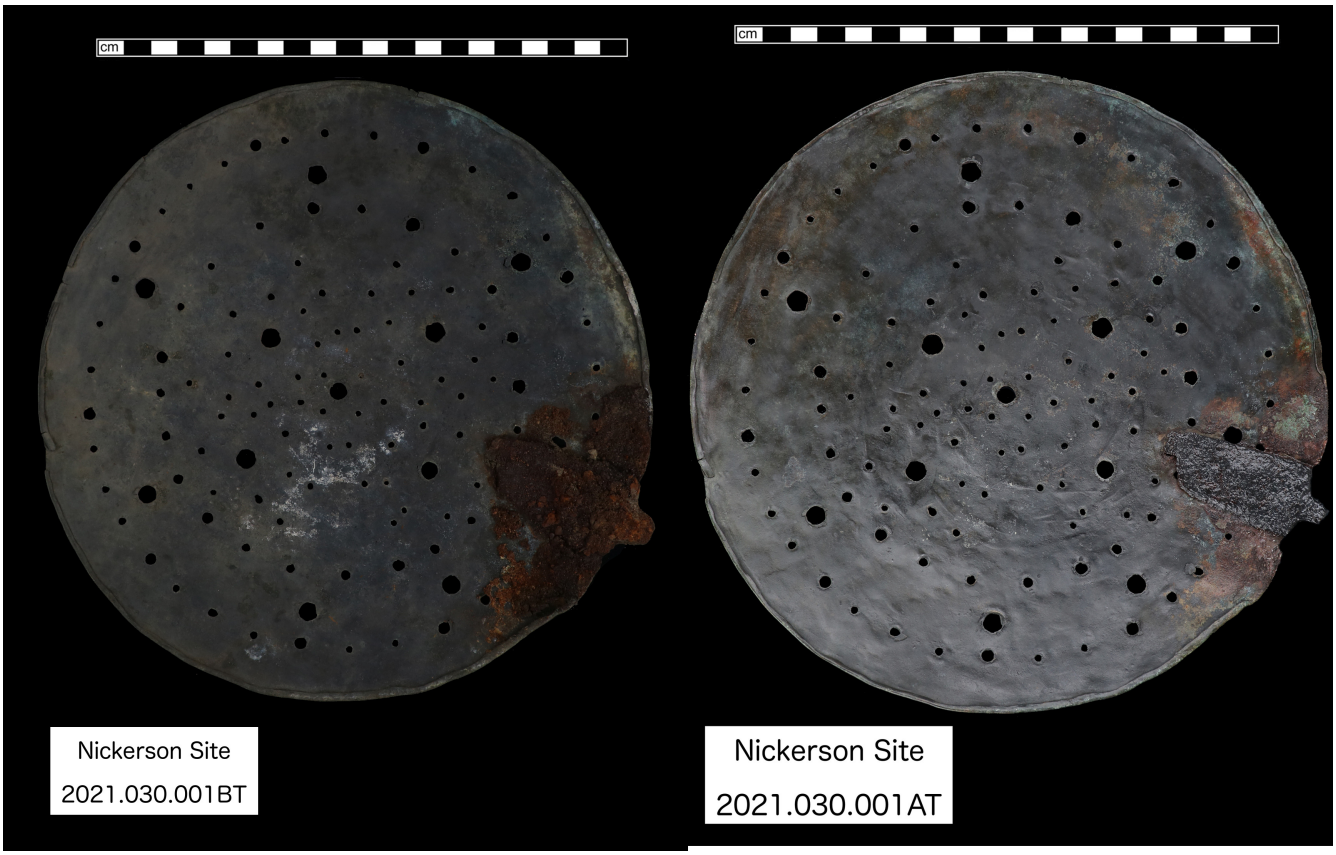
Report on the Artifact Conservation, Flotation Analysis, Radiocarbon Dating Results, and Results of the Slag Analysis From the William and Anne Nickerson Site, Chatham, Ma

