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EXCAVATIONS AT CASTLE HILL

by

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BUILDING HARDWARE

Artifacts described in this chapter include specimens used on and in the construction of buildings. Tie rods, timber braces, brackets and beam hangers are included. Hinges of various types are described here. A large number of specimens have been identified as locks and latches and these are also included. The most common wrought iron structural artifact was the nail and a detailed description and analysis of these specimens is presented.

Lock Plates and Fragments

Several specimens have been identified as iron plates from stock locks or fragments of such plates (Figs. 158, 159). The nearly complete specimens were rectangular although they are missing sections now. They had perforations for attachment in the corners and in one case a rivet with an irregular rectangular washer is in situ. Near the bottom and at the centre is a key hole. On either side of the key hole is a

short, narrow, vertical slot through which the blade ends of the ward were formerly fastened. Above the key hole and ward slots are other perforations, or in the case of more complete specimens, the riveted attachment for the tumbler pivot. Some of the specimens are small fragments of such lock plates and have been identified on the basis of remnants of the key hole or ward anchor slots. The specimens listed below are plates or plate fragments lacking other parts of the lock or mechanism. The specimens have been identified by reference to Noel Hume (1970: 243-52).

Prov.	Length (in mm.)	Width (in mm.)	Thickness (in mm.)	Remarks or Description
2A1A5	150.0	105.0	2.0	Identified by perforations
2A1A7	57.0	50.0	2.0	Identified by perforations
2A6B1	40.0	40.0	2.0	Identified by perforations
2A6D6	270.0	137.0	2.0	Partly complete plate. Riveted washer in one corner. Key hole present, bottom is missing. Two slots adjacent to key hole filled with remnant of key hole collar blade. Two open ward attachment slots, one on each side of key hole.

Prov.	Length (in mm.)	Width (in mm.)	Thickness (in mm.)	Remarks or Description
2A6D6	260.0	130.0	2.7	Part of a rectangular plate with key hole intact. Open ward blade slots are present on each side and slightly above the key hole. An open perforation for the tumbler pivot is present. At one side the plate has a rectangular notch, perhaps cut to fit a specific location. The notch is 78.0 mm. long and 32.0 mm. wide.
2A6D6	87.0	42.0	3.0	Plate fragment with top of key hole and one vertical slot intact.
2A6D6	95.0	77.0	5.0	Plate fragment including bottom portion of key hole opening (?). Probably a lock plate fragment.
2A6D7	86.0	73.0	3.0	Probable plate fragment with part of vertical slot intact.

Prov.	Length (in mm.)	Width (in mm.)	Thickness (in mm.)	Remarks or Description
2A6D10	87.2	80.0	2.3	Plate fragment with perforation in one corner. Probably part of a lock plate.
2A7A3	60.0	45.0	2.0	Fragment identified by perforations.
2A8B1	137.0	87.0	2.0	Half of small lock plate, broken across key hole; one side of key hole from top to bottom is intact. Has an open perforation and another with a riveted pivot <u>in situ</u> .
2A10E3	46.0	40.0	1.0	Plate fragment identified by perforations.
2A10D14	50.0	-	-	Plate fragment with remnant of a collared key hole intact.

Lock Plates with Mechanism

Three specimens of stock lock plates identical with those described above include parts of the internal lock mechanism intact on the interior. They are similar to the

specimen illustrated by Noel Hume (1970: Fig. 77b 2) of 18th century age.

One is a badly rusted specimen.

Provenience: 2A7A7

One specimen is part of the face plate, missing most of the top edge. It has attachment perforations in one corner and another along the bottom. The key hole is identifiable but enlarged and distorted. One vertical ward attachment slot is filled, the other open. On the inside part of the mechanism is present. A tumbler similar to one illustrated by Noel Hume (1970: Fig. 77b 3) is attached by a riveted pivot. Above it is a remnant of the spring. The keeper for the bolt is intact just beyond one end of the tumbler but the bolt is missing. Part of a ward blade is present on the interior side of the filled vertical slot, but the remainder of the ward is missing (Fig. 158e).

Provenience: 2A6D6

Dimensions (in mm.):

Length: 203.0

Width: 100.0

Thickness: 2.0

Length of spring: 80.0

Length of tumbler: 94.0

Another example is also the bottom portion of a large rectangular plate; all four corners are missing. At one end there is a right-angled projection of the sheet iron, a remnant of an enclosed end (?). The key hole is intact in the centre of the bottom of the plate and adjacent to it is an open vertical slot. In the other slot the end of the ward attachment is intact. The tumbler is intact and held to the plate by a riveted pivot.

Provenience:	2A6D1?
Dimensions (in mm.):	
Length:	231.0
Width:	113.0
Thickness:	2.0
Length of tumbler:	86.0

One specimen consists of a small part of the face plate, including most of the key hole. The plate is the section between the vertical slots, in this case still with the blades of the ward in situ. On the interior side the blades fixed in the plate slots are at right angles to the plate and between them support a complex iron sheet which is parallel to the plate surface. This is part of the ward and in its centre is a semi-circular opening, open at the bottom, which has a collar protruding beyond both faces of the ward plate. Other projecting flanges complete the ward. It is very similar to the

specimen illustrated by Noel Hume (1970: 77b 2), (Fig. 158 c,d).

Provenience:	2A6D20
Dimensions (in mm.):	
Length:	80.0
Width:	54.0
Thickness (maximum):	40.0
Metal thickness:	2.0

Another specimen is a small fragment of a ward consisting of the sheets of iron at right angles. One is a segment of the lock plate and the other a ward blade inserted into the vertical slot on the plate.

Provenience:	2A6D14
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One smaller lock plate is a rectangular plate with the bottom edge bent to form a right-angled shelf. There are three open perforations along the top located at the corners and the centre. Attached to the back are two curved pieces forming a horse shoe-shaped enclosure (Fig. 158f).

Provenience:	2A6D13
Dimensions (in mm.):	
Length:	121.0
Width:	88.0
Width of bottom shelf:	21.0
Metal thickness:	3.0
Internal enclosure:	41.0 x 57.0

Another small fragment is similar to the one described above in having the right-angle shelf. It lacks any other significant features.

Provenience: 2A6D13

Three specimens have been classified as fragments of lock plates with the squared U-shaped bolt keeper in situ. Similar features are present on the most complete specimen described above.

	Length	Width	Thickness	Keeper size
Provenience	(in mm.)	(in mm.)	(in mm.)	(in mm.)
2A6D5	34.0	36.0	4.0	9.0 x 23.0
2A6D6	88.0	32.0	4.0	10.0 x 19.0
2A6D13	70.0	37.0	4.0	27.0 x 21.0
2A10E18	89.0	24.0	3.0	25.0 x top missing

One fragment of a lock plate retains only a trace of the top of the key hole. There was a collar around the key hole and there is a vertical slot to one side for ward attachment. Above the key hole are two rusted bolt keepers and held in place by them is a narrow rectangular rod-like bolt with two projections on the side toward the key hole (Fig. 158a).

Provenience: 2A2A7

Dimensions (in mm.):

Length: 85.0

Width: 85.0

Length of bolt:	63.0 (incomplete)
Width of bolt rod:	5.0

Lock Mechanism Parts

Several specimens are fragments of individual parts from the lock mechanism. Most are probably from stock locks but some may be from padlocks.

Bolt

A large iron bolt from a stock lock consists of a rectangular iron block with a long arm projecting from one corner. The arm has a hooked end (Fig. 159a). It is similar but not identical to the bolt illustrated by Noel Hume (1970: Fig. 77b 2).

Provenience:	2A10H2
Dimensions (in mm.):	
Length:	135.0
Block size:	35.0 x 40.0
Block thickness:	20.0
Arm length:	100.0
Arm thickness:	5.0 x 10.0
Hook end:	12.5 x 17.0

Another specimen identified as a bolt is a flat piece of iron with a spring strip along the top. On the bottom side are two projections, one incomplete,

the other rounded on the end. At the end of the bolt the specimen is broken off but probably had a thickened rectangular end originally (Fig. 159b).

Provenience:	2A6D7
Dimensions (in mm.):	
Length:	98.0
Width:	14.0
Thickness of metal:	5.0

Two specimens have been identified as stock lock tumblers (Noel Hume 1970: Fig. 77b 3). They are flat pieces of iron with a straight top. At one end the bottom is widened and down curved. On the top of the tumbler immediately above the widest part of the curved bottom there is a right angled projecting arm or short peg. Beyond the widened part a narrow shaft extends; at its end is a rounded or rectangular extension above the line of the top. A perforation in the centre of the extension serves for the pivot which attached the tumbler to the lock plate. These specimens have the same form as those illustrated on the more complete lock fragment (Fig. 159c).

Provenience:	2A6D6
Dimensions (in mm.):	
Length:	115.0
Thickness of metal:	4.0
Maximum width:	21.0

Provenience:	2A6D12
Dimensions (in mm.):	
Length:	79.0 (Bent and distorted)
Thickness of metal:	5.0
Maximum width:	22.0

Two specimens have been classified as keepers, but they are no longer attached to the lock plate. They are larger rectangular U-shaped specimens, with rectangular cross-sections. If they are bolt keepers they are larger than the other examples found in situ in lock interiors.

Provenience:	2A6D6	2A6D6
Dimensions (in mm.):		
Length:	39.0	41.0
Width:	40.0	42.0
Cross-section:	5.0 x 7.0	8.0 x 9.0

A specimen of angular shape is included here as a possible lock fragment but its identification is uncertain. It consists of a flat tapered shaft and an enlarged encircling projection, beyond which the shaft is rectangular in cross-section. The rectangular end of the shaft is bent up at right angles, then back parallel to the shaft again at right angles and then terminates in a flattened flange like end which is also bent at right angles to the shaft. At right angles to the flattened end is another right angle bend short lip somewhat narrowed and flattened

(Fig. 159d). The specimen may be a lock part.

Provenience:	2A6D7
Dimensions (in mm.):	
Length:	74.0
Length of tapered end:	48.0
Diametre of encircling ridge:	15.0
Length of square shaft:	21.0
Length of right angled bend:	22.0
Length of short right angled bend:	11.0
Flat flange dimensions:	11.0 x 14.0
Length of short lip projection:	12.0

Another specimen included as a possible lock mechanism part is made of thin flat sheet iron, one end of which is bent up at right angles to the strip-like body. At the other end a rounded projection extends below the bottom of the strip while a squared projection extends sideways at right angles. The specimen has not been identified but may be a lock bolt of some sort (Fig. 159 e,f).

Provenience:	2A8B1
Dimensions (in mm.):	
Length:	59.0
Width:	15.0

Thickness:	3.0
Dimensions of end bent	
at right angles:	19.0 x 20.0
Rounded projection:	10.0 x 11.0
Square projection:	10.5 x 11.0

A possible lock part is an iron rod, flattened and tapered in longitudinal cross-section. When viewed from the top its ends taper and the middle of the sides are slightly rounded. At one end is a rounded projection oriented at right angles to the flat side (Fig. 159 g,h). The specimen has not been identified but may be part of a lock.

Provenience:	2A6E6
Dimensions (in mm.):	
Length:	87.0
Width:	50.0 - 9.0
Thickness:	2.5 - 5.0
Length of curved end:	15.0

A small iron spring (Fig. 159i) has been identified as a probable lock part. It has a rounded V-shape, one tail being bent back to form an eye while the other tapers flat.

Provenience:	2A10E19
Dimensions (in mm.):	
Length:	35.0

Several other specimens, all small fragments, have been listed here as possible lock parts although they cannot be positively identified. One, from 2A9E4, has a pin passing through its narrow rectangular shaft. Specimens from 2A6D4 and 2A10D20 are small iron rods with projections and appear to be possible fragments of padlock bolts.

Provenience	Description or Remarks	Length (in mm.)	Width (in mm.)
2A9E4	Shaft with pin.	96.0	6.0
2A6D4	Shaft with two projections (Fig. 159j).	62.0	7.0
2A10D20	Shaft with three projec- tions (Fig. 159k).	57.0	8.0
2A6D10	End of spring?	44.0	10.0
2A6D10	End of spring?	54.0	5.0
2A6D11	Rod, thin, right angled bent end.	49.0	4.5
2A1A5	Parallel sided strap with central hole. Truncated end has a projecting hook.	105.0	35.0
2A1A5	Strap, tapers to point, has hole in end.	135.0	35.0
2A10E12	Strap with truncated end and hook.	50.0	35.0

Provenience	Description or Remarks	Length (in mm.)	Width (in mm.)
2A10D17	T-shaped plate fragment.	150.0	30.0
2A10D17	T-shaped plate fragment.	150.0	30.0
2A10F8	Strap with four holes, two with screws. Projecting hook near centre.	150.0	28.0
2A10F8	Similar to above, but strap broken and has two holes.	65.0	30.0
2A10F31	Bi-pointed pivot with rounded centre with long and short tapered pro- jection on each side. Round centre perforated to pivot.	44.0	

Key Hole Escutcheons

Three iron key hole escutcheons were recovered (Fig. 160 a,b). The large specimens are ovoid in form but pointed on the top while the smaller fragment was apparently a rounded oval shape. There are perforations at the sides and top for attachment. All are missing the base and one side.

Provenience	Length (in mm.)	Thickness (in mm.)
2A6D20	74.0	2.0
2A6D6	73.0	1.5
2A8B1	52.0	2.7

Keys

Four poorly preserved keys were also recovered. They would fit into some of the key hole openings in lock face plates found at the site (Fig. 160 c,d,e). They have round shafts and bow ends where preserved.

Prov.	Length (in mm.)	Shaft Diam. (in mm.)	Bow Diam. (in mm.)	Cleft end size (in mm.)	Description
2A4A2					Rusted fragment.
2A9E2	65.0	11.0	27.0	16.0x23.0	Complete specimen with rounded bow, round shaft and tabular cleft end.
2A6D11	51.0	10.0	-	13.0x22.0	Bow missing; round shaft with cleft end formed by wrapping strip around shaft end.

Prov.	Length (in mm.)	Shaft Diam. (in mm.)	Bow Diam. (in mm.)	Cleft end size (in mm.)	Description
2A3A4	72.5	8.0	24.0	15.5x24.0	Bow partly missing; heart shaped (?), round shaft. Cleft end is S-shaped and was probably cleft. End of shaft has socket hole.

Padlocks and Padlock Fragments

One complete padlock was recovered (Fig. 161d). It is rectangular with rounded corners and slightly concave sides. It has a loop shackle on top. On the face plate it has a hinged key hole cover. The body of the lock consists of three parts, the face plate, the back plate and a strap bent to form the side. The back is broken open revealing a spring, a keeper and a tumbler (?) inside. The shackle is in the locked position; possibly the lock was broken open in an attempt to force it. It is similar but not identical to the late 18th century specimens illustrated by Noel Hume (1970: Fig. 80).

Provenience:	2A6D12
Dimensions (in mm.):	
Length:	103.0
Width:	78.0
Thickness:	27.0
Diameter of shackle:	11.0
Length of key hole cover:	64.0

A key hole cover was also recovered as a separate specimen. It is virtually identical with the one on the intact padlock, (Fig. 161a). Made of iron, it has a teardrop shaped base and an angular top. There is a perforation at the top for attachment to the cover. The specimen pivoted on a pin or rivet in the top hole; it was not hinged although it has a hinge-like decoration. The pivot hole area is flat; the rest of the specimen is concave-convex in cross-section. There is another open perforation in the centre of the enlarged base of the specimen.

Provenience:	2A5C13
Dimensions (in mm.):	
Length:	74.0
Width:	24.0
Thickness:	7.0
Metal thickness:	2.0

A padlock shackle was also recovered (Fig. 161b). It has a round but tapered shank. The hinge end is rusted but a riveted pivot pin with an irregular round washer is present on one side. The latch end is thin, flat and twisted at 90 degrees from the plane of the shackle. It has a rectangular slot in one side for the engagement of the bolt.

Provenience:	2A6A8
Dimensions (in mm.):	
Shank diameter:	10.0 - 12.0
Latch end:	26.0 x 20.0 x 2.0
Height:	73.0
Width:	85.0

A fragmentary lock may be a padlock. It consists of a face plate with some mechanism parts attached. The face plate has a small key hole in the centre near the bottom. A flat rectangular key hole cover, pivoted through a hole in its top is present. The edges of the fragment are mostly irregular but the bottom seems to form a curve; this plus the key hole cover suggest the specimen is a possible padlock fragment. Part of the top edge is present; it is oriented at right angles to the face plate. It is twisted out of position but at one end has part of a slot through which the latch end of the padlock shackle could have passed and been

aligned with the bolt. There are two keepers of rectangular form holding a small bolt with a spring top in situ. The bottom side of the bolt has an inset curve and projection to engage the key. A remnant of a collar surrounds the interior top of the key hole (Fig. 161 e,f).

Provenience:	2A6A8
Dimensions (in mm.):	
Length:	94.0
Width:	69.0
Thickness:	31.0
Length of bolt:	69.0

Another curved face plate fragment was also identified as a probable padlock. The key hole is nearly intact (Fig. 161e). Near one edge of the face plate there is a 3.0 mm. x 15.0 mm. vertical slot for attachment of the side or internal mechanism. The bottom and intact side of the plate are curved in a generally oval shape; the top and opposite side have been cut.

Provenience:	2A6D6
Dimensions (in mm.):	
Length:	98.0
Width:	68.0
Thickness:	2.0
Key hole length:	47.0

Two curved fragments have been identified as probable padlock casing parts.

Provenience: 2A6A9
2 specimens

Latches

A number of specimens have been identified as door or window latches (Fig. 162). All are made of iron.

One specimen is a long rectangular iron shaft with a flattened rounded end (Fig. 162d).

Provenience: 2A6D6
Dimensions (in mm.):
Length: 140.0
Width: 9.0 - 10.0
Thickness: 4.0

Two examples of thumb latches were recovered (Fig. 162 f,g). They have round ends at right angles to the plane of the shank. One has a rounded triangular blade like shank, the other a long rectangular shaft with a curved end. The one from 2A6D12 (Fig. 162f) may be a timber anchor rather than a thumb latch.

Provenience: 2A6D7
Dimensions (in mm.):
Length: 130.0
Plate diameter: 38.0
Thickness: 5.0

Provenience:	2A6D12
Dimensions (in mm.):	
Length:	93.0
Plate diameter:	36.0
Thickness:	4.0

Another specimen was identified as a fragment of a long latch lever (Fig. 162a). The rod is of iron, rectangular in cross-section. One end is tapered and curved to form a handle. The opposite end is raised, curved and is incomplete.

Provenience:	2A9G11
Dimensions (in mm.):	
Length:	216.0
Shaft:	9.0 x 9.0

An additional example of a heavy latch bar is also of iron and has a rectangular cross-sectioned shaft (Fig. 162b). One end is broken off, the opposite end terminates in a folded and rounded knob and must be the handle.

Provenience:	2A6D14
Dimensions (in mm.):	
Length:	180.0
Shaft diameter:	14.0 x 16.0 to 11.0 x 12.0
Knob diameter:	14.0

Hooks

Two specimens have been identified as hooks. One is small and has a right angled tapered point at one end and a curled pivot hole on the other (Fig. 162e). The other example is quite long and round shafted; it tapers to a blunt point on one end (Fig. 162c). The opposite end has a right angled hook.

Provenience: 2A10D12

Dimensions (in mm.):

Length: 105.0

Provenience: 2A6D10

Dimensions (in mm.):

Length: 205.0

Hook end length: 28.0

Diametre of shank: 6.5

Door Gudgeons

Several iron artifacts consisting of tangs with one end worked to form a round head were recovered (Fig. 163). The tangs are tapered. An example of this type was found in association with the doorway of the guardroom entrance to the magazine suggesting the identification. Such specimens could have served other purposes as well.

Provenience	Length (in mm.)	Exterior	Interior	Thickness (in mm.)
		Diametre (in mm.)	Diametre (in mm.)	
2A1A4	175.0	40.0	28.0	5.0 - 19.0
2A7A17	95.0	23.0	-	7.0 - 10.0
2A9B1	122.0	45.0	25.0	19.0 - 20.0
2A10B12	-	26.0	-	-
2A10C2	98.0	43.0	27.0	17.0
2A10F8	70.0	28.0	19.0	34.0
2A10G4	190.0	-	-	16.0
2A9C2	-	-	-	35.0
2A10G10	85.0	21.0	7.0	-
2A10C4	43.0	12.0	3.0	4.0
2A10D20	57.0	-	-	3.0 - 5.0

Pintle

This specimen is a small iron pintle for a light door or window shutter (Fig. 163a). There is a tapered tang for insertion into masonry or timber. At one end is a right angled round pintle.

Provenience:	2A6D6
Dimensions (in mm.):	
Length:	100.0
Tang thickness:	11.0 x 13.0 to 4.0 x 6.0
Pintle length:	44.0
Pintle diameter:	12.0

Tapered Strap Hinges

These hinges are made of tapered strap iron. Some have a rounded expanded or splayed end (Fig. 164); others are incomplete. There are several perforations along the strap as well as one in the splayed end for attachment to the door or shutter.

	Length	Width	Thick	
Provenience (in mm.)	(in mm.)	(in mm.)	(in mm.)	Description or Remarks
2A1A3	240.0	23.0-		One end rounded, other
		30.0		slotted. 3 holes.
2A3C1	160.0	20.0-		1 hole in round end.
		7.0		
2A6D2	155.0	25.0-		Fragment. 1 hole.
		8.0		
2A10A1	345.0	40.0-		Incomplete, 3 holes.
		15.0		
2A10A1	-	30.0-		Fragment.
		17.0		
2A10C10	180.0	44.0-		3 holes. Hinge frag-
		15.0		ment.
2A10C10	39.0	11.0		Fragment.
2A10F1	40.0	11.0		Fragment.
2A10F7	140.0	34.0-		3 holes, one with nail.
		20.0		End has rolled gudgeon.

Provenience	Length (in mm.)	Width (in mm.)	Thick (in mm.)	Description or Remarks
2A10F31	275.0	37.0-		3 holes.
		16.0		
2A11A1	130.0	25.0-		Fragment, 2 holes.
		17.0		
2A----	-	20.0		Fragment, 2 holes.
2A6D6	50.0	5.0	6.0	Fragment.
2A6D11	80.0	8.5	5.0	Fragment.
2A6D12	124.0	16.5-	3.0	Fragment.
		20.0		
2A6E6	112.0	11.0-	3.0	Fragment.
		13.5		
2A6A7	235.0	14.0-	3.0	Fragment, 2 holes,
		35.0		broken at third.
2A4A4	140.0	14.0-	4.5	Fragment, 3 holes.
		24.0		
2A6D11	133.0	25.0-	5.0	Fragment, 2 holes.
		37.0		Wide end has central gudgeon.
2A6D6	56.0	15.0-	3.0	1 hole, fragment.
		19.0		Rolled gudgeon at end.
2A6D11	210.0	22.0-	5.0	4 holes, 1 nail <u>in situ</u> .
		40.0		Fragment.
2A6D11	84.0	28.0-	7.0	Fragment, centre gudgeon
		35.0		with pintle.

	Length	Width	Thick	
Provenience (in mm.)	(in mm.)	(in mm.)	(in mm.)	Description or Remarks
2A6D11	325.0	14.0- 40.0	5.0	Two leaves attached at centre, one leaf broken; could either be a strap or T-shape hinge.
2A6D6	282.0	10.0- 22.0	7.0	5 nails in holes at 38.0 mm. interval.

T-Shaped Strap Hinges

This type of hinge has its two leaves oriented at right angles forming a T shape (Fig. 165a).

Provenience:	2A6D12
Dimensions (in mm.):	
Length of Short leaf:	145.0
Width of Short leaf:	38.0
Thickness:	5.0
Long leaf:	Fragmentary
Remarks:	4 attachment holes in short leaf.
Pintle:	51.0 long
Provenience:	2A6D12
Dimensions (in mm.):	
Length of short leaf:	155.0
Width of short leaf:	33.0

	2A6D12
Width of long leaf:	41.0
Length of long leaf:	Fragment
Thickness:	4.0
Remarks:	5 holes in short leaf.

Strap Hinge

Some fragmentary hinges appear to consist of parallel sided rather than tapered straps (Fig. 163d). These examples are incomplete.

Provenience:	2A6D2
Dimensions (in mm.):	
Width:	45.0 - 40.0
Remarks:	Fragment of hinged joint. One strap has 2 holes.

H Hinge

One example appears to be a leaf from an H or similar complex hinge form (Fig. 166a). It is made of strap iron and has a central strap with a right angle extension from each end, each pointing in opposite directions. The end of one arm has a rolled gudgeon. The end of the other arm tapers to a point and has three holes for attachment. There is one

hole in the centre strap.

Provenience:	2A10E15
Dimensions (in mm.):	
Length of gudgeon leaf:	65.0
Length of centre strap:	165.0
Length of pointed leaf:	105.0
Width of straps:	28.0
Overall length:	165.0

Butt Hinges

Leaves representing halves of butt hinges were also recovered (Fig. 166b). They consist of a rectangular strap with perforations for attachment. From one side, centred, a short stub projects and is rolled to form a gudgeon. A second twisted specimen has both leaves.

Provenience:	2A10D17
Dimensions (in mm.):	
Length:	165.0
Width:	50.0
Provenience:	2A6D12
Dimensions (in mm.):	
Length:	110.0
Length:	130.0
Width:	21.0 (leaf only)

	2A6D12
Thickness:	3.0
Remarks:	3 holes in each leaf

Strap Hinge

One fragment of a strap hinge has a rolled gudgeon the width of the strap end; it probably fitted over a pintle (Fig. 163b).

Provenience:	2A5C3
Dimensions (in mm.):	
Length:	145.0
Width:	28.0
Thickness:	3.0
Rounded end:	37.0 diameter
Hole diameter:	7.0
Remarks:	2 attachment holes at 52.0 interval. One has 47.0 long nail <u>in situ</u> .

Tapered Strap, Ring Leaf

This specimen consists of fragments of a hinge, the two leaves still joined (Fig. 165b). One end is a broken tapered strap. At its hinge joint end it has a central narrow rolled gudgeon loop. The other leaf consists of a strap which terminates in a large

loop which passes through the end of the opposite leaf.
The joint is thus a very loose one.

Provenience:	2A6D7
Dimensions (in mm.):	
Length:	105.0
Strap widths:	29.0 - 33.0 (Tapered leaf)
Strap width:	28.0 - 31.0 (opposite leaf)
Ring hole:	12.0 x 18.0
Thickness:	7.0
Provenience:	2A6E6
Dimensions (in mm.):	
Width:	33.0
Thickness:	4.0
Remarks:	Fragment of a rounded end, possibly similar to the above described example.

Butterfly Hinges

These specimens consist of two leaves, narrow at the joint and flared or splayed to form a butterfly-like shape (Fig. 163e).

Provenience:	2A6D2
Dimensions (in mm.):	
Length overall:	102.0
Maximum width:	75.0; 55.0
Width at joint:	50.5
Remarks:	One leaf is smaller than the other. They are joined at the centre by a five part joint, interlocking. This is a complete specimen. 5 holes per leaf.
Provenience:	2A6D5
Dimensions (in mm.):	
Length:	50.0
Maximum width:	70.0
Remarks:	Fragment of one leaf, broken across two of the five attachment holes; gudgeon missing.
Provenience:	2A6E6
Dimensions (in mm.):	
Length:	42.0
Maximum width:	62.0
Pintle length	43.0

	2A6E6
Pintle diametre:	5.0
Remarks:	Complete leaf, half of hinge. 4 attachment holes. Three part joint; pin <u>in situ</u> and exposed by missing leaf gudgeon.

Iron Tie Rods

Several long heavy iron rods were found (Figs. 167a, 170). Some of these are rectangular in cross-section while others are round. One fragment has a slotted end with a cotter key in situ, but the others are plain or fragmentary. Two examples are French, but most are from English contexts. These specimens were probably used in building construction, although they could also have been utilized in cannon carriages and in the timber palisades.

Round Cross-section:

Provenience	Length (in mm.)	Diametre (in mm.)	Remarks and Cultural Identification
2A2B6	-	15.0	Mixed level.
2A2C7	400.0	16.0	French.
2A6B1	175.0	15.0	Mixed. Incomplete.
2A7A3	90.0	12.0	English. Incomplete.
2A10E18	-	12.0	English.

Provenience	Length (in mm.)	Diametre (in mm.)	Remarks and Cultural Identification
2A10F32	260.0	16.0	English.
2A9F-	307.0	23.0- 28.0	French. Flared head 38.0 in diametre. Slightly concave.
2A9E11	285.0	28.0	French. Made from rectan- gular rod beveled to round. Flared head 41.0 in diametre.

Rectangular or square cross-section:

Provenience	Length (in mm.)	Diametre (in mm.)	Remarks and Cultural Identification
2A1A2	240.0	11.0	Mixed level. (Fig. 171b).
2A9B1	130.0	20.0	Probably French.
2A9C1	170.0	17.0	Mixed level. (Fig. 171f).
2A10A11	130.0	35.0	Probably French.
2A10C18	170.0	23.0	English level.
2A10G7	170.0	20.0	English level.
2A10H2	105.0	17.0 x 20.0	English. (Fig. 170a). Has channeled rose head one end and slot with cotter key <u>in situ</u> . Key is 43.0 x 8.0
2A6D13	235.0	28.0 x 4.0	Strap. English.

Long Slotted Tie Rod

These specimens are long iron rods slotted at one end for the insertion of a key fastening (Fig. 172e). One specimen has a square bolt-like head while the other is incomplete.

The bolt-headed specimen has a head 27.0 mm. x 27.0 mm. in size and 6.0 mm. thick. The shank is rectangular in cross-section for 23.0 mm. below the head where it tapers to become round in cross-section and 12.0 mm. in diameter. The slot is located 6.0 mm. from the end opposite the head. The slot is 2.0 mm. x 15.0 mm. in size. The overall length of the specimen is 37.5 cm. (375 mm.).

Provenience: 2A10F7

The headless example has an overall length of 27.0 cm. (270 mm.) and is square in cross-section. The shank is 26.0 mm. in size at the end and tapers to 3.0 mm. at the other end.

Provenience: 2A3A2

Beam Hanger Fragments

These iron artifacts are fragments of twisted and rolled strap iron which may be parts of strap iron beam hangers (Fig. 167b).

Prov.	Length (in mm.)	Width of Strap (in mm.)	Diametre of Roll (in mm.)	Length of Roll (in mm.)	Strap Thickness (in mm.)
2A6D6	143.0	32.5	16.0	47.0	3.0
2A6D6	85.0	33.3	16.0	44.0	3.0
2A6D6	97.0	-	15.8	45.0	4.7
2A6D12	220.0+	25.5	14.0	50.0	2.4
2A5C5	101.0	29.3	14.0	61.0	3.0
2A5C13	78.0	17.3	12.0	37.0	4.7
2A6D11	153.0	-	6.0 x 9.0	120.0	4.0

Strap Iron Hangers

These beam hangers are made of strap iron and vary in form.

One is a long piece of perforated strap iron, broken across one end. At the opposite end is a large hole formed by a ring flare at the end of the strap (Fig. 170b). There are two examples, one French and one English.

