: 14 three-pounder (2.68-2.79 inches [68.1mm-70.9mm]), two four-pounder (3-3.01 inches [76.2mm-76.5mm]), two five-pounder (no dimensions given), 11 six-pounder (3.41-3.52 inches [86.6mm-89.4mm]), two 12-pounder (4.38-4.43 inches [111.3mm-112.5mm]), and a single 16-pounder shot (4.56 inches [115.8mm]). The two most common sizes were probably for the standard three- and six-pounder guns used by British artillery, as indicated by the broad arrow found on four of the six-pounder cannon balls (Hanson and Hsu 1975:76-78). Without the diameters of the five-pounder shot it is difficult to speculate where they originated. The 16-pounder shot is almost certainly French, probably brought from the Lake Ontario campaigns. Hanson and Hsu (1975:78) speculate that it could have been used as a doorstop.
because it was found in a level dating to between 1777 and 1781.

Fort Ligonier yielded "four one-half-pounders, one 1-pounder, three 2-pounders, two 3-pounders, one 6-pounder, and two 7-pounders" (Grimm 1970:76). The lack of heavier cannonballs probably reflects Fort Ligonier’s remote location and the difficulty of transporting large artillery through Pennsylvania’s rugged western terrain. The one-half-, three-, and six-pounder cannonballs are probably from the garrison’s own ordnance, while the origin of the other shot is not clear. The seven-pounder shot could have been used in the French eight-livre cannon or in a well-worn six-pounder cannon. The two-pounder cannonballs could be French, as well. However, without diameter measurements it is difficult to assign these cannonballs to a particular cannon.

Cannonballs found on Machault demonstrate the importance of four-livre cannon in French North American artillery. Out of a total 538 balls, 186 were for four-livre cannon. Of the 186, 94 had a fleur-de-lis stamped on the side. The remaining cannonballs were for six-livre cannon (48 examples, diameters 8.8cm-9.2cm [3.46-3.62 inches]) and twelve-livre cannon (304 examples, 11.3cm-11.7cm [4.45-4.61 inches]). Fourteen British twelve-pounder balls (11cm-11.2cm [4.33-4.4 inches]) and a
nine-pounder ball (10.16cm [4 inches]) document the gun battle that ended Machault’s service. The four-livre balls are attributed to ordnance stores destined for North America because Machault was equipped with only twelve-livre cannon and swivels (Bryce 1984:51).

**Grenade Fragment (art. #03-041):**
Diameter: 3.375 inches (85.73mm)
Wall thickness: .1875 to .375 inch (4.8mm-9.5mm)
(Figures 70, 81)

This iron grenade was found in unit 403. It is hollow to receive a powder charge. The fuse hole is on the mold ring, which is equidistant from where the cast grenade was broken from its sprue. Besides the normal hand-throwing, these grenades could be launched by two different devices. One was a cup that fit on the musket muzzle, the other a special hand-mortar built into the butt of a musket. Two soldiers were required to fire the muzzle-cup variety: one to light the fuse and place the grenade, the other to fire the musket when the grenade was in place.

The mortar-type grenade was fired in the same way as a cannon. The propelling charge was put in the chamber of the mortar after the two-part musket-butt was unfolded. The mortar’s pan was then primed. The grenade fuse was then lit and put in the chamber, after which the grenadier would set off the propellant charge with a pre-lit match (Peterson 1956:206). Needless to say, both types of
grenade launchers could be very dangerous, especially if the propelling charge failed to fire. The lit grenade could explode and kill or maim the grenadiers if not thrown quickly enough.

When a grenade exploded, metal fragments from the casing injured and killed surrounding people. The large size of the Boscawen grenade fragment suggests it was accidently broken rather than exploded. Because Boscawen was not engaged in any boarding action (Crisman 1985; Lewis 1984), the fragment is probably from some other source.

One grenade was part of the Campbell collection at Fort Stanwick, but is of uncertain provenance (Hanson and Hsu 1975:78). Six grenades were found on Machault, five of which were eight centimeters (3.15 inches) in diameter, the other, 7.3 centimeters (2.87 inches) in diameter. Three corresponding fuses were found, one in situ (Bryce 1984:54). A similar fuse would have been placed in the Boscawen grenade.

The contemporaneous British warship Invincible, sunk in 1758, yielded 16 whole grenades stored in an open-topped, lead-lined box in the bow magazine. Several were found with wooden fuses intact, protected by layers of linen and canvas. The canvas was secured by a light whipping around the top of the fuse and glued with sealing wax to the grenade body (Bingeman 1985). No sealing wax or
binding canvas was found on the Bosca\-wen fragment. The lack of any remains on the surface of the grenade fragment suggests that it was discarded prior to falling into the bilge.

**Iron Mortar Shell** (art. #03-473):
Diameter: 6.5 inches (165.1mm)
Diameter of fuse hole: .8125 inch (13/16 inch [20.6mm])
Average inside diameter: 4.25 inches [108mm]
(Figures 71, 72, 84)

The mortar shell, or bomb, has two recessed cavities on the upper surface, straddling the fuse hole. The mortar bomb was originally cast in one piece. Sometime after the mortar shell was excavated from unit 410, it cracked in two. The break reveals interior features, including the method of casting and the grain characteristics of the solidified metal.

The wall thickness of the bomb varies between a half inch (12.7mm) next to the fuse hole and one inch (25.4mm) on the opposite side. The two metal lifting rings are made from .1875 inch (4.8mm) wrought steel, bent into loops and flattened on the ends. When the mortar shell was cast, these loops were set into holders protruding from the bottom of the mold. As molten iron poured into the mold, the flattened loop ends were encased, securing the lifting rings.