Craig Chartier
June 2022

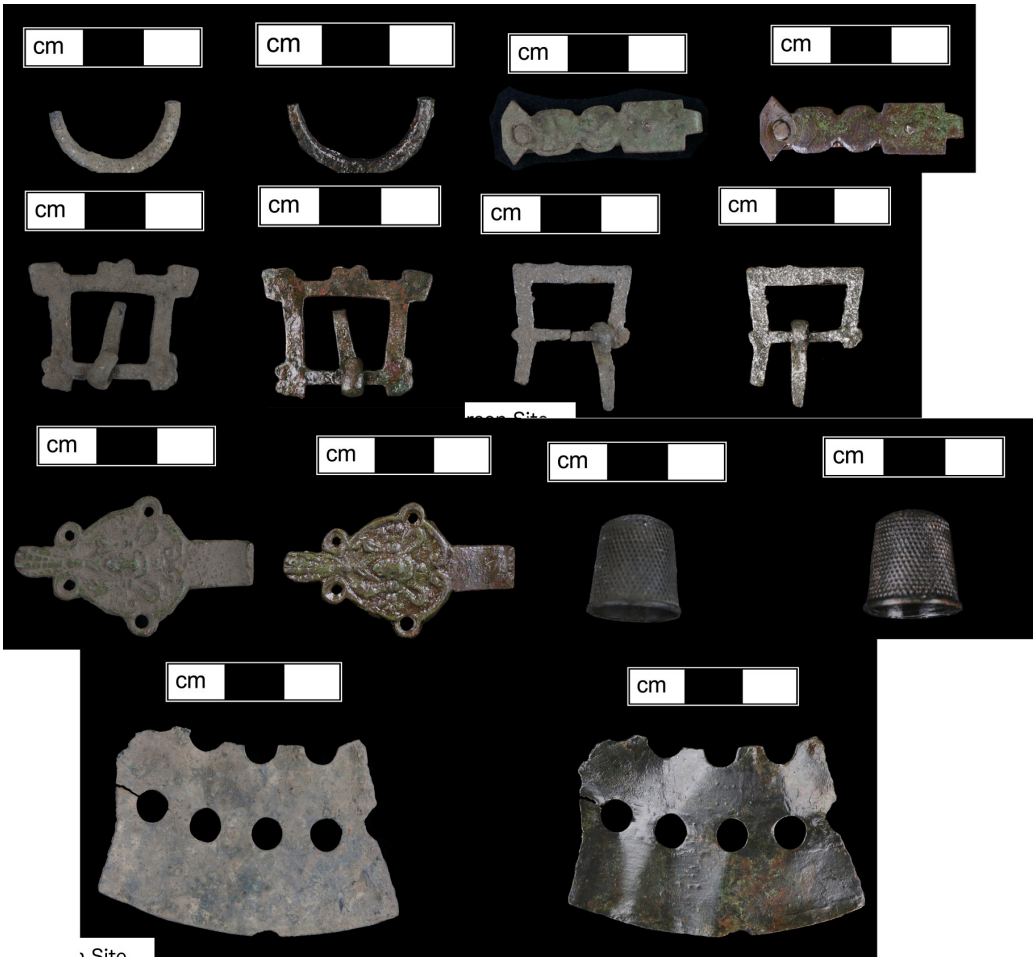
Table of Contents

Artifacts Sent for Conservation at Maryland Archaeological Conservation Laboratory

-Cuprous and iron warming pan lid
U42 30 cm

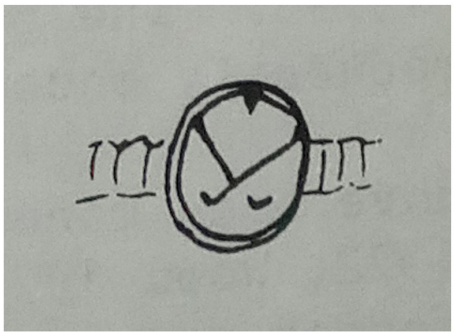


-Brass Bed Curtain Ring
U166 NW 30-35 cm
-cuprous book clasp
U274 SW 20-30 cm
-Brass Buckle
U215 NW 0-20 cm
-Rough Cast Silver Buckle
U137 NW
-Sword Belt hook
U162 SW 20 cm
-Thimble
U227 SE 0-20 cm
-Brass Skimmer fragment
U67 SW