Provenience:	2A6D6
Dimensions (in mm.):	
Length:	31.3
Width:	25.0
Thickness:	4.0
Ring diametre:	30.0

	2A6D6
Hole diameter:	16.0
Diameter of ring metal:	8.7
Perforations in strap, diameter:	5.0, 6.0
Interval of 4 perforations:	52.0, 105.0, 105.0
Provenience:	2A6D7
Dimensions (in mm.):	
Length:	102.0
Width:	23.0
Thickness:	4.0
Ring diameter:	25.0
Hole diameter:	13.0
Diameter of ring metal:	6.0

Another example is a flattened round rod forming a U-shaped area (Fig. 167c). The rod had been flattened on each end into a strap with two perforations; these are broken off and incomplete. The round central area is bent in a shallow U.

Provenience:	2A6D12
Dimensions (in mm.):	
Length:	317.0
Rod diameter:	11.0
Strap lengths:	105.0, 95.0
Strap widths:	30.0, 31.0

2A6D12

Strap thickness:	3.0, 4.0
Holes, diametre:	6.0, 7.0
Hole spacing:	48.0 and 41.0 apart

Iron Timber Braces

These are artifacts made out of flat strap iron with expanded round ends (Fig. 168a). One end is usually larger in diametre than the other. The rounded ends are perforated with round or rectangular holes. These specimens were probably used as braces on heavy timber joints. Some have bolts or riveted rooves (Fig. 168b) in situ in the holes. Similar specimens were identified as timber braces at Louisbourg. They may also have been used in the construction of cannon carriages (Priess: Pers. Comm.).

Prov.	Length (in mm.)	Width (in mm.)	Thick (in mm.)	Remarks
2A6D2	260.0	17.0	-	Bolt remains in one hole.
2A6D4	280.0	20.0	-	Bolt remains in one hole.
2A9C1	-	17.0		Fragment
2A10A1	300.0	20.0		
2A10-	-	17.0		Fragment
2A6D6	285.0	15.0	5.0	
2A6D6	285.0	15.0	5.0	
2A6D6	287.0+	13.0-	7.0	
		18.5		

	Length	Width	Thick	Remarks
Prov.	(in mm.)	(in mm.)	(in mm.)	
2A6D6	300.0	17.0	5.7	
2A6D6	240.0	17.0	7.0	Hole beveled.
2A6D12	80.0+	15.0	7.0	Fragment
2A6D12	285.0	15.0	5.5	Riveted roove in hole.
2A3B2	275.0+	20.0	5.0	

Double Ended Brace

A short iron brace has two flared ends. One end has three perforations for attachment; the other is fragmentary (Fig. 171c).

Provenience:	2A2A7
Dimensions (in mm.):	
Length:	145.0 (incomplete)
Width at end:	50.0 (incomplete)
Width at centre:	17.0

Tanged Drain Bracket (?)

A bent tanged bracket with a shape similar to modern brackets for fastening downspouts to masonry walls was found (Fig. 171d). It has a tang at one end, bent, and a tapered body with a right angled projection at one end.

Provenience:	2A2A8
Dimensions (in mm.):	
Length:	154.0
Maximum width:	22.0

Masonry Bracket

This specimen, made of iron, has a tapered tang which is rectangular in cross-section (Fig. 169b). At the end it is thinned and splayed to a triangular flange with rounded corners. There are three holes for attachment in the thinned flange. It is probably a bracket for affixing timber to masonry.

Provenience:	2A6E7
Dimensions (in mm.):	
Length:	192.0
Tang length:	143.0
Tang dimensions:	9.0 x 12.0 tapers to 7.0 x 7.0
Flange length:	53.0
Flange width:	61.0
Flange thickness:	7.5
Hole diameters:	3.5, 4.0

Tanged Brackets

These specimens are also interpreted as brackets or hangers which were driven into masonry (Figs. 169 a,c, 170 c,d). They have straight tapered tangs. There is a large hole in the thickest part of the iron bar which on some specimens is a somewhat expanded area. Beyond the perforation the specimens again taper to a thinner pointed end which is bent at right angles. Probably used to affix timbers to masonry walls.

These specimens are tabulated in Table 128 which also includes fragments identified as parts of brackets similar to the complete specimens. One specimen is from 2A5C13, an indeterminate lot, and one from 2A6D6, a probably English context; all others are in French deposits and it is clear that the stratigraphic association of this type of iron artifact is with the French occupation of the site.

Tanged Iron Rods

These specimens are iron rods, round in cross-section, which have a tapered end. The tapered end is rectangular in cross-section and appears to be a tang. Two specimens have round cross-section tangs and are indicated in the tabulation below.

Provenience (in mm.)	Length (in mm.)	Diametre (in mm.)	Tang Dimensions and Remarks
2A5C4	142.0	7.5	4.0 x 4.0
2A6D6	99.0	6.0	4.0 x 5.0
2A6D6	87.0	5.0	4.0 x 5.0
2A6D6	59.0	4.0	3.0 x 5.0; 2.0 x 2.0 (Bi-pointed)
2A6D6	51.0	8.0	2.0 Round tang
2A6E6	125.0	8.0	4.0 Round tang
2A9J5	213.0	7.0	4.0 x 7.0 Flattened end 2.0 x 3.0 Rectangular end
2A10J1	183.0	7.0	4.0 x 5.0
2A3A2	250.0	30.0	10.0 x 12.0 Tang tapers (Fig. 171h)

Iron Cotters or Clamps

Three wrought iron specimens may have been heavy spring-like cotter keys (Fig. 171a). The narrow body is parallel sided while at one end one side curves to form a flared end. At the narrow end of the body the iron has been doubled back over itself and hammered thin at the end. The doubled portion extends halfway along the flat body and forms a spring-like wedge. Two specimens are from English contexts while the one from 2A2C4 is probably French.

Provenience	Length (in mm.)	Width (in mm.)	End Width (in mm.)	Thickness (in mm.)
2A2C4	74.0	40.0	58.0	4.0
2A10E9	110.0	32.0	45.0	4.0
2A10F27	110.0	31.0	44.0	4.0

Iron Sheathing (?)

Two specimens may be iron sheathing but are too fragmentary to be identified.

One tapers to a point, is concave-convex in cross-section and has two attachment perforations on the top (Fig. 171e).

Provenience:	2A3A1
Dimensions (in mm.):	
Length:	124.0
Width:	45.0

The second is also pointed; it has a truncated V-shaped cross-section (Fig. 171g).

Provenience:	2A10E22
Dimensions (in mm.):	
Length:	73.0
Width:	45.0

Riveted Rooves

Rooves are small diamond shaped iron plates used as a backing against which to rivet the end of a rivet or nail (Fig. 172a). Several specimens with roove and riveted nail intact were recovered. The specimens apparently fastened some now disintegrated wooden object which had been discarded in the refuse fill of the ditch. A total of 43 of the specimens were from probable

English refuse layers while two specimens came from a lower probable French zone. The latter are almost certainly intrusive items. One is from a sealed French level. One other example came from a culturally unidentified context. There is little question that these artifacts are associated with the English occupation at Castle Hill.

The rivets used with the rooves have rose heads similar to the heads of nails. Most have round shanks. Only two specimens have rectangular shanks. The round shanks are uniform in diameter. Two different specimens have thin flat heads rather than rose heads. The rooves themselves are made of thin iron, usually with two parallel and two nearly parallel sides, which are alternately beveled. Manufacture was apparently by chisel cutting from an iron strap. A few examples are less regular diamonds and may have been cut from sheet rather than strap.

Two sizes of rooves, large and small, are illustrated in the Royal Engineers list of nails and spikes (1812: 153, 154). The list does not provide dimensions but measurement of the illustration indicates that the size of the "large" roove is 33.0 x 32.0 mm. measured across the points of the diamond. The "small" size is 30.0 x 20.0 mm.

The sizes of the Castle Hill specimens are given in Table 129. Inspection of the table will illustrate that the specimens can be grouped into two categories on the basis of the longest dimension. A large group consisting of 11 specimens has a mean size of 33.6 mm. x 24.5 mm., from a range of 31.0 mm. x 23.0 mm. to 40.0 mm. x 28.0 mm. A small group consisting of 25 specimens ranges from 20.0 mm. x 18.0 mm. to 30.0 mm. x 22.0 mm. in size with a mean size of 26.0 mm. to 20.6 mm. There is a great deal of variability in the Castle Hill specimen dimensions and this comparison does not demonstrate that only two "sizes" were used or even reflect the specimens listed in the Royal Engineers list.

The specimens can also be classified according to overall length from the top of the head to the tip of the riveted shank. The specimens fall into three length groupings. Short, 33.0 mm. to 42.0 mm., two specimens. Medium, 47.0 mm. to 54.0 mm., 21 specimens. Long, 55.0 mm. to 60.0 mm., 14 specimens. The size of the roove and the length of the nail do not appear to be correlated.

One riveted roove was found in a functional position. It was in situ through a hole in the end of an iron timber brace (Fig. 168). This specimen was recovered from an upper level of mixed rubble in the ditch. Although

mixed, this lot is late and presumably includes more English rubble than anything else.

Staples

Seventeen staples were recovered. Two were from French contexts and the remainder from English associations in the site. They are made of bent iron 3.0 mm. to 6.0 mm. in diameter and each specimen varies in diameter; at least two examples are rectangular in cross-section. The ends are flattened, pointed or tapered. The overall length of the staples ranges from 29.0 mm. to 49.0 mm. and the width ranges from 24.0 mm. to 40.0 mm. The specimens are tabulated below:

Provenience	Number of Specimens
2A2A11	1
2A2B7	1
2A5C13	1
2A6D7	1
2A8B1	1
2A10B6	1
2A10B25	1
2A10C3	1
2A10C4	1
2A10D2	1
2A10D13	1

Provenience	Number of Specimens
2A10E3	3
2A10E23	1
2A10F4	1
2A10H2	1

Several examples of nuts and bolts of various sizes were recovered in the excavations (Fig. 172 b,c,d). Such specimens are predominantly associated with the English occupation of the site. The specimens are described and tabulated below.

Round Domed Slotted Head, Round Shank Cross-Section

Provenience	Overall Length (in mm.)	Head Diam. (in mm.)	Head Thick. (in mm.)	Length Threaded (in mm.)	Shank Diam. (in mm.)
2A6D6	55.0	14.0	5.0	10.0	5.0
2A6D12	66.0	17.7			7.0
2A10A3	50.0				6.0
2A10F6	100.0				13.0
2A10F31	135.0				7.0
2A10F32	70.0				5.0
2A11A1	40.0				5.0

Round Domed Head, Square Shank Cross-Section, Round Threaded End

	Overall	Shank	End	Head
	Length	Size	Diametre	Diametre
Provenience	(in mm.)	(in mm.)	(in mm.)	(in mm.)
2A6D6	112.0	8.0 x 8.0	7.0	19.0

Thin Square Flat Head, Round Shank, Lower 1/3 Threaded, Thin Square Nut

	Overall	Shank	Head	Head	Nut	Nut
	Length	Diam.	Diam.	Thick.	Size	Thick.
Provenience	(in mm.)	(in mm.)	(in mm.)	(in mm.)	(in mm.)	(in mm.)
2A5C1	137.0	7.0	15.0	3.0	15.0	3.0
2A6D6	140.0	7.0	-	-	17.0	4.0
2A6D6	132.0	7.0	-	-	-	-
2A6D6	129.0	7.0	17.0	2.0	17.0	3.5
2A6D7	139.0	7.0	15.0	4.0	17.0	3.5
2A6D12	138.0	7.0	15.0	4.0	14.0	4.0

Large Bolts with Nuts and Washers

These specimens have square heads (Fig. 172d). The top one-half of the shank is square in cross-section while the bottom half is round and threaded. There are three to four threads per 12 mm. The specimens have flat round washers in many cases. The nuts are square.

There are also three specimens of the above description differing only in the head shape; these have rounded rose heads. Some specimens lack washers.

Most of these specimens were recovered from lot 2A6D6 in the refuse fill of the ditch. They have a fairly uniform distance between the point under the head to the top of the nut or washer. This distance ranges from 79.0 mm. to 101.0 mm. It is possible that these bolts were once part of a door or perhaps part of the bridge which crossed the ditch. The large nuts and bolts are listed in Table 130. Specimens of this form are called "screw bolt" by Mercer (1960: Fig. 213).

A variety of iron rings, bands and flat washers were present in the site, primarily but not exclusively from English contexts. These are described and then tabulated in Table 131.

Cylindrical Ring

These specimens are small rings with thin sides which form a cylindrical band (Fig. 173a). Three are from French contexts, the remainder from mixed levels.

Plain Iron Washers

These specimens are flat iron washers similar to

those found on bolt and nut combinations already described (Fig. 173b). Two are from French contexts, one is from an English lot and the remainder are indeterminate.

Flat Rings, Large Hole

These specimens are similar to washers but have a larger diameter central hole (Fig. 173c,d). They are probably another type of washer. Two are from French contexts, the remainder from English associations. Some of these specimens have holes drilled on opposite sides, probably to permit them to be nailed or screwed to a flat surface.

Flat Rings, Rounded or Beveled Outer Edges

These specimens are also washer-like flat rings or flanges with rounded or beveled outer edges.

Wire Ring

This specimen is a ring formed from a round cross-sectioned wire.

Iron Bands

These specimens are iron rings or collars of large diameter (Fig. 173e). All specimens are from English

contexts except one indeterminate lot and one from a French context. The specimens consist of a strap of iron bent into a circular or ring form. In several cases small holes have been drilled through the collar on opposite sides of the ring. The function of the specimens is unknown from the context but they may have been metal bands for a timber. An alternative would be a band for the hub of a wheel.

Prov.	Diametre	Thickness	Height or	# of	Hole
	Exterior	of Metal	Width of		
	(in mm.)	(in mm.)	Strap	Holes	Diametre
	(in mm.)	(in mm.)	(in mm.)		(in mm.)
2A2A5	70.0	3.0	20.0		
2A2C7	80.0	6.0	18.0		
2A10B10	-	3.0	18.0		
2A10B27	65.0	6.0	17.0		
2A10C2	-	6.0	17.0		
2A6E7	75.5	3.0	18.5	2	3.5-4.5
2A6D6	77.0	4.0	23.0	2	3.0-4.0
2A6D6	77.0 est	3.0	23.0	2	4.0-4.5
2A6D6	78.0	3.0	20.0	2	4-indet.
2A6D6	68.0	4.0	22.0	2	4-indet.
2A6D6	77.7 est	4.0	19.0	2?	5-indet.
2A6D12	77.7	5.0	18.0	2	4-indet.
2A6D12	71.0 est	4.0	19.0	2	3.5

Nails

A large number of rectangular wrought iron nails were found in the excavations at Castle Hill; such specimens were present in almost every excavation unit. A total of 9,756 nails was found. No cut nails were recognized in the collection.

A large proportion of the nails were fragmentary specimens which could not be classified. Point and head fragments could be classified to some extent and whole specimens could easily be placed in typological categories. One of the major classificatory devices is size, based on overall length and related to the "penny" classification of nails. The lengths of nails of various penny sizes are listed in Audels Carpenters and Builders Guide #1 (Graham and Emery 1923: 24; Figs. 17 to 26). Nails in the penny system range from 2d (1 in.) in length to 60d (6 in.), while boat spikes and ship nails range from 3 in. to 14 in. in length (Graham and Emery 1923: 24, 38). Larger and thicker shanked nails are termed spikes in the following discussion.

Small nails and tacks are also present and some specimens of sizes other than those standard in the penny system were also found in the collection.

Accordingly, the descriptive tabulations include both the overall length and the probable penny sizes.

Another reference employed in the classification was the "Royal Engineers Office, Halifax, List of Nails and Spikes required for the service of the Office of Ordnance, Approved by the Honorable Boards Order of the 29 July 1812" (Public Archives of Canada). This document is cited as Royal Engineers Office 1812 in the following discussion. This document lists nails of varying types and sizes and illustrates each example. The head and point types used in the classification of the nails was based on this document. Although the memorandum post-dates the end of the English occupation at Castle Hill, this nail card may be regarded as a contemporary illustration. Not all specimens found at Castle Hill are illustrated in the Royal Engineers list, particularly specimens with rectangular blunt points. A number of combinations of head and point form are present in the collection but not illustrated in the list, but most of the basic nails can be recognized. It should be noted that the list is for ordnance and is thus presumed to be restricted accordingly in the variety of nails illustrated.

Nails from French contexts in the site could not be distinguished by obvious typological characteristics;

they appear with few exceptions to exhibit the same form traits as English nails. There are some variations in the relative frequency of some types when the two occupations are compared.

Using a combination of head form and point form traits, a total of 29 different types of nails and spikes was established. More than 25 different sizes are also represented so great a variety of nails is present in the collection. The various point and head types are described below.

Heads

Sprig. The sprig (Fig. 174a) is a small headless nail. Some larger specimens are also included in this category in this report. The category may grade into that of the larger brads, some of which are also headless. The sprig head, for purposes of this report is a headless nail with a rectangular cross-section (Royal Engineers Office 1812: 155-57).

Brad. Brad heads are L-shaped on smaller rectangular nails (Fig. 174b), (Royal Engineers Office 1812: 120-32).

T-brad. These nail heads are T-shaped but otherwise similar to the L-shaped head (Fig. 174c). This form could be confused with a clasp head which had been

flattened (Royal Engineers Office 1812: 32-9).

Flat, round. These heads are similar to the smaller tack head, being flat and round (Fig. 174d). They lack the tapered underhead base of the similar countersunk clout head, but are similar to that type (Royal Engineers Office 1812: 40-7).

Irregular. A small number of specimens in the collection have irregular heads which are not otherwise classifiable. These are probably misshapen rose heads.

Rose. The most common nail head seen in the collection is the rose head with four hammer struck facets (Fig. 174e). This is the first type illustrated in the 1812 list (Royal Engineers Office 1812: 1-21).

Clasp. The clasp head (Fig. 174f) is one with a facet on each side of a peak (Royal Engineers Office 1812: 22-39).

Clasp, oval. Several specimens with a flattened head forming a double oval pinched in at the centre (Fig. 174g) when viewed from the top are also a variety of the clasp head.

Die. Die heads (Fig. 174h) are square with beveled upper edges. They appear on larger nails and spikes (Royal Engineers Office 1812: 100-108).

Broad Deck. The broad deck head is similarly found on spikes (Fig. 174i); the corners of this flat topped head are faceted giving an octagonal outline to the top (Royal Engineers Office 1812: 109).

Countersunk clout. This head form (Fig. 174j) has a circular flat top. The underhead is tapered or beveled (Royal Engineers Office 1812: 45-55).

Dog. This head type (Fig. 174k) is a multi-faceted and conical form (Royal Engineers Office 1812: 91-98).

Points

Sharp. The sharp point (Fig. 174l) is one drawn to a tapered point (Royal Engineers Office 1812: 5-16).

Blunt. Blunt points (Fig. 174m) are similar to sharp points in that the end of the nail is tapered, but differ in that the end is rectangular rather than drawn to a sharp point. These are not illustrated in the 1812 list and it is impossible to know if the point described there as sharp is also intended to encompass the blunt point as defined here.

Flat. Flat points (Fig. 174n) have been hammered thin. They have an oval outline because they have been splayed out by the thinning (Royal Engineers Office 1812: 1-4).

Chisel. The chisel point (Fig. 174o) is similar in form to that of a chisel. It tapers to a thin edge when viewed from one side (Royal Engineers Office 1812: 139-147).

There are additional head types illustrated in the Royal Engineers list but they were not recognized in the Castle Hill collection and are thus not considered here.

Using a combination of the above head and point types the nails in the collection can be adequately described and classified. To these typological characteristics must be added the variable of size, and both overall lengths and approximate penny sizes are recorded. Size appears to be a useful means of comparing the English and French nails since there were few form differences in specimens associated with the different occupations.

In determining sizes, the lengths include the head. Fragments were treated separately. Bent specimens were measured and included as complete examples. The measured lengths recorded are median values; specimens longer or shorter than the listed standards were placed in the closest length category.

The classification of nails recovered during the

1965 field season was done separately from those found in 1968, and the earlier classification was not as fine as the later one. The earlier sample was not available for re-classification. Most of the specimens found in 1965 were rose head, blunt point types, but some of the less common forms may not have been recognized, except in the case of large spikes. To avoid confusion the 1965 specimens are simply tabulated as "rose head" in the following lists.

Tacks

A few examples of small tacks were found. They have rose heads, sharp points and have shanks $2/16$ in. in cross-section size. The length is $11/16$ in. and average weight is 0.10 oz.

Provenience	Number
2A6A9	1
2A9F8	1

$7/8$ in. Nails

A small number of $7/8$ in. long nails with rose heads and sharp points are present. The shank size is $2/16$ in. and the average weight is 0.05 oz.

Provenience	Number
2A6D6	1

Provenience	Number
2A6D10	10
2A6D14	1
2A6D20	2

1 in. Nails

Several examples of 1 in. long nails are present. These have rose heads, sharp points and shank sizes of 2/16 in. to 3/16 in. The average weight is 0.057 oz.

Provenience	Number
2A4A1	1
2A6D6	7
2A6D10	97
2A6D11	9
2A6D12	7
2A6D19	1
2A6D20	2
2A6E7	1
2A8B1	5
2A9K14	1
2A10H2	1

A few sprigs of 1 in. length, with sharp points are present. Shank size is 2/16 in. and average weight is 0.057 oz.

Provenience	Number
2A6D10	6
2A6D11	1
2A8B1	1

1 1/8 in. Nails

Several different types of nails in this size range were identified. They are described and tabulated below.

Rose head, sharp point. Shank size ranges:
 1/16 in. to 2/16 in. to 3/16 in. Average
 weight: 0.06 oz.

Provenience	Number
2A6A6	1
2A6A9	1
2A6C2	1
2A6D6	15
2A6D7	1
2A6D10	121
2A6D11	8
2A6D12	22
2A6D13	4
2A6D14	1
2A6D16	1
2A6D18	1
2A6D19	1

Provenience	Number
2A6E2	1
2A8B1	8
2A9E2	2
2A9E11	2
2A10H2	2
2A13A2	1

Rose head, blunt point. Shank size ranges:
 2/16 in. x 3/16 in. to 4/16 in. Average weight:
 0.07 oz.

Provenience	Number
2A6D6	3
2A6D10	3
2A6D12	1

Sprig, sharp point. Shank size ranges: 2 in.
 x 3/16 in. to 2/16 in. Average weight: 0.05 oz.

Provenience	Number
2A6D10	5
2A6D11	1
2A6D13	1
2A8B1	1
2A9E2	1

Irregular head, sharp point. Shank size ranges:
 1/16 in. x 2/16 in. to 3/16 in. Average weight:
 0.05 oz.

Provenience	Number
2A6D6	1
2A6D10	2
2A6D11	1

Brad, sharp point. Shank size ranges: 2/16 in.

Average weight: 0.05 oz.

Provenience	Number
2A6D10	2
2A6D12	1

Clasp head, sharp point. This type of clasp head has been flattened to form two oval sides; hour-glass in outline. Shank size: 2/16 in. Average weight: 0.05 oz.

Provenience	Number
2A6D10	3

1 1/4 in. Nails

A variety of types of 1 1/4 in. (3d) nails can be identified. They are described and tabulated below. Two sprigs with sharp points have shank dimensions of 2/16 in. x 3/16 in. and an average weight of 0.12 oz. Most nails of this size are rose headed. Rose heads with chisel points have shank dimensions of 2/16 in. to 3/16 in. and an average weight of 0.10 oz. Rose headed nails with blunt points are 2/16 in. to 2/16 in. x 3/16 in. in

shank size and weigh 0.07 oz. average. Rose headed nails with sharp points are the most common. Shank dimensions are 2/16 in. to 2/16 in. x 3/16 in. and average weight is 0.06 oz. Specimens of this size range are tabulated in Table 132.

1 1/2 in. Nails

A large number of nails of 1 1/2 in. (4d) size were recovered. These included several types. Sprigs with sharp points had a shank size of 2/16 in. x 3/16 in. and an average weight of 0.10 oz. Rose headed nails with blunt points have sizes of 2/16 in. x 3/16 in. to 4/16 in. and average 0.17 oz. in weight. Rose head specimens with sharp points have shank dimensions of 2/16 in. x 3/16 in. to 3/16 in. x 4/16 in. and weights of 0.13 oz. Rose headed nails with flat points have shank sizes of 2/16 in. x 3/16 in. to 3/16 in. x 4/16 in. and average weights of 0.09 oz. One nail 1 1/2 in. in length was found in a French context. It has a large round head, a sharp point and a shank section of 3/16 in. x 4/16 in. Its weight is 0.5 oz. The specimens are tabulated in Table 133.

2 in. Nails

A wide variety of 2 in. (6d) nails can be identified in the collection. The following tabulation

records the various traits of nail types in this size range.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Rose	Flat	2/16 x 3/16 to 3/16 x 5/16	0.10
Rose	Chisel	2/16 x 3/16 to 3/16 x 4/16	0.20
Rose	Blunt	2/16 x 3/16 to 3/16 x 4/16	0.16
Rose	Sharp	2/16 x 3/16 to 3/16 x 4/16	0.17
Small, Irregular	Sharp	2/16 x 3/16 to 3/16 x 5/16 x 4/16	0.20
Flat, Round	Chisel	3/16	0.25
Flat, Round	Blunt	3/16 to 4/16	0.40
Clasp, Double Oval	Sharp	2/16 x 3/16 to 3/16 x 4/16	0.14
Clasp	Chisel	2/16 x 3/16	0.16
Clasp	Sharp	2/16 x 3/16 to 3/16	0.16
Brad	Chisel	2/16 x 7/16 to 3/16 x 4/16	0.20
Brad	Sharp	3/16 x 3.5/16	0.20
Brad, T	Sharp	2/16 x 3/16	0.20

The stratigraphic distribution of specimens of these types in the 6 penny size is recorded in Table 134, 135.

2 1/2 in. Nails

A wide variety of 2 1/2 in. (8d) nails were identified in the collection. The following tabulation records the

various traits of the nail types in this size range.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Rose	Chisel	3/16 to 3/16 x 4/16	0.34
Rose	Flat	3/16 x 4/16 to 4/16 x 5/16	0.30
Rose	Blunt	2/16 x 3/16 to 5/16 x 5/16	0.32
Rose	Sharp	3/16 x 3/16 to 4/16 x 5/16	0.25
Round, flat	Blunt	3/16 to 4/16	0.22
Irregular	Blunt	1.5/16 x 2/16 to 3/16 x 5/16	0.22
Clasp, Double Oval	Sharp	3/16 x 4/16	0.25
Clasp	Flat	3/16 x 4/16	0.50
Clasp	Sharp	1.5/16 x 2.5/16 to 3/16 x 4/16	0.20
T Brad	Sharp	2.5/16 x 3/16	0.16
Brad	Sharp	3/16 x 4/16	0.25
Brad	Blunt	3/16 x 4/16	0.50
Brad	Chisel	4/16 x 5/16	0.50
Rose	Chisel	5/16 x 6/16	0.75

Spike size

The stratigraphic distribution of 8 penny nails of these types is tabulated in Table 136, 137.

3 in. Nails

A large number of 3 in. (10d) nails were recovered from the site and can be classified into several types.

The characteristics of the types in this size range are listed in the tabulation below.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Rose	Blunt	3/16 to 4/16 x 5/16	0.40
Rose	Sharp	2/16 x 3/16 to 4/16 x 5/16	0.32
Rose	Chisel	2/16 x 3/16 to 4/16 x 5/16	0.52
Rose	Flat	3/16 x 4/16 to 3/16 x 6/16	0.50
T Brad	Blunt	2/16 x 3/16 to 3/16 x 4/16	0.28
Clasp	Flat	2/16 x 4/16 to 3/16 x 5/16	0.50
Clasp	Blunt	2/16 x 3/16	0.50
Sprig	Sharp	2/16 x 3/16 to 3/16 x 4/16	0.25
Rose	Sharp	5/16 x 6/16 Spike size	1.50

The distribution of these types in this size range is indicated in the tabulation in Table 138.

3 1/4 in. Nails

Nails of 3 1/4 in. (12d) length were less common than smaller sizes but still present in quantity in the site. The characteristics of the several recognized sub-types in this size range are listed below.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Rose	Sharp		0.50
Rose	Chisel		0.68
Rose	Flat	3/16 x 4/16 to 5/16	0.66

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Clasp, Oval	Blunt	3/16 x 4/16	0.50
Clasp, Rounded	Sharp	3/16 x 3.5/16	0.50
T Brad	Sharp	3/16 x 4/16	0.50

The frequency and distribution of these types are recorded in the tabulation in Table 139.

3 1/2 in. Nails

Nails of 3 1/2 in. (16d) length were relatively common in the site. The several types in this size range are characterized in the tabulation below.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Irregular Rose	Blunt	2/16 x 3.5/16 to 3/16 x 5/16	0.80
Flattened Rose	Blunt	3/16 to 5/16	0.70
Flattened Rose	Chisel	3/16 to 5/16	0.83
Rose	Flat	4/16 x 5/16	0.75

The distribution and frequency of these specimens is listed in Table 140.

3 3/4 in. Nails

A small number of 3 3/4 in. nails of different types were identified in the Castle Hill collection. The type characteristics are tabulated below.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Rose	Blunt	3/16 x 4/16 to 5/16	0.88
Rose	Chisel	3/16 x 4/16 to 5/16 x 6/16	1.00
Rose	Flat	3/16 x 4/16 to 4/16 x 6/16	0.75
Clasp	Blunt	1/4	1.50
T Brad	Sharp	4/16 x 5/16	0.50

The distribution of these specimens is recorded in Table 141.

4 in. Nails

Four inch (20d) nails were few in number but exhibit similar type characteristics when compared to smaller nails. The types are listed below.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Rose	Blunt	3/16 x 4/16 to 6/16	0.83
Rose	Chisel	3/16 x 5/16 to 5/16 x 6/16	1.00
Rose	Flat	3/16 x 4/16 to 5/16 x 6/16	1.00
Clasp	Flat	4/16 x 6/16 Spike	2.00
Clasp	Blunt	4/16 x 6/16 Spike	2.00

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Rose?	Sharp?	5/16	1.50
Deck	Blunt	5/16	2.00
Rose	Chisel	1/2 x 1/2	3.50
Broad Deck	Sharp	6/16 x 5/16	5.00

As noted above both nails and spikes are present in this length range. Nails have small cross-section dimensions in the shank while the spikes are thicker and heavier.

The distribution of these specimens is recorded in Table 142.

4 1/2 in. Nails

Nails of the 4 1/2 in. (30d) length include several different types and vary from more slender nails to a few examples with thick shanks which can be classified as spikes in the 30d length range. The characteristics of the various types of 30d nails are listed below.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Rose	Chisel	3/16 x 4/16 to 6/16	1.0
Rose	Flat	3/16 x 4/16 to 5/16 x 6/16	1.0
Rose	Blunt	3/16 x 5/16 to 5/16	1.6
Die	Flat	5/16 Spike	2.0
Die	Chisel	5/16 Spike	2.0

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Die	Blunt	6/16 Spike	2.0
Round, Flat	Blunt	5/16 x 5/16 Spike	2.0
Broad Deck	Sharp	5/16 x 7/16 Spike	4.0
Clasp	Chisel	6/16	2.0

The distribution of these specimens in the excavation lots is recorded in Table 143, 144.

5 in. Nails

Several 5 in. (40d) size nails with rose heads and a variety of point forms were found in the site. The characteristics of these specimens are summarized below.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Rose	Sharp		0.50
Rose	Blunt	6/16	1.25
Rose	Chisel	3/16 x 4/16 to 5/16 x 6/16	1.33
Rose	Flat	3/16 x 4/16 to 5/16 x 6/16	1.33
T Brad	Flat		1.33

The distribution of these specimens in the site is recorded in Table 145.