The thicker bottom suggests the shell was cast in one pour, with the fuse hole at the bottom of the mold. The
Figure 71: Mortar Shell (art. #03-473)
Figure 72: Mortar Shell (Photo) (art. #03-473)
inside half of the shell’s thicker bottom wall is fine-grained, an indication of rapid cooling. This would correspond to the initial molten metal coming in contact with the cool mold core. As more molten iron poured in the mold heated, allowing the remaining iron to cool slowly. Long, radially-oriented crystals formed in the remaining areas. The mortar wall is filled with solidified bubbles. The bubbles are especially obvious close to the interior and exterior surfaces. There seems to be a faint fleur-de-lis mark on the exterior, although it is not positively identifiable.

The thicker part of the shell was intentionally cast opposite the fuse hole. It was generally thought that the heavier end would right the shell as it fell. This was supposed to assure that the fuse would burn even if the shell hit ground before the interior charge was ignited. It was only in the last decade of the 18th century that shells of constant wall thickness were adopted, after comparative tests (McConnell 1988:291-293).

The national origin of this shell is difficult to specify. British mortar shells of the period are 4.40 inches (111.8mm), 5.54 inches (140.7mm), 7.75 inches (196.9mm), 9.75 inches (247.7mm), and 12.75 inches (323.9mm). These shells were cast to fit the standard mortars of 4.8 inches (121.9mm) (Coehorn), 5.8 inches
(147.3mm) (Royal), 8 inches (203.2mm), 10 inches (254mm), and 13 inches (330.2mm) (McConnell 1988:291-292, 114-120). The mortar shell from Boscawen falls almost exactly halfway between the "Royal" and 8-inch shell size. The diameter is similar to solid shot used in British 42-pounders, but tables for the use of exploding shells in heavy guns are not given until 1813 (McConnell 1988:294).

There are three remaining possibilities. First, the British could have been using bastard-size mortars cast in the previous century. Alternatively, the shell could have been used by the regular French artillery or made to fit a French mortar cast in the previous century. It seems unlikely that the Royal Artillery would be using mortars from the previous century, considering mortar sizes were standardized in the first half of the 18th century. It is more likely that this shell was part of the captured French munitions removed from either Isle aux Noix or Saint Jean, which would be consistent with what Rudi Roth (1993, pers. comm.) has suggested. He feels it is much more likely to be for a mortar shipped to the North America in the late 1600s or early 1700s.

Neither Fort Ligonier nor Fort Stanwick yielded 6.5-inch (165.1mm) shells or fragments. Two complete 4.5-inch (110.3mm) mortar shells and two large fragments of 5.5-inch (134.8mm) diameter shells were found at Fort Ligonier
Fort Stanwick was bombarded with 4.5-inch (110.3mm) mortars in the 1777 siege (Hanson and Hsu 1975:78). Two complete 4.5-inch (110.3mm) shells were recovered from the fort, along with a number of fragments from shells of the same diameter and one fragment from a 10-inch (254mm) mortar shell. Hanson and Hsu (1975:78) conclude that shell fragments must have been collected after battles because the recovered metal only accounts for 11 complete shells. This conclusion is supported by the relatively low number of iron fragments found in Boscawen's bilge. Iron was in high demand in the colonies at the time and was collected after battles through systematic searches.

Fifty-eight complete mortar shells were recovered from Machault, of which 56 were 31.75cm (12.5 inches) in diameter. The remaining two were 30.48cm (12 inches) in diameter, with a seam running through the fuse hole, equidistant from the two lifting handles. The ear-shaped lifting handles were cast into the two mold halves (Bryce 1984:54), a method completely different from that seen on the Boscawen shell.

All the Machault examples have raised collars around their fuse holes (Bryce 1984:54). If these were shells destined to be used by French artillery attacking Quebec in 1760, it seems unlikely that the standard French artillery
would include a mortar that would fire a 6.5-inch (165.1mm) shell. The lack of comparable contemporaneous shells suggests that the Boscawen shell must have been used in a mortar cast prior to 1710. According to Hogg and Batchelor (1972:7), this shell is the proper size for a French demi-cannon from the 17th century. The French had occupied the Champlain Valley from 1690 to the mid-1700s. During this period they had constructed, armed, and manned several forts. It is possible--given the size, casting technique, and lack of comparable, contemporaneous shells--that this shell was part of the armament of one of these early French fortifications.
ANALYSIS AND DISCUSSION

Boscawen, like many shipwrecks, provides a positively-dated, well-preserved collection of artifacts for comparative studies. Warships on North American Lakes, like their ocean-going counterparts, functioned as fighting platforms, cargo carriers, and temporary quarters for their crews. These multiple roles meant that a wide range of armaments were carried aboard. Boscawen's active duty was as a warship and naval transport. Arms remains found in the hold and bilges (Figures 73-92 [APPENDIX I]) consist of items that were probably accidentally and intentionally discarded during her service years and the years she lay intact on her bottom in the King's Shipyard at Ticonderoga. The question of when each artifact was deposited is a difficult one, given the diverse uses to which Boscawen was put, but occasional positive dates can be surmised from individual artifacts and the overall artifact distribution.

Many of the required arms of a standard soldier are represented in the Boscawen collection, as are the munitions necessary to fire her cannon and swivels. Gunpowder, carrying pouches for ammunition, sword sheaths, and ramrods and sponges for artillery--among other things--are missing. Wooden artifacts were preserved, but they are restricted to musket stocks and ramrod fragments. Because Boscawen was built far from the seaboard where Sea Service
small-arms and ordnance were easily available, one would expect to find a wider range of weapons aboard.