-Jesuit Ring
U91 SW 15 cm

L Heart IV style
RI-1000 Burial 19
C1660-1675

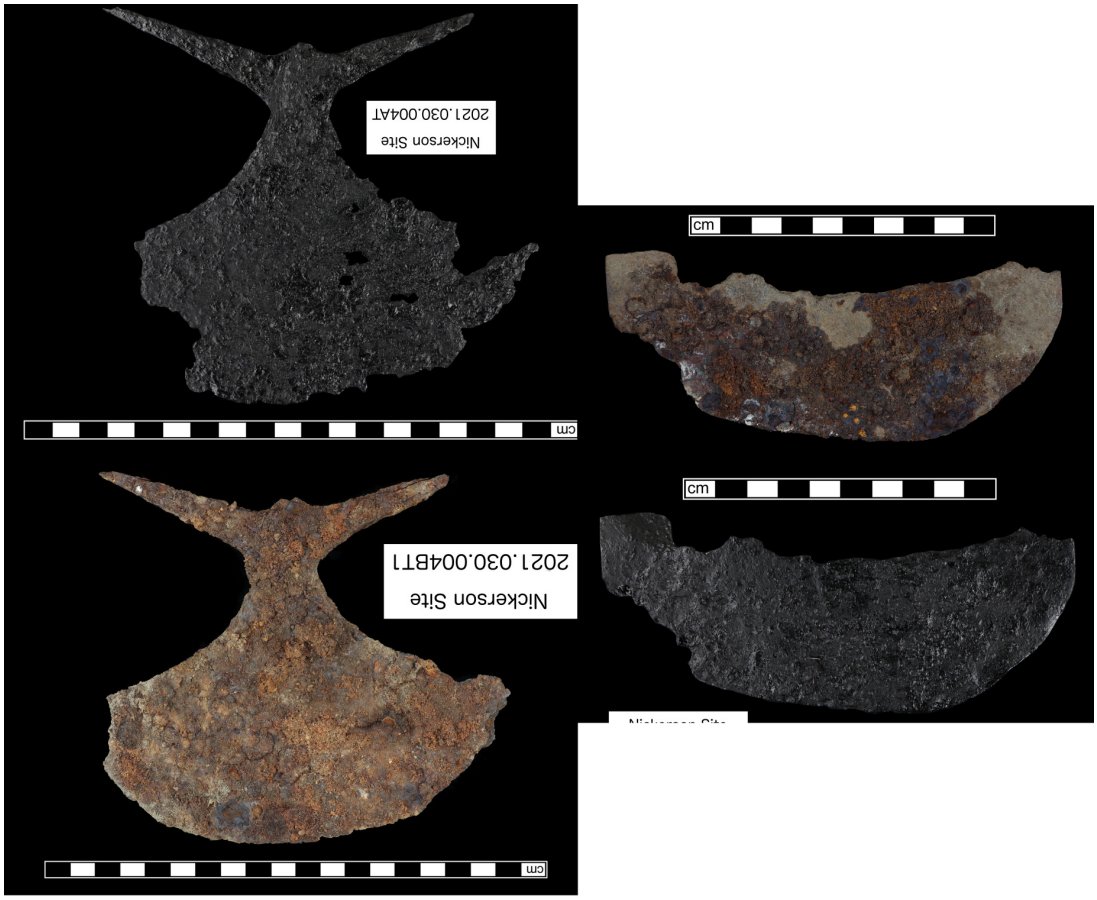


The jesuit ring was found to have a parallel that was found in a Native burial in Rhode Island at the RI 1000 site (Turnbaugh, William 1984 The material culture of RI-1000: A mid-17th century Narragansett Indian burial site in North Kingston, Rhode Island, Dept. of Sociology and Anthropology, University of Rhode Island)