5 1/4 in. Nails

Nails larger than 40d in length range were sorted

into categories based on their overall length. Several specimens 5 1/4 in. long were found in the collection. One of these had a die head; all of the remainder had rose heads. Several different point types are present, however. These are summarized in the tabulation below.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Die	Blunt	5/16	1.5
Rose	Blunt	6/16 to 4/16 x 6/16	3.0
Rose	Flat	3/16 x 5/16 to 6/16 x 7/16	2.0
Rose	Chisel	5/16 to 6/16	2.0

The distribution of these specimens in the site is recorded in Table 146.

5 1/2 in. Nails

Nails 5 1/2 in. in length include both rose and die head types. Their characteristics are tabulated below.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Die	Chisel	5/16 to 6/16	1.8
Rose	Blunt	5/16 x 6/16	2.0
Rose	Sharp	6/16	1.0
Rose	Chisel	3/16 x 4/16 to 5/16 x 6/16	

The specimens are recorded in Table 147.

5 7/8 in. Nails

Nails 5 7/8 in. in length include specimens with die, clasp, rose and broad deck heads and a variety of point types. These are listed in the tabulation below.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Die	Sharp	7/16 x 8/16	2.5
Die	Chisel	7/16; 7/16 x 10/16	3.6
Die	Blunt	6/16 to 8/16	3.0
Clasp	Flat	5/16 x 6/16 to 6/16 x 7/16	2.6
Broad Deck	Blunt	8/16	4.0
Clasp	Chisel	5/16 x 6/16	2.0
Rose	Sharp	4/16 x 6/16	2.5
Rose	Blunt	5/16 to 6/16 x 7/16	3.0
Rose	Chisel	6/16 to 8/16	3.2

The specimens are tabulated in Table 148.

6 in Nails

Nails 6 in. (60d) in overall length consist mainly of rose, die and broad deck head types. The various characteristics of nails in this size range are tabulated below.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Clasp	Chisel	6/16 x 8/16	3.0
Broad Deck	Chisel	8/16	4.0

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Broad Deck	Flat	9/16; 6/16 x 7/16	3.5
Rose	Chisel	8/16; 8/16 x 9/16	4.0
Rose	Flat	7/16	3.0
Rose	Blunt		
Die	Flat	9/16; 6/16 x 8/16	5.0
Die	Chisel	7/16; 5/16 x 6/16	3.5

These specimens are tabulated in Table 149.

6 1/8 in. Nails

One specimen 6 1/8 in. in overall length has a clout countersunk head and a sharp point. It has a diameter of 5/16 in. and a weight of 1.5 oz.

Provenience	Number
2A9E4	1

6 1/2 in. Nails

A small number of nails measuring 6 1/2 in. in overall length are present. They have different head and point shapes as indicated in the tabulation below.

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Die	Flat	8/16	5.0
Broad Deck	Chisel	6/16 x 7/16	3.0
Rose	Flat	6/16	4.0

	Point	Shank Size Range	Average Weight
Head Type	Type	(in in.)	(in oz.)
Rose	Chisel	6/16	3.0
Rose	Blunt	7/16 to 9/16	4.0

The distribution of the specimens is recorded in Table 150.

7 in. Nails

A few nails of 7 in. overall length are present in the collection from Castle Hill. They are listed below.

	Point	Shank Size Range	Average Weight
Head Type	Type	(in in.)	(in oz.)
Die	Flat	8/16 x 10/16 to 7/16 x 8/16	6.0
Die	Chisel	8/16 x 10/16 to 7/16 x 8/16	5.0
Broad Deck	Flat	7/16 x 8/16	4.2
Rose	Chisel	8/16	4.0
Rose	Blunt	8/16	4.0
Rose	Flat	6/16 x 7/16	4.0

These specimens are tabulated in Table 151.

7 1/2 in. Nails

Nails measuring 7 1/2 in. in overall length are listed in the tabulation below.

	Point	Shank Size Range	Average Weight
Head Type	Type	(in in.)	(in oz.)
Rose	Flat	8/16; 7/16 x 8/16	5.0
Die	Chisel	7/16 x 9/16	6.0

Head Type	Point Type	Shank Size Range (in in.)	Average Weight (in oz.)
Broad Deck	Flat	8/16; 7/16 x 9/16	5.5
Broad Deck	Chisel	8/16	5.0

These specimens are listed in Table 152.

8 in. and Larger Nails

Large spikes of 8 in. and more in overall length primarily have die heads although a few specimens have rose heads. The points are primarily flat and chisel types. The 8 in. specimens weigh 5.0 to 9.0 ozs., averaging 7.1 oz. Shank dimensions range from 1/2 in. to 11/16 in. Specimens larger than 8 in. in length weigh up to 14.0 oz. apiece. The largest example in the collection is 12 1/2 in. long and weighs 1 1/4 lbs.

These specimens are tabulated by provenience in Table 153.

Fragments

A large number of nail fragments were found in the collection. It was impossible to determine the precise length of these fragments. They were classified into general size categories by comparing them to head and shank sizes of complete specimens. A precise classification was not possible, but the specimens could be

grouped on the basis of head type and point type. They were further grouped into general size categories. Smaller nail sizes include specimens up to 2 1/2 in. (up to 8d), larger nails are from 3 in. to 5 in. (10d to 40d) in length. Larger specimens were arbitrarily termed spikes for this purpose. They are tabulated in Tables 154 through 162.

The attempt to classify the fragments is not altogether satisfactory, but it may be of some use. It was attempted in order to provide additional statistical data for the study of size distribution in the site.

Analysis of Nail Distribution

An examination of the distribution of nail types through the French and English occupations indicates that all of the types recognized are present in both periods of occupation at the site although there are some variations in the frequency of different sizes and combinations. One way to illustrate these differences is to examine the stratigraphy of the refuse midden in the ditch. The distribution of the various sizes of nails in the fortification ditch strata block A is shown in Table 163. The table includes both whole nails and nail fragments. In this sequence there is

undoubtedly some mixture of specimens due to the nature of the midden deposit. However, study of other types of specimens confirms that lots 2A6D5 and 2A6D6, the uppermost levels, are predominantly English refuse and that lots 2A6D7, 6D8 and 6D9 are predominantly French refuse. The samples from lots 6D5, 6D8 and 6D9 are small and therefore not a very reliable indicator of variations in nail distribution. The samples from 6D6 and 6D7 are adequate: 1403 and 230 respectively. The relative percentages for nail types in these levels are also included in the table. These figures indicate a relatively large percentage of small size nails in the English level 6D6 and a somewhat higher frequency of spike sizes in 6D7, the French level. Larger nails occur in approximately equal percentage in both periods.

This comparison can be summarized and simplified by comparing major size categories and combining cultural levels as well, as in Table 164.

A further examination of the nails associated with the French occupation can be made by comparing the frequencies of the various nail sizes found in sealed French strata in the rampart fills excavated as operation 9 in several sub-operations. These data are also included in Table 163.

Here again the tendency for the nails in the French

period to be of relatively larger sizes can be seen. The tendency is even more pronounced in these levels, perhaps because of the nature of the deposits which are construction and gun deck refuse rather than occupational debris. Table 163 includes a summary of the operation 9 data, combining the nails from the several sub-operations.

These can be further simplified and summarized by comparing major nail size groups as in Table 165.

Another important area in which the stratigraphic distribution of nails can be examined is in the interior of the redoubt, excavated as operation 10. The evidence found in the excavation indicated that the bulk of the refuse in this area was English since the French structures had been leveled prior to construction of the English blockhouse and other buildings. However, some deeply buried remnants of French refuse levels and even some small pockets of French occupational debris were discovered.

The stratigraphy of the redoubt interior began with a sod or turf level, included a rubble zone in which the occupational debris was mixed with heavy rock rubble, and ended in an occupational zone on bedrock. The major strata were also subdivided into arbitrary excavation units as well as the major

stratigraphic separation. Hence the rubble zone was divided into several levels. These have been combined in the study of the nails. The arbitrary levels within the occupation zone have been retained in the table although zones I-IV could all be combined as representing the English occupation. French refuse pockets and deeply buried French refuse zones are separated in the table. Table 166 summarizes the distribution of nails in the interior of the redoubt. Here again there is a gross difference in the number of nails found in the two occupations; nails were far more common an artifact in the English than in the French occupation. This is not surprising in view of the known differences in construction in the two periods.

There is also a tendency for larger nails to be somewhat more common in the French zones, but this is much less pronounced than in the previously illustrated rampart fill and refuse levels.

A summary of the operation 10 nail distributions is presented in Table 167.

Table 167 again illustrates the slight differential in the distribution of larger size nails in the French occupation. It is also clear that the gross quantity of nails employed by the English at Castle

Hill is far in excess of such specimens utilized by the French, a reflection of different construction techniques.

The horizontal distribution of nails in the interior of the redoubt, operation 10, does not reveal too much about the relationship of these specimens to the location of structures. Figures 175, 176, 177 and 178 illustrate the quantity of nails of all sizes found in different areas of the excavation grid within the interior of the redoubt.

Figure 175 illustrates the distribution of nails in the combined English debris from both the rubble and occupation zone levels in the interior. There is a fairly even distribution of nails in the interior when these strata are combined.

Figure 176 illustrates the distribution of nails in the rubble zone. Here there is a marked concentration of nails in sub-operation F in grid square N980-990/E1030-1040 where 34.4 per cent of the nails from the rubble zone were located. Immediately adjacent squares to the northwest and south have high concentrations of nails while those to the east do not. The west wall of an English structure was located in the centre of this grid square and the square immediately to the east would have been within the structure. It may be

suggested that the distribution of nails in the rubble zone may reflect the location of the west wall of this building. Table 167 records the stratigraphic distribution of nails within the floor area of this structure in sub-operation 10G.

Figure 177 illustrates the distribution of nails in the English occupational zones of the redoubt interior. In this strata the sub-operation F grid square N980-990/E1030-1040 has a very low relative frequency of nails while the surrounding squares show higher frequencies. The square immediately to the east, within the structure, has a high nail frequency. Comparing these data with those from Figure 176 (the rubble zone) it is seen that with respect to this structural area the nail frequency is reversed in the lower stratum. This could be explained as indicating that the distribution of nails in the rubble zone reflects the location and collapse or destruction of the west wall superstructure and that the lack of nails in the occupational zone at this location reflects the presence of the wall foundation. Nails within the floor area at the occupation zone level may be interpreted as representing the decay of the floor of the structure and the lower frequency of nails in the rubble zone above as an indication of a lack of nails in debris which covered the floor

level. This may also be seen in the stratigraphic record for 10G in Table 167.

The relatively low percentage of nails in sub-operation D, grid square N990-1000/E1010-1020 in both the rubble and occupation zones can best be explained by noting that this is the location of the remnant of the masonry base of the hearth and chimney of the English blockhouse.

Figure 178 illustrates the distribution of nails from French levels in operation 10. The highest percentage of nails is found in the southwest corner of the interior in sub-operations 10B and 10G where 41.9 per cent, 2.5 per cent and 9.4 per cent of the French nails were recovered. These lots are all from deeply buried French refuse strata which are continuations of French deposits within the rampart fill stratigraphy. These deposits fill a depression in bedrock in this location of the interior and the nails here represent refuse rather than structural debris. The remaining nails from French occupational zones in the interior may be related to structures but constitute less than half of the sample, of French nails, from operation 10. This too may be interpreted as reflecting the lack of nails in the predominantly masonry construction of the French in contrast to the timber construction of

the English period. However, it could also be noted that the lack of nails in French contexts may in part be due to the lack of French contexts in the interior of the redoubt, which is, in turn, the apparent result of English efforts to clear and level this area prior to starting their construction.

Several other stratigraphic sequences of nails may be useful in a consideration of architectural features of the site. These data for nail distributions, by size, are presented in Tables 168 and 169.

The stratigraphic distribution of nails in sub-operation 10G (Table 168) have been discussed above. Table 168 also records the distribution of nails by size in the stratigraphic levels within operation 7, the guardroom. In this case there is a reversal of the pattern previously observed. Here there is a larger percentage of spikes in the English levels and more small nails associated with the French floor than with the English floor.

Table 169 records the nails by size in the stratigraphy of operations 1 and 2, the north guardroom and the magazine, respectively. The floor materials in operation 1A7 have in other artifact classes proved to be English. In operation 2 the rubble fill of the magazine appears to be of French

origin, the result of the collapse of the original masonry arched roof of the casemate into the room. Both English and French floor levels were identified in the structure and nails associated with these levels are tabulated. There seem to be more spikes at the French floor level, and in the French roof rubble zone.

An attempt to correlate both nail types and sizes with the French and English occupations of the entire site is presented in Tables 170 and 171. Table 170 presents the specimen counts and Table 171 presents the occupational percentages by nail size category for each type of nail identified in the collection. Unlike the stratigraphic analyses presented above, these tables do not include nail fragments; they are based on complete specimens only. This is because it is not possible to completely classify a nail from which either point or head is missing.

An examination of the percentages in Table 171 will illustrate that on the basis of the sample of complete nails from culturally identified lots the French employed relatively more large nails than did the English. There are also a greater variety of sizes and types of nails in English associations.

There are 107 variations in the English sample and only 87 in the French. Although a few were used in the French period, sprigs and brads are mainly English. Spikes with rose heads and sharp points appear to be primarily a French type of nail.

Of the total collection of nails from the site, 82.2 per cent are from English contexts and 17.9 per cent from French associations, a good indication of the importance of this artifact in English construction at the site.

The size difference in cultural association of nails can be illustrated more clearly by reference to Table 172 which compares the cultural distribution of size groups.

The cultural association of different types of nail and spike heads is summarized in Table 173.

There are somewhat more irregular heads in the French sample while the rose head is present in greater relative percentage in the English sample. Die heads are relatively more common in the French period, probably because of the greater use of large spikes upon which this head type is common.

The cultural association of different types of nail points is summarized in Table 174.

Chisel and flat points are somewhat more common in the French sample, also probably due to the slightly larger percentage of large nails and spikes upon which such points are most common. One combination, the spike with rose head and sharp point, was previously noted as a primarily French type.

The nails from Castle Hill most closely resemble the English nails illustrated in the Royal Engineers Office (1812) list. There are many similarities in head and point shapes as has been indicated. Few similarities in such details are seen when the specimens from the site are compared to the illustrations of French nails provided by St. Remy (1745: Vol. 2, Pl. 65; 165) and those shown in Diderot (Plates, Vol. 3, Pl. 1, Figs. 8,9). The nails illustrated by St. Remy are for cannon carriages. The illustrations are not as clear as those in the Royal Engineers list, but the head forms appear to be different.

Building Hardware Conclusions

The various examples classified as building hardware are found in English, French and indeterminate contexts in the site. There are a few distinctive differences in the stratigraphic distribution and cultural association of these specimens and these will be

discussed below. It should be kept in mind, however, that the sample is small and the differences noted are presented as observations at this site and not as generalities of broad significance.

Fragments of locks were all identified as being parts of iron face plate stock locks and padlocks. These fragments all appear to be similar to the 18th century specimens illustrated by Noel Hume (1970: 243-252), a dating consistent with the stratigraphic distribution of the specimens at Castle Hill. Nearly all of the specimens are from English contexts. One key came from a sealed French rampart fill level and two padlock and three stock lock fragments were from probable French contexts; these could be intrusive specimens. In contrast 44 specimens were found in probable English contexts.

Most of the hinges recovered are common strap and butterfly types described by Noel Hume (1970: 236). The majority come from English contexts in the site and the most common type is a tapered strap hinge. Sixteen of these were found in English contexts and only two in probable French associations, both of which are levels subject to possible intrusion. T, H and butt hinges are uncommon and found only in English contexts. Tanged gudgeons and pintles are

present in deposits from both periods of occupation. A unique tapered strap with a ring joint is from a French level. The only examples of butterfly hinges are from mixed levels and cannot be associated with either occupation although they are more likely English than French.

Iron tie rods are present in both periods at the site, as are hangers and timber braces. Hangers and braces, however, are much more frequent in English associations than in French. In contrast tanged masonry brackets are almost exclusively found in French levels, 23 specimens coming from such contexts while only a single example was found in an English level. Tanged iron rods were more common in English contexts than in French ones.

Riveted rooves are nearly all associated with levels identified as English. Most of the nuts, bolts, rings and washers are also from English contexts but there are examples from French levels.

The analysis of nails indicates that the French probably employed more relatively large nails than did the English while there is a greater variety of sizes and forms of nails in English contexts. A much higher percentage of the total nail collection was found in English associations and this artifact

was probably more common in English construction at the site. Some minor variations in the relative frequency of various nail form traits have been noted in detail.

As a general conclusion it may be tentatively suggested that the building hardware associated with the two periods of occupation at Castle Hill tends to reflect French masonry and English timber construction differences.

BUILDING MATERIALS

The artifacts described here are non-ferrous specimens of a structural nature. Earthenware roof tiles, bricks and dressed stone are all included.

Earthenware Roof Tile

A number of fragments of earthenware roof tile (Fig. 179) were recovered from various parts of the site. The specimens found in or near buildings in the redoubt were concentrated in the area of the magazine but it is unlikely that the casemate had such specimens as an architectural feature. It seems more likely that an adjacent structure might have had a tile roof. Other tile fragments were found in the rampart fill levels. The distribution of the specimens does not serve to associate the tile with any particular structure and perhaps none had a tile roof.

The paste in the body of these ceramic artifacts is similar to that in the orange paste coarse earthenware of French origin. The fired clay is a strong

yellowish pink to orange colour and has a fine sandy texture. There are a few small aplastic inclusions but they appear to be of natural origin rather than particles added as temper. Small air pockets are frequent.

The interior (concave) surface of the tiles is rough while the exteriors have a smoothed surface marked by wiping striations parallel to the long axis of the specimens. There are also longitudinally oriented ridges on the exterior surfaces, also part of the smoothing operation.

The tiles range from 13.0 mm. to 30.0 mm. in thickness, the thinner dimensions being near the edges. Thickness varies considerably along the length of larger fragments. No complete example was found; the longest fragment is 210.0 mm. in length.

The tiles are half-cylinders, or nearly so. The largest measured trough diameter is 210.0 mm., but most are estimated at 160.0 mm. to 170.0 mm. The lateral edges are beveled in some fragments and slightly upcurved and rounded in others. The ends appear to be squared in cross-section. The ends bear vertical smoothing striations, possibly from cutting or finishing.

There are occasional patches of mortar on the convex exterior surfaces of a few specimens. There

is often a lime deposit on the concave interior.

Provenience	Number of Specimens
2A1A2	1
2A2--	12
2A2A7	9
2A2A12	1
2A2B1	1
2A2C1	1
2A3A1	1
2A3A6	1
2A6B1	26
2A6D6	3
2A9C1	14
2A9C2	1
2A9E2	3
2A9E12	1
2A9J4	1
2A9J5	7
2A10F18	1
2A10--	13

Of the specimens listed a total of 68 were found in mixed or otherwise indeterminate contexts. Nine specimens were found in the matrix of an English floor in the magazine and four others in probable English deposits. Two specimens were from probable French contexts while 14 were from definite French rampart fill deposits.

None of the specimens can be well enough associated with a structure to demonstrate the use of tile as roofing at the site. There is an historical reference to French roof material; temporary plank coverings were used while awaiting shingles from Quebec (Proulx 1969: 100). The English also shipped large quantities of shingles to Placentia (Ingram 1964: Appendix I). It is doubtful that either reference is to earthenware tile.

The most important cultural association of tile in the site appears to be that in the French rampart fills which indicates these specimens were definitely in use somewhere in Plaisance during the French occupation. The fact that only fragments were found, and their presence in rampart fills, suggests that these specimens were brought to the site mixed with rubble for use in filling the gun platform areas. The fragments found in the matrix of the English magazine floor may have been re-used as fill material.

Bricks

Numerous complete bricks, brick chips and fragments of bricks were encountered in the rubble of structures in the site. Many were from mixed levels but some examples were found in French and English contexts indicating that bricks were used in both periods of occupation at the

site. Historical records indicate that the brigantine William included 20,000 bricks in its cargo to Placentia in 1762 when English construction began at the Castle (Ingram 1964: Appendix I,ii).

During the field season the immediate visual impression was that there were two types of bricks present; thick and thin. It was impossible to establish an exclusive association of one type with one occupation, although thin specimens were found in situ in French structures. The thickness of specimens ranges from 7/8 in. to 2 5/8 in. The arbitrary separation between thick and thin specimens is about 1 1/2 in., but when a large enough sample was available for measurement it was found to represent a continuum without a clear cut dividing point. An attempt to determine whether or not there was a difference in bricks of the French and English periods has been made and is discussed in detail below.

All of the bricks are rectangular and somewhat irregular in shape. There are a few examples of unusually large size or with special characteristics. The colour ranges from orange yellow to reddish orange, but colour is an unreliable characteristic for study (Noel Hume 1970: 81). The dimensions of the specimens offer the best means of analysis.

Structural remains in the site indicate that bricks were used in hearths and fireplaces and historical records note the use of brick in chimneys. These associations have been discussed in the appropriate architectural sections.

Complete bricks from culturally identifiable stratigraphic contexts were used in the first analysis. These data are found in Table 175. Except for specimens from sub-operation 6A, the French specimens are from sealed rampart fill deposits which are certainly French contexts. The English specimens are from probable English levels in the interior of the redoubt and from the ditch fill, these being the only specimens available from potentially English contexts. In the analysis of the cultural association of brick index numbers only specimens from definite (not probable) French contexts were used while the English sample was necessarily drawn from less reliably identified strata.

The complete bricks were measured in eights of inches and their dimensions were converted to an Index Number according to South's method (South 1964), a technique validated by Lazarus (1965).

Index numbers from bricks from French contexts range from 85 to 124 in contrast to index numbers from English context specimens which range from 87 to 111.

However, there is only a single French specimen of the 124 size and the range is a poor comparison. A more meaningful comparison of French and English brick index numbers is the mean index number (See Table 176). The mean index number for bricks from French contexts is 94.1 in contrast to those from English associations which have a mean index number of 101.7. This contrast indicates that French bricks tend to be smaller than English bricks at Castle Hill. Due to the stratigraphic association of the French specimens we can be sure that that sample is of the French period and presume the bricks to be of French origin. The English contexts are not sealed and could have early specimens in them. Furthermore, since the English re-occupied the fort, they could have re-used French bricks as well as retaining some French structures if they were in good repair as far as brickwork was concerned. These factors must be kept in mind in interpreting the bricks, but there still appears to be a significant difference in bricks from French and English associations at the site.

The nature of this difference may be seen in the following comparison of average brick dimensions.

	Dimensions of Whole Bricks		
	Average Length	Average Width	Average Thickness
	(in in.)	(in in.)	(in in.)
English	7 3/8	3 1/2	1 3/4
French	7 1/8	3 1/2	1 1/4

It is clear from this comparison that the width is the most constant dimension, the average being the same for both French and English specimens. The English specimens average 1/4 in. longer than the French specimens and 1/2 in. thicker. The immediate visual impression when looking at specimens is that thickness is the main difference and these data bear that out. There is an even greater contrast in thickness as can be observed in Table 177 where it is apparent that the very thin bricks, about 1 in. thick, are clearly more common in French contexts.

These data are based on complete specimens. Many bricks from the site are fragmentary and the lengths and widths cannot be determined in all cases, but thickness can. Although Lazarus (1965) suggests a formula for approximating the index number from any two brick dimensions, this analysis was not attempted. Instead, a distribution of bricks in the site based only on their thickness was utilized. These data are presented in Table 177. Table 175 dealt with complete specimens.

The addition of fragments to the study sample in Table 177 produces a few additional specimens at both ends of the thickness range which were not represented in the sample of complete specimens. It also provides

a larger sample. The difference in thickness between average bricks from the two contexts is still $1/2$ in. but the means are different, being $1 \frac{1}{8}$ in. for the French sample and $1 \frac{5}{8}$ in. for the English specimens.

The percentages shown in Table 177 also support the conclusion that thinner bricks are more frequent in French contexts while the thicker specimens are relatively more common in English associations. In Table 177 a few specimens have been designated as coming from possibly English and French lots. This category of lot reliability has not been used elsewhere in this report, but has been introduced to help control a possible problem of intrusive specimens. The specimens listed in Tables 176 and 177 as possibly French are all from lot 2A6A9 which has otherwise been classified as probably French. The concentration of thick bricks in this one probable French lot was so notable as to suggest the possibility that the specimens were intrusive or perhaps had been erroneously identified as coming from that lot. Hence they were segregated as possibly French specimens for purposes of comparison of the bricks. In Tables 176 and 177 these specimens have been included in the final column which lists the total French sample. Their inclusion there does not materially alter the general conclusion

that French bricks tend to be thinner ones. Tables 176 and 177 also include some specimens designated as possibly English. These were all from lot 2A6D5 which was otherwise classified as indeterminate. On stratigraphic grounds this lot is almost certainly English but was not classified as such due to the presence of modern intrusives and other possible causes of mixture. These possibly English bricks have been included here to increase the sample; they do not materially alter the conclusions reached on sampling from more reliably identified lots.

In addition to the standard bricks discussed above there are a few specimens of unusual qualities which deserve mention.

Glazed Brick

One fragment of a slightly tapered brick with a glazed surface was recovered from an English context. It is thinner at the edge than toward the centre, and is a small fragment. The glaze is probably from firing and not intentional (Noel Hume 1970: 81).

Provenience:	2A6D6
Dimensions (in mm.):	
Thickness:	42.0 to 61.0

Brick with Hole

This is a small fragment of a fine grained soft brick and is notable only because there is a remnant of a hole in it.

Provenience:	2A6D14
Dimensions (in mm.):	
Dimensions of fragment:	45.0 x 29.0 x 29.0
Hole diametre:	Greater than the 18.0 remnant

Mortar Block

This specimen is a rectangular block of large size made entirely of mortar. It was recovered from the magazine, context unknown.

Provenience:	2A2--
Dimensions (in in.):	
Length:	9 3/8
Width:	4 1/4
Thickness	2 1/2

Summary of Brick

The analysis of bricks and brick fragments from Castle Hill indicates that there probably are some significant differences in size when bricks from French and English contexts in the site are compared. The

size ranges overlap, but the most common brick in the French period is a thin one while thicker specimens are more frequently associated with the later English occupation of the fort.

The English may have re-used French bricks as indicated in the material from several English associations.

As seen in Tables 176 and 177, when the French sample is restricted to specimens taken from sealed French strata, the size differences are greater and more clear cut. Brick from possibly French lots 2A6A7 and 2A6A9 are all in the index and thickness ranges of the brick sample from probably English contexts and could well be intrusive English specimens since these lots are from ditch rubble. However, they could actually be French specimens. Even including these in the analysis, there still appear to be some significant differences in the index size and thickness of bricks from French as opposed to English contexts.

The most likely hypothesis is that the thin bricks are of French origin and that thicker sizes, although present, were relatively rare in that period. The thicker brick appears to be from the English occupation during which time some of the older French bricks were salvaged and re-used. In operation 7 a French fireplace

was found stratigraphically beneath an English hearth. The French fireplace was made of the thin type of brick. In operation 10 in the northwest corner of the redoubt the remnants of a fireplace built into the north revetment wall also had the thin brick in its construction. Both were built by the French.

Roof Slate ?

A small fragment of slate was recovered from a French context.

Dimensions (in mm.)

Length: 28.0

Width: 22.0

Thickness: 3.5

The specimen could be an important indication of the possible use of slate for roof covering in the French period. However, had that been the case there surely would have been many such fragments in the refuse of the site instead of a single one. It was recovered from a refuse deposit in the rampart fill and perhaps came from some other location in the French town.

Dressed Stone

One hundred ninety-six examples of dressed stone

(Fig. 180; Pls. 35, 36, 37 in 1965 report) were found in various locations in the site. Some of these were recovered from excavations, some were found mortared into wall remnants, a few examples were incorporated into dry-wall constructions and others were found in scattered surface locations. An effort to locate and record examples of dressed stone from surface areas outside the immediate excavations was made, but there are undoubtedly numerous examples which could still be located, especially far down the slopes on the south and west sides of the fort.

Several types of dressed stone are present. The most common type is the cordon stone made of local igneous rock. Door frame stones and other dressed stone, also made of igneous rock, were also common. Another variety of cut stone is made of limestone. All of the cut stone utilized in the construction of the site appears to be of French origin although the English re-used some of it in their work.

The rock used in the construction of the walls was irregular and angular in shape, but carefully laid to present a relatively smooth exterior wall face. Some dressed stone of local igneous rock was also used in the walls and the amount of shaping varied considerably. At the salient angles large

rocks used as corner stones showed minor traces of pecking on one or more surfaces but were not worked extensively enough to be classed as dressed stone. These were the only dressed stones, other than door frame cut stones, which were found in situ as constructed. There were some examples of cordon stones which had been re-used in the English repairs and built into the bases of walls and hearths. The most extensive re-use of cordon stones in the lower wall reconstruction by the English was in the northwest demi-bastion.

The cordon stones were the most common type of cut rock. They were made of reddish and greenish local igneous rock and were generally of irregular outline except for the dressed cordon face. Stones selected for the purpose were basically slabs of relatively uniform thickness. The longest straight edge was pecked to form a protruding semi-circle 6.5 in. in diameter. In those cases where the stone selected was thicker than the desired diameter of the cordon a lip effect is noted where the thickness was reduced to form the semi-circular projection. Most of the cordon examples are straight. Four examples were identified as cordon quoins in which two straight faces meet forming an angle. These were undoubtedly used at shoulder angles.

There is some variation in the diameter of the cordon projection; the diameters range from 5 in. to 8 in. The most frequently occurring diameter (30 examples) is 6.5 in. with 6 in. next (24 cases) and 7 in. fairly common (14 examples). The average diameter is slightly over 6 in. Cordon stones range in length from 3.5 in. to 3 ft. 2 in., the shorter examples being small fragments. It appears likely that the usual length was between 1 ft. and 2 ft. while typical widths range between 1 ft. and 1.5 ft. These dimension limits probably represent a size and weight range desirable from the point of view of the working mason. Anything larger would have required more than two men to handle easily judging from the observed labor of moving these specimens around the site during excavation.

The cordon was a structural feature located high on the exterior walls of the fort and was illustrated on the 1695 plan of the redoubt, and references indicate that the walls had been completed to this height by 1697 (Proulx 1969: 92). In 1701 there was reference to 300 toises of cordon at the fort (Proulx 1969: 98). There is little doubt from these historical records that the cordon stones were a feature of the French construction of the site. The discovery of cordon

stones at low levels in the basal remnants of walls and in hearths is an indication that work where such stones were employed out of their original position was done by the English during their repairs of the fort. Similarly, the cordon stones found in various dry-wall locations around the redoubt must represent later construction.

The cordon stones (Fig. 180) are listed in Table 178.

Other cut stones made of local igneous rock were utilized in the construction of the stone doorway entrance of the magazine. At least 23 such door stones were recovered. Some of them were still in situ and the remainder were found in the rubble fill of operations 1, 2 and 3, where they fell when the doorway collapsed. These stones all have a notch or inset jog to serve as a door jamb. The notch was usually between 0.1 ft. and 0.15 ft. in depth and 0.65 ft. in length. These cut stones are listed in Table 179, (Fig. 180). Table 179 also lists various other miscellaneous cut stones made of local igneous rock. These include possible quoins from bastion angles and stones with carefully squared edges. Since the magazine was constructed by the French it seems most likely that these cut stone specimens belong to that period of construction.