Explanation is one aim when analyzing the physical distribution and relative quantities of these arms. The physical distribution of artifacts suggests how and where supplies and munitions were carried aboard the ship, as well as how thoroughly the hull was emptied during and after service. In other words, it allows us to glimpse the behavior of officers, soldiers, and sailors during the Lake Champlain campaigns. Simultaneously, the relative numbers of various arms and their ages give insights into contemporary military practices that might otherwise be unknown. Identifying individual arms and studying their aggregate physical distribution emphasizes the character of sailors and marines serving on *Boscawen* because these men were responsible for the arms being in the hold. Studying the physical remains also refocuses historical research on documents that give insights into individual experiences during the campaign.

For the purposes of analysis, the arms are divided into discrete categories. Musket parts and musket accessories are the first groups to be considered, followed by lead shot, pole arms, and artillery munitions. Only excavation units with arms remains are illustrated in the preceding series of figures. Excavation units are numbered
from bow to stern, 301-314 on the starboard side of the keelson, 401-414 straddling the keelson, and 501-514 on the port side of the keelson. Unit 614 shows the location of the musket lock. The bow is always towards the page top.

MUSKET PARTS AND ACCESSORIES

Musket parts are all grouped within ten feet of the mast step (Figures 77, 78, 81-84, 89), with the notable exception of the musket lock (art. #03-334) (Figure 92). The close distribution of musket stock fragments suggests that there were a number of broken musket parts discarded amidships. The French musket barrel, ramrod fragments, and sheet brass ramrod guides suggest that at some point either French muskets or musket scraps were transported in Boscawen. Crisman (1988:144) has suggested that small arms repair was performed aboard. However, no gun repair has been documented aboard Boscawen. Excavations of the armorer’s shop at Fort Michilimackinac (T. Hamilton 1976:25-31) yielded a diversity of gun parts, including disarticulated lock plates, lock mechanism parts, and breech plugs. None of these are present in the Boscawen collection. It seems more likely that the fractured musket butts, the bent—but otherwise intact—French musket barrel, and the diversity of ramrod pipes are from storage or transport activity which is documented during the 1760 campaign.
The stylistic range of ramrod pipes from Boscawen is closer to the range of pipes found at Fort Michilimackinac. Two pipes (art. #03-457, 03-529) are exact duplicates of guides found at Fort Michilimackinac (T. Hamilton 1976:17L). The wide range of ramrod pipe styles can be explained in two plausible ways. A wide range of weapons could have been used by the men aboard Boscawen. This seems less likely because the preferred weapons for the British were regulation British Land-Pattern arms and British or Dutch civilian arms, which would be represented by a less diverse array of ramrod pipes. The ramrod guides from Boscawen more likely represent a mixing of gun parts collected from French forts along the Richelieu River (Lewis 1984:14) with parts broken from the British regulation and civilian arms carried aboard.

There were no close groupings of French hardware for the French musket barrel (art. #03-051) or French-attributed ramrod pipes (art. #03-252, 03-328, 03-457, 03-474, 03-529), so the likelihood that a whole musket was left in the bilge when Boscawen was abandoned is slim. It seems most likely that the musket parts of French origin were part of the cargo of surplus arms, munitions, and parts removed from Isle aux Noix in 1760, as well.

Considering Boscawen's construction, the reason for storing muskets and musket parts amidships is apparent.
Amidships was the widest, deepest, and most protected part of the hold. Also, the main hatch was the largest opening above the hold, making it easier to load and unload bulky objects. If long-four to four-and-a-half foot--shoulder arms and cannon were transported, they would have been most easily loaded through the largest hatch. Additionally, cannons and heavy crates could have been lowered into and hoisted from the hold by a tackle attached to the boom.

The whole bayonet and two fragments came from opposite ends of the hull. Judging from its manufacture date and physical location, the nearly complete bayonet (art. #03-337) was probably wedged in part of the now-disintegrated bow (Figure 80). However, it is possible that the bayonet was deposited on the site during the Revolutionary War. The poor condition of the remaining two bayonet fragments suggests that they were probably broken and lost in action. It is also possible that they were part of the scrap from the French forts. It is unlikely that either was part of a fully functional bayonet when dropped into the hold.

The most likely activity suggested by the clusters of ramrods, ramrod tips, and the musket worm in the aft part of the hull is storage of musket accessories. Only the ramrods could have floated into the stern from farther forward. In either instance, is likely that musket
accessories were loaded and stored aft of the mast, possibly through the aft hatch. The few ramrod fragments found in unit 405 (art. #02-184) (Figure 82) could have floated into the bow after Boscawen was abandoned.

The powder flask (art. #03-133) (Figure 74) is an anomaly. Except for the powder flask, comparable armament remains for all the Boscawen arms have been found on contemporaneous sites. The flask's post-1800 date (De Witt Bailey 1991, pers. comm.; Riling 1956:299) indicates that it is intrusive to the hull. However, its position within the wreck--wedged between two frames--means a 1759-1760 date should not be completely ruled out (Kevin Crisman 1995, pers. comm.).