-2 iron curved blades

U67 NW/SW F47 40-45 cm

U217 NW F75 85-90 cm



-iron chisel
    U220 SW Feature 75 30-40 cm
-iron fish hook
    U306 SE 10-20 cm
-unknown iron object possibly smithing waste
    U29 SW F18 20-25 cm
-half of an iron mouth harp
    U261 NE 10-20 cm

-3 iron horse bits

U223 SW F75 65-70 cm

U217 SW F75 45-50 cm

U215 NW 65-70 cm

-iron horseshoe

N10.5 W5 0-10 cm

-large iron key

U224 NE F75 70 cm

-latten spoon

F47

-latten spoon handle

U217 NE 55-60 cm

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.001**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	cu alloy and iron warming pan lid

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description-
Circular thin cu alloy sheet with rolled edges & holes. Remnants of an iron attachment.

Dimensions-
Diam: 23.1cm & Wgt: 341.7g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with hand tools, while preserving what remains of the original surface.
• Apply Tannic Acid to iron elements
• Apply BTA (corrosion inhibitor) to cu alloy surface
• Apply protective coating of 10% Paraloid B48N/67 in acetone/xylene.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
12//2021: Mechanically cleaned the cu alloy portion of the object with a dremel tool. min. MK
12//2021: Mechanically cleaned the iron portion of the object using an air abrasive unit with aluminum oxide; Covered the cleaned cu alloy to protect it from damage. min. MK
12/22/2021: Placed object in 1% sodium sesquihydrate in reverse osmosis water to desalinate. min. MK
12/28/2021 - 1/20/2022: Monitored the chloride levels weekly & changed solution as necessary. MK
1/20/2022: Removed the object from desalination & placed in hot wash with reverse osmosis water at 60 °F to remove any remaining soluble salts. min. MK
1/27/2022 - 2/18/2022: Monitored pH & changed water daily, until pH remained neutral. MK
2/18/2022: Removed from hot wash & placed in dryer for 4 hrs. 10 min. MK
3/4/2022: Applied 1% BTA to the cu alloy portion of the object; 10 min; MK
3/4/2022: Applied multiple coats of 5% tannic acid in deionized water to the iron portion of the object. 10

min. MK
3/7/2022: Applied 10% Paraloid B48N/B67 w/v in acetone/xylene coating; 5 min; MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

Chloride

DESALINATION

Date	pH	Cl- (ppm)
12/22/21	started	
12/28/21	10.24	2.16
1/20/22	10.25	2.69
removed		

HOTWASH

Date	pH
1/20/22	started
1/27/22	6.51
1/28/22	7.40
2/4/22	6.5
2/18/22	6.95

Storage and Display Recommendations

--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.002**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	cu alloy book clasp

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description-
Thin folded cu alloy book clasp.

Dimensions-
Max H: 1.14cm, Max L: 3.56cm, Max W: 0.34cm, & Wgt: 2.5g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with hand tools, while preserving what remains of the original surface.
• Apply BTA (corrosion inhibitor under vacuum to insure thorough impregnantion.
• Apply protective coatings of 10% Paraloid B48N/67 in acetone/xylene. Apply multiple coats if necessary.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
12/13/2021: Mechanically cleaned the object under the microscope, using a scalpel & glass bristle brush. 30 min. MK
3/3/2022: Applied 1% BTA in ethanol under vacuum; 5 min; MK
3/7/2022: Applied 10% Paraloid B48N/B67 w/v in acetone/xylene coating; 5 min; MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

Storage and Display Recommendations

--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.003**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	7 small cuprous objects

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description
- Cu alloy thimple
- Decorative cu alloy object with 4 holes
- Cu alloy buckle
- Cu alloy buckle
- Thin decorative cu alloy object
- 'U' shaped cu alloy object
- Thin cu alloy sheet fragment with 4 holes