Another major category of cut stone includes all specimens made of limestone (Table 180; Fig. 180). There are two basic facies of limestone represented; one is fine grained and the other coarse. Both are cream coloured. These specimens have been carefully worked and in unweathered specimens the parallel chisel grooves can be seen clearly. Many of these specimens have been eroded by exposure. A number can be identified as quoins, others as capstones, presumably used to finish the parapet. Several examples of the limestone dressed rock feature sockets and grooves for metal masonry dogs, clamps or pegs for fastening them in place. Two specimens are curved, one with compound curves suggesting that it might have been part of a complex arched door or window but cannot be associated with a structure. Insufficient evidence prevents more than a tentative suggestion of this important architectural feature. The south guardroom (operation 7) is the closest structure to the talus findspot of the specimen.

One large limestone specimen with a clamp socket on one side has the letter C engraved on its surface. Most of the remaining examples of limestone are small fragments.

The cut limestone specimens suggest that the salient and shoulder angles of the exterior wall may have been dressed with at least some limestone quoins. One

rectangular limestone block was found in situ in the east face of the northeast bastion. It was the only limestone found in the wall. The parapet coping was probably of limestone. Unlike the un-socketed dressed stone made of local igneous rock, the limestone was employed in locations where the use of sockets and clamps was necessary.

Like most of the cut stone, the limestone examples came from rubble locations and only one was found in its original position. Many are from surface proveniences in various operations. One fragment was recovered from lot 2A9E15. This lot is a sealed layer of French refuse in the rampart fill deposits and this specimen provides the most reliable stratigraphic evidence of the French origin of the limestone specimens. Examples were found in English contexts as well but more likely represent re-used stones since the major English construction was in timber. The English repairs of the exterior walls did not restore either the cordon or the limestone capped parapet.

There are no local sources for the limestone material in the area of Castle Hill. Samples were submitted to the Mineral Resources Division of the Department of Mines, Agriculture and Resources in St. John's Newfoundland. Macroscopic examination

indicated these limestones are not from the Island of Newfoundland. The analyst agreed with the suggestion that they were imported, and indicated that a likely source would be the Cretaceous chalk beds on either side of the English Channel where there are large deposits in both France and England (John H. McKillop, Pers. Comm. 2 July 1969).

It seems most logical to suggest that the limestone was brought from France, possibly as ballast. It is known that lime was shipped to the site for use in the fortifications (Proulx 1969: 86), and limestone, "pierre a chaux", (Proulx 1969: 98) was also hauled to Placentia.

The igneous rock used in the construction of the fort could have been obtained in part from quarrying operations at the site in the process of leveling the interior of the redoubt and the magazine floor. However, most of the rock was probably obtained from a quarry located across the gut from the fort and near the town.

The labor expended on the cordon stones must have been considerable and the use of decorative limestone which had to be imported is a further indication of the effort which went into the redoubt constructed by the French. The cordon had a

traditional military purpose but the limestone probably did little, if anything, to enhance the structural integrity of the fort. Its presumed function was the decorative embellishment of the fort, carried out despite the fact the site is frequently shrouded in fog and frequently none of it, let alone its structural decoration, would have been visible. It is suggested that these architectural features of the site may be interpreted as having symbolic value as material representations of French cultural tradition.

Mortar Contents

The mortar used in the construction of the redoubt was made of lime imported to Plaisance. A lime kiln was located at the base of the hill (Proulx 1969: Pl.13) and lime and sand were used in construction (Proulx 1969: 86). During stabilization of the site sand obtained from the beach at Point Verde was discovered to duplicate that found in preserved mortar in the walls. Other local sources produce similar sand. In addition to sand the mortar was found to contain artifacts and animal bone. Numerous mortar stained clay pipe stem fragments were recovered. Mortar stained fish bone was found in the rubble of the magazine vault and at least nine mortar stained shells, including those of the Blue Mussel, clams, winkles and a barnacle, were also recovered.

FAUNAL REMAINS

Faunal remains from the site include shells as well as mammal, bird and fish bones. A total of 22,518 faunal specimens were recovered from culturally identified contexts in the site. These specimens provide a means of studying the diet of people living at the fort and further can illuminate the nature of French and English adaptation to the area.

Study of the animal bone recovered in 1965 gave added impetus to the 1968 field work. The earlier sample was weak on data from French horizons and one of the goals of the 1968 season was to excavate additional French material. With an increased sample the entire faunal collection was restudied. Different methods of analysis were also employed and some significant changes made in the original hypotheses (Grange 1967: 295-9).

The bird and mammal bones were identified by Carole Sumner; the sections dealing with the identification and tabulation of these specimens are her report (Appendix C).

The shellfish and fish bones were identified by the author. These data are in Appendix A. The archaeological interpretation of the faunal remains was done by the archaeologist who is therefore responsible for any misinterpretation of Sumner's data as well as for any defects in the identification of fish and shells. The tabulations of faunal remains from various excavation lots in Appendix A and C also include estimates of the approximate minimum number of individuals represented. The analysis of the faunal remains in the following sections is based on the data recorded in the appendix tabulations.

Both domestic and wild species are present in the collection. With few exceptions the wild animal remains are species which have been included in the diet of recent inhabitants of Newfoundland. There is also historical evidence which suggests that the faunal remains are probably representative of part of the food supply of the inhabitants of the fort. This evidence is reviewed below.

Shellfish

Shell was abundant in some parts of the site but the number of species represented was not great. The shellfish remains were common types and relatively easy to recognize (see Appendix A).

Blue Mussel

The most common shell found in the site was that of the Blue Mussel (Mytilus edulis). These mussels, found at low tide in rocky places, are a popular food species in Europe (Morris 1947: 34-35; Waterman 1969: 2). They were utilized by both French and English at Castle Hill.

Clam

Clam shells (Mya arenaria) were next in abundance in the site.

Horse Mussel

Fragments of the Horse Mussel (Volcella) were present in small quantity, but were relatively rare.

Scallops

A small number of both large and small scallop shells were found in the excavations.

Oyster

Two fragments of oyster shell (Crassostrea virginica) were recovered.

Periwinkle

A number of probable Atlantic Dogwinkle shells (Nucella lapillus) were recovered. Often filled with mortar and perhaps once incorporated in the walls, these specimens may not represent a species eaten at the site.

Snail

One small snail shell was recovered.

Cockle

One fragment of a cockle (?) shell was found.

Lobster

Several fragments of lobster shell (Homarus spp.) were found. They are tinged a bright orange, presumably from cooking. It is notable that a straightened fish hook, identified as a lobster spear point, was also found at the site.

Fish

Most of the fish bone identified was that of the Cod, Gadus morhua. A small quantity of fish bone representing other species was recognized but could not be

specifically identified (See Appendix A.). The significance of the fort as a defence for the cod fishery has already been noted, and it is not surprising that fish were an important resource at Placentia.

Formal laboratory identification of fish bone was supplemented by informal identification obtained from fishermen on the crew during the field season. The most important aspect of their observations was that the fish bone recovered from the site represents fish eaten fresh. Preparation of fish for preservation by drying or salting involves the removal of the head and vertebrae (Ryder 1970: 393) and can be confirmed historically (Innis 1954: 48, Note 51). Thus skull bones and vertebrae in the site, many of which bear cut marks, reflect the butchering of fresh fish. The fort is too far from the sea to have served as a drying flake, especially since there are many more suitable locations in the harbour for that purpose. The fish bone in the site is therefore not likely the debris of large scale fish processing and thus represents those fish consumed fresh rather than in a preserved state. In some cases the bones were found clustered possibly representing the remains of a single fish or meal. It is known that fresh salmon were eaten at the site in 1794 although the species was not identified in the collection. This

historical reference indicates that 46 salmon taken at one time were sufficient to feed the twenty man garrison for a week or more (Murray 1968: 98).

Of the 10,790 fish bones tabulated, 80 per cent are from French contexts in the site.

Mammals

Mammal remains from the site include both wild and domestic species as identified in Sumner's technical report (Appendix C). Most, but not all, of the species represented were part of the food supply at the fort. The distribution of specimens in excavation lots is recorded in Appendix C.

The domestic mammals, clearly food remains, are the pig, cattle, sheep and possibly goats. They are present in both periods of occupation. Cattle and sheep are known to have been kept in the French period at Placentia (Proulx 1969: 112). In 1687 the colony had 31 betes a cornes (Proulx 1969: 39). The domestic cat is also present in both periods, but probably not as a food source.

A smaller number of wild mammal specimens were recovered. Of these the seal and caribou, present in both periods, and the rabbit, found in English contexts, can easily be interpreted as food remains. A caribou

taken at Placentia in 1794 was of remarkable size with fore quarters weighing 159 pounds (Murray 1968: 129).

Fox bones are present in both periods at the site, the Martin is found in French associations, and the Otter was identified but came from an indeterminate context. These species may have been taken for their fur. The sale of furs hunted locally is recorded in Aaron Thomas' journal at Placentia in 1794. The same source also implies that the flesh of animals taken for fur was eaten (Murray 1968: 133). Thus, the fur bearing wild game present in the site may be included as potential food sources in the analysis of these materials. The inclusion or exclusion of these few specimens does not materially alter the major results in numerical or percentile terms. Rats are also present in French refuse at the site, but are unlikely food sources and have not been included in the analysis of diet.

Birds

Bird bones in the site have been identified in Sumner's technical report and the distribution of specimens in excavation units is recorded in Appendix C. Most of these remains are of species providing food sources in modern Newfoundland and the large quantities

of bird bone in the site are therefore probably not the result of accidental causes. A brief review of the modern uses of the bird species illustrates their significance as a food resource.

Red-throated Loon

Several specimens of the Red-throated Loon were recovered from French contexts in the site. It is uncommon and appears during the summer (Peters and Burleigh 1951: 48).

Shearwaters

Elements of these birds were found in both French and English contexts in the site. They prefer to stay at sea when in the Newfoundland area which suggests their presence in the site is not accidental. The Sooty Shearwater was often used for bait and is preferred above the Greater Shearwater as food; the latter is "common fare" among Newfoundland fishermen (Peters and Burleigh 1951: 53-57).

Cormorant

Both the Great Cormorant and the Double-crested Cormorant were identified in the collection, the latter

in both French and English contexts, the former only in French associations. Cormorants are apparently edible but rarely eaten due to the strong fishy taste (Peters and Burleigh 1951: 68).

Canada Goose

The goose was found in French contexts in the site. The species is highly desirable as food (Peters and Burleigh 1951: 85).

Ducks

A variety of ducks were present in both French and English contexts. The Oldsquaw is sometimes caught in fish nets; their strong taste means few are taken for food (Peters and Burleigh 1951: 111). The King Eider is sometimes shot for sport but has an undesirable fishy taste (Peters and Burleigh 1951: 117; Freuchen and Salomonsen 1958: 44). They are also useful for feathers. The Mergini or Sea Ducks are shot for sport (Peters and Burleigh 1951: 120, 122) and are edible although not highly desirable (Peters and Burleigh 1951: 124). The

Scoters are taken as game birds (Peters and Burleigh 1951: 120,124).

Eagles, Ospreys, Hawks and Falcons

The Bald Eagle and Osprey were found in both French and English contexts while the Gyrfalcon and Pigeon Hawk were present in only the French period. Such birds as Eagles and Ospreys could be expected to collect at a fisheries site like Placentia for feeding (Peters and Burleigh 1951: 138-9, 142-4). Refuse at the site may have attracted them. Drying fish may also have attracted these species, in which case they might have been killed to remove a nuisance. Another alternative is to suggest that falconry may have been practised during the French occupation, the period when most of these specimens were deposited. Long before Castle Hill was occupied Newfoundland was a source of birds such as hawks and gyrfalcons (Tuck 1967: 265) for that purpose. Falcons, hawks, sometimes eagles and even owls may be trained to hunt selectively (Encyclopaedia Britannica 1965: Vol. 9, 44-5). It is possible that such birds were used for sport or food getting during the occupation of the site.

Willow Ptarmigan

Locally called the Partridge as well as the Ptarmigan,

this bird is a highly desirable food source in Newfoundland (Peters and Burleigh 1951: 150-52). The species was present in both periods at the site.

Chicken

A few examples of domestic fowl were present in both French and English contexts in the site. There are historical references to poultry being kept at Placentia during the French period (Proulx 1969: 112).

Whimbrel

These birds are found in French contexts at the site; they are an excellent food (Peters and Burleigh 1951: 183).

Greater Yellowlegs

This species is also associated only with the French period at the site. Now protected, it was formerly a game bird (Peters and Burleigh 1951: 194).

Gulls and Terns

The bones of both large and small gulls were present in great quantity in the site and in both periods of occupation. They were much more common in the French period. The large specimens may be from the Black-backed Gull or Herring Gull, both species which are captured and

fed with poultry in Newfoundland. Such a controlled diet eliminates the fishy taste and results in edible birds (Peters and Burleigh 1951: 225-8).

Alcids

Auks, Murres and other Alcids including the Black Guillemot, Dovekie and the Common Puffin are present in both occupations at Castle Hill. All of these species are important food sources (Peters and Burleigh 1951: 157,259,260) and the Great Auk was exterminated in Newfoundland by hunting for use as food and bait. They were salted for winter use (Peters and Burleigh 1951: 246-58). Thousands of Murres are shot for food (Freuchen and Salomonsen 1958: 44). They were undoubtedly eaten at Castle Hill.

Great Horned Owl

The Great Horned Owl is found in French contexts in the site. It is often shot as a destructive bird and also frequently for food (Peters and Burleigh 1951: 268). The Hawk Owl is relatively tame (Peters and Burleigh 1951: 270) and could have been trained if falconry was practised at the site. It is associated with the French period at the site.

Ravens and Crows

Ravens are present in both French and English contexts and Crows are found in French associations at the site. They could have been attracted to the site by garbage. The large quantities of bones present in the site suggest that these species were eaten at Castle Hill.

Most of the species of birds represented in the collection are ones which are eaten at the present time and it is not unreasonable to assume that they represent food remains in the site. The numerical quantity of the bird bone fragments is such that they cannot be attributed to chance specimens. In addition cut marks have been found on some bones.

Archaeological Interpretation of Faunal Remains

The presence of some species of birds in early dated contexts at Castle Hill may have some ornithological importance, but the major archaeological interest in the faunal remains from the site lies in their interpretation as evidence of the diet and ecological adjustment of Europeans in Newfoundland. The interpretations of these remains may be approached from several points of view which have been discussed in detail by Daly (1969) and Cleland (1971).

One of the first factors which must be held constant is environmental change. The similarities in species found in both French and English occupations suggest that ecological change was negligible during the occupation of the fort. It is assumed that the same local food sources were available to the French and English, so differential utilization of those resources may be attributed to cultural differences. The same relative stability was assumed for the analysis of materials at Fort Michilimackinac (Cleland 1971: 8-9).

There are several methods for determining the extent of difference between faunal remains from French and English contexts. A simple approach is to compare the number of species associated with the two occupations. Not all of the bones could be identified to species level; some were placed in less specific taxonomic categories. A total of 83 species and taxonomic categories have been recognized in faunal remains from the site. Of these, 58 per cent are found in English contexts in contrast to 89 per cent in French associations. Even discounting rare or unique shellfish and non-edible species it is clear that the French made a broader use of local food resources than did the English.

In spite of this difference, the species of major dietary significance are shared by both occupations. English and French alike used domestic and wild mammals, domestic and wild birds, fish and shellfish as food. There are differences in the relative importance of these categories in the two periods of occupation which can be interpreted as evidence of different diets and different patterns of adaptation to Newfoundland. The identification and quantification of the precise nature of these differences is difficult because the results are greatly affected by sample sizes and techniques of analysis. These problems are discussed below and several different approaches to faunal analysis are presented.

The analysis involves several different kinds of samples of the faunal material and it is necessary to explain these factors. Chaplin (1965: 206) states that the best method is to equate bone with pottery and treat it in the same manner. The analysis of pottery and other artifacts from Castle Hill has been done with reference to levels of reliability of lot identification. Some excavation lots are definitely French or English while others must be classified as "Probable" French or English. A "Total" French or English sample is made up of both definite and probable specimens. The use of the probable materials is necessary because many English lots were

subject to modern intrusion and the sample from definite English contexts is relatively small. Thus, the tabulations of faunal remains involve these lot reliability factors.

Where the minimum number of individuals has been used as a basis for the calculation of usable flesh weights, the number of individuals varies with the way in which lots are grouped for analysis. This will be discussed in detail later, but the tabulations of specimens to follow are of three types: those based on individual excavation lots, others based on grouped excavation lots representing major stratigraphic units, and tabulations based on site totals for French or English cultural components.

One basic approach to the analysis of faunal materials is based on the number of bones of each species identified. Cornwall (1956: 242) indicates that the number of bone fragments of a species represents the relative frequency of that species at a site. Heizer also regards the number of bones as an indicator of the relative popularity of species (Heizer 1960: 104). This method was used in the initial analysis of the Castle Hill faunal remains (Grange 1967: 295-9). This method is subject to bias and may not provide the most accurate results (Daly 1969: 149-50; Cleland 1971: 14). An

example of this problem seen in the Castle Hill data concerns the interpretation of shellfish remains. A large number of blue mussel shells are present in English contexts. If these specimens are included in comparisons on a specimen count basis it makes the mussel appear to be of major dietary significance. Such specimens amount to about 62 per cent of the total numerical count of faunal specimens in those contexts (See Table 181). In reality, however, it has been shown that this large number of shells represents about 22 pounds of edible flesh and the blue mussel cannot have been of major dietary importance. Shellfish could be eliminated from such calculations and only vertebrates used but similar problems exist with other species as well.

Analysis based on number of bones is thus subject to some question. These data are presented (Table 181) despite the fact that they are not the best method of faunal analysis.

A more useful comparison based on the number of bones is derived from comparison of the relative percentages of species within major faunal classes rather than within the total collection. Table 182 reports the number and percentages of various shells from French and English contexts. Over 82 per cent of the shellfish

remains were found in English contexts. The blue mussel was the most important species in both occupations. Lobsters were secondary but more important to the French than to the English.

Eighty per cent of the fish bones came from French contexts. Cod was the most significant in both periods, non-cod bones somewhat more frequent in French than English contexts, (See Table 183).

Table 184 summarizes the number of bones of different mammals found in French and English contexts. Sixty-one per cent of the mammal bones were from French contexts. The pig was of primary importance and the cow second in relative popularity in both periods. Among wild mammals seal bones are more frequent than caribou, and the red fox most common. Cats were present in both contexts while rats were found only in French deposits.

The number of bird bones are summarized in Table 185. Over 96 per cent of the bird remains were found in French contexts. Domestic fowl were of minor importance and about equally represented in both periods. Wild fowl were much more common and French and English alike emphasized the gull. Ravens were of secondary importance, and there are many variations in the relative frequency of other wild bird species.

To avoid the pitfall of adding apples and pears inherent in the numerical approach, the faunal remains can be converted to a common denominator. The most effective method is to determine the minimum number of individuals represented by the bones and from that calculate the edible flesh weight represented by each species (White 1953). This has obvious advantages; it also produces different results (Daly 1969: 150; Cleland 1971: 14). This approach is also used in the study of the Castle Hill materials, but it, too, is subject to difficulties which should be recognized.

When comparing results from percentages based on numbers of bones with those based on minimum individual/edible flesh weights both Daly (1969: 150) and Cleland (1971: 14) indicate that domestic mammals greatly increase in dietary significance when the calculations are based on flesh weights. The same is true at Castle Hill and it is probable that domestic mammals were of primary dietary importance to French and English occupants of the site. However, it is difficult to believe that fish was not the major food source at a fishing station of the importance Placentia held. There are some historical data which would support such a contention. In a 1794 reference, 46 salmon were regarded as sufficient to feed the garrison for a week (Murray 1968: 98).

During the French period the population was reported to have lived almost entirely by fishing although gardens and cattle are mentioned (Proulx 1969: 38-9). At Louisbourg, later than the Castle Hill occupation, the French ration was primarily cod fish and both domestic and wild meat was scarce (Downey 1965: 10). These historical data do not negate the archaeological data but they suggest some caution in interpretation.

An additional difficulty with the minimum individual approach should also be outlined in advance of presenting the data. In the numerical specimen count approach it is possible to study different aspects of the site by simply adding the number of bones when lots are combined. For some purposes, for example, it is desirable to compare the relative frequency of species in each stratigraphic unit in a sequence such as that found in sub-operation 9E, a series of French rampart fill deposits. For other purposes it is desirable to combine all strata in the 9E sample.

In the numerical approach this can be accomplished by simply adding the number of bones found in each lot included in the combined grouping of proveniences. The minimum number of individuals determined for each excavation lot cannot be simply added up when units are combined without distorting the principle of minimum

individuals represented. For each change in sample used in the analysis, the minimum number of individuals represented must be revised and is usually less than the number obtained by adding up lot totals. In effect, the larger the sample the smaller the minimum number of individuals. For example, on an excavation lot basis, seven French lots in sub-operation 9E contain 195 pig bones representing a minimum number of 14 individuals. Some of these data are employed in the stratigraphic study of this sub-operation (See Table 191).

On the basis of historical evidence it is known that this series of rampart fill deposits date after the beginning of the construction of the fort in 1693 and must have been in place prior to 1697 when the walls reached the cordon level, an elevation above the extant deposits excavated in the sub-operation. The presence of crossmends in artifacts also suggests that these stratified rampart fill deposits may be grouped together. The French lots in sub-operation 9E, on a stratigraphically grouped basis, still contain 195 pig bones, but as a group represent a minimum number of 6 individuals.

Similar revision of the estimated minimum number of individuals must also be made when the French lots in 9E are combined with all other French lots in the site to obtain a French site total sample. The minimum number

of individuals of a given species such as pig represented in a "total French" sample may thus be far less than the minimum number of individuals used in a lot by lot comparison within a stratigraphic sequence of French deposits. What then is the real minimum number of individuals in the French occupational period? It varies with the lots arbitrarily selected or grouped for analysis.

In Sumner's technical report (Appendix C) the minimum number of individuals was calculated for each species represented in each lot. Additional calculations of the minimum number of individuals were made for various combinations of lots. Thus it is possible to compare the results obtained by adding up the lot by lot minimum number of individuals with the results obtained from calculations based on the smaller minimum number of individuals from the same lots taken as a single grouped sample. The results differ so both are presented (See Table 187).

There are other difficulties in the conversion of minimum individuals to useable flesh weights for comparative purposes. It is sometimes difficult to determine what average weight should be utilized in the calculation. Different authors give different figures (see Cleland 1971: Appendix A, B, C and White 1953: Table 14). With respect to cod fish at Castle Hill an average weight was assumed at 25 pounds based on modern data. The cod

bones identified in the site are frequently of much greater size than the laboratory specimen used for comparison. The average size of fish during the period when Castle Hill was occupied was probably much larger than today but the proper figure to use could not be accurately determined. Thus, the relative importance of fish in the diet could be in error.

Weight data for birds is difficult to locate and in some cases weights for Florida birds have been used in this study. In Appendix B the weight data sources are discussed and listed.

Chaplin has pointed out the inadequacy of available data for and the dangers of conversion of bone to flesh weights (Chaplin 1965: 209). Cleland has noted the difficulties of making valid comparisons of faunal analyses (Cleland 1966: 41). It is important for comparative purposes to indicate the methods employed and to present sufficient data to permit the recalculation of flesh weights in the event that this is necessary for a later comparative study. Hence these data are all presented in Appendix form.

The relative percentage of edible flesh weight is another factor which may introduce error. Cleland (1971: Appendix A,B,C) uses 80 per cent edible meat for fish, but modern data cited here (See Appendix A) suggest that

this may be too high for cod and 50 per cent was used in the analysis of Castle Hill specimens. Had Cleland's 80 per cent factor been used the percentage results would have been slightly different although the basic conclusions would not have been significantly altered.

Cleland uses 80 per cent for birds (1971: Appendix A,B,C) in contrast to the 70 per cent employed by White (1953: Table 14). Had 70 per cent been used in this study the edible pounds of meat and percentages for birds would have been slightly altered. As Chaplin (1965) suggests, there is a need for standardized data for use in faunal analysis.

In addition to these problems the diet of the occupants of Castle Hill must have included many items, both local and imported, which are not present in the material remains at the site. Gathering of berries, for example, was then, as now, an important source of food (Murray 1968: 140). Asparagus, artichokes and green peas were grown in the French colony (Proulx 1969: 154). An English account of the Castle in 1709 notes that the French exchanged salt, wine and brandy for bread and flour brought to Placentia from Canada (Proulx 1969: 154). English fishing ships bound for Newfoundland in 1615 included flour, bread, beer, cider, "good English beef", Irish beef, salted hogs, peas, butter, cheese, oatmeal, mustard seed, vinegar and

dried fish in their supplies (Innis 1954: 57, Note 15). Food imported to Newfoundland also included rum, molasses, Indian corn, Madiera wine, chocolate, rice, sugar and coffee (Innis 1954: 146, Note 7). Honey, ginger, pepper, nutmeg and aquavita may be added to the list as well (Drummond and Wilbraham 1957: 198). Thus it is obvious that British and French diets at Castle Hill included many items not preserved in the archaeological record. These must be kept in mind when attempting to determine the diet represented by the faunal remains; that is only part of the total picture.

The use of native wild fauna for food by the French was probably in part the result of a policy during 1670-90 through which the governor was supposed to encourage the inhabitants to subsist by themselves with the aid of fish and agriculture (Proulx 1969: 36-7). The importance of fish in the diet is clearly recorded in reports that the population lived almost entirely on fish during the winter. Limited garden plots were established and other items needed for subsistence were acquired by trade. Cattle were also kept (Proulx 1969: 38-9). Despite the use of local resources the colony was dependent upon the parent state and reverses in fishing or delay of ships from France quickly reduced the town to

serious difficulty (Proulx 1969: 103). The degree of dependence is illustrated by the effectiveness of the blockade which was far more serious than direct attacks upon the town had been in an earlier period (Proulx 1969: 124). The importance of imported foods was noted by English prisoners who reported that poor supply and high prices meant much of the population would "starve for want of bread" (Proulx 1969: 154). Both French and English were dependent upon supplies from home or from other locations for the construction of their forts at Placentia (Ingram 1964: Appendix I). Thus, supply lines were vital to the settlement and forts.

Several different approaches to the analysis of faunal remains are presented in the tables. The interpretation of these aspects of French and English diet at the site depends on the method of analysis used. The several approaches are presented in the belief that the combined data may be more useful than had only a single method been employed.

The effect of different samples on the estimated minimum number of individuals represented by animal bone in single excavation lots and grouped lots has already been illustrated. A further comparison of these different samples can be based on samples representing the total French and English faunal collections. One method is

to add up the minimum number of individuals present in each culturally identified excavation lot. These data are recorded in tabulations in Appendix A and C and are summarized in columns A, B, C, and D of Table 186. Columns A and C reflect the individuals from definite French and English contexts while B and D represent totals which include specimens from probable contexts. The minimum number of individuals has been multiplied by the amount of usable flesh for each species as established in Appendix B. Table 186 columns A, B, C and D include the pounds of usable meat as well as number of individuals. Columns E, F, G and H in Table 186 present similar figures on minimum individuals and pounds of usable meat determined by grouping the faunal specimens as cultural component site totals, data taken from Appendix A.

In order to compare the relative importance of the pounds of usable meat for French and English components of the site it is necessary to convert these to percentages. Table 187 is such a summary. In it the weights recorded in Table 186 have been grouped into major categories of shellfish, fish, wild mammals, domestic animals, domestic fowl and wild fowl. Columns A, B, C, D, E, F, G and H in Table 187 correspond to those in Table 186 but are not in the same sequence in order to facilitate comparison of French and English data.

It is notable that there is a great degree of similarity in the results of this analysis using data from an excavation lot basis (Columns A, C, B and D) as compared to cultural component site total samples from definite French and English contexts (Columns E and G), but the percentages in columns F and H which include individuals from probable contexts do not correspond to the others. This is probably due to the combined effect of including specimens from probable contexts and the reduction of the estimated number of individuals in some but not all species in the grouped sample of columns F and H.

The most accurate sample for the two occupations of the site is probably that shown in Table 187 columns E and G, taken from definite French and English contexts grouped together for determination of minimum individuals. This is most like the sample Cleland utilized in the study of Fort Michilimackinac (Cleland 1971: 8) which was restricted to clearly datable features. The contrasts between the French and English diets at Castle Hill are clearly shown in this comparison, although the number of individuals and total usable meat from definite English contexts is small.

The table illustrates the primary importance of domestic mammals to both the French and English at

Castle Hill. However, this resource seems to have been somewhat more important to the English than to the French. In contrast the French made relatively greater use of wild mammals and wild fowl although the English also used these food resources. Shellfish were of very minor importance in both periods at the site, as were domestic chickens. Fish were relatively low on the list but were more important in the English diet than wild mammals or wild fowl. Thus there are some basic similarities and yet some significant differences in the French and English diets at Castle Hill, and it appears that the French were making relatively greater use of local resources at the site, particularly a much wider variety of wild fowl than did the later English occupants.

The probable sequence of importance of various classes of animal resources in the French and English periods at Castle Hill is as follows:

French	English
Domestic Mammals	Domestic Mammals
Wild Mammals	Fish
Wild Fowl	Wild Mammals
Fish	Wild Fowl
Domestic Fowl	Shellfish
Shellfish	Domestic Fowl

If this evaluation of the data is correct it appears that there probably were different patterns of subsistence during the French and English occupations of Castle Hill although there are some basic similarities as well.

There are also some interesting differences in the relative importance of species within the major categories of food resources. The Blue Mussel was the most important shellfish and the cod the most important fish in both French and English periods. Mammals and birds are more complex and in Tables 188 and 189 the percentages for species or groups are recorded, columns A, B, C, D, E, F, G and H again corresponding to those in Table 186. On the basis of these data, the probable order of relative importance for mammals in the two occupations is as follows:

French	English
Pig	Pig
Cow	Cow
Seal	Sheep/goat
Caribou	Caribou
Sheep/goat	Seal
Fox	Fox
Martin	Hares

The probable order of relative importance for different groups of birds in the two occupations is as follows:

French	English
Gulls and terns	Gulls and terns
Predatory birds	Ducks
Ducks and Geese	Cormorants
Cormorants	Auks and Murres
Ravens and Crows	Ravens and Crows
Ptarmigan	Predatory birds
Auks and Murres	Domestic chicken
Domestic Chicken	Shearwaters
Loon	Ptarmigan
Shearwaters	
Miscellaneous	

These conclusions may be compared with the relative importance of various classes of animals based on the analysis of numbers of bones (See Tables 184, 185).

The results are similar but not identical.

All of the French and English dietary data discussed above are based on the site as the sample unit. Another type of French and English sample for comparative study can be drawn from culturally identified major stratigraphic units within the site. The minimum number of individuals for various species was determined

for such stratigraphically grouped lots (See Appendix C). In Table 190 below these data are summarized for major classes of animals and may be compared with the cultural component site totals in Table 187. There are variations in the percentages but there is great similarity in the pattern revealed. The relative order of importance in various French samples (Table 190, columns 1, 2, 3, 6) is domestic mammal, wild mammal, wild fowl, fish, domestic fowl and shellfish; the same relative order seen in the Table 187 analysis. The French pattern seems to be quite consistent. The only variation seen in a French grouped sample is in the French levels in sub-operation 6D (Table 190, column 3) in which the relative position of fish as a dietary component is different (compare column 3 with columns 1, 2, 6, 7, Table 190). This variation may be due to a change in dietary pattern during the French occupation as a result of the English blockade of Placentia. This will be discussed in detail in a later section.