The flask's lack of a charger is an important clue to how it was deposited in the bow. If it were intentionally stored by its owner, the charger would have been in place. It seems most likely that the flask was bent during use, splitting the side seam. The resulting leak would have made the flask worthless for holding powder, much less keeping it dry. If repair facilities were not immediately available, the owner could have unscrewed the charging mechanism to use on a replacement body and thrown out the body. The flask was probably deposited on the site after Boscawen sank, possibly during the American Revolution.
GUNFLINTS

Middle to late 18th-century military gunflints and gun spalls were imported from three countries: France, Britain, and Holland and spalls were produced in the field from local flint. Generally, honey-colored flints came from deposits in France. Holland produced a wide range of colors, from light brown to black and grey to black flints came from southeastern England.

British knappers of the late eighteenth century produced consistent, well-shaped gunflints using elements of the French blade technology. These flints were trapezoidal, formed by snapping off long blades into two to four shorter pieces. The method of manufacturing various sizes of English blade flints was thoroughly described by Skerchly (1879), who says that English blade flints were not commonly produced until after the American Revolution.

The absence of any late-style British gunflints suggests that the assemblage dates prior to the American Revolutionary War. The assemblage is also consistent with "provenanced" flints described by de Lotbiniere (1984). Flints he observed from wrecks of the pre-1760 period were individually struck from cores. Most were also grey to black and had a clear bulb of percussion. This is consistent with flints from Boscawen.

Gunflints (Table 7) were widely distributed over the
Table 7: Distribution of Gunflints from Boscawen

<table>
<thead>
<tr>
<th>UNIT 301</th>
<th>UNIT 401</th>
<th>UNIT 501</th>
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<tbody>
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UNIT 314 | UNIT 414 | UNIT 514 |

Note: Units are arranged sequentially, top to bottom. Table does not include artifact #05-175 found in Unit 606 or artifact #05-053 found on land.
wreck. The overall number of flints (25) is smaller than for any contemporary land site. Only one example from Boscawen had its original edge, evidence of never having been used. With one exception, the flints are evenly distributed over the length of the hull. Most flints are near the keelson. This suggests that a majority of the flints were lost during everyday service.

There is a single concentration of eight gunflints in the stern (Figures 85-86), including one French blade flint and a honey-colored spall. The flint concentration coincides with a shot concentration in the same area (see below). The flint concentration could possibly be attributed to transportation of the useful weapons accessories from Isle aux Noix. However, it is also possible that these flints were part of a single musket accessory kit lost in the bilge.

MUSKET BALLS AND SHOT

The groupings of musket balls and lead shot are striking (Table 2). First, there is a clear size clustering of 60 balls around the standard diameters for Long-Land Pattern and Long-Land Pattern-like musketballs (.69 caliber [17.5mm]). Additionally, there is a cluster of 14 examples around the standard diameter for French musketballs and carbine-bore English musketballs (.63 caliber [16mm]). Another cluster of 13 balls appears
around the size of ammunition for light infantry carbines and regulation-bore pistols (.56-.57 caliber [14.2-14.5mm]). Each of these clusters corresponds to weapons of .75 (19mm), .69 (17.5mm), and .63 (16mm) inch bore, respectively.

Moving to the smaller lead shot, there are clusters around .35 (9 examples), .26 (7 examples), and .15 (56 examples) inch (8.9mm, 6.6mm, 3.8mm). The .35 and .26 inch sizes correspond to shot that would have been used for a typical "buck and ball" load. This type of load was one musketball and one to three "buck" shot fired in a single charge, providing more coverage across the line of fire. The .26 and .35 inch shot were also popular for hunting medium to large game animals, a practice common on military campaigns. The clustering of 56 small shot (.06-.19 inch [1.5mm-3.8mm]) corresponds to shot used for shooting birds and small game.

The presence of lead ammunition in the hull can be attributed to careless handling of shot kegs, pouches, and canisters during the loading and unloading of the hold. Some of the lead ammunition could have been lost during everyday activities aboard the vessel. Why so many shot ended up in the ends of the hull is a more difficult question. These areas were often used for storage, and could have been Boscawen's small-arms shot lockers.
Officers and crew were also quartered in the ends of the hull, where they may have spilled shot at various times.

One caveat exists, however. The current distribution may not reflect the original positions of the shot when deposited. The shot could have rolled forward or aft in the bottom of the bilge, finally being funnelled into the ends next to the keelson. Despite this possibility, it seems more likely that the current distribution generally reflects the original deposition pattern. The bilge was filled with dunnage, discarded items (Crisman 1985), and ballast remains, effectively limiting the longitudinal movements of heavy objects in the hull. However, lead balls and shot could have easily rolled down the ceiling planking, lodging against the keelson. Once in this position, the ballast and debris probably kept them from being shifted along the keelson. There is no evidence of an uniform shift of all the shot towards either the bow or stern.

There is a clear group of 34 regulation-size balls (.69 inch [17.5mm]) in the bow (Table 2). Such a high concentration of this particular size strongly suggests that the small arms shot locker for Boscawen while on active duty was in the bow. The British marines and soldiers assigned to the sloop might have stored kegs of ball under the forward hatch, a pattern observed on
Machault, as well (Bryce 1984:55).

There is a more diverse distribution of lead ammunition in the aft end of the vessel. There is a small cluster of six British regulation-size musketballs just aft of the maststep (unit 410/411) and clusters (five or greater) of British regulation-size musketballs, French (or English) carbine-bore balls (.57-.58 inch [14.5-14.7mm]), .31-.35 inch (7.9-8.9mm) shot, and .12-.19 inch (3-4.8mm) shot in unit 412 (Figure 85). This diversity of sizes in a single area suggests that an assortment of weapons' equipment was stored in the stern. The trail of munitions from this cluster seems to lead more clearly to the stern (18 examples in units 412/413, 413, and 414) rather than towards the bow (14 examples in units 411 and 410, excluding the pumpwell). Shot in this area was probably loaded and unloaded through both the main and rear hatches. Unfortunately, without historical documentation of the types of pistols and other small caliber weapons used by British soldiers and marines on this campaign, we cannot positively attribute the smaller diameter shot (6mm-12mm) to either French or British sources.