Dimensions-
Max H: 3.19cm, Max L: 5.31cm, Max W: 0.08cm, & Wgt: 5.3g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with hand tools, while preserving what remains of the original surface.
• Apply BTA (corrosion inhibitor under vacuum to insure thorough impregnantion.
• Apply protective coating of 10% Paraloid B48N/67 in acetone/xylene.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
12//2021: Mechanically cleaned the object under the microscope, using a scalpel & glass bristle brush. min. MK
3/3/2022: Applied 1% BTA in ethanol under vacuum; 5 min; MK
3/7/2022: Applied 10% Paraloid B48N/B67 w/v in acetone/xylene coating; 5 min; MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

Storage and Display Recommendations

--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.004**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	2 curved iron blades

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description
- Thin iron semicircle blade
- Thin iron ax head

Dimensions-
Max H: 6.81cm, Max L:16cm , Max W: 0.55cm, & Wgt: 197.6g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with air abrasion & hand tools as needed, while preserving what remains of the original surface.
• Desalinate in a solution of 1% sodium hydroxide (NaOH) in reverse osmosis water to remove soluble salts (chlorides).
• Remove any remaining soluble salts left behind from desalination solution by washing in repeated changes of warm reverse osmosis water, until pH is neutralized.
• Apply protective coatings of 5% tannic acid in deionized water followed by 10% Paraloid B48N/67 in acetone/xylene. Apply multiple coats if necessary.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
11/30 & 12/15/2021: Mechanically cleaned the object using an air abrasive unit with aluminum oxide. 50 min. MK
12/22/2021: Placed object in 1% sodium sesquihydrate in reverse osmosis water to desalinate. min. MK
12/28/2021 - 1/20/2022: Monitored the chloride levels weekly & changed solution as necessary. MK
1/20/2022: Removed the object from desalination & placed in hot wash with reverse osmosis water at 60 °F to remove any remaining soluble salts. min. MK

1/27/2022 - 2/18/2022: Monitored pH & changed water daily, until pH remained neutral. MK
2/18/2022: Removed from hot wash & placed in dryer for 4 hrs. 10 min. MK
2/22/2022: Mechanically cleaned the object using an air abrasive unit with aluminum oxide to remove flashing. min. MK
3/4/2022 - 3/7/2022: Applied multiple coats of corrosion inhibitor 5% tannic acid in deionized water to the object. 10 min. MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

DESALINATION

Date	pH	Cl- (ppm)
12/17/21	started	
12/28/21	13.58	90.6
1/20/22	13.62	12.1
solution changed		
1/27/22	13.6	3.09
removed		

HOTWASH

Date	pH
1/28/22	9.65
2/4/22	6.47
2/18/22	6.99

Storage and Display Recommendations

--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.005**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	iron chisel

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description-
Iron chisel

Dimensions-
Max H: 2.15cm, Max L: 6.25cm, Max W: 2.18cm, & Wgt: 92.8g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with air abrasion & hand tools as needed, while preserving what remains of the original surface.
• Desalinate in a solution of 1% sodium hydroxide (NaOH) in reverse osmosis water to remove soluble salts (chlorides).
• Remove any remaining soluble salts left behind from desalination solution by washing in repeated changes of warm reverse osmosis water, until pH is neutralized.
• Apply protective coatings of 5% tannic acid in deionized water followed by 10% Paraloid B48N/67 in acetone/xylene. Apply multiple coats if necessary.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
11/30/2021: Mechanically cleaned the object using an air abrasive unit with aluminum oxide. 25 min. MK
12/22/2021: Placed object in 1% sodium sesquihydrate in reverse osmosis water to desalinate. min. MK
12/28/2021 - 1/20/2022: Monitored the chloride levels weekly & changed solution as necessary. MK
1/20/2022: Removed the object from desalination & placed in hot wash with reverse osmosis water at 60 °F to remove any remaining soluble salts. min. MK
1/27/2022 - 2/18/2022: Monitored pH & changed water daily, until pH remained neutral. MK
2/18/2022: Removed from hot wash & placed in dryer for 4 hrs. 10 min. MK