The relative order of importance of classes of animals in samples of English stratigraphic units (Table 190, columns 4, 5 and 8) do not agree with those established on the basis of the site total samples. In Table 190, columns 4 and 5, however, the difference in sequence is related primarily to the relative position of fish; the relationships of domestic mammals, wild mammals and

wild fowl remain the same. In column 8 the difference is in the relative position of wild mammals, probably due to the small size of the sample from Operation 2. In the study of ceramic remains recovered from the site, it was concluded that the probable English lots from the interior of the redoubt, Operation 10, constituted the best sample of English artifacts. Column 5 of Table 191 records the faunal sample from that stratigraphic unit. It is difficult to determine the relative importance of fish in the English diet at the site but it is probable that the site-wide samples provide a more accurate picture than do these stratigraphically grouped data.

It has already been noted that when the French sample from sub-operation 6D is compared with other French stratigraphic units in the site, a change in dietary pattern is evident. Table 191 presents summary data which can be used to further explore this possibility. These data are taken from a series of excavation lots which form a temporal sequence spanning the entire French occupation of the site. Two sections of the site are involved. The first is sub-operation 9E, the southeast demi-bastion. This structure contained a stratified series of rampart fill deposits which originated during the French construction of the Fort. These levels must

date between 1693 when construction began and 1697 when the walls had reached the cordon level. Lot 2A9E15 rested upon the undisturbed pre-fort surface, lot 2A9E11 was a refuse filled occupation zone within the rampart fills above 9E15, and 2A9E2 was also an occupational level, still higher in the fill. All three occupational zones were well below the cordon level and thus represent French refuse of the 1693-7 period. The second section of the site is strata block A in sub-operation 2A6D, the ditch below the east wall of the fort. The ditch, quarried into bedrock, was begun at an unknown date but was still incomplete in 1709. It was probably completed during the period 1709-13 (Proulx 1969: 139). The French refuse deposited in the ditch probably dates from the 1709-13 period, while the upper levels of ditch fill contain post-1714 English debris. The ditch fill levels thus contain French deposits of later date than those in sub-operation 9E. The English blockade of Placentia began in 1708 (Proulx 1969: 114). By October of 1709 the blockade had produced a famine in the French garrison where troops were reduced to four ounces of bread a day (Proulx 1969: 117). The famine continued in 1710 (Proulx 1969: 118) and in 1711 brought even more severe hardships to Plaisance. Fishing was bad that year and few ships reached the colony except during fog

or storms (Proulx 1969: 119-20). The blockade continued in 1712 and 1713 saw most activity in the French town reduced (Proulx 1969: 121).

There is little question from historical accounts that the English blockade produced severe hardship and famine in the French colony. The effects may have been primarily related to the availability of bread and other supplies not preserved in the archaeological record. The comparison of pre- and post-blockade French deposits might permit the archaeological identification of the blockade effects on French diet as reflected in the faunal remains from the site.

Examination of Table 191 will show that there are pre- and post-blockade differences in the relative importance of various classes of animals. This analysis also demonstrates that the French pattern of utilization of wild food sources was well established prior to the beginning of construction of Castle Hill, since they are clearly evident in the earliest fill deposits in the rampart. One significant post-blockade change is a marked increase in the relative importance of fish. In contrast, wild fowl decreases in relative popularity. Wild mammals are absent from the earliest post-blockade levels and are slightly less important where they are represented in this period. Domestic animals fluctuate in relative percentage in the pre-blockade levels and are apparently of greater relative importance in the initial post-blockade

deposits. In stratigraphically later post-blockade levels the relative percentage of domestic mammals steadily decreases. Domestic fowl are absent from post-blockade levels while shellfish increase slightly during that period.

Although the changes noted above are based on data from stratified deposits the reliability of the 2A9E sample (pre-blockade) is much greater than that of the 2A6D sample (post-blockade). The 2A9E rampart fill deposits are definite French levels, undisturbed and sealed by later material. In contrast, the ditch fill levels are "probable" French lots above which are "probable" English levels. The ditch fill was certainly subject to some mixture. The English lots in strata block A of the ditch (Table 191) show a lower percentage of domestic mammal flesh weight than do the French deposits and are not consistent with the percentages seen in other English samples (Table 187). This raises the possibility that the differences in pre- and post-blockade French food resources may somehow be due to the nature of the ditch refuse than to the effects of the blockade.

A method of checking this possibility is available through the comparison of a larger sample of pre- and post-blockade specimens. The analysis in Table 191 is based on ^{selected} excavation lot units in 2A9E and on excavation lots in strata block A of 2A6D, and not on the total samples

from these two sub-operations. Grouped samples from the sub-operations have been recorded in Table 190 (columns 1, 3 and 4). These figures include all lots from 2A9E, not just the three major refuse levels, and all French or English lots from the ditch fill, not just those from strata block A. The percentages from Table 190, columns 1, 3 and 4 are listed below for convenience.

	2A6D	2A6D	2A9E
	English	Post-blockade	Pre-blockade
	Ditch Fill	French	French
	(4)	Ditch Fill	Rampart Fill
		(3)	(1)
Shellfish	0.4	0.03	0.009
Fish	7.9	17.2	1.8
Wild Mammals	11.7	9.3	8.1
Domestic Mammals	78.8	72.4	83.98
Domestic Fowl	0.07	0	0.08
Wild Fowl	1.0	0.9	5.9

These are probably much more reliable samples upon which to base a pre- and post-blockade comparison. Using this sample for the English material in the ditch still shows a smaller percentage of domestic mammals than previously established as the English pattern, but the numerical values are at least close to those of one of the cultural component site total sets (see Table 187, column H). This may be taken as an indication that although the ditch fill may be mixed, and therefore a less accurate sample

than others available, it still reflects the patterns at the site. The French sample from 2A9E as a total unit also compares favorably with site samples for the French occupation (Table 187) and with the sample from other French rampart fill deposits (Table 190).

Inspection of the grouped lot pre- and post-blockade data (Table 190, columns 1, 3 and 4 summarized above) more clearly illustrates the changes in French dietary pattern as a result of the English blockade. Domestic mammals, domestic fowl and wild fowl all decrease in relative importance while shellfish, wild mammals and particularly fish increase in importance after the blockade.

In general there was a slight reduction in the food supply from domestic sources which was compensated for by an increased dependence on fish and wild mammals. It is difficult to explain the reduction in use of wild fowl since an increased use of this resource would have been expected as supplies were reduced by the blockade. Perhaps access to the sources of wild fowl was reduced. It is also possible that gulls, the wild fowl of primary significance had been kept and fed scraps prior to the blockade. If so, the blockade might have resulted in a reduction of the availability of such feed for the birds, but this is highly speculative.

The historical data reviewed earlier indicated that the reduction of the bread supply was the most significant

result of the blockade and this may have been of much greater significance in the total French diet than the shifts in species popularity seen in the analysis of the faunal remains. Nevertheless, the analysis of the faunal data does reveal that there were changes in the French diet during their occupation of the fort and these changes may be attributed to the British blockade of the town.

Comparisons

Cleland has recently published a study of faunal remains from the French and British occupations at Fort Michilimackinac (Cleland 1971). It is thus possible to

compare that site with Castle Hill. The French occupation at Fort Michilimackinac was between 1715 and 1760, (Cleland 1971: 8) the period just after the French ceded Castle Hill to the English. The English occupation at Fort Michilimackinac was between 1760 and 1780 (Cleland 1971: 8). Although the English held Castle Hill from 1714 onwards, their major occupation at the fort was during the 1760-80's period. From the temporal point of view, then, Castle Hill and Fort Michilimackinac are comparable although the French occupation at the Castle is slightly earlier.

The methods of analysis employed by Cleland and in this report are similar although not precisely the same. There are, for example, minor differences in the estimates of usable meat for some species, as well as differences in faunal identification data. However, these differences appear to be relatively minor ones and a comparison is possible.

A few species are represented in both sites, but there are many differences in the faunal lists which probably reflect the ecological differences in the locations of the two forts. The most practical comparison is one based on major classes of animals such as domestic and wild mammals, and on the percentage of pounds of meat represented by the faunal remains.

Cleland's analysis was restricted to features which were clearly dated (Cleland 1971: 8). In contrast an attempt was made to utilize material from the entire site at Castle Hill. The sample most nearly comparable to Cleland's sample is from definite French and English excavation lots combined as cultural component site total samples (See Table 187, columns E and G). A comparable sample from Fort Michilimackinac is taken from Cleland's Table 4 (Cleland 1971: 13) by adding appropriate classes of animals together. The percentages of pounds of usable meat for the two sites are listed in Table 192.

Although the relative degree of dependence upon a particular class of animals varies between Castle Hill and Fort Michilimackinac as indicated by the percentages in Table 192, there is some correspondence in the general contrasts between the French and English subsistence patterns at the two sites.

At Castle Hill domestic mammals provided the largest proportion of usable meat. The same was true for the British at Fort Michilimackinac, but there the French were more heavily dependent upon wild mammals. Cleland attributes the difference in part to a superior British supply line (Cleland 1971: 16, 17). The higher percentages of domestic mammals at Castle Hill and

relatively lower proportions of wild mammals may be due to a similar factor, since Castle Hill could be supplied directly by sea. Fish were also apparently less important to both cultures at Castle Hill than at Fort Michilimackinac. However, it must be remembered that the faunal analysis is based on bone remains and the vast quantities of dried fish presumably available at Placentia cannot be reflected in this study of diet at Castle Hill. With respect to wild birds, the French at Castle Hill made more use of this resource than they did at Fort Michilimackinac. British use of wild fowl was about the same at both sites.

Cleland concluded that the French at Fort Michilimackinac lived primarily by hunting with domestic stock providing a margin of security while the British there were not dependent on local resources to the same degree (Cleland 1971: 17). At Castle Hill neither French nor English derived the major subsistence from local resources, but, at the same time, the French utilized those local resources in a broader fashion and more intensively than did the English. Thus the basic cultural subsistence patterns at Castle Hill and Fort Michilimackinac seem to be similar for both French and English occupations at the sites, and the variations noted may be attributed to the greater ease of shipping

domestic supplies to Castle Hill directly by sea. The shift in the French subsistence pattern which correlated with the English blockade of the site illustrates their dependence on supplies and would tend to support this interpretation.

Cleland also attributes the differences in French and British subsistence at Fort Michilimackinac in part to cultural differences. The British were "transplanted Englishmen" with a supply system which could satisfy their food preferences while the French were neither in the mainstream of French culture nor did they have a supply system to match British capability (Cleland 1971: 18). Both French and English at Castle Hill were dependent upon their homelands (Ingram 1964: Appendix I; Proulx 1969: 144-5). Castle Hill was located at a point where constant sea traffic related to the fishery solved the supply problem. In effect it is possible to assume that the supply factor was relatively constant for the French and English at the site.

It is therefore possible to interpret any differences in the subsistence patterns as reflecting cultural preferences rather than supply difficulties. Both French and English were dependent upon imported foods and domestic stock but the French pattern did place more emphasis on local resources than did the English. This was partly the result of governmental policy which

directed the governor to encourage the inhabitants to subsist by themselves (Proulx 1969: 36-7). This analysis of the faunal data thus suggests that there were cultural differences in French and English subsistence adaptation to the New World.

Conclusions

Conclusions based on the study of the faunal remains can be summarized briefly. The study reflects similarities and differences in the meat diet only and other dietary items, including dried fish, are not included in the collection for study.

There are some basic similarities between the French and English meat diets at Castle Hill, domestic animals constituting the major source for both occupations. The French utilized more species, particularly wild birds, than did the English. Both wild mammals and wild fowl were more important in the French food supply than in the English. Fresh fish was probably second in importance to domestic mammals for the English.

The English blockade of Placentia produced a shift in French diet which was reflected in the animal bones. A reduction in the use of domestic animals and wild fowl was compensated for by an increased dependence upon fish and wild mammals.

When compared to Fort Michilimackinac, the French

and English patterns both reflect better supply lines at Castle Hill. The English dietary pattern at Castle Hill is more like the British period at Fort Michilimackinac than is true of the French at the two sites. At Castle Hill an improved French supply system made possible greater use of domestic mammals in contrast to the French dependence on wild mammal resources at Fort Michilimackinac. This contrast appears to be related to the supply line, but despite these differences there are similarities in the French and English dietary contrasts when the two sites are compared. These may be interpreted as reflecting different culturally determined patterns of subsistence adaptation to the New World.

SUMMARY AND CONCLUSIONS

Castle Hill is located on the Avalon Peninsula at Placentia, Newfoundland. The site is a hill which was essential in the defence of the town and its fishery and on it the French erected Fort Royal, a small masonry redoubt. The fort was started in 1693 and was completed but for minor details by 1702. Fort Royal was an important part of the French defence at Plaisance until 1713 when Newfoundland was ceded to the English.

The English ignored the redoubt between 1714 and 1762 and it continued to deteriorate, falling into partial ruin during this period. Military needs dictated control of this strongpoint and the English began to rebuild the old French fort in 1762. The work was essentially complete by 1775. English construction was partly determined by the nature of useable remnants of the old French redoubt, but some of the original structures had to be modified or replaced in the construction of Castle Graves. The

English fort was primarily of timber construction.

Intensive English use of the redoubt lasted from about 1762 until sometime after 1786 although official military abandonment of Placentia did not come until 1811.

Archaeological work at Castle Hill was conducted as part of the research necessary for the stabilization and interpretation of the site as a National Historic Park. The excavations revealed stratigraphic evidence of both French and English occupations. Architectural remains were found and stabilized. These structures can be identified on various historical plans of the fort. The French plan of 1701 and the English plan of 1775 represent the two architectural periods best. The archaeological work confirmed the essential accuracy of those plans although some minor discrepancies in wall locations and dimensions were found.

A large number of objects were recovered during the archaeological work and both French and English occupations are well represented in artifacts and faunal remains. Some 23,535 artifacts and over 22,518 faunal specimens were recovered.

Fontana (1965: 87) has demonstrated the value of Linton's concepts of form, use, function and meaning (Linton 1936: 401-21) for historical archaeology. These concepts will be used in a comparison of the French and English occupations at Castle Hill.

The concept of form refers to those aspects of a trait or complex which can be established by direct observation (Linton 1936: 403). The architectural features and artifacts associated with the occupations of the site thus constitute French and English forms.

In contrast to the objective qualities of form, the meaning of a culture trait or complex is arbitrarily determined and may be unconscious, subjective and indirectly expressed. The meaning of a trait is the association attached to it by a society (Linton 1936: 403). The meaning of the redoubt at Castle Hill could be quite different for the French and English. Can something of the meaning of the fort to its builders be inferred from the archaeological and historical evidence? An attempt to do so must be based on a discussion of the form, use and functions of the site.

Linton believed that there was a basic difference between the concepts of use and function which was most clearly seen in the case of material objects. The use of a cultural element is external while its function is internally related to the society and its culture (Linton 1936: 404). The use of a tool is to perform an operation and it thereby has functions in meeting a societal need. A function is often a composite of a number of functions all related to the satisfaction of a need.

The concepts of form, meaning, use and function are interrelated (Linton 1936: 402) but independently variable. Form broadly limits or influences the other qualities of a trait (Linton 1936: 405), but potential uses of the trait may be selectively ignored (Linton 1936: 406,408). Function is more related to meaning (Linton 1936: 410) and potential meanings for culture traits are almost without limit (Linton 1936: 409). Multiple uses and meanings of traits may be complex and multiple functions may change through time. The time factor cannot be ignored if the relationships between needs, traits and functions are to be determined (Linton 1936: 410-20).

Form, use, function and meaning are thus independently variable but interrelated aspects of culture traits which must be viewed in historical perspective. Although it is patently impossible to determine all of the forms, uses, functions and meanings of English and French cultural traits and complexes at Castle Hill, the use of these concepts may be of assistance in comparing these two occupations of the site.

The major aim of using the concepts of function, use and form in the analysis of Castle Hill is to attempt to reach some tentative conclusions about its meaning to the French and English. Due to the

variable nature of these qualities of culture traits such a goal would be impossible unless some of these factors could be held constant. Indeed, it was the recognition of some common factors in the French and English occupation of the site which led to the attempt to define its meanings.

The two factors which can be held relatively constant are primary function and use, both of which can be determined from the historical record.

Function is related to basic needs, as has been discussed, and the common basic need was the defence of the nearby town and fishery. Thus, the primary function of the site was the same for French and English; the redoubt on Castle Hill was related to the need for defence in a broad context. The site undoubtedly had other functions as well, but the primary one seems to have been this and to have been the same in both periods at the site.

The specific use of Castle Hill can also be regarded as a constant element; the same for both French and English. The major fortifications of both people were large forts erected near the town at sea level. It was clearly recognized that military control of the hill overlooking the main fort was essential to the defence of the town. Hence the initial French construction of

Fort Royal followed a successful English attack on Plaisance. The use of the fort was as part of a system of fortifications meeting the general need or defence function. That the use of the redoubt met this need or fulfilled this function is also clear from the historical record. Blockade rather than direct attack was the English reaction (Proulx 1969: 143). The same need, function and use of the site during the English regime at Placentia is clearly indicated by both historical account (Ingram 1964: 4-5) and by the fact of their construction of Castle Graves.

The fort undoubtedly had other uses and functions. The French, for example, kept English prisoners at the redoubt, but this prison function and use was clearly secondary.

If function and use of the site can be held relatively constant for both French and English occupations as suggested above, it opens the possibility for making some inferences about the meaning of the site. With function and use held constant, it may be possible to interpret descriptive differences in form as reflections of the meaning of the site during the two occupations.

As noted above, form is the primary factor which

broadly limits the other qualities of a trait or complex and it is also the quality which can be determined by direct observation. Form is the sum of component parts (Linton 1936: 403) and the forms of Castle Hill thus consist of the description of the French and English occupational components of the site. These can be compared and the differences in French and English form at the site which have already been described in the body of the report can be summarized.

The form of the redoubt had to be suitable to meet the intended use and function. The location of the site was thus selected with its use in mind (Proulx 1969: 157), it having been estimated that the main fort and town could not hold out for more than an hour after the Castle had been taken. A strong fortification on the hill would have been desirable for the intended purpose.

Fort Royal, the French redoubt, consisted of masonry curtain walls with a demi-bastion at each corner except the northeast where a full bastion with a casemate magazine was located. The interior of the fort was bounded by a masonry revetment wall. Gun platforms were created by filling the space between the outer walls and the interior revetment

with earth and rubble to form the ramparts. The entrance was on the east side of the fort and was flanked by a loop-holed hangar and guardrooms. A large L-shaped barracks building in the interior of the redoubt had a timber second floor. Ramps and stairs led up to the gun platforms and down into the magazine. The French had carefully selected and prepared a natural knob of bedrock which served as the core of the fort. Along the east side of the redoubt a ditch was quarried and a natural slope was utilized as a glacis. The perimeter of the hill top was provided with a dry-masonry covered way. The fort had a laboriously constructed cut stone cordon and the parapet and other areas were decorated with limestone brought from France for the purpose.

The quarried ditch and the cordon to impede scaling ladders may have had some military utility at Fort Royal but the use of limestone as decorative elements probably had little, if any, military value. However, the architectural embellishment of the site was important. Indeed, construction of the cordon and shipment of limestone from France to the site required the approval of the king (Proulx 1969: 98). The absence of local limestone required the shipment of raw material for the manufacture of mortar. However, the stone was also used in building and it is suggested that the use

of limestone decorative features may have had functions beyond the mere utility of fortification. As for the cordon, it surely represented a great deal of effort whatever its actual military usefulness. It would have been more practical to construct the planned cisterns for water storage than to expend effort on the cordon or limestone decorative features, but the cisterns were never built (Proulx 1969: 126).

Years of effort went into the construction of the fort, yet supplies and troops available were inadequate and the fort itself not particularly strong. It was, in fact, poorly built and in an area where the climate was not conducive to long life for masonry using lime mortar. Leaching of the lime from the walls led to their collapse. The settlement of the gun platforms was a constant problem and more than one historical reference has been cited to the effect that the fort was far from sound from a military point of view. It appears that the effort which went into the construction of the redoubt was out of proportion to its military strength.

Despite its structural weakness the redoubt partially fulfilled its function by deterring a direct attack. The English blockade proved to be an effective answer.

The factors described above suggest that the construction and embellishment of Fort Royal took its particular form both to meet basic military requirements and for reasons beyond those of its immediate military use and its basic defensive function. It is tempting to suggest that the non-military reasons may have been in the realm of the meaning of the site to the French.

Why might such added architectural effort have been worth while? Plaisance was the chief French stronghold in Newfoundland and after its loss in 1713 the Fortress of Louisbourg was built to protect the French fishing trade. Louisbourg was more than a fortification; it served as a symbol of French prestige (Downey 1965: 1-2). Its grandeur may have been a veneer (Downey 1965: 4) for Louisbourg was never fully armed (Downey 1965: 32-33). Thus there are some parallels between an interpretation of Louisbourg and Castle Hill, and it is suggested that the effort which went into the architectural form of Fort Royal was expended because the fort had additional meaning as a symbolic expression of French culture.

After the change of ownership in 1714 the English neglected the redoubt although they did considerable construction of major fortifications at sea level

(Ingram 1965: 4). They made their effort to complete the defences of the town only when they recognized need to control the hill top became a necessity through threat of war (Ingram 1965: 4). The English built a less elaborate timber redoubt, Castle Graves, making use of the partially collapsed ramparts of Fort Royal. The English architectural form was in part determined by the previous French form.

The old stone parapets and cordon had collapsed along with the upper parts of the outer walls. Wooden pickets were erected on the sloping talus of rampart fill to form the outer edge of the gun platforms. The guardroom south of the entrance was rebuilt; the magazine bastion was still useable and was retained. The old hangar was filled in and a new guardroom was erected using the stone walls of the ramp down to the magazine door as its foundation. An additional barracks or storeroom was built of timber adjacent to the south guardroom. The old L-shaped barracks was missing and in its place a timber blockhouse was erected in the centre of the redoubt interior. English repairs of the walls and other construction made use of old French cordon stones as ordinary rock. Immediately around the fort the English erected a palisade with a dry-masonry foundation. The covered way around the hill top was rebuilt, also a dry-masonry wall.

There are repeated references to the structural weakness of Castle Graves (Ingram 1965: 5) and it seems to have been poorly maintained during the period of its use by the English. Its general function and specific military use remained the same as during the French period but the English seem to have been content with a much less elaborate redoubt. The English naval blockade had reduced the French garrison to near famine prior to 1713 and during the period of English occupation at Castle Hill their emphasis was on naval strength (Downey 1965: 5). Perhaps due to this factor the English may have felt no need for anything more than a simple but adequate defensive work on Castle Hill. The basic need for the fort may have been slightly different during the English period, and this could account for some differences in the form the redoubt took. Its simple but practical nature, requiring a minimum of effort, also suggests that its meaning may have been a more practical one than the symbolic overtones suggested for the French period. Castle Graves served its purpose and that was sufficient.

It has thus been suggested that, since the basic function and use of the redoubt on Castle Hill was the same for both French and English, the difference

in architectural form of the fort may be partly explained as cultural differences at the level of meaning.

Turning to other comparisons of the French and English occupations of the site, the artifact assemblage presents another aspect of form at the site. There are some basic similarities in the artifacts from the two periods, but significant differences as well. Some of these may be the result of the passage of time, a factor which Linton indicated must be considered in the evaluation of form and meaning. The passage of time between the French and English occupations, for example, brought new types of pottery into existence.

The French ceramic complex primarily consisted of earthenwares; olive jars, French coarse earthenwares and tin glazed earthenware. A few specimens of French stoneware complete the ceramic inventory. In contrast, the English probably had more ceramic vessels at the site and certainly more variety. Olive jars probably continued in use but were rare. Several types of stoneware were common. Brown salt glazed stoneware jugs, Westerwald stoneware mugs and chamberpots, miscellaneous fine stonewares and an abundance of thin white salt glazed stoneware were

used. Creamware was also an abundant ceramic type, some tin glazed earthenware was still in use and both Chinese and European porcelain were present in limited amounts. Ceramic types are consistent with the known periods of occupation.

Clay pipes were used in both periods of occupation. The French utilized both Dutch and English pipes, Dutch types being somewhat more common. Dutch pipes are present in the English period as well, but by then were less frequent than the English product. The pipe stem bore diameter dates are consistent with the two occupations.

Bottle glass was also more common in the English period than in the French and different finish, vessel form and kickup shapes consistent with these two occupational periods have been identified. Greener coloured glass is more common in the French period than later. Window glass appears to be associated with the English period although some may have been used by the French. Both people made use of stemmed wine glasses of types consistent with their occupations.

The French and English occupations are similar in the presence of these same categories of material objects, ceramics, pipes and glassware. The differences in form appear to be most easily explained as

the result of dual factors; different cultural traditions and the passage of fifty years time between the two occupations, during which period technological innovations resulted in changes in all of these types of artifact.

There are perhaps fewer basic differences when the military equipment and ordnance supplies are compared. Grapeshot was rare in the French period but common in the English occupation. Solid shot and bar shot are both more common in the French artifact inventory than they are in that of the English. Hollow shells are more frequent in the English period, but were present in the French occupation. The French had large mortar bombs at the site which confirms historical records. The French had a wider variety of artillery calibres at the site and probably placed more emphasis on 5 and 6-pounders in contrast to the English emphasis on 6 and 9-pounder cannon. Cannon equipment and carriage parts are present in both periods. Lead balls are likewise found in both occupations as are gun fragments, the latter being somewhat more common in the French levels of the site. Sword parts and pole arms are present in both periods. Gunflints are also present in both occupations, those of the French period being of the blade types and those of the English of the spall variety.

Thus, there are some differences in the details of military and ordnance supply in the two periods at Castle Hill, but a basic similarity in artifacts of this general class can be recognized. This similarity may be taken as additional evidence of the fundamentally similar use of the fort during the two occupations.

Tools reveal some minor differences. Sledges, chisels, mason's trowels and picks, hatchets, pinch bars and iron spades are French tools contrasting to the English axes, adz, splitting wedge, whetstones, files and saws. These basic differences reflect the different modes of construction at the site, French masonry as opposed to English timber. Some tools, such as iron edged wooden shovels, trowels, awls are found in both periods. The fascine knife is only present in the French period. The French more often used thin bricks than did the English whose bricks appear to have been thicker. Locks and latches were present in both periods but more commonly English than French.

In addition to tools, other artifacts further reflect the different construction methods. Gudgeon hinges are more common in French contexts while strap hinges are found in abundance in the English period. Tanged masonry brackets are common in French levels and less so in the English period while iron braces and brackets for structural timber are more frequently found

in English than in French associations. Riveted rooves, staples, nuts and bolts and rings and washers are all more common in the English than in the French period. Nails were used by both French and English. Some types seem to be associated with the French somewhat more commonly and a larger proportion of nails in French associations are of large size. The English used a greater variety of nails and many more nails than did the French.

Most of these artifact traits can be interpreted as reflecting the different requirements of French masonry and English timber construction techniques.

Iron kettles of slightly different **form** were used by both French and English. The English also employed the long handled frying pan in cooking at the site. Table knives and case knives are English rather than French traits and forks also may have been restricted to the English period although one was found in a French context. Pewter spoons are more common in English contexts.

The English may have had more elaborate tableware in addition to the stoneware and creamware table service already noted. These data can be interpreted as evidence of a more "gracious" style of eating in the English period. The sample may be inadequate, however,

and the French did have some fine stemware in use at the site.

Miscellaneous artifacts provide less meaningful similarities or contrasts between the occupations at the site due to the probable inadequacy of the sample of specimens for such purposes.

Scissors were used in both periods, as were buttons, although there are typological differences in the latter. Shoebuckles were more common in English refuse while waistbelt buckles and breeches knee band buckles were found only in French contexts. Bone combs were from French contexts as were some French coins, while none were recovered from English levels. Horse equipment was found in both French and English contexts while the only ox shoe came from a French association. Fish hooks were present in both periods, but the one straightened to serve as a lobster spear was a French specimen. These and other miscellaneous artifacts reflect only minor differences in the cultural inventory of specimens at the site.

The artifact inventories of the French and English periods appear to be variants of a broader tradition and differ in part due to the passage of time. However, the differences in some categories such as ceramics parallel those seen at Fort Michilimackinac where they

were interpreted as evidence that the British were maintaining a higher level of social life (Stone and Miller 1970: 99).

In addition to the artifact inventory, the faunal remains from the two occupations of Castle Hill exhibit some similarities. Both French and English made use of domestic mammals, wild mammals, domestic fowl, wild fowl, fish and shellfish in their subsistence, and both were also dependent upon the homeland for additional supplies. There are also differences in the subsistence patterns, and these are significant. The French made a broader and more intensive use of local wild fauna, particularly of birds, than did the English. This pattern was established prior to the British blockade of the French town and was probably the result of a specific policy to encourage the inhabitants to develop self-sufficiency although that goal was not attained. From this perspective the English were more dependent upon their homeland or more interested in importing their home cultural environment to the colony. This parallels the conclusions reached on similar faunal data at Fort Michilimackinac (Cleland 1971: 18).

When French and English occupations are compared on the basis of the forms represented by artifacts and subsistence patterns it is seen that there are some

similarities but also some distinct differences. While the differences may be partly due to temporal changes in European technologies, they also reflect different French and English cultural traditions.

Summary

It has been shown that the use and function of Castle Hill was the same for the French and English and that these factors could therefore be held constant for comparative purposes. This permits the interpretation of differences in form partly as reflections of cultural differences at the level of meaning.

At this level of interpretation it has been suggested that the French made a maximum effort in architectural elaboration at Castle Hill to symbolize their presence in Newfoundland while adapting their way of life to balance the availability of domestic meat supplies by the exploitation of local resources. The English, in contrast, made the minimal architectural effort consistent with meeting the practical need of military defence while importing a broad spectrum of artifacts of their home culture. The English were more dependent on domestic meat sources; although they utilized local faunal resources they were apparently less adaptive in these terms than were the French.

The archaeological interpretation of Castle Hill through the use of the concepts of form, use, function and meaning allows us to see in the site and the material recovered from it a reflection of two different value systems in action as the French and English took different approaches to adaptation in their colonization of Newfoundland.

Such an interpretation of cultural meanings from archaeological data is admittedly risky and speculative, but the repetition at Castle Hill of this contrasting pattern also observed at Fort Michilimackinac suggests that the hypothesis may have some validity. Right or wrong, this interpretation of Castle Hill may serve to illustrate that there can be more to historical archaeology than merely recovering artifacts and restoring historic sites.

APPENDIX A. IDENTIFICATION AND TABULATION
OF SHELLFISH AND FISH

Shellfish

Shell was abundant in some parts of the site. The species represented are tabulated below, and the conversion of these counts to flesh weight is discussed.

Blue Mussel (Mytilus edulis)

The most common shell in the site was that of the Blue Mussel (Morris 1947: 34-5).