One anomaly in the lead ammunition distribution is the grouping of 50 shot, all less than .19 inch (4.8mm), in the pump well. These pellets are by far the most mobile of the shot because of their light weight and small size. Most
weigh less than four grams and are less than one-eighth inch (3mm) in diameter. While it is possible they all come from a single spill from a mishandled shot pouch, they were more likely drawn together from individual, smaller spills by the movement of water towards the pump. They are easily small enough to fit through Boscawen's limber holes. In either instance, the grouping eliminates the possibility of this cluster being deposited after the ship was abandoned.

Thousands of small, sieve-made shot were found on Machault, where they must have been destined for use in North America (Bryce 1984:55). Bird shot of this size was not generally used during battle on military campaigns because it was not an effective anti-personnel weapon. However, it could have been used for bird-hunting on the campaigns. While laid up during the winters and springs of 1759, 1760, and 1761, Boscawen could also have been used as a blind for hunting pigeons, ducks, and geese. Even today several marshes on the southern end of Lake Champlain are reserves for hunting Canada geese (personal observation).

BOARDING PIKE

Not much can be inferred from the single pike head (art. #03-514). Boarding action was probably anticipated during Boscawen's service, so the pike head's presence is not anomalous. However, how it was broken and dropped into the hold is not clear. Its location supports the idea that
bulky arms were stored amidships. It is not clear whether this pike head was manufactured in England or in the Americas.

ARTILLERY MUNITIONS

Iron grape, canister, and swivel shot were common on Boscawen (68 examples), especially considering she was supposed to have been cleaned before being laid up. The large quantity of iron shot strongly supports documentary evidence of Boscawen's mounting swivel guns and her use as an artillery transport during the 1760 campaign (Lewis 1984). The distribution of shot (Table 3) suggests that her officers ordered swivel munitions and grapeshot stored in the stern, under the aft deck. If the swivel guns were mounted on the aft deck, this would be the most efficient place to store their ammunition. The most common diameter is .87 inch (22.1mm); the large number (27 examples) of this size in the stern suggests that it is the size used in Boscawen's own swivels, and it is the correct size for one-pounder grape shot (Table 4). This size is also appropriate for British 12-pounder canister shot (Table 5). Despite this potential confound, it still is more likely that this diameter shot was for the sloop's own swivels.

Another small cluster of nine 1.50-1.56 inch (38-40mm) shot were found in units 412-414. This is close to both the single-shot load for a half-pounder (Table 6) and the
grape shot diameter for a six-pounder (Table 4). These shot were probably used in the sloop's own six-pounders, or in the swivels, if they were half-pounders. The relatively thin distribution of the remaining iron shot over the rest of the wreck suggests that a diversity of cannon and ammunition was carried aboard. There are no other concentrations of shot, suggesting that most examples were lost during everyday activities. One curious aspect of the smaller iron shot is the lack of accompanying remains of sabots or spindles to confirm the presence of stands of grapeshot aboard. Amherst only mentions that ammunition was loaded aboard in 1759. He does not detail the types of ammunition loaded (Webster 1931:179).

Cannonballs were only represented by five examples. Their physical distribution on the wreck suggests that the sloop's own ordnance munitions were stored just aft of the main hatch. Four of the five were located in units 511, 411, and 412, including two of three four-pounder balls and the six-pounder ball. The twelve-pounder example is clearly part of the artillery munitions carried in 1760. There was no evidence of a shot locker in Boscawen's hold, unlike on Defense, another late colonial vessel (David Switzer 1992, pers. comm.). This suggests that ordnance munitions were carried in crates or stored individually in the hold.
The mortar shell (art. #03-473) is perhaps the most intriguing of the artillery munitions. It is a size not used in contemporary European theaters and presents a problem both in identification and attribution. After consulting with one of the foremost students of European artillery (Rudi Roth 1993, pers. comm.), it seems most likely that this shell was manufactured around 1700 to fit a bastard-sized mortar. If the shell were used in a mortar carried on the 1759 or 1760 campaigns, it would be further evidence that older weapons were shipped to the colonies. The shell’s position in the center of the hull supports Boscawen’s documented use as an artillery transport in 1760 (Lewis 1984).

Last in the artillery category is the grenade fragment (art. #03-041). Because it was found in the bow, it would be easy to surmise that grenades were stored in the bow. However, to do this on the basis of one example seems too tenuous. It would have been easy for munitions fragments to drop into the bilge.

DEPOSITIONAL FACTORS AND OVERALL DISTRIBUTION

To a large degree, Boscawen was undisturbed during the time between its sinking and excavation. This was not the case at Fort Stanwick, where many house foundations and utility lines disturbed the site (Hanson and Hsu 1975:3-5), or Fort Ligonier, that also ended up in the middle of a
city. By contrast, Boscawen, Machault, Invincible, and a host of contemporary shipwrecks have generally not been disturbed by construction or systematic looting. The only potential intrusions of colonial-era weaponry into Boscawen's archaeological assemblage are the later military activities of the Americans and British in the American Revolutionary War.

The Americans and British constructed fortifications and a floating bridge in the vicinity. Both sides also massed troops in the area, resulting in the loss of an unknown quantity of munitions and arms into the lake. Indeed, on the Vermont shore of the lake—across from the King’s Shipyard—massive amounts of weaponry and shot were dumped in the lake in 1777 (Kevin Crisman 1995, pers. comm.). The powder flask might be an example of this intrusive material from the Revolutionary War.

Boscawen was also systematically abandoned. Valuable items, arms included, were consciously unloaded from the hold and all the salvageable fittings were supposedly removed. Despite this systematic stripping of equipment, many items remained on board (see Crisman 1985 for details). The arms remains left aboard were mostly cheap or broken and useless items. The loss of this material would hardly have concerned soldiers unloading and cleaning the hold. If these items were being transferred from Isle
aux Noix to Crown Point in 1760, they probably would have been treated no differently than modern scrap metal. That is to say of modest value, but not valuable enough to be worth scouring the noisome bilges.

The overall distribution of the armament and ordnance remains should be noted, as well. Almost all arms-related artifacts were within two feet of the keelson. This could reflect a number of different kinds of deposition. If weapons and scrap were loaded and unloaded from centrally-aligned hatches, many pieces could have been dropped on top of the ballast pile, some pieces were possibly walked on and crushed, or sandwiched between ballast stones. Every item loaded or unloaded from the sloop had to pass over the keelson, making the centerline of the hull a more likely place to lose individual items. If the arms were stored evenly across the hull’s width, the concentration of remains along the keelson represents a post-depositional funneling of the remains towards the lowest point in the bilge, along the keelson and keel.
CONCLUSIONS AND DIRECTIONS FOR FURTHER RESEARCH

Several conclusions can be drawn from Boscawen's armament remains. Although drawn from a combination of the current historical research and the physical distribution of artifacts in the hull, these conclusions are by nature subject to future revisions. New insights regarding the processes by which the artifacts were used and discarded could easily arise from more comprehensive historical research, further illuminating the behavior of the sailors, soldiers, and officers who served on the Lake Champlain campaign. In addition to presenting conclusions, this section proposes some fruitful topics for further documentary and archaeological research. Several sources of primary information are noted in this section.

Most conclusions relate to the process of lading the ship. This includes both loading and unloading cargo, crew, and passengers (or prisoners). The arms remains indicate that a wide range of weapons were present aboard Boscawen at one point or another. British Land Pattern muskets, British and Dutch civilian muskets, French military muskets, and French trade guns are all represented in the collection. The diversity of the collection indicates that British and French forces were using many old, outmoded, or civilian weapons to fight in government-sponsored campaigns. Accessories and parts for at least
six types of muskets of three nationalities (Dutch, English, and French) were present aboard, indicating that North America may have been a "dumping ground" for these second-grade or outmoded weapons (De Witt Bailey 1995, pers. comm.). This is confirmed by a wrought iron swivel gun recovered from Crown Point, around Fort Saint-Fredric, the abandoned French fort (Kevin Crisman 1995, pers. comm.).

As we have seen in the previous chapter, certain types of armament remains cluster in different parts of the hull, indicating that long arms and large ordnance ammunition were probably loaded through the main hatch and stored just aft of amidships, in the central part of the hold. If cannon were carried in Boscawen's hold, they probably would have been loaded in this same area.

Ammunition and accessories for the ship's swivels and muskets appears to have been stored in the ends of the hull. Most of the ammunition for Boscawen's swivel guns was likely stowed in the rear of the hold, through the main and aft hatches. The archaeological evidence suggests that the sloop's swivels were either large muskets, half-pounder cannon, or one-pounder cannon. The use of four- and six-pounder cannon is confirmed by the presence of the appropriately-sized solid and grape shot. Grape shot for six-pounders was concentrated in the aft end of the hold.
Conclusions can also be drawn about the crew and officers' attitudes towards the process of lading. The quantity of grape shot and musket ammunition—as well as the size of the six artillery rounds—makes it clear that the crew was not fastidious in unloading the vessel or cleaning the bilges. This behavior must have been—at the least—overlooked by the officers supervising the process. This indicates that there was only moderate concern about arms supplies and that the campaign was relatively well-supplied, at least on the British side.

It is also reasonable to conclude that there is physical evidence for *Boscowen*'s use as an armed transport in 1760. This conclusion derives from the presence in the hold of French musket parts, small-arms ammunition for French weapons, French spall-type and blade-type flints, and a possibly-French cannonball. Some of these remains could have easily been lost while *Boscowen* was conveying surplus equipment from French forts on the Richeleau River to Crown Point or Ticonderoga.

Despite leaving a diversity of arms parts and accessories, the crew did not leave any whole weapons or accessories. Whole weapons were considerately more valuable, more visible in the hold, and more conscientiously stored and removed. This is a pattern largely confirmed by other types of artifacts found aboard
the wreck (Crisman 1985).

Continued documentary and archaeological research will help to further clarify Boscawen's role in the Lake Champlain campaign, and may shed new light on the attitudes of crew and officers. Several questions could be addressed through further archival research. By comparing the 1760 crew muster rolls with name indexes in local archives in Boston, Newburyport, and Newport, Rhode Island, the individual crew members can be traced and any remaining diaries (Moffett 1932; Wood 1882-1884), journals (Hawkes 1911; Putnam 1886), and letters collected. This might help address questions about how the officers and crew felt about the campaign, their compatriots, the ship they were sailing, and the supplies they were given. Anderson (1984) has shown the power of this approach for exploring themes of late colonial life.