Provenience	Number of Whole Specimens	Number of Fragmentary Specimens
2A1A4	4	7
2A1A5	1	3
2A1A7		1

Provenience	Number of Whole Specimens	Number of Fragmentary Specimens
2A1A4	4	7
2A1A5	1	3
2A1A7		1
2A2A1	2	3
2A2A2		1
2A2A4		3
2A2A7		2
2A2A8		1
2A2A9		1
2A2A12		1
2A2B1	2	9
2A2B2		1
2A2B4	1	
2A2B6	1	
2A2C3		1
2A2C5	1	
2A2C6	1	
2A2C7		2
2A2C8	1	1
2A3A1		5
2A3A2		3
2A3A4		3

Provenience	Number of Whole Specimens	Number of Fragmentary Specimens
2A2A1	2	3
2A2A2		1
2A2A4		3
2A2A7		2
2A2A8		1
2A2A9		1
2A2A12		1
2A2B1	2	9
2A2B2		1
2A2B4	1	
2A2B6	1	
2A2C3		1
2A2C5	1	
2A2C6	1	
2A2C7		2
2A2C8	1	1
2A3A1		5
2A3A2		3
2A3A4		3

Provenience	Number of Whole Specimens	Number of Fragmentary Specimens
2A3B1		3
2A3B2		4
2A3C2		1
2A3C4	1	6
2A4A1		2
2A5A1	1	2
2A5B1	4	7
2A5C1 2	1	1
2A5C1 3	13	9
2A6A5		1
2A6A6		3
2A6A7	2	1
2A6A8	1	
2A6A9	5	10
2A6A1		2
2A6B1	1	12
2A6B2	3	3
2A6B3	7	3
2A6B4	8	2
2A6D2	7	11
2A6D3	3	6
2A6D4	5	7

Provenience	Number of Whole Specimens	Number of Fragmentary Specimens
2A6D6	1541	1789+
2A6D7	38	150
2A6D8	7	15
2A6D9	3	7
2A6D10	55	100
2A6D11	95	115
2A6D12	74	145
2A6D13	90	65
2A6D14	54	30
2A6D15	1	
2A6D16	1	4
2A6D18		4
2A6D20	21	27
2A6D dirt	60	104
2A6C2		3
2A6E2		2
2A6E6	7	
2A6E7	4	1
2A7A2	1	
2A7A3		1
2A7A5	2	
2A7A7	1	2

Provenience	Number of Whole Specimens	Number of Fragmentary Specimens
2A7A16		1
2A8A1		1
2A8A2	1	
2A8B1	17	5
2A9A1		1
2A9B2		2
2A9D1		2
2A9D2	1	4
2A9D3		3
2A9E2		53
2A9E4		1
2A9E10	2	7
2A9E11	1	26
2A9E12	1	1
2A9E13		4
2A9E15	1	23
2A9F2		1
2A9F3		1
2A9F4	2	9
2A9F5		5
2A9F6	2	19
2A9F7	2	4

Provenience	Number of Whole Specimens	Number of Fragmentary Specimens
2A9F8	1	8
2A9G3		5
2A9G6		8
2A9G8		9
2A9G9		12
2A9G10	2	8
2A9G11		18
2A9G15		2
2A9J5	48	180
2A9K9		6
2A9K10		1
2A9K11	1	1
2A9K12		1
2A9K14	15	71
2A10A1	6	9
2A10A5		1
2A10B4	1	
2A10B10		2
2A10B11	4	5
2A10B18		1
2A10B20	1	
2A10B27	18	5

Provenience	Number of Whole Specimens	Number of Fragmentary Specimens
2A10C3		1
2A10C6		1
2A10C15	1	3
2A10C16		3
2A10D5		1
2A10D7	3	
2A10D9	1	3
2A10D10		1
2A10D12	1	
2A10D20		2
2A10D23	1	
2A10D27	1	
2A10E3		7
2A10E4		2
2A10E6	1	
2A10E7		3
2A10E9		1
2A10E15		4
2A10E16	2	1
2A10E19	2	1
2A10E21	1	2
2A10E22	1	3

Provenience	Number of Whole Specimens	Number of Fragmentary Specimens
2A10E23	1	
2A10F3		3
2A10F4		1
2A10F6	9	8
2A10F7	1	
2A10F8	1	4
2A10F10		4
2A10F12	2	
2A10F14W	5	2
2A10F15E	13	1
2A10F23	2	4
2A10F28	8	13
2A10F30	2	2
2A10F31	6	2
2A10F34	71	17
2A10G1		3
2A10G3	1	1
2A10G8	2	
2A10G10		1
2A10H2	8	18
2A10H3	8	4
2A10H4		2
2A10J2	8	5

The amount of shell in various excavation units in the site can be used as a means of determining the relative significance of species in the two occupations of the fort. In order to make effective use of the mussel shell sample it is necessary to estimate the number of individuals represented and/or the total edible flesh weight. Meighan notes that accurate shell to flesh ratios are subject to regional variation and are not available for all species; he cites the ratios determined by Cook and Treganza (Meighan 1970: 420; 1959: 403). Table 193 is based on Cook and Treganza's 2.35:1 ratio of shell weight to flesh weight for the San Francisco Bay mussel, a ratio they also used in the analysis of river mussel (Cook and Treganza 1956: 250). This method, based on the total weight of the shell for each period of occupation, makes it possible to use the fragmentary specimens since all that is required is their weight.

An alternative method of calculating the useable flesh weight based on the number of individuals represented involves the conversion of fragments to an estimate of whole shells. The average weight of a single whole valve of Blue Mussel shell from Castle Hill was determined to be 0.31 oz. The average fragment weight was 0.08 oz. Thus, on the average, about

four fragments equal a whole valve. The 2434 fragments from English levels represent about 608 complete valves while the 726 fragments from French contexts represent 181 whole specimens. These counts may then be added to the total for complete valves. The total numbers are then reduced by 50 percent to arrive at an estimated number of individuals. The average shell weight of a complete individual is 0.31 oz. per valve or 0.62 oz. Using the 2.35:1 shell to flesh weight ratio, the weight of the individual meat would be 0.26 oz. Multiplying the number of individuals by this figure thus produces another estimate of flesh weight represented by mussel shell. These data are presented in Table 194.

These figures are very close to those estimated by the first method. It is concluded that the Blue Mussel flesh weight was about 22.0 lbs. in the English period and only about 3.0 lbs. in French contexts.

Clam

Clam shells (Mya arenaria) were next most frequently represented in the site.

Provenience	Number of Whole Specimens	Number of Fragmentary Specimens
2A1A3		1
2A3A1		1

Provenience	Number of Whole Specimens	Number of Fragmentary Specimens
2A4A1		1
2A4A4		1
2A5A1		2
2A5C1		4
2A6D6	13	204
2A6D7	3	48
2A6D8	1	11
2A6D9		1
2A6D10		10
2A6D11	2	23
2A6D12		31
2A6D13		14
2A6D14	1	8
2A6D15		2
2A6D20		10
2A6D dirt		15
2A9E2		4
2A9E5		3
2A9E11		2
2A8B1		2
2A9J5		2
2A9F6		3

Provenience	Number of Whole Specimens	Number of Fragmentary Specimens
2A9G6		2
2A9G8		1
2A9K14		5
2A5C1 2		5
2A5C13		1
2A6A4		2
2A6A6		1
2A6A9		4
2A6C2		1
2A10C3		1
2A10C15		1
2A10C18		1
2A10E3		1
2A10E9		1
2A10F16		1
2A10G10		1
2A10J1		1
2A11A1	1	
2A11A2		1
2A12A2		2
2A13A2		1
2A13A4		1

	Number of Whole Specimens	Number of Fragmentary Specimens	Total Number of Specimens
English	17	319	336
French	4	82	86
Indeterminate		20	20

The distribution of clam shells in culturally identified lots indicates that these specimens were represented in both periods of occupation but that they are numerically more common in the English contexts.

The average weight of the whole shell was 0.30 oz. and of the fragment 0.08 oz., so similar to the blue mussel data that the same factor was used in converting these shell counts to individuals and flesh weights.

	Number of Individuals	Flesh Weight
English	48	12.5 oz.
French	12	3.1 oz.

Horse Mussel

One complete and several fragmentary horse mussel (Volcella) shells were recovered in the site.

	Provenience	Number of Fragmentary Specimens			
	2A6D8			1	
	2A6D9			1	
	2A6D10			1	
	2A10E9			1	
	2A10G8			1	
	2A6A9			17	
	2A6C2			1	
	2A6A7			1	
	2A10B10			3	
	Number of Fragmentary Specimens	Estimated Number of Individuals	Estimated Flesh Weight (in oz.)	Shell Weight	Flesh Weight
English	6	3	0.8	2.75	1.2
French	20	2	0.5	3.50	1.4
Indeter.	1				

This type of shell appears to be more common in French contexts although the count is distorted by the fragmentary nature of the specimens from lot 2A6A9 which may represent only two or three shells.

Scallops

Fragments of large scallop shells were recovered from

a few locations in the site.

Provenience	Number of Specimens
2A6D11	1
2A6A7	1
2A6A7	1
2A10B11	1
2A10D17	1

Both complete shells and fragments of very small scallops were also present in small quantity.

Provenience	Number of Specimens
2A6D7	6
2A13A4	1

Two of the large scallop shell fragments were found in French contexts and two were from English contexts. One was indeterminate. In contrast all of the small scallop shells were from probable French deposits.

	Number of Large Specimens	Number of Small Specimens	Estimated Total Flesh Weight (in oz.)
English	2	0	0.5
French	2	7	1.4

Oyster

Two fragments of oyster (Crassostrea virginica) shell were recovered.

Provenience	Number of Specimens
2A6E7	1
2A2A2	1

One specimen is from a mixed context, the other from a probable French level. The estimated flesh weight is 0.26 oz.

Periwinkle

A number of Atlantic Dogwinkle (Nucella lapillus) shells were found in the site. Three had the shell cavity filled with mortar, indicating that they had at one time been incorporated into the walls of the fort. These specimens could have been used in making lime or included in the sand while making mortar. These shells may not represent a species eaten at the site. Whatever their purpose, they are present in both occupations, but are relatively more common during the English period.

Provenience	Number of Specimens
2A1A3	1
2A2A8	1
2A2B1	1

Provenience	Number of Specimens
2A4A1	1
2A6D1	1
2A6D2	1
2A6D6	6
2A6D11	2
2A6D10	2
2A6D12	1
2A6D15	1
2A6D17	1
2A6D20	1
2A6A6	1
2A9E10	1
2A9E11	2
2A9F3	1
2A9H12	1
2A9J2	1
2A10B10	4
2A10B11	7
2A10D7	1
2A10D10	1
2A10F17	1
2A10G1	1

	Number of Individuals	Estimated Flesh Weight (in oz.)
Total English	28	3.6
Total French	9	1.2
Snail		

One small snail shell was found. It was from a French context.

Provenience	Number of Specimens
2A9E11	1

The estimated flesh weight is 0.13 oz.

Cockle

One fragment of a cockle (?) shell was recovered.

Provenience	Number of Specimens
2A9E11	1

The estimated flesh weight is 0.13 oz.

Lobster Shell

Several fragments of lobster, Homarus spp., were recovered. An alternative identification as crab shell might be possible. They are tinged a bright orange colour, presumably from cooking. Two specimens are from

a probable English level while 15 are from French contexts. If this small sample is an accurate indication, the French made more use of this resource at Castle Hill than did the English. It is notable that a straightened fish hook, identified as a lobster spear point, was found at the site; it was from a French context.

Provenience	Number of Fragments	Number of Individuals
2A6D6	1	1
2A6D7	10	1
2A6D8	3	1
2A6D10	1	1
2A9F4	1	1
2A9K14	1	1
2A6D-	1	-

An average size is difficult to determine but some of the fragments appear to be from large lobsters and a 2.0 lb. weight, the upper range of the popular size (Waterman 1965: 3), was assumed. Weight loss during cooking varies from 5 per cent to 25 per cent, averaging about 14.0 per cent (Waterman 1965: 3). The shell is inedible and a cookbook estimate of about 1.0 lb. in the shell yielding 6.0 oz. of meat is used in the calculation below.

	Number of Specimens	Number of Individuals	Useable Flesh Weight (in lbs.)
English	2	2	1.5
French	15	4	3.0

Fish

The identification of fish bone is difficult (Ryder 1970: 393). The fish bone from Castle Hill was identified by comparison with illustrations in Svetovidov (1962) and with a disarticulated cod skull obtained from a zoological supply house. Virtually all elements in that laboratory standard could be identified in the collection from the site and there was no question that the majority of the fish bone represented the cod, Gadus morhua. This was not unexpected since the fort was established to protect the cod fishery.

A very small number of fish bones were recognized as not being cod. These have not been identified as to species but are probably of almost negligible importance in the total fish bone collection. Some elements, such as vertebrae, could not be formally identified but were assumed to be cod in view of the fact that nearly all skull fragments were that species.

There are undoubtedly errors in the identification of the fish bone since the task was not undertaken by a professional, but the errors are thought to be relatively unimportant.

The tabulation of fish bone also includes a count of fragments as well as the larger identifiable bones. In lots containing a small number of fish bones any recognized element was used to determine the minimum number of individuals represented, usually only one. In lots containing larger quantities the elements utilized to determine the minimum number of individuals present were the frontal, parasphenoid, basioccipital, suborbitalis, premaxilla and vomer, separated into right and left elements where appropriate. Most of the vertebrae were in the "cod size" range (Ryder 1970: 388) and larger. Many vertebrae and other elements were extremely large when compared to the laboratory sample, assumed to be an average or large specimen today. The average cod taken when the site was occupied could have been exceptionally large by today's standards. The minimum number of individuals estimated for lots in the collection is probably lower than would have been possible had the classification been done with real expertise.

The quantity of fish remains present in French

and English contexts is summarized in Table 195. It is evident that cod is the predominant fish in both French and English contexts but that non-cod specimens are relatively more common in French contexts. In terms of the minimum number of individuals, there are almost twice as many fish in the French period as in the English, and the same is also true when estimated edible weights are compared.

Average cod weights are listed by Innis (1954: 4) and range from ten to twelve pounds for Newfoundland shore fish to 35 pounds for large Gulf of Maine shore fish. Jordon and Evermann (1969: 514) note that although cod weighing over 100 pounds have often been recorded even 75 pound fish are not common. Average weights for bank fish range from 20 to 35 pounds and shore fish average about 12 pounds. The record cod was six feet long and weighed 211 pounds (Innis 1954: 4) but today more than 90 per cent of the cod landed are less than three feet in length (Waterman 1968: 5) and the average gutted weight would be about 12 pounds for a three foot fish (Waterman 1968: 6). Heavier fishing reduces the number of old and hence larger cod. The weight of fish landed is reduced as fishing intensity increases (Cushing 1966: 70) and it would be expected that the average weight of cod in the

period of occupation of the site would have been greater than it is today. The fish bones from the site are relatively large ones in the opinion of the fishermen who were on the crew. An average size of 25 pounds was therefore arbitrarily selected as the factor for flesh weight calculations. This weight is perhaps too low rather than too high.

Cleland (1971: Appendix A) uses 80 per cent as the percentage of meat for fish in his calculations. This figure appears to be too high for cod. Waterman indicates that the weight of cod fillets ranges from 41 per cent of live weight without skin to 47 per cent with skin (Waterman 1965: 8-9). Useable meat production ranges from 47 per cent up to 52 per cent depending on the skill of the workman and the quality of the fish (Waterman 1968: 11). On this basis 50 per cent is a probable percentage of useable meat for fish from Castle Hill. Thus, to calculate the useable meat represented by the fish bones, the minimum number of individuals was multiplied by the 25 pound average weight and reduced by 50 per cent to determine useable meat.

The proportion of fish in the diet of French and English at Castle Hill represented by these calculations

is minimal since it is based on fresh fish and does not include any of the product eaten as salt fish or dried fish.

APPENDIX B. MAMMALS AND BIRDS: LIVE WEIGHTS AND POUNDS
OF USABLE MEAT PER INDIVIDUAL.

The method of calculating the average live weights of amounts of usable meat for shellfish and fish have been discussed in appendix A. The methods used in determining the live weights and pounds of usable meat per individual for mammals and birds are briefly described in this appendix.

Carole Sumner assembled most of the data. The author undertook the task of assembling this information, along with other data on both birds and mammals. The author took responsibility for the final selection of individual weight factors to be used in this analysis. Sumner should be credited with locating most of the information; the author is responsible for any mis-application of her data or any errors in recording the data in the following tables.

The data for mammals is summarized in Table 196 and the information for birds in Table 197. The weight of usable meat per individual used in this study is indicated in the last column in the tables. Alternatives used by other authors (Cleland 1971) are also indicated. Cleland does not cite sources for the individual weights or the

percent of usable meat factors used in his study. Wherever possible an effort has been made in this analysis to obtain data pertinent to Newfoundland species or subspecies. This may account for variations in the factors used by Cleland and those used in this analysis.

APPENDIX C

Bird and Mammal Remains from

Castle Hill, Newfoundland

by Carole F. Sumner

Castle Hill is an archeological site located at Placentia, Newfoundland, which was successively occupied by French and English during the 17th and 18th centuries. The birds and mammals represented at the site, listed in Table 1, were identified from material recovered by Roger T. Grange.

In most cases generic determinations are based on qualitative osteological differences, with specific assignment made on size differences and present distribution of living species. All comments on bird distribution come from *Birds of Newfoundland* (Peters and Burleigh, 1951). Most of the bird bones could be identified at least to genus, but many of the mammal bones are too fragmented for identification. Most of these fragments are of large bones, especially of artiodactyls, and probably all species were identified. Ribs and most of the vertebrae, which are less diagnostic, were not examined.

The minimum number of individuals in each taxon was determined for each of the proveniences, for various groupings of the proveniences determined by Grange to be contemporary, and for four large groupings of proveniences determined by Grange to be English, probable English, French, and probable French (Tables 204, 205, and 206 respectively).

Results, summarized in Table 198, show the total number of individuals for each taxon differs for each method of grouping the bones, the number of individuals decreasing with the number of proveniences grouped. All three methods of grouping the bones result in an over-estimate of the number of individuals represented, as in some instances parts of the same bone were recovered from adjacent proveniences.

Table 198: Species represented at Castle Hill and minimum number of individuals represented based on totaling individuals counted in (1) each provenience, (2) small groups of contemporary proveniences, and (3) French and English culture groupings of proveniences.

Species	Number of Individuals		
	(1)	(2)	(3)
Birds			
<u>Gavia stellata</u> , Red-throated Loon	3	3	1
<u>Puffinus diomedea</u> or <u>gravis</u>	6	5	3
<u>Puffinus</u> spp.	10	6	1
<u>Phalacrocorax carbo</u> , Great Cormorant	1	1	1
<u>Phalacrocorax auritus</u> , Double-crested Cormorant	23	13	4
<u>Phalacrocorax</u> spp.	16	8	4
<u>Botaurus lentiginosus</u> , American Bittern	1	1	*
<u>Branta canadensis</u> , Canada Goose	3	2	2
<u>Anser</u> or <u>Branta</u>	5	3	1
<u>Anas</u> spp.	2	2	1
<u>Clangula hyemalis</u> , Oldsquaw	4	3	3
<u>Histrionicus histrionicus</u> , Harlequin Duck	1	1	1

Species	Number of Individuals		
	(1)	(2)	(3)
Birds			
<u>Mergus merganser</u> , Common Merganser	1	1	1
<u>Mergus serrator</u> , Red-breasted Merganser	4	2	1
<u>Mergus</u> spp.	4	4	1
Mergini	3	3	
<u>Somateria spectabilis</u> , King Eider	2	2	1
<u>Somateria</u> spp.	19	7	2
<u>Somateria</u> or <u>Melanitta</u>	3	1	1
<u>Oidemia nigra</u> , Common Scoter	1	1	1
<u>Melanitta</u> or <u>Oidemia</u>	2	1	
<u>Somateria</u> , <u>Melanitta</u> , or <u>Oidemia</u>	2		
Anatidae	9	5	
<u>Accipiter striatus</u> , Sharp-shinner Hawk	1	1	1
<u>Buteo</u> spp.	3	2	1
<u>Haliaeetus leucocephalus</u> , Bald Eagle	31	18	5
<u>Haliaeetus</u> or <u>Aquila</u>	8	3	2
<u>Pandion haliaetus</u> , Osprey	6	4	2
<u>Falco rusticolus</u> , Gyrfalcon	6	2	1
<u>Falco columbarius</u> , Pigeon Hawk	4	3	1
<u>Lagopus lagopus</u> , Willow Ptarmigan	13	13	6
<u>Lagopus</u> spp.	44	16	15
<u>Gallus gallus</u> , Domestic Fowl	16	7	4
Galliformes	1	1	1
<u>Arenaria interpres</u> , Ruddy Turnstone	1	1	1
<u>Numenius phaeopus</u> , Whimbrel	1	1	1
<u>Totanus melanoleucus</u> , Greater Yellowlegs	2	2	1

Species	Number or Individuals		
	(1)	(2)	(3)
Birds			
<u>Large Larus</u> spp.	284	165	84
<u>Larus</u> spp.	97	53	21
Probable <u>Larus</u>	12	4	
Larinae	52	26	14
<u>Hydroprogne caspia</u> , Caspian Tern	5	4	3
Laridae	1		
Lari	4	1	
<u>Pinguinus impennis</u> , Great Auk	5	4	2
<u>Uria</u> spp.	7	4	2
<u>Uria</u> or <u>Alca</u>	2	2	
<u>Plautus alle</u> , Dovekie	1	1	1
<u>Cephus grylle</u> , Black Guillemot	3	3	2
Probable <u>Fratercula arctica</u> , Common Puffin	1	1	*
<u>Bubo virginianus</u> , Great Horned Owl	2	2	1
<u>Surnia ulula</u> , Hawk Owl	2	2	1
<u>Dendrocopos</u> or <u>Picoides</u>	1	1	1
<u>Perisoreus</u> or <u>Cyanocitta</u>	1	1	1
<u>Corvus corax</u> , Common Raven	74	40	17
<u>Corvus brachyrhynchos</u> , Common Crow	6	1	1
Mammals			
<u>Martes americana</u> , Marten	1	1	1
<u>Lutra canadensis</u> , River Otter	1	1	*
<u>Vulpes fulva</u> , Red Fox	10	6	5
Canidae	15	3	

Species	Number of Individuals		
	(1)	(2)	(3)
Mammals			
<u>Felis felis</u> , Cat	13	10	4
<u>Phoca</u> spp.	12	10	5
<u>Rattus</u> spp.	14	12	7
<u>Lepus arcticus</u> , Arctic Hare	3	3	1
<u>Sus scrofa</u> , Pig	247	128	40
<u>Rangifer</u> spp.	12	9	4
<u>Bos taurus</u> , Cow	65	34	8
Probable <u>Ovis aries</u> , Sheep	14	8	4
<u>Ovis</u> or <u>Capra</u>	23	14	4

* Bone is from a provenience that could not be assigned to a culture.

Using the culture groupings unfortunately reduces the sample because all proveniences could not be assigned to a culture, but the possibility of counting an individual more than once is reduced most with this method.

Bones identified as probable are included in tallying minimum number of individuals except for Sus, Larus, and Laridae, where the number of bones involved is great. For these probable categories and for some taxa higher than species, where bones identified may belong to individuals already represented by better elements identified to lower taxa, the number listed under minimum number of individuals is the number of individuals identified minus the number of individuals already tabulated under a more specific identification. For higher taxa containing relatively few or less fragmented bones direct comparison of bones identified to lower and higher taxa was possible, and number of individuals listed is the number in addition to those tabulated for

the lower taxa based on direct comparison rather than subtraction of individuals. These procedures were used in all tables to avoid counting an individual more than once because some of its bones were identified to species while others could be assigned only to genus, family, etc.

Annotated List

Comments are made only for taxa where information additional to that found in the tables seems pertinent.

Gavia stellata

The Red-throated Loon is represented by almost all long bones, a mandible, and three phalanges, probably all from one individual. Cuts on the ventral coracoid and humeral head appear to be knife marks, suggesting the loon was eaten.

Puffinus

Two species of Puffinus occur regularly in migration off the coast of Newfoundland, the Greater Shearwater (P. gravis) and Sooty Shearwater (P. griseus). Manx Shearwater (P. puffinus) is listed as accidental and Cory's Shearwater (P. diomedea) as hypothetical for Newfoundland. All bones that could be assigned on the basis of size appear to be the larger P. gravis, which is commonly eaten by Newfoundland fishermen (Peters and Burleigh, 1951). P. diomedea could not be eliminated by measurements of the single specimen available, and wing measurements for the two species overlap (Palmer, 1962). Measurements for bones assigned to P. gravis or P. diomedea are listed in Table 199 except for two partial mandibles and a damaged radius and ulna which were assigned by direct comparison with specimens. All measurements are in millimeters.

Table 199

Measurements used in identification of <u>Puffinus</u> elements	<u>Puffinus griseus</u> (5 specimens)	<u>Puffinus gravis</u> (3 specimens)	<u>Puffinus diomedea</u> (1 specimen)	No. and size of elements assigned to <u>P. gravis</u> or <u>P. diomedea</u>
ulna total length	93.8-108.0	111.5-121.5	125.5	(2) 121-[121] ¹
radius t. 1.	90.8 [103.5]	108.0-118.0	123.5	(2) 117.5-119.5
tibiotarsus distal width	6.3 - 7.5 (3 specimens)	7.9 - 8.3 (1)	-	(2) 8.15 -8.3
carpometacarpus t. 1.	50.4-58.8	65.4	-	(2) 64.3
manus t. 1.	24.9-29.1	31.8	-	(1) 32.65

¹Brackets indicate an estimates measurement taken from a damaged bone.

Two scapulae assigned to Puffinus spp. have marks that appear to be knife cuts on the ventro-lateral head.

Phalacrocorax

Both the double-crested Cormorant (P. auritus) and the larger Great Cormorant (P. carbo) occur in Newfoundland. Most of the cormorant bones appear to be of P. auritus on the basis of their smaller size; one quadrate matches in size the one P. carbo specimen available. Published measurements of the two species indicate they overlap in size (Palmer, 1962). Bones assigned to P. auritus are smaller than ten specimens of P. auritus examined, all of which, unfortunately, belong to the smaller Florida subspecies. Bones equal to or slightly larger than the P. auritus specimens were assigned to Phalacrocorax spp. although most probably are P. auritus.

Botaurus lentiginosus

The American Bittern, a common marsh resident, is represented by only a partial distal tarsus. The bone is smaller than three available specimens but matches well qualitatively.

Anseriformes

Identification of the waterfowl was assisted by measurements and qualitative features described by Woolfenden (1961) and by a large series of unpublished measurements made available by Woolfenden.

Anser or Branta

Goose elements assigned to Anser or Branta in size match Canada Goose (B. canadensis), a common summer resident, and Snow Goose (A. hyperborea=Chen hyperborea), hypothetical for Newfoundland.

Anas

A distal humerus and partial distal tibia identified as Anas spp. probably are Black Duck (A. rubripes), but the equally large Mallard

(A. platyrhynchos) is on the Newfoundland hypothetical list, and the Pintail (A. acuta) and Gadwall (A. strepera) approach them in size (see measurements in Table 200). The tibia was damaged and not readily measureable.

Table 200

Meas. used in identification of Anas elements	<u>Anas rubripes</u> (5 specimens)	<u>Anas acuta</u> (5)	<u>Anas strepera</u> (9)	Element assigned to <u>Anas</u> spp.
humerus distal width	14.9-17.0	13.4-14.4	12.9-14.5	15.25

Mergus

On the basis of size five elements were assigned to Red-breasted Merganser (M. serrator) and one to Common Merganser (M. merganser) (see measurements in Table 4). The caepometacarpus of Mergus is distinguishable from Bucephala, Lophodytes, and Mergellus in relative height of the process of metacarpal I (Woolfenden, 1961). The range for the height through the process of metacarpal I is 17.9-22.6 per cent of the total length of the bone for Mergus (19 specimens) and 22.5-23.9 for the other three genera (18 specimens) (Woolfenden, 1961). The percent for the carpometacarpus assigned to Mergus is 21.97 (10.6/48.25). Species assignment of the bone was based on total length (see Table 4).

The humeri of the two Mergus species differ in width of the shaft relative to total length (Wetmore in Woolfenden, 1961). For 17 specimens of M. serrator the range is 5.6-6.9 and for four M. Merganser, 7.0-7.3 (Woolfenden, 1961). The humerus assigned to M. serrator is 6.1 (5.5/90.25).

The length of the maxilla from distal tip of nares to distal tip of maxilla relative to the total length of the maxilla from suture with the skull to distal tip differs in the two Mergus species. This feature was used to assign the one Mergus maxilla to M. serrator (see Table 201). A small proximal femur was assigned to M. serrator by direct comparison with specimens.

A partial humerus assigned to Mergus spp. has presumed knife cuts on the proximal shaft.

Table 201

Meas. used in identification of <u>Mergus</u> elements	<u>Mergus serrator</u> (10 specimens)	<u>Mergus merganser</u> (4)	Elements assigned to <u>M. serrator</u>
proximal phalange of toe 3 total length	18.4-26.25 (19)	26.4-28.9 (7)	24.05 24.05
carpometacarpus t. 1.	46.2-52.8 (8)	51.2-60.1 (3)	48.25
<u>maxilla from distal nares to tip</u> <u>maxilla from suture with skull to tip</u>	59.0-62.6 (19)	51.1-51.9 (7)	60.8 (39.5/65) Element assigned to <u>M. merganser</u>
ulna t. 1.	66.1-74.6	71.7-83.7	83.85

Bones of sea ducks identified as tribe Mergini (sensu Woolfenden, 1961) are a sternum that agrees with Bucephala, Mergus, and Lophodytes and a coracoid that matches both Bucephala and Mergus.

Somateria

A humerus and femur were assigned to King Eider (S. spectabilis) on the basis of size (see measurements in Table 202). Bones identified as Somateria spp. may be King Eider or the larger Common Eider (S. mollissima).

Table 202

Meas. used in identification of <u>Somateria</u> elements	<u>Somateria</u> <u>spectabilis</u> (5 specimens)	<u>Somateria</u> <u>mollissima</u> (10)	Elements assigned to <u>S. spectabilis</u>
humerus total l.	97.3-103.2	102.1-112.2	99.25
humerus distal w.	15.0- 16.2	16.2- 18.0 (11)	15.0
femur total l.	56.7- 60.0	59.4- 68.6	56.8

Some of the less diagnostic elements were assigned to various combinations of Somateria, Melanitta, or Oidemia. Other less diagnostic and damaged elements could be assigned only to the duck family, Anatidae.

Accipiter striatus

A partial humerus is the only Accipiter element present. The bone is larger than specimens of five male Sharp-shinned Hawks and smaller than three female Cooper's Hawks (A. cooperii), which is the rarer of the two species in Newfoundland. Width of the distal end is intermediate between the two, but in overall size the bone is closer to A. striatus and was assigned to species on that basis.

Buteo

Bones identified as Buteo spp. probably are Rough-legged Hawk (B. lagopus), but Red-tailed Hawk (B. jamaicensis), hypothetical in Newfoundland, is not separable for elements examined.

Haliaeetus leucocephalus

Two humeri of the Bald Eagle from French proveniences have presumed knife cuts on the bones, one on the shaft and the other on the proximal end. A number of cuts are present on the distal ends of two tibiotarsi, one from French and the other from probably English proveniences.

Cuts are present on two ulnae identified as Bald Eagle or Golden Eagle (Aquila chrysaetos); one ulna has cuts across the shaft near the proximal end, and the other has a cut encircling the bone, along which the bone was broken. A third partial ulna has a straight edge suggesting the bone was cut and then broken. All three of these bones are from French proveniences.

Falco rusticolus

The Gyrfalcon is considered a rare transient in Newfoundland, but in the past these falcons were used much for falconry and therefore it cannot be assumed the bones were of a native bird. Elements identified include most of the limb bones.