This line of research could also be pursued in the Public Record Office in England. Many English officers kept journals, besides the ones mentioned thus far. However, their journals and correspondence are not as accessible or well-published. There might be information in the writing of Colonel Montgomery (77th Regiment), whose troops served on board in 1759. The diaries of Alexander Grant might also yield interesting information, as he was assigned to service on Boscawen in 1759 and was the naval
commander on Lake Champlain in 1760. It is possible that Boscawen's conversion to a transport for the artillery was made on the basis of her sailing properties, which Grant would have known intimately. The diaries of Colonel Ord and his artillery officers for 1759 and 1760 might also have information about Boscawen's use. It would be more difficult to trace English and Scottish regulars' journals or correspondence because of their lower social status and general avoidance of writing, but the men's names might be available and a search for correspondence and diaries would be worthwhile.

Similarly, French officers and men often had important comments to make about the strategies employed by both sides in the Seven Years War. Their letters to each other, Vaudrielle (the French governor), the administration in France, and home, have been incorporated into accounts of the campaigns (Lee 1969; Charland 1960; Lewis 1983), but the histories tend to be written only from accounts by the uppermost echelon of the French officer corps.

A number of New England shipwrights and apprentices were enticed to join the campaigns from 1754 to 1760, some of whose names are recorded in the War Office records and the more well-known journals. These names should be researched in the archives in and around Boston and Newport for letters and other records of their service. This might
help clarify the changes made in ship design and construction for the ships built to sail on the Great Lakes.

Archaeological research could go in several interesting directions. Probably the most important in terms of the armament remains is a comprehensive re-study of arms-related remains from military sites of the Seven Years War. There appear to be serious inaccuracies in the identification of some published arms remains and under-publishing of armament remains from other sites. These problems have contributed to the generally poor understanding of differences in the types, quantities, and distribution of small arms on Seven Years War sites. Such a re-survey would generate additional conclusions about the variations in arms distribution across the Northeast; indeed, questions about the overall nature of arms distribution could be addressed.

A concurrent, more comprehensive study of extant weapons in American, French, Dutch, and English collections would immeasurably improve the accuracy of identifications made of archaeologically-recovered arms remains. Published surveys of these collections have not been done with the archaeologist in mind. They often lack the necessary detail—both in measurements and visual representations—to identify even the nationality of a disarticulated gun part.
There is a awareness of this shortcoming among some historic arms experts (Kit Ravenshear 1994, pers. comm.; De Witt Bailey 1991, pers. comm.), but it will probably be a cooperative effort of archaeologists and collectors that makes more detailed information available, improving on early efforts by Bailey (1971), Blackmore (1961), and others.

Appendix II is a first attempt at improving knowledge of these collections among archaeologists. It includes measurements of the brass furniture from all Long Land Pattern weapons in the Colonial Williamsburg collection. With these measurements in hand, an analyst should be able to determine with certainty whether individual pieces of gun furniture from an archaeological site of the late eighteenth century are from regulation British weapons, especially if the furniture is from a Land Pattern or Land Pattern-like weapon.

Technological studies could be performed on a sample of Boscawen's arms. Trace element analysis of the lead shot and unidentified brass ramrod pipes might help determine where and under what circumstances they were manufactured. The same type of comparative work could be done on the cannonballs and shell. These studies would require the use of specialized equipment and procedures.

Finally, excavation of one of the French sloops that
sailed on Lake Champlain would add substantially to our knowledge of the ships sailed in the Seven Years War. Not only would it provide a complete sample of what a vessel sailed by both the French and the British had aboard, it would also provide an opportunity to collaborate with Canadian experts and augment our knowledge of French shipbuilding in Canada (Mathieu 1971). The British seemed eager to use the captured French sloops in 1759 and 1760. In addition to needing all the ships they could put in service, the British seem to have favored the smaller French vessels in 1760 and 1761. A search should be undertaken to find out why this preference existed. These are just a few of the potential avenues of research that could be pursued in the coming years.
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APPENDIX I

Units 601-201
Units 602-202
Units 603-203
Units 604-204
Units 605-205
Units 606-206
Units 607-207
Units 608-208
Units 609-209
Units 610-210
Units 611-211
Units 612-212
Units 613-213
Units 614-214
Units 615-215

Figure 73: Excavation Unit Guide Map
Figure 74: Units 301-302
Figure 77: Units 307-308
Figure 78: Units 309-310
Figure 80: Units 401-402
Figure 81: Units 403-404
Figure 85: Units 411-412
Figure 87: Unit 415
Figure 89: Units 505-506
Figure 90: Units 507-508
Figure 91: Units 511-512
APPENDIX II

ARTIFACT NUMBERS AND UNIT PROVENIENCES FOR LEAD AND IRON SHOT FROM BOSCAWEN

LEAD SHOT

(Note: Number of examples per line is one unless otherwise noted.)

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APPENDIX III

On May 2, 1991, a meeting was arranged in Williamsburg to review the extant examples of Long Land Pattern muskets in the Colonial Williamsburg collection. Present at the meeting were De Witt Bailey, Kit Ravenshear, Richard Cheel, Fred Lewis, Jay Gainor (Collection Curator), and the author. One day was spent reviewing individual muskets and making notes about their appearance and specific traits. As a long-time student of 17th and 18th-century weapons, De Witt Bailey was interested in the overall appearance of the weapons, the regiments from which they came, and technical aspects of their manufacture. Kit Ravenshear was very interested in the detailed measurements of the muskets. He manufactures replica muskets and rifles. Every part of the replicas is recreated from measurements and casts taken from original muskets. He casts the brass furniture using the same processes as those used for the original hardware. Fred Lewis and Richard Cheel are gun collectors interested in improving their understanding of the changes made to Long Land Pattern weapons over the length of their service. The author was interested in improving the quality of identifications made by archaeologists working on 18th-century sites where musket remains have been found. Jay Gainor wanted our collected opinions about the weapons for curatorial purposes.
After consulting for two or three hours, we decided that detailed measurements of each musket's brass ramrod pipes would be helpful to all of us. We set to work measuring the pipes (Table 8). Once this was accomplished, the meeting ended for lunch. After lunch, the author returned alone to take additional measurements on the brass furniture and barrel (Table 9).

We concluded from the review that the manufacturing tolerances for Ordnance muskets were tight. This implies that careful comparison of archaeologically-recovered furniture with these extant examples would reveal whether the recovered pieces were from Ordnance-assembled weapons. In the case of Boscawen, it was clear that only one artifact--ramrod pipe #03-270--could be positively attributed to a Long Land Pattern musket. We also concluded that a comprehensive re-study of musket parts from late colonial sites would clarify how widely these Ordnance-manufactured weapons were distributed in North America. The measurements are tabularized below, followed by a key with notes on each musket.
Table 8: Measurements of Ramrod Pipes from Long Land Pattern Muskets in the Colonial Williamsburg Collection

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<th>Gun A</th>
<th>Gun B</th>
<th>Gun C</th>
<th>Gun D</th>
<th>Gun E</th>
<th>Gun F</th>
<th>Gun G</th>
<th>Gun H</th>
<th>Gun I</th>
<th>Gun J</th>
<th>Gun K</th>
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<td><strong>Butt plate width (max.)</strong></td>
<td>2.23</td>
<td>2.158</td>
<td>2.221</td>
<td>2.155</td>
<td>2.136</td>
<td>2.194</td>
<td>2.13</td>
<td>2.163</td>
<td>2.232</td>
<td>2.073</td>
<td>2.19</td>
</tr>
<tr>
<td><strong>Butt plate height (max.)</strong></td>
<td>5.535</td>
<td>5.405</td>
<td>5.384</td>
<td>5.571</td>
<td>5.543</td>
<td>5.304</td>
<td>5.402</td>
<td>5.316</td>
<td>5.478</td>
<td>5.23</td>
<td>5.438</td>
</tr>
<tr>
<td><strong>Escutcheon plate width</strong></td>
<td>.983</td>
<td>1.069</td>
<td>1.055</td>
<td>1.016</td>
<td>1.078</td>
<td>1.065</td>
<td>1.08</td>
<td>1.065</td>
<td>1.073</td>
<td>1.028</td>
<td>1.064</td>
</tr>
<tr>
<td><strong>Escutcheon plate length</strong></td>
<td>2.709</td>
<td>2.663</td>
<td>2.649</td>
<td>2.555</td>
<td>2.658</td>
<td>2.658</td>
<td>2.66</td>
<td>2.632</td>
<td>2.621</td>
<td>2.632</td>
<td>2.589</td>
</tr>
<tr>
<td><strong>Backing plate finial ball diameter</strong></td>
<td>.232</td>
<td>.211</td>
<td>.218</td>
<td>.209</td>
<td>.338</td>
<td>.306</td>
<td>.306</td>
<td>.29</td>
<td>.297</td>
<td>.292</td>
<td>.31</td>
</tr>
</tbody>
</table>
KEY TO TABLES 8 AND 9

Gun A--Iron-mounted, Second pipe appears to be a reproduction
Gun B--Brass Furniture, Lock marked "E. Cookes 1729", CW #19, Wood ramrod
Gun C--Brass Furniture, Lock marked "Jordan 1734", CW #51-338, Wood ramrod
Gun D--Brass Furniture, Lock marked "Tower 1741", CW #51-325, Wood ramrod, second pipe damaged, tailpipe worn
Gun E--Brass Furniture, Lock marked "Farmer 1742", CW #51-331, Wood ramrod, Tailpipe damaged
Gun F--Brass furniture, Lock marked "Tower 1741", CW #51-342, Wood ramrod, first and third pipes worn
Gun G--Brass furniture, Lock marked "Tower 1742", escutcheon marked CR No 3, wood ramrod
Gun H--Brass furniture, Lock marked "Jordan 1745", CW #49-139, wood ramrod
Gun I--Brass furniture, Lock marked "Farmer 1747", CW #51-323, steel ramrod
Gun J--Brass furniture, Lock marked "Farmer 1750", CW #51-327, steel ramrod
Gun K--Brass Furniture, Lock marked "Edge 1756", CW #51-326, Steel ramrod, Trumpet-shaped first pipe (3.68 inches long).
Figure 93: Parts of a Musket (idealized) (after Hamilton 1976)
Figure 94: Artillery Ammunition (idealized)
VITA

Brinnen Stiles Carter was born June 15, 1966. He attended Saint Barnabas Elementary through the 7th grade and DeLand Junior High and High Schools grades nine through 12. He was graduated (summa cum laude) from high school in 1982 and went to Bowdoin College, Brunswick, Maine. Junior year was spent in Madrid in the Stetson University Study Abroad Program. He was graduated from Bowdoin College in May, 1986, with an Artis Baccalaureus (A.B.) in History (with Honors) and Anthropology. After attending University of Florida in the spring of 1988, he was matriculated into the Nautical Archaeology Program at Texas A&M. Brinnen is now married (7/3/93) to Jennifer Lynn Castiglione and working towards the doctoral degree in anthropology at University of Florida. His address is 9025 T-Bird Road, Tallahassee, Florida 32310.