Lagopus

Two ptarmigans occur in Newfoundland, Willow Ptarmigan (L. lagopus) and Rock Ptarmigan (L. mutus). Eight tarsi and six femurs were the only elements that could be assigned to species on the basis of size; all appear to be L. lagopus, the larger and more easily procured of the two species (Peters and Burleigh, 1951). Total length could be measured for only seven tarsi and one femur (see measurements in Table 203); the remaining bones assigned were by comparison with these.

Table 203

Meas. used in identification of <u>Lagopus</u> elements	<u>Lagopus mutus</u> (6 specimens)	<u>Lagopus Lagopus</u> (3)	No. and size of elements assigned to <u>L. lagopus</u>
tarsus total lgth	30.6-36.1 (2, smallest and largest of above)	39.5-40.6 (2)	(7) [39.0]-42.0
femur t. lgth	53.5-59.6	60.4-61.8	(1) [61.9]
femur head wdth	10.0-11.65	11.2-12.0	(1) 12.7

Numenius phaeopus

A carpometacarpus is the only element of Whimbrel present. The absence of the smaller Eskimo Curlew (N. borealis) is puzzling if Peters and Burleigh (1951) are correct in reporting that formerly the species was killed in Newfoundland in great numbers and preserved for winter food. A distal ulna assigned to Numenius or Limosa probably is N. phaeopus also, but it is similar to the one specimen of Marbled Godwit (L. fedoa) examined.

Larinae

Because of the apparent lack of qualitative differences among the numerous species of the genus Larus and the overlap in size among all three genera of gulls occurring in Newfoundland, species assignment within the Larinae was not feasible. Some elements of the small Black-legged Kittiwake (Rissa tridactyla) and Ivory Gull (Pagophila eburnea) differ qualitatively from those of Larus, but the relatively few small bones are fragmentary and not diagnostic. Most of the gull bones are of the larger Larus species, but the range in size exhibited among the bones excludes none of the seven species occurring regularly in Newfoundland: L. marinus, L. hyperboreus, L. argentatus, L. leucopterus, L. delawarensis, P. eburnea, and R. tridactyla. In order to determine relative size of gulls represented and thus approximate their weights, bones are grouped in the following general categories: large Larus spp., bones within the size range of L. argentatus, L. hyperboreus, and L. marinus; Larus spp., bones estimated to be too large for Pagophila or Rissa but smaller than L. argentatus or too fragmented to compare size accurately; and Larinae, bones that approach in size the smaller

Pagophila and Rissa. This arbitrary grouping reveals most of the gull bones are of the three largest species. Cuts are present on many of the gull bones.

Hydroprogne caspia

The Caspian Tern is the only tern represented in the material, but poorer elements assigned to family Laridae could include additional terns. No skuas or jaegers were identified from the many elements for which they are distinguishable from gulls and terns, but because skuas and jaegers occur in Newfoundland, some less diagnostic or fragmented bones were assigned only to suborder Lari.

Alcidae

Alcids are well represented in the collection, but by only a few individuals, suggesting fort occupants did not visit breeding colonies regularly to obtain food.

Bones identified as Uria spp. may be Common (U. aalge) or Thick-billed Murre (U. lomvia). Some bones matched both Uria and Northern Razor-bill (Alca torda).

A tibia identified as probable Cephus differs from the few Cephus specimens examined in having a more pronounced ridge along the inter-muscular line distal to the ligamental attachment, but is closer to Black Guillemot (C. grylle) than to Fratercula. The one bone identified as probable Fratercula arctica, Common Puffin, is a partial distal humerus.

Dendrocopos or Picoides

The only woodpecker bone is a distal tibiotarsus that matches both Hairy Woodpecker (D. villosus) and Black-backed Three-toed Woodpecker

(P. arcticus). The rare Northern Three-toed Woodpecker (P. tridactylus) also occurs in Newfoundland, but no specimens were available.

Perisoreus or Cyanocitta

A complete ulna is the only jay bone present, and it appears indistinguishable for Gray Jay (P. canadensis) and Blue Jay (C. cristata), both common residents.

Corvus

Cuts are present on three humeri of Common Raven (C. corax) from French proveniences and on a coracoid and ulna from probable English proveniences.

The bones identified as Corvus spp. are a partial sternum and pelvis that appear intermediate in size between specimens of Common Raven and Common Crow (C. brachyrhynchos).

Martes americana

The Marten is represented by only a lower jaw and axis.

Lutra canadensis

A humerus is the only element identified as River Otter.

Vulpes fulva

The Red Fox is the only canid definitely represented in the material. Many of the canid bones, which include many phalanges, could not be assigned to genus with the reference material available.

Felis felis

Domestic Cat is represented by both cranial and postcranial elements. Two of the three individuals from English proveniences are immature.

Phoca

Elements tentatively identified as seal were examined by John H. Miles, Jr., Museum Specialist in the Division of Mammals at the United

States National Museum, and identified as Phoca. Harbor Seal (P. vitulina) and Harp Seal (P. groenlandica) both occur on the coast of Newfoundland (Hall and Kelson, 1959). The bones identified include lower jaws, periotic bones, limb bones, and pelvis; some are from immature seals.

Rattus

Rats of the genus Rattus are not native to the New World, but two species may have been introduced, Norway Rat (R. norvegicus) and Black Rat (R. rattus).

Lepus Arcticus

Elements identified as Lepus were examined by Miles and found to compare well with Arctic Hare, the only hare native to Newfoundland.

Rangifer

Some of the elements tentatively identified as cervid were sent for identification to John E. Guilday, Associate Curator at the Carnegie Museum, and some were sent to Miles at the U.S. National Museum, where comparative material is available. Although the Woodland Caribou (R. caribou) is the only caribou resident in Newfoundland assignment is made only to genus because of the remote possibility that the material represents introduced individuals of the Old World species R. tarandus. The presence of jaw fragments suggests the entire animal was returned to the fort and thus probably was taken nearby.

Ovis

Because adequate comparative material was not available to determine differences between Sheep (O. aries) and Goat (Capra hircus), identification of bones as probable Sheep is based on characteristics described by Boessneck (1970) in a paper on osteological differences

between Sheep and Goat. On the basis of differences he described none of the material could be assigned to Goat, but some of the material was not separable for the two species.

Summary and Conclusions

With the exception of the domestic animals, which comprised most of the mammal remains, all of the birds and mammals recovered at Castle Hill occur or formerly occurred nearby at least seasonally. Almost all of the common larger species of birds and mammals are represented in the material; Eskimo Curlew is the only species whose absence is unexpected. The presence of domesticated animals and the variety of resident species represented in the material suggest the site was occupied throughout the year.

Acknowledgements

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Table 204

Appendix A: Species Represented at Castle Hill with Number of Bones and Minimum Number of Individuals for Each Provenience.

Species	Provenience	No. of Bones Identified Definite	Probable	Minimum Number of Individuals
<u>Gavia stellata</u>	2A6A9	4		1
	2A6D7	2		1
	2A9E2	2		1
	2A9E11	7		
Total		15		3
<u>Puffinus diomedea</u> or <u>P. gravis</u>	2A2A15	2		1
	2A6D10	3		1
	2A6D11	1		1
	2A9E11	4		1
	2A9F4	2		1
	2A10A5	1		1
Total		13		6
<u>Puffinus</u> spp.	2A2A15	1		(In Addition to <u>Puffinus</u> tabu- lated above)
	2A4A1	1		1
	2A6A9	3		1
	2A6D6	1		1
	2A6D10	1		
	2A6D11	3		
	2A6D12	2		1

Puffinus spp. (Cont'd)	2A6D13	1	1
	2A6D15	4	1
	2A6D18	1	1
	2A7A11	1	1
	2A9E2	1	1
	2A9E10	1	1
	2A9E11	1	1
Total		22	10

<u>Phalacrocorax</u>	2A9E11	1	1
<u>carbo</u>			
Total		1	1

<u>Phalacrocorax</u>	2A2C4	1	1
<u>auritus</u>	2A2C5	1	1
	2A2C7	1	1
	2A6A6	1	1
	2A6A8	1	1
	2A6A9	2	1
	2A6D-		1
	2A6D6	1	1
	2A6D7	1	1
	2A6D15	2	1
	2A9E1	1	1
	2A9E2	2	2
	2A9E11	16	4
	2A9E13	1	1

<u>Phalacrocorax</u>	2A9E14	2		1
<u>auritus</u>	2A9E15	3		1
(Cont'd)	2A9F4		1	
	2A9G10	1		1
	2A9G11	1		1
	2A9K14	1		1
	2A10F27	1		1
Total		40	8	23

<u>Phalacrocorax</u> spp.			(In Addition to <u>Phalacrocorax</u> Tabulated Above)
	2A1A7	1	1
	2A2C4	1	
	2A2C7	1	
	2A5C3	1	1
	2A5C13	1	1
	2A6A-	1	1
	2A6D6	1	
	2A6D10	2	1
	2A6E6	1	1
	2A9D2	1	1
	2A9D3	1	1
	2A9E2	3	
	2A9E10	1	1
	2A9E11	10	
	2A9E13	4	

<u>Phalacrocorax</u>	2A9F4	1		
spp. (Cont'd)	2A9F6	1		1
	2A9G11	1		
	2A9J5	2		1
	2A9K10	1		1
	2A9K12	1		1
	2A9K14	3		
	2A10B23	1		1
	2A10E4	1		1
	2A10H3	1		1
Total		43		16
<hr/>				
<u>Botaurus</u>	2A6A4	1		1
<u>lentiginosus</u>				
Total		1		1
<hr/>				
<u>Branta</u>	2A2C7	1	1	1
<u>canadensis</u>	2A9E11	1	1	1
	2A9J5	1		1
Total		3	2	3
<hr/>				
				(In Addition to <u>Branta</u> Tabu- lated above)
<u>Anser</u> or <u>Branta</u>	2A2A13+2A2B10	1		1
	2A3A4	1		1
	2A6D7	1		1
	2A9E2	1		1
	2A9E11	2		

<u>Anser</u> or <u>Branta</u> cont.	2A9F6	1		1
Total		7		5
<hr/>				
<u>Anas</u> spp.	2A6D6	1		1
	2A10C9	1		1
Total		2		2
<hr/>				
<u>Clangula</u> <u>hyemalis</u>	2A9F5	2		1
	2A9K14	2		1
	2A10C6	1		1
	2A10J2	2	1	1
Total		7	1	4
<hr/>				
<u>Histrionicus</u>	2A9E2	1		1
<u>histrionicus</u>				
Total		1		1
<hr/>				
<u>Mergus</u> <u>Merganser</u>	2A9G11	1		1
Total		1		1
<hr/>				
<u>Mergus</u> <u>serrator</u>	2A9E2	1		1
	2A9G9	1		1
	2A9J1	1		1
	2A9K14	2		1
Total		5		4
<hr/>				

<u>Mergus</u> spp.	2A6D7	1	1	(In addition to
	2A6D14	1	1	<u>Mergus</u> Tabulated
	2A7A1	1	1	Above)
	2A7A2	1	1	
	2A9E2		2	
	2A9G9	1		
	2A9K14	1		
Total		6	2	4
<hr/>				
Mergini	2A5A1	1	1	(In Addition to
	2A6A9	1	1	<u>Clangula</u> , <u>Histri-</u>
	2A9E11	1	1	<u>onicus</u> , and <u>Mergus</u>
				Tabulated Above)
Total		3	3	
<hr/>				
<u>Somateria</u>	2A3B2	1	1	
<u>spectabilis</u>	2A6D8	1	1	
Total		2	2	
<hr/>				
<u>Somateria</u> spp.	2A2B11	1	1	(In Addition to
	2A3B2	1	1	<u>Somateria</u> tabu-
	2A6A9	1	1	lated Above)
	2A6D7	1	1	
	2A9E2	2	1	
	2A9E15	1	1	
	2A9F4		1	
	2A9F5	1	1	
	2A9F6	1	1	
	2A9G8	1	1	
	2A9G10	1	1	

<u>Somateria</u> spp. (Cont'd)	2A9G11	1	1
	2A9J5	1	1
	2A10B23	1	1
	2A10D9	1	1
	2A10D11	1	1
	2A10H3	1	1
	2A10J2	1	1
Total		19	19
<u>Somateria</u> or <u>Melanitta</u>	2A2B11	1	(In addition to <u>Somateria</u> tabu- lated above)
	2A6A9	1	
	2A6D6	1	1
	2A9D2	1	1
	2A9G6	1	
	2A9G11	1	
	2A9K14	1	1
Total		7	3
<u>Oidemia nigra</u>	2A6D7	3	1
	2A6D8	1	
Total		4	1
<u>Melanitta</u> or <u>Oidemia</u>	2A9E13	1	1
	2A9G11	1	1
Total		2	2

(Minus Overlapping
Categories Tabu-
lated Above)

			(Minus Overlapping Categories Tabulated Above)
Somateria, Mela-	2A6D7	1	
nitta, or Oidemia	2A6D10	1	1
	2A10J3	1	1
Total		3	2

			(Minus Overlapping Categories Tabulated Above)
Anatidae	2A2A12	1	1
	2Z3A5	1	1
	2A5C13	1	1
	2A6D2	1	1
	2A6D6	1	
	2A6D7	1	
	2A6D8	1	
	2A6D10	1	1
	2A6E7	1	1
	2A7A2	1	
	2A9E2	2	
	2A9E11	3	
	2A9F4	1	
	2A9F6	1	
	2A9F11	1	1
	2A9J5	1	

Anatidae cont.	2A9K11	1	1
	2A9K14	2	
	2A10B23	1	
	2A10G10	1	1
Total		24	9

<u>Accipiter</u>	2A9K14	1	1
<u>striatus</u>			
Total		1	1

<u>Buteo</u> spp.	2A9E11	3	1
	2A9F2	1	1
	2A9F8	1	1
Total		5	3

<u>Haliaeetus</u>	2A9A9	0	1	1
<u>leucocephalus</u>	2A2C8+9	1		1
	2A3A4	1		1
	2A4C1	1		1
	2A5C13	1		1
	2A6A-		1	1
	2A6A9		1	1
	2A6B3	1		1
	2A6D2	1		1
	2A6D12	1		1
	2A9D3		1	1
	2A9E2	5	3	1
	2A9E10	1		1

<u>Haliaeetus</u>	2A9E11	19	5	2
<u>leucocephalus</u>	2A9E14		1	1
cont.	2A9E15	4	1	1
	2A9F3		1	1
	2A9F4	2	1	1
	2A9F6	2	2	1
	2A9F8	3		1
	2A9G6	1		1
	2A9G9	1	1	1
	2A9G10	1		1
	2A9G11	5		1
	2A9G14	2		1
	2A9J5	10	7	2
	2A9K12	1		1
	2A9K14	3		1
	2A10H4	1		1
Total		68	26	31

(In Addition to
Haliaeetus Tabu-
lated above)

<u>Haliaeetus</u> or	2A3A4	1		
<u>Aquila</u>	2A3B1	1		1
	2A6D6	1		1
	2A9D-	1		1
	2A9D3	2		1
	2A9E2	3		
	2A9E11	4		

<u>Haliaeetus</u> or	2A9E13	1	1
<u>Aquila</u> cont.	2A9E15	3	
	2A9F4	2	
	2A9F5	1	1
	2A9F6	3	
	2A9F8	2	
	2A9G11	2	
	2A9G14	1	
	2A9J5	11	
	2A9K14	2	
	2A10G10	1	
	2A10H3	1	1
	2A10H12	1	1
Total		44	8

<u>Pandion haliae-</u>	2A3B2		1	1
<u>tus</u>	2A6B2	1		1
	2A9D-		1	1
	2A9F6	1		1
	2A9K9	1		1
	2A9K14	1		1
Total		4	2	6

<u>Falco resti-</u>	2A9E2	2		1
<u>colus</u>	2A9E11	2		1
	2A9E15	2		1
	2A9G3+2A9G10	1		1
	2A9G9	1		1

<u>Falco resti-</u>	2A9J5	1	1
<u>colus cont.</u>			
Total		9	6

<u>Falco columbar-</u>	2A9D-		1	1
<u>ius</u>	2A9E11	2		1
	2A9F4	1		1
	2A9F6	1		1
Total		4	1	4

Lagopus lagopus	2A2A7	1		1
	2A5C13	1		1
	2A6B6	1		1
	2A9E2	2		2
	2A9E15	1		1
	2A9F6	1		1
	2A9F7	1		1
	2A9G9	1		1
	2A9J5	1		1
	2A9K14	1		1
	2A10D19	1		1
	2A10G10	1		1
Total		13		13

Lagopus spp.

(In Addition to
Lagopus Tabu-
lated above)

	2A2A12	2		1
	2A2B1	1		1

<u>Lagopus</u> spp. cont.2A2C4	1		1
2A2C7	3		1
2A5C3	1		1
2A5C13	5		
2A6A9	1		1
2A6D6	6		2
2A6D9	1		1
2A6D12	1		1
2A8B1	1		1
2A9A sf	1		1
2A9D-	2		1
2A9D2	2		1
2A9E1	1		1
2A9E2	32	6	1
2A9E10	5		2
2A9E11	16	5	3
2A9E13	7	2	2
2A9E15	2	2	1
2A9F4	2		1
2A9F5	2		1
2A9F6	3		
2A9F7	3		
2A9F8	5	1	1
2A9G6	3		1
2A9G9	1		
2A9G11	3	1	1

<u>Lagopus</u> spp. cont.	2A9G14	1	1	1
	2A9J5	15	2	1
	2A9K9		1	1
	2A9K12	1	1	1
	2A9K14	8	3	1
	2A1OB23	2		2
	2A1OB28		1	1
	2A1OC16	1		1
	2A1OG10	1		1
	2A1OH3	1		1
	2A1OH4	1		1
Total		144	26	44

<u>Gallus</u> <u>gallus</u>	2A2B6	1		1
	2A4A5	1		1
	2A6A9	1		1
	2A6D10		1	1
	2A6D12	1		1
	2A6D20	1		1
	2A9E2	1		1
	2A9E11	1		1
	2A9E13	3		1
	2A9E15	1		1
	2A9F4	1		1
	2A9F5	1		1
	2A9F6	1		1
	2A9J5	1		1

<u>Gallus gallus</u>	2A9H12	1	1
cont.	2A10J5	2	1
Total		18	1 16
<hr/>			
			(Minus <u>Lagopus</u> and <u>Gallus</u> Tabu- lated Above)
Galliformes	2A9E2	2	
	2A9A sf	1	
	2A9F8	1	1
	2A9K14	2	
Total		6	1
<hr/>			
<u>Arenaria inter-</u>	2A6D7	1	1
<u>pres</u>			
Total		1	1
<hr/>			
<u>Numenius phaeopus</u>	2A9E15	1	1
Total		1	1
<hr/>			
<u>Numenius or</u>	2A9E15	1	(Minus <u>Numenius</u> Tabulated Above)
<u>Limosa</u>			
Total		1	
<hr/>			
<u>Totanus melano-</u>	2A6D8	1	1
<u>leucus</u>	2A9E11	1	1
Total		2	2
<hr/>			
<u>Large larus spp.</u>	2A1A2	1	1
	2A1A7	1	1

<u>Large Larus</u> spp.	2A2A1	1	1
cont.	2A2A7	1	1
	2A2A11	15	5
	2A2A12	6	2
	2A2A13	1	1
	2A2A14	4	1
	2A2A15	7	2
	2A2B1	4	1
	2A2B3	1	1
	2A2B4	1	1
	2A2B6	1	1
	2A2B7	1	1
	2A2B8	2	1
	2A2B9	5	2
	2A2B11	2	1
	2A2C1	1	1
	2A2C5	1	1
	2A2C7	3	1
	2A2C8+9	14	3
	2A3A1	5	2
	2A3A4	5	1
	2A3B1	4	1
	2A3B2	6	1
	2A3C2	2	1
	2A3C3	2	1
	2A4A1	1	1

<u>Large Larus</u> spp.	2A4A2	1	1
cont.	2A4A4	1	1
	2A4A5	1	1
	2A5A1	3	1
	2A5A2	1	1
	2A5C2	3	1
	2A5C4	1	1
	2A5C5	1	1
	2A5C8	1	1
	2A5C12	3	1
	2A5C13	11	2
	2A6A-	3	1
	2A6A3	1	1
	2A6A5	2	1
	2A6A6	1	1
	2A6A7	6	1
	2A6A9	24	5
	2A6B1	12	3
	2A6B2	2	1
	2A6B3	2	1
	2A6B4	4	1
	2A6B5	2	1
	2A6C2	1	1
	2A6D-	1	1
	2A6D6	9	1
	2A6D7	31	4

<u>Large Larus</u> spp.	2A6D8	19	4
cont.	2A6D9	1	1
	2A6D10	2	1
	2A6D11	1	1
	2A6D12	1	1
	2A6D14	1	1
	2A6E2	1	1
	2A6E5	1	1
	2A6E6	9	2
	2A6E7	13	3
	2A7A10	1	1
	2A7A16	1	1
	2A7A17	2	1
	2A7A19	1	1
	2A7A21	1	1
	2A8A2	1	1
	2A8B1	2	1
	2A8B2	1	1
	2A9A sf	10	2
	2A9A2	1	1
	2A9B1	1	1
	2A9C1	3	2
	2A9C2	2	1
	2A9D-	4	1
	2A9D1	3	1
	2A9D2	10	2

<u>Large Larus</u> spp.	2A9D3	11	3
cont.	2A9E1	4	2
	2A9E2	295	18
	2A9E3	1	1
	2A9E4	6	1
	2A9E10	37	4
	2A9E11	432	21
	2A9E12	5	1
	2A9E13	79	7
	2A9E14	32	5
	2A9E15	146	7
	2A9E16	2	1
	2A9E18	1	1
	2A9E19	16	2
	2A9F1	1	1
	2A9F2	1	1
	2A9F3	3	1
	2A9F4	49	8
	2A9F5	33	5
	2A9F6	53	4
	2A9F7	3	1
	2A9F8	46	6
	2A9G3	2	1
	2A9G6	16	2
	2A9G8	9	2
	2A9G9	10	2

<u>Large Larus</u> spp.	2A9G10	14	2
cont.	2A9G11	56	6
	2A9G14	9	3
	2A9J1	1	1
	2A9J2	2	1
	2A9J4	4	1
	2A9J5	207	11
	2A9K5	1	1
	2A9K9	4	1
	2A9K10	8	2
	2A9K11	9	2
	2A9K12	8	2
	2A9K13	1	1
	2A9K14	145	12
	2A10B-	2	1
	2A10B8	1	1
	2A10B21	1	1
	2A10B23	5	1
	2A10B24	3	1
	2A10B25	5	1
	2A10C1	1	1
	2A10E21	1	1
	2A10F6	1	1
	2A10F9	1	1
	2A10G8	1	1
	2A10G10	28	5

<u>Large Larus</u> spp.	2A10H3	10	2
cont.	2A10J3	5	1
	2A10J10	3	1
	2A13A3	1	1
Total		2,150	284

<u>Larus</u> spp.	2A1A7	1	1
	2A2A2	1	1
	2A2A7	1	1
	2A2A11	1	1
	2A2A12	2	1
	2A2A14	1	1
	2A2A15	1	1
	2A2B1	2	1
	2A2B3	1	1
	2A2B8	2	1
	2A2B9	1	1
	2A2B11	1	1
	2A2C1	1	1
	2A3A1	1	1
	2A3A4	1	1
	2A3B1	1	1
	2A3B2	2	1
	2A6A7	1	1
	2A6A9	3	1
	2A6B2	1	1
	2A6B3	1	1

<u>Larus</u> spp.	2A6B4	1	1
cont.	2A6B5	1	1
	2A6C2	1	1
	2A6D6	2	1
	2A6D8	4	1
	2A6E7	1	1
2A9A sf	2A9A sf	1	1
	2A9D2	4	2
	2A9E2	44	4
	2A9E10	4	1
	2A9E11	112	13
	2A9E12	3	1
	2A9E13	12	2
	2A9E14	4	1
	2A9E15	21	3
	2A9E18	1	1
	2A9E19	4	2
	2A9F4	13	3
	2A9F5	2	1
	2A9F6	6	1
	2A9F7	1	1
	2A9F8	9	3
	2A9G3	1	1
	2A9G5	1	1
	2A9G6	3	1
	2A9G8	2	1

<u>Larus</u> spp. cont.	2A9G9	2	1
	2A9G10	2	1
	2A9G11	1	1
	2A9G14	2	1
	2A9H12	1	1
	2A9J5	35	5
	2A9K14	33	3
	2A10B23	1	1
	2A10B24	1	1
	2A10B25	2	2
	2A10C17	1	k
	2A10D26	2	1
	2A10E20	1	1
	2A10G10	5	2
	2A10J10	2	1
Total		380	97

Probable <u>Larus</u>		(Minus <u>Larus</u> Tabu- lated above)
2A1A3	1	1
2A1A7	1	
2A2A1	1	
2A2A7	1	
2A2A11	1	
2A2B1	3	
2A2B3	2	
2A2B7	1	
2A2C5	1	

Probable <u>Larus</u>	2A2C8+9	1	
cont.	2A3A1	2	
	2A3A4	1	
	2A3C2	1	
	2A4A1	1	
	2A4A2	1	
	2A4A4	1	
	2A5A1	3	
	2A5C3	1	1
	2A5C51	1	
	2A5C12	1	
	2A5C13	4	
	2A6A8	1	1
	2A6A9	7	
	2A6B1	2	
	2A6B4	1	
	2A6C1	1	1
	2A6D6	6	1
	2A6D7	5	
	2A6D8	4	
	2A6D10	1	
	2A6E7	5	
	2A7A16	1	
	2A9A sf	4	
	2A9B2	1	1
	2A9D1	1	

Probable <u>Larus</u>	2A9D2	5
cont.	2A9D3	2
	2A9E1	1
	2A9E2	61
	2A9E4	1
	2A9E10	11
	2A9E11	124
	2A9E12	2
	2A9E13	19
	2A9E14	6
	2A9E15	36
	2A9E19	1
	2A9F3	1
	2A9F4	11
	2A9F5	10
	2A9F6	12
	2A9F7	1
	2A9F8	6
	2A9G3	1
	2A9G6	2
	2A9G8	5
	2A9G9	6
	2A9G10	6
	2A9G11	18
	2A9G14	3
	2A9J5	27
	2A9K9	4

<u>Probable Larus</u>	2A9K10		2	
cont.	2A9K11		2	
	2A9K12		1	
	2A9K13		1	
	2A9K14		28	
	2A10B3		1	1
	2A10B23		1	1
	2A10B28		3	1
	2A10D17		1	1
	2A10F9		1	
	2A10G9		1	1
	2A10G10		1	
	2A10H3		2	
	2A10J2		1	1
	2A10J10		1	
	2A12A2		1	1
	2A13A3		1	
Total			501	12

Larinae	2A2A1	1		1
	2A2B1	2		2
	2A2C1	1		1
	2A2C8+9	6		2
	2A3A1	1		1
	2A3A6	1		1
	2A3B1	1		1
	2A5C13	3		1

Larinae cont.	2A6A8	1	1
	2A6A9	1	1
	2A6B3	1	1
	2A6B5	1	1
	2A6D6	1	1
	2A6D7	1	1
	2A6D8	1	1
	2A6D12	1	1
	2A6D18	1	1
	2A9D2	2	1
	2A9E1	1	1
	2A9E2	32	4
	2A9E10	8	2
	2A9E11	40	4
	2A9E13	10	2
	2A9E14	4	2
	2A9E15	13	2
	2A9F4	4	2
	2A9F6	3	1
	2A9G9	1	1
	2A9G11	3	1
	2A9J5	15	3
	2A9K14	3	1
	2A10B1	1	1
	2A10B23	1	1
	2A10D11	1	1

Larinae cont.	2A10G10	1	1
	2A10H4	1	1
	2A10J10	1	1
Total		170	52

<u>Hydroprogne</u>	2A6B5	2	1
<u>caspia</u>	2A9E2	2	1
	2A9E11	4	1
	2A9E13	2	1
	2A9K14	1	1
Total		11	5

Laridae

(Minus Overlap-
ping Categories
Tabulated Above)

Laridae	2A5A1	1		
	2A6A9	1		
	2A6B2		1	
	2A6B4	1		
	2A6D-		1	
	2A6E2		1	
	2A9A sf		1	
	2A9E1	1		
	2A9E2	9	13	
	2A9E8		1	1
	2A9E10	2	2	
	2A9E13	4	5	
	2A9E14		1	
	2A9E15	4	12	

Laridae cont.	2A9E18		1	
	2A9F4	4	1	
	2A9F5	1	2	
	2A9F6	2	1	
	2A9F8		2	
	2A9G3	1		
	2A9G8	1	1	
	2A9G10	2	1	
	2A9G11	1	6	
	2A9J5	4	4	
	2A9K9		2	
	2A9K11		1	
	2A9K14	5	7	
	2A10B28		1	
	2A10H3		1	
Total		44	89	1

(Minus Overlapping Categories
Tabulated Above)

Lari	2A4A1	1		
	2A5C12	1		
	2A5C13	1		
	2A6A4	1		1
	2A6A9	1		
	2A6D6	2		
	2A6D8	3		
	2A6D12	1		

Lari cont.	2A6D16	1	1
	2A8B1	1	
	2A9A sf	1	
	2A9E2	21	
	2A9E10	2	
	2A9E11	43	
	2A9E13	3	
	2A9E14	6	
	2A9E15	8	
	2A9E19	1	
	2A9F3	2	
	2A9F4	4	
	2A9F5	2	
	2A9F6	6	
	2A9F8	2	
	2A9G3	3	
	2A9G6	1	
	2A9G11	3	
	2A9G14	1	
	2A9J5	7	
	2A9K9	1	
	2A9K14	5	
	2A10B24	1	
	2A10B4	1	1
	2A13A2	1	1
Total		138	4

<u>Pinguinus impennis</u>	2A6D2	1		1
	2A6D6	1		1
	2A6D20	1		1
	2A9E1	1		1
	2A9F8	1		1
Total		5		5

<u>Uria spp.</u>	2A4A2	1		1
	2A6D6	1	1	1
	2A9D2	1		1
	2A9E11	2		1
	2A9F4	0	1	1
	2A10C3	1		1
	2A10C6	1		1
Total		7	2	7

<u>Uria or Alca</u>	2A5C12	1		1
	2A9E11	1		
	2A10J2	2		1
Total		4		2

<u>Plautus alle</u>	2A9F6	1		1
Total		1		1

<u>Cephus grylle</u>	2A6D6	2		1
	2A9E2	1		1
	2A9F4		1	1
Total		3	1	3

<u>Probable Frater-</u>	2A5C12		1	1
<u>cula arctica</u>				
Total			1	1
<hr/>				
<u>Bubo virgin-</u>	2A5C12		1	1
<u>ianus</u>	2A9E15	1		1
Total		1	1	2
<hr/>				
<u>Surnia ulula</u>	2A9E11	1		1
	2A9F4	1		1
Total		2		2
<hr/>				
<u>Dendrocopos</u> or	2A9F4	1		1
<u>Picoides</u>				
Total		1		1
<hr/>				
<u>Perisoreus</u> or	2A9E11	1		1
<u>Cyanocitta</u>				
Total		1		1
<hr/>				
<u>Corvus Corax</u>	2A1A7	1		1
	2A2A14	1		1
	2A2B1	1		1
	2A2B10	1		1
	2A3A1	1		1
	2A3A5	1		1
	2A3A6		1	1
	2A3B2		1	1
	2A4A1	1		1

<u>Corvus corax</u>	2A5C3		1	1
cont.	2A5C5	1		1
	2A5C13	4		1
	2A6A-	1		1
	2A6A6	1		1
	2A6A9	1		1
	2A6D-	1		1
	2A6D6	9	2	2
	2A6D7	17	1	2
	2A6D8	4		2
	2A6D15	1		1
	2A6E6	1		1
	2A7A19	1		1
	2A9A sf	1		1
	2A9D1		1	1
	2A9D3	2		1
	2A9E2	31	3	3
	2A9E10	1	1	1
	2A9E11	55	1	4
	2A9E13	8	1	1
	2A9E14	1		1
	2A9E15	4		1
	2A9F3	1		1
	2A9F4	9	4	2
	2A9F5	4		1
	2A9F6	6		2

<u>Corcus corax</u>	2A9F7	1		1
cont.	2A9F8	6	1	1
	2A9G2	1		1
	2A9G6	1		1
	2A9G7	1		1
	2A9G8	1		1
	2A9G10	1	1	1
	2A9G11	5	1	1
	2A9G15	1		1
	2A9J4		1	1
	2A9J5	34	1	3
	2A9K9	3		1
	2A9K10	2	1	1
	2A9K14	15	1	2
	2A10B21	1		1
	2A10B24	1		1
	2A10B28	1		1
	2A10D20	2		2
	2A10F10	1		1
	2A10G1	1		1
	2A10G7	1		1
	2A10G9	1		1
	2A10G10	3	1	1
	2A10J2	1		1
	2A10J3	1		1
Total		358	25	74

<u>Corvus brachy-</u>	2A9F4	2		1
<u>rhynchos</u>	2A9F5	1		1
	2A9G11	1		1
	2A9J5	2		1
	2A9K14	1		1
	2A1OG10	1		1
Total		8		6
<hr/>				
<u>Corvus spp.</u>	2A9E11	2		(Minus <u>Corvus</u>
Total		2		Tabulated Above)
<hr/>				
<u>Martes americana</u>	2A9E11	2		1
Total		2		1
<hr/>				
<u>Lutra canadensis</u>	2A5C13	1		1
Total		1		1
<hr/>				
<u>Vulpes fulva</u>	2A2B8		1	1
	2A6D6	2		1
	2A9E2		3	1
	2A9E11	3	2	2
	2A9E15	1	1	1
	2A9F4		2	1
	2A9G11		1	1
	2A9J5		3	1
	2A9K14		2	1
Total		6	15	10
<hr/>				

			(Minus <u>Vulpes</u> Tabulated Above)
Canidae	2A2A6	1	1
	2A2A7	6	1
	2A2A10	3	1
	2A2B11	3	1
	2A5C5		1
	2A6A9	2	1
	2A6D13	1	1
	2A9D2	1	1
	2A9E2	8	1
	2A9E11	1	
	2A9E15		1
	2A9F5	1	1
	2A9F6	2	1
	2A9G9	1	1
	2A9J2	1	1
	2A9J4	1	
	2A9J5	3	
	2A9K14	1	1
	2A10J2	1	1
Total		37	3 15
<hr/>			
<u>Felis felis</u>	2A1A3	1	1
	2A3A1	1	1
	2A3A2	2	1
	2A3A4	1	1

<u>Felis felis</u>	2A3B1	1		1
cont.	2A3B2	1		1
	2A6D5	1		1
	2A6D6	2		1
	2A6D8	1		1
	2A6D10		1	1
	2A6D12	1		1
	2A9E11	1		1
	2A9E14		1	1
Total		13	2	13

<u>Phoca spp.</u>	2A2B1	1		1
	2A4A1	1		1
	2A6A9		1	1
	2A6D6	6	2	2
	2A6D6+2A6D7	1		
	2A6D7	3		2
	2A9A7	1		1
	2A9E2	1		1
	2A9E15	1		1
	2A9F8	1		1
	2A9J5	3	1	1
Total		19	4	12

<u>Rattus spp.</u>	2A5C10	1		1
	2A6D7	1		1
	2A6E6	1		1
	2A9D-		1	1

<u>Rattus</u> spp.	2A9E2	24		4
cont.	2A9E11	5		2
	2A9G10	1		1
	2A9J5	1		1
	2A9K9	1		1
	2A9K14	1		1
Total		36	1	14

<u>Lepus arcticus</u>	2A6B4	1		1
	2A7A10	1		1
	2A10H3	2		1
Total		4		3

<u>Sus scrofa</u>	2A1A6	1		1
	2A2A2	3		1
	2A2A10	2		1
	2A2A11	1		1
	2A2A13	1		1
	2A2B10	1		1
	2A2C4	1		1
	2A2C6	1		1
	2A2C7	1		1
	2A2C8+9	1		1
	2A3A1	8		1
	2A3A2	1		1
	2A3A4	9	1	2
	2A3A6	2	1	1

<u>Sus scrofa</u>	2A3B1	2		1
cont.	2A3B2	4		1
	2A3C1	1		1
	2A3C4		1	1
	2A3C5	1		1
	2A4A1	5		3
	2A4A2	1		1
	2A4A41	1		1
	2A4A5	1		1
	2A4A11	1	1	1
	2A4C1	3		1
	2A5A1	14	1	3
	2A5B1	2	2	2
	2A5C1	2		1
	2A5C2	4	1	1
	2A5C4	3		1
	2A5C5	8		1
	2A5C6	1	1	1
	2A5C7	1		1
	2A5C10	2		1
	2A5C12	6	1	2
	2A5C13	13	2	2
	2A6A-	1		1
	2A6A1	4		1
	2A6A5	7	2	1
	2A6A6	7	1	1

<u>Sus scrofa</u>	2A6A8	3		1
cont.	2A6A9	50	14	4
	2A6B1	12		2
	2A6B2	3		1
	2A6B4	2		1
	2A6B5	1		1
	2A6D-	1	1	1
	2A6D1	2		1
	2A6D2	2		1
	2A6D3	5		2
	2A6D4	11		1
	2A6D5	4	2	1
	2A6D6	141	40	9
	2A6D7	120	13	8
	2A6D8	31	6	4
	2A6D9		2	1
	2A6D10	7	5	1
	2A6D11	10	1	2
	2A6D12	50	6	3
	2A6D13	11	3	1
	2A6D14	21	3	3
	2A6D15	29	3	2
	2A6D16	1		1
	2A6D17	1	1	1
	2A6D18	1	1	1
	2A6D19	1	1	1

<u>Sus scrofa</u> cont.	2A6D20	20	6	3
	2A6E2	1		1
	2A6E6	5	1	1
	2A6E7	22	5	3
	2A6E9	3		1
	2A7A1	1		1
	2A7A3	1		1
	2A7A4	1		1
	2A7A15	1		1
	2A7A16	1		1
	2A7A18	1		1
	2A8A1	1		1
	2A8A2	1		1
	2A8B1	5	2	1
	2A9A-	1		1
	2A9A1	1		1
	2A9A2	1		1
	2A9A7	4	2	2
	2A9C1	1		1
	2A9C14	1		1
	2A9D2	6		1
	2A9E2	31	5	3
	2A9E4		1	1
	2A9E5	2		1
	2A9E10	9		1
	2A9E11	71	13	4
	2A9E13	17	2	2

<u>Sus scrofa</u> cont.	2A9E14	4	1	1
	2A9E15	34	7	2
	2A9F3	1		1
	2A9F4	9	2	2
	2A9F5	13	7	2
	2A9F6	15		2
	2A9F7	1	1	1
	2A9F8	31	2	3
	2A9G1	1	1	1
	2A9G3	2		1
	2A9G6	2	1	1
	2A9G8	7		2
	2A9G9	3		1
	2A9G10	2		1
	2A9G11	26	2	3
	2A9G14	3		1
	2A9J1	2		1
	2A9J2	1		1
	2A9J4	1		1
	2A9J5	58	14	3
	2A9K9	4	1	1
	2A9K10	2		1
	2A9K14	38	2	3
	2A10A1	8		2
	2A10A2	1		1
	2A10A9	1		1
	2A10B1	1		1

<u>Sus scrofa</u> cont.	2A10B3	2		1
	2A10B4	3		1
	2A10B6	2		1
	2A10B11	5		1
	2A10B12	5		1
	2A10B13	2		1
	2A10B20	1		1
	2A10B23	2		1
	2A10B24	2		1
	2A10B25	1		1
	2A10B26	2		1
	2A10B27	6	2	1
	2A10B28		1	1
	2A10C2	3		1
	2A10C4	2		1
	2A10C5	1		1
	2A10C6	1		1
	2A10C13	1		1
	2A10C18	1		1
	2A10C19	1		1
	2A10D1	1		1
	2A10D6	2	1	1
	2A10D14	1		1
	2A10D15	2		1
	2A10D16	1		1
	2A10D17	1	1	1

<u>Sus scrofa</u> cont.	2A10D20	1		1
	2A10E3	2		1
	2A10E4	1		1
	2A10E5	1		1
	2A10E7	1		1
	2A10E9	2		1
	2A10E10	2		1
	2A10E12	2		1
	2A10E18	2		1
	2A10E19	1		1
	2A10E22	1		1
	2A10E23	1		1
	2A10F6	1	1	1
	2A10F12	2		1
	2A10F13	3		1
	2A10F15	5		1
	2A10F30	2		1
	2A10F34	3		1
	2A10G1	2		1
	2A10G4	2		1
	2A10G6	4		1
	2A10G7	5	2	1
	2A10G8	2		1
	2A10G9	3		1
	2A10G10	12	1	1
	2A10H2	6	3	1

<u>Sus scrofa</u> cont.	2A10H3	5	1	1
	2A10H12	1		1
	2A10J2	2	1	1
	2A11A1	4		1
	2A12A1	2		1
	2A12A2	1		1
	2A13A1	2		1
	2A13A2	2	1	1
	2A13A4	1		1
	2A10J5	1		1
	2A10J10	2		1
Total		1,271	210	247

<u>Rangifer</u> spp.	2A2A2	1		1
	2A6A9	1		1
	2A6D6	1		1
	2A7A4	1		1
	2A8AB1	1		1
	2A9E10	1		1
	2A9E11	1		1
	2A10A2	1		1
	2A10B3	1		1
	2A10B27	1		1
	2A10D7	1		1
	2A11A1	2		1
Total		13		12

<u>Bos taurus</u>	2A2B2	1		1
	2A3A1	1		1
	2A3A4		2	1
	2A3B2		1	1
	2A4A1	2		1
	2A4A2	1		1
	2A5B1	1		1
	2A5C2	1		1
	2A5C13		1	1
	2A6A7	1	1	1
	2A6A9	8	7	3
	2A6B4	1		1
	2A6B5	1		1
	2A6D2	1		1
	2A6D3		1	1
	2A6D4		1	1
	2A6D6	8	6	1
	2A6D7	8	5	2
	2A6D8	2	2	1
	2A6D9	1		1
	2A6D10		1	1
	2A6D12	30	2	1
	2A6D13	13		1
	2A6D14	4	1	1
	2A6D18		1	1
	2A6D20	5	3	1

<u>Bos taurus</u> cont.	2A6E5	1		1
	2A6E6	2	1	1
	2A6D7	9	1	1
	2A8B1	2	1	1
	2A9E2	4	1	1
	2A9E11	15	7	2
	2A9E13	1	1	1
	2A9E14	1		1
	2A9F4	3		2
	2A9F8	2		1
	2A9G3		2	1
	2A9G11	1		1
	2A9J5	1		1
	2A9K10	1		1
	2A9K14	2		1
	2A10A1	2	1	1
	2A10A2	1		1
	2A10B21	1		1
	2A10B22	1		1
	2A10B28	1		1
	2A10C2	4		2
	2A10C11	5		1
	2A10C18	1		1
	2A10D6		1	1
	2A10D17	1		1
	2A10E18		1	1
	2A			

<u>Bos taurus</u> cont.	2A10E22	1		1
	2A10F6	1		1
	2A10F12		1	1
	2A10F15		1	1
	2A10G7	1	1	1
	2A11A1	2	1	1
	2A12A5	3		1
Total		160	56	65

Probable <u>Ovis</u>	2A5C13		1	1
<u>aries</u>	2A6B1		1	1
	2A6D6		4	1
	2A6D11		1	1
	2A6D12		7	1
	2A6D13		2	1
	2A6D14		2	1
	2A6D15		1	1
	2A6D16		1	1
	2A6E7		1	1
	2A9F8		2	1
	2A10F7		1	1
	2A10F13		1	1
	2A12A2		1	1
Total			26	14

<u>Ovis</u> or <u>Capra</u>			(Minus Probable <u>Ovis</u> Tabulated Above)
2A2A1	1		1
2A2A10	1		1
2A2C7	1		1
2A3A4	2		1
2A5C5	4		1
2A6A9	10		2
2A6B1	1		
2A6D3	1		1
2A6D6	7	2	
2A6D10	2		1
2A6D11	2		
2A6D12	13	1	1
2A6D13	6		
2A6D14	3		
2A7A6	1		1
2A7A7	1		1
2A8B1	1		1
2A9E11	1		1
2A9G9	1		1
2A9G11	1		1
2A9J5	2		1
2A10B11	1		1
2A10B27	1		1
2A10D6	1		1

<u>Ovis</u> or <u>Capra</u>	2A10D27	1		1
cont.	2A10E19	1		1
	2A10E22	1		1
Total		68	3	23

Table 205: Species Represented at Castle Hill with Minimum Number of Individuals for Each Provenience or Group of Contemporary Proveniences.

Proveniences	Number of Individuals ¹																		
	<u>Gavia stellata</u>	<u>Puffinus diomedea</u> or <u>gravis</u>	<u>Puffinus</u> spp.	<u>Phalacrocorax carbo</u>	<u>Phalacrocorax auritus</u>	<u>Phalacrocorax</u> spp.	<u>Botaurus lentiginosus</u>	<u>Branta lentiginosus</u>	<u>Branta canadensis</u>	<u>Anser</u> or <u>Branta</u>	<u>Anas</u> spp.	<u>Clangula hyemalis</u>	<u>Histrionicus histrionicus</u>	<u>Mergus merganser</u>	<u>Mergus serrator</u>	<u>Mergus</u> spp.	<u>Mergini</u>	<u>Somateria spectabilis</u>	<u>Somateria</u> spp.
2A1A2																			
2A1A3-6; 1B1,2																			
2A1A7						1													
2A2A1-5,9,11-15; 2B1-6, 8-11; 2C1-4,6-9	1			1					1										1
2A2A6-8, 10; 2B7; 2C5				1															
2A3A1																			
2A3A2																			
2A3A4									1										
2A3A5																			
2A3A6																			
2A3B1																			
2A3B2																			1

¹ Minimum number of individuals are tabulated as in Table 204.

Proveniences	Number of Individuals	
Provenience	<u>Gavia stellata</u>	<u>Puffinus diomedea or gravis</u>
		<u>Puffinus spp.</u>
		<u>Phalacrocorax carbo</u>
		<u>Phalacrocorax auritus</u>
		<u>Phalacrocorax spp.</u>
		<u>Botaurus lentiginosus</u>
		<u>Branta canadensis</u>
		<u>Anser or Branta</u>
		<u>Anas spp.</u>
		<u>Clangula hyemalis</u>
		<u>Histrionicus histrionicus</u>
		<u>Mergus merganser</u>
		<u>Mergus serrator</u>
		<u>Mergus spp.</u>
		<u>Mergini</u>
		<u>Somateria spectabilis</u>
		<u>Somateria spp.</u>
2A3C1		
2A3C2		
2A3C3		
2A3C4		
2A3C5		
2A4A1		1
2A4A2		
2A4A3		
2A4A4,		
2A4A5		
2A4A6,7		
2A4A9-11		
2A4C1		
2A5A1		1
2A5A2		
2A5C2, 4-7, 9-11		
2A5C3		1

Number of Individuals

Proveniences	<u>Cavia stellata</u>	<u>Puffinus diomedea or gravis</u>	<u>Puffinus spp.</u>	<u>Phalacrocorax carbo</u>	<u>Phalacrocorax auritus</u>	<u>Phalacrocorax spp.</u>	<u>Botaurus lentiginosus</u>	<u>Branta canadensis</u>	<u>Anser or Branta</u>	<u>Anas spp.</u>	<u>Clangula hyemalis</u>	<u>Histrionicus histrionicus</u>	<u>Mergus merganser</u>	<u>Mergus serrator</u>	<u>Mergus spp.</u>	<u>Mergini</u>	<u>Somateria spectabilis</u>	<u>Somateria spp.</u>
2A12A5																		
2A13A1																		
2A13A2																		
2A13A3																		
2A13A4,6																		
2A8A1,2; 8B1,2; 10A1-4,7,8; 10B1-8,11,12; 10C1-16,18; 10D1-17,20- 22, 26-28; 10E1-21, 23, 24; 10F1-15, 18-25, 27-32; 10G4-9; 10H2, 3; 10J2-4					1	1				1	1							1
2A10A11, 10B12A, 14-28; 10C19; 10D19, 23-25; 10E22; 10F17; 26; 10G10; 10H4; 10J5,6								1										1
Totals	3	5	6	1	13	8	1	2	3	2	3	1	1	2	4	3	2	7

Number of Individuals

Proveniences	<u>Somateria</u> or <u>Melanitta</u> <u>Oidemia nigra</u> <u>Melanitta</u> or <u>Oidemia</u> <u>Anatidae</u> <u>Accipiter striatus</u> <u>Buteo</u> spp. <u>Haliaeetus leucocephalus</u> <u>Haliaeetus</u> or <u>Aquila</u> <u>Pandion haliaetus</u> <u>Falco rusticolus</u> <u>Falco columbarius</u> <u>Lagopus lagopus</u> <u>Lagopus</u> spp. <u>Gallus gallus</u> <u>Galliformes</u> <u>Arenaria interpres</u> <u>Numenius phaeopus</u>
2A10A5	
2A10A9	
2A10B-	
2A10B13	
2A10C17	
2A10F34	
2A10G1	
2A10H12	
2A10J7-11	
2A11A1,2	
2A12A4	
2A12A5	
2A13A1	
2A13A2	
2A13A3	
2A13A4,6	
2A8A1,2; 8B1,2; 10A1-4,7,8;	

Number of Individuals

Proveniences	<u>Somateria or Melanitta</u>	<u>Oidemia nigra</u>	<u>Melanitta or Oidemia</u>	<u>Anatidae</u>	<u>Accipiter striatus</u>	<u>Buteo spp.</u>	<u>Haliaeetus leucocephalus</u>	<u>Haliaeetus or Aquila</u>	<u>Pandion haliaetus</u>	<u>Falco rusticolus</u>	<u>Falco columbianus</u>	<u>Lagopus lagopus</u>	<u>Lagopus spp.</u>	<u>Gallus gallus</u>	<u>Galliformes</u>	<u>Arenaria interpres</u>	<u>Numenius phaeopus</u>
10B1-8,11,12; 10C1-16,18; 10D1-17,20; 22,26-28; 10E1-21,23, 24;10F1-15, 18,25-27-32; 10G4-9;10H2,3; 10J2-4							1						2				
2A10A11;10B12a, 14-28; 10C19;10D19, 23.25;10E22; 10F17,26; 10G10; 10H4; 10J5,6							1					1		1			
Totals	1	1	1	5	1	2	18	3	4	2	3	13	16	7	1	1	1

Number of Individuals

Proveniences	<u>Totanus melanoleucus</u>	<u>Large Larus spp.</u>	<u>Larus spp.</u>	<u>Probable larus</u>	<u>Larinae</u>	<u>Hydroprogne caspia</u>	<u>Lari</u>	<u>Pinguinus impennis</u>	<u>Uria spp.</u>	<u>Uria or Alca</u>	<u>Plautus alle</u>	<u>Cephus grylle</u>	<u>Probable Fratercula arctica</u>	<u>Bubo virginianus</u>
2A6E5		1												
2A6E6		2												
2A6E7		3	1											
2A6E9														
2A7A1														
2A7A2-11		1												
2A7A12-19, 21		1												
2A7C4														
2A9A sf		2	1											
2A9A1,2;9B1,2;9C2		1												
2A9A7														
2A9C1		2												
2A9C14														
2A9D-		1												
2A9D1		1												
2A9D2,3;9F;9G;9H; 9J;9K		39	10	3	1			1	1		1	1		
2A9E minus 9E5,6	1	40	15	9	2			1	1		1		1	

Proveniences	<u>Totanus melanoleucus</u>	<u>Large Larus spp.</u>	<u>Larus spp.</u>	<u>Probable Larus</u>	<u>Larinae</u>	<u>Hydroprogne caspia</u>	<u>Lari</u>	<u>Pinguinus impennis</u>	<u>Uria spp.</u>	<u>Uria or Alca</u>	<u>Plautus alle</u>	<u>Cephus grylle</u>	<u>Probable Fratercula arctica</u>	<u>Bubo virginianus</u>
2A13A4,6														
2A8A1,2; 8B1,2; 10A1-4,7,8; 10B1-8,11,12; 10C1-16,18; 10D1-17,20- 22,26-28; 10E1-21,23, 24;10F1-15, 18-25,27-32; 10G4-9;10H2,3; 10H3,10J2-4		3	1	1						1				
2A10A11;10B12a, 14-28; 10C19;10D19; 23-25;10E22; 10F17;26; 10G10; 10H4; 10J5,6		5	3	1										
Totals	2	165	53	4	26	4	1	4	4	2	1	3	1	2

Number of Individuals

Proveniences	<u>Surnia ulula</u>	<u>Dendrocopos or Picoides</u>	<u>Perisoreus or Cyanocitta</u>	<u>Corvus corax</u>	<u>Corvus brachyrhynchos</u>	<u>Corvus spp.</u>	<u>Martes americana</u>	<u>Lutra canadensis</u>	<u>Vulpes fulva</u>	<u>Canidae</u>	<u>Felis felis</u>	<u>Phoca spp.</u>	<u>Rattus spp.</u>	<u>Lepus spp.</u>	<u>Sus scrofa</u>	<u>Rangifer spp.</u>	<u>Bos taurus</u>	<u>Probable Ovis aries</u>	<u>Ovis or Capra</u>
2A5C12															2				
2A5C13				1			1								2		1	1	
2A6A-				1											1				
2A6A1															1				
2A6A3																			
2A6A4																			
2A6A5															1				
2A6A6				1											1				
2A6A7,8															1		+ ²		
2A6A9				1				1			1				4		1	3	2
2A6B1															2				1
2A6B2-6															1	1		1	
2A6C1																			
2A6C2																			
2A6D-															1				
2A6D1															1				
2A6D2															1		1		

²Fragment of bone tabulated under 2A6A9.

Number of Individuals

Proveniences	<u>Surnia ulula</u>	<u>Dendrocoptes</u> or <u>Picoides</u>	<u>Perisoreux</u> or <u>Cyanocitta</u>	<u>Corvus Corax</u>	<u>Corvus brachyrhynchos</u>	<u>Corvus</u> spp.	<u>Martes americana</u>	<u>Lutra canadensis</u>	<u>Vulpes fulva</u>	<u>Canidae</u>	<u>Felis felis</u>	<u>Phoca</u> spp.	<u>Rattus</u> spp.	<u>Lepus</u> spp.	<u>Sus scrofa</u>	<u>Rangifer</u> spp.	<u>Bos taurus</u>	<u>Probable Ovis aries</u>	<u>Ovis</u> or <u>Capra</u>
2A6D3															2				
2A6D4-7-9,15				3							1	2	1		11		2	1	
2A6D5											1				1				
2A6D6,10-14, 16-21				2				1			2	2			10	1	2	2	1
2A6E2															1				
2A6E5																		1	
2A6E6				1											1		1		
2A6E7															3		1		
2A6E9															1				
2A7A1															1				
2A7A2-11															1	1			1
2A7A12-19,21				1											1				
2A7C4																		1	
2A9A sf				1											1				
2A9A1,2; 9B1,2; 9C2															1				
2A9A7												1			2			1	

Number of Individuals

Proveniences	<u>Surnia ulula</u>	<u>Dendrocopos</u> or <u>Picoides</u>	<u>Perisoreus</u> or <u>Cyanocitta</u>	<u>Corvus Corax</u>	<u>Corvus brachyrhynchos</u>	<u>Corvus spp.</u>	<u>Martes americana</u>	<u>Lutra canadensis</u>	<u>Vulpes fulva</u>	<u>Canidae</u>	<u>Felis felis</u>	<u>Phoca spp.</u>	<u>Rattus spp.</u>	<u>Lepus spp.</u>	<u>Sus scrofa</u>	<u>Rangifer spp.</u>	<u>Bos taurus</u>	Probable <u>Ovis aries</u>	<u>Ovis</u> or <u>Capra</u>
2A9C1															1				
2A9C14															1				
2A9D-													1						
2A9D1				1															
2A9D2, 3; 9E; 9G; 9H; 9J; 9K	1	1	6	1				2			1	2		8			2	1	1
2A9E minus 9E5,	1		1	7			1	2		1	1	6		6		1	4		1
2A9E5,6															1				
2A10A5																			
2A10A9																1			
2A10B-																			
2A10B13																1			
2A10C17																			
2A10F34																1			
2A10G1				1												1			
2A10H12																1			
2A10J7-11																1			
2A11A1,2																1	1	1	
2A12A1																1			
2A12A2																1			
2A12A4																			1
2A12A5																	1		
2A13A1																1			

Number of Individuals

Proveniences	<u>Surnia ulula</u>	<u>Dendrocoptes or Picoides</u>	<u>Perisoreus or Cyanocitta</u>	<u>Corvus Corax</u>	<u>Corvus brachyrhynchos</u>	<u>Corvus spp.</u>	<u>Martes americana</u>	<u>Lutra canadensis</u>	<u>Vulpes fulva</u>	<u>Canidae</u>	<u>Felis felis</u>	<u>Phoca spp.</u>	<u>Rattus spp.</u>	<u>Lepus spp.</u>	<u>Sus scrofa</u>	<u>Rangifer spp.</u>	<u>Bos taurus</u>	<u>Probable Ovis</u>	<u>Ovis or Capra</u>
2A13A2															1				
2A13A3																			
2A13A4,6															1				
2A8A1,2; 8B1,2; 10A1-4,7,8; 10B1-8,11,12; 10C1-16,18; 10D1-17,20- 22,26-28; 10E1-21,23, 24;10F1-15, 18-25,27-32; 10G4-9;10H2, 3; 10J2-4			2					1				1	9	2	2	1	1		
2A10A11; 10B12a, 14-28; 10C19;10D19; 23-25;10E22; 10F17,26; 10G10; 10H4; 10J5,6			1												3	1	1		1
Totals	2	1	1	40	1	1	1	6	3	10	10	10	12	3	128	9	34	8	14

Table 206: Species Represented at Castle Hill with Minimum Number of Individuals for English and French Periods.

Species	Number of Individuals ¹						
	Definite English	Probable English	Total English	Definite French	Probable French	Total French	Total for Site
<u>Gavia stellata</u> , Red-Throated Loon				1	1	1	1
<u>Puffinus diomedea</u> or <u>gravis</u>		1	1	2		2	3
<u>Puffinus</u> spp.		1	1		2		1
<u>Phalacrocorax carbo</u> , Great Cormorant				2			1
<u>Phalacrocorax auritus</u> , Double-Crested Cormorant	1	1	1	3	2	3	4
<u>Phalacrocorax</u> spp.	1	1	1	2	1	3	4
<u>Branta canadensis</u> , Canada Goose				2	1	2	2
<u>Anser</u> or <u>Branta</u>						1	1
<u>Anas</u> spp.		1	1				1
<u>Clangula hyemalis</u> , Oldsquaw		1	1	2		2	3
<u>Histrionicus histrionicus</u> , Harlequin Duck				1		1	1
<u>Mergus merganser</u> , Common Merganser				1		1	1
<u>Mergus serrator</u> , Red-breasted Merganser				1		1	1
<u>Mergus</u> spp.		1	1				1
<u>Somateria spectabilis</u> , King Eider					1	1	1

¹ Minimum number of individuals are tabulated as in Table 204

Table 206 cont.

Number of Individuals

Species	Definite English	Probable English	Total English	Definite French	Probable French	Total French	Total for Site
<u>Somateria</u> spp.		1	1	2		1	1
<u>Somateria</u> or <u>Melanitta</u>						1	2
<u>Oidemia nigra</u> , Common Scoter					1	1	1
<u>Accipiter striatus</u> , Sharp-shinned Hawk				1		1	1
<u>Buteo</u> spp.				1		1	1
<u>Haliaeetus leucocephalus</u> , Bald Eagle		1	1	4	1	4	5
<u>Haliaeetus</u> or <u>Aquila</u>				2		2	2
<u>Pandion haliaetus</u> , Osprey		1	1	1		1	1
<u>Falco rusticolus</u> , Gyrfalcon				1		1	1
<u>Falco columbarius</u> , Pigeon Hawk				1		1	1
<u>Lagopus lagopus</u> , Willow Ptarmigan	1	1	1	4	1	5	6
<u>Lagopus</u> spp.		2	2	14	2	13	15
<u>Gallus gallus</u> , Domestic Fowl		2	2	1	1	2	4
Galliformes				2		1	1
<u>Arenaria interpres</u> , Ruddy Turnstone					1	1	1
<u>Numenius phaeopus</u> , Whimbrel				1		1	1
<u>Totanus melanoleucus</u> , Greater Yellowlegs				1	1	1	1

Table 206 cont.

Number of Individuals

Species	Definite English	Probable English	Total English	Definite French	Probable French	Total French	Total for Site
Large <u>Larus</u> spp.	1	4	4	72	16	80	84
<u>Larus</u> spp.	1	2	2	18	4	19	21
Larinae		1	1	11	4	13	14
<u>Hydroprogne caspia</u> , Caspian Tern		1	1	2		2	3
<u>Pinguinus impennis</u> , Great Auk		1	1	1		1	2
<u>Uria</u> spp.		1	1	1		1	2
<u>Uria</u> or <u>Alca</u>		1					
<u>Plautus alle</u> , Dovekie				1		1	1
<u>Cephus grylle</u> , Black Guillemot		1	1	1		1	2
<u>Bubo virginianus</u> , Great Horned Owl				1		1	1
<u>Surnia ulula</u> , Hawk Owl				1		1	1
<u>Dendrocopos</u> or <u>Picoides</u>				1		1	1
<u>Perisoreus</u> or <u>Cyanocitta</u>				1		1	1
<u>Corvus corax</u> , Common Raven		3	3	13	5	14	17
<u>Corvus brachyrhynchos</u> , Common Crow				1	1	1	1
Bird Totals	5	30	29	177	46	194	223

Table 206 cont.

Number of Individuals

Species	Definite English	Probable English	Total English	Definite French	Probable French	Total French	Total for Site
<u>Martes americana</u> , Marten				1		1	1
<u>Vulpes fulva</u> , Red Fox		1	1	4	1	4	5
Canidae	1				1		
<u>Felis felis</u> , Cat	1	2	3	1	1	1	4
<u>Phoca</u> , spp.		2	2	2	2	3	5
<u>Rattus</u> spp.				7	2	7	7
<u>Lepus arcticus</u>		1	1				1
<u>Sus scrofa</u> , Pig	2	15	15	11	16	25	40
<u>Rangifer</u> spp.		2	2	1	1	1	4
<u>Bos taurus</u> , Cow	1	3	3	4	4	5	8
probable <u>Ovis</u> , Sheep		2	2	1	1	2	4
<u>Ovis</u> or <u>Capra</u>	1	1	2	1	3	2	4
Mammal Totals	5	29	31	33	32	51	83

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