2/22/2022: Mechanically cleaned the object using an air abrasive unit with aluminum oxide to remove flashing. min. MK
3/4/2022 - 3/7/2022: Applied multiple coats of corrosion inhibitor 5% tannic acid in deionized water to the object. 10 min. MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

DESALINATION

Date	pH	Cl- (ppm)
12/17/21	started	
12/28/21	13.58	90.6
1/20/22	13.62	12.1
solution changed		
1/27/22	13.6	3.09
removed		

HOTWASH

Date	pH
1/28/22	9.65
2/4/22	6.47
2/18/22	6.99

Storage and Display Recommendations

--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.006**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	iron fishhook

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description-
Thin iron fishhook with intact sharp hookend

Dimensions-
Max H: 2.09cm, Max L: 3.82cm, Max W: 0.21cm, & Wgt: 1.2g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with air abrasion & hand tools as needed, while preserving what remains of the original surface.
• Desalinate in a solution of 1% sodium hydroxide (NaOH) in reverse osmosis water to remove soluble salts (chlorides).
• Remove any remaining soluble salts left behind from desalination solution by washing in repeated changes of warm reverse osmosis water, until pH is neutralized.
• Apply protective coatings of 5% tannic acid in deionized water followed by 10% Paraloid B48N/67 in acetone/xylene. Apply multiple coats if necessary.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
12/15/2021: Mechanically cleaned the object using an air abrasive unit with aluminum oxide. 15 min. MK
12/22/2021: Placed object in 1% sodium sesquihydrate in reverse osmosis water to desalinate. min. MK
12/28/2021 - 1/20/2022: Monitored the chloride levels weekly & changed solution as necessary. MK
1/20/2022: Removed the object from desalination & placed in hot wash with reverse osmosis water at 60 °F to remove any remaining soluble salts. min. MK
1/27/2022 - 2/18/2022: Monitored pH & changed water daily, until pH remained neutral. MK
2/18/2022: Removed from hot wash & placed in dryer for 4 hrs. 10 min. MK

2/22/2022: Mechanically cleaned the object using an air abrasive unit with aluminum oxide to remove flashing. min. MK
3/4/2022 - 3/7/2022: Applied multiple coats of corrosion inhibitor 5% tannic acid in deionized water to the object. 10 min. MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

DESALINATION

Date	pH	Cl- (ppm)
12/17/21	started	
12/28/21	13.58	90.6
1/20/22	13.62	12.1
solution changed		
1/27/22	13.6	3.09
removed		

HOTWASH

Date	pH
1/28/22	9.65
2/4/22	6.47
2/18/22	6.99

Storage and Display Recommendations

--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.007**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	3 iron horse bits

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description
- 'T' Shaped iron horse bit part, with circle on one end & round balls on the other two
- Iron horse bit part, with one triangular hole & two circular holes
-'Y' Shaped iron horse bit part

Dimensions-
Max H: 8.35cm, Max L: 11.13cm, Max W: 1.64cm, & Wgt: 73.3g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with air abrasion & hand tools as needed, while preserving what remains of the original surface.
• Desalinate in a solution of 1% sodium hydroxide (NaOH) in reverse osmosis water to remove soluble salts (chlorides).
• Remove any remaining soluble salts left behind from desalination solution by washing in repeated changes of warm reverse osmosis water, until pH is neutralized.
• Apply protective coatings of 5% tannic acid in deionized water followed by 10% Paraloid B48N/67 in acetone/xylene. Apply multiple coats if necessary.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
11/30 & 12/15/2021: Mechanically cleaned the object using an air abrasive unit with aluminum oxide. 30 min. MK
12/22/2021: Placed object in 1% sodium sesquihydrate in reverse osmosis water to desalinate. min. MK
12/28/2021 - 1/20/2022: Monitored the chloride levels weekly & changed solution as necessary. MK
1/20/2022: Removed the object from desalination & placed in hot wash with reverse osmosis water at 60 °F

to remove any remaining soluble salts. min. MK
1/27/2022 - 2/18/2022: Monitored pH & changed water daily, until pH remained neutral. MK
2/18/2022: Removed from hot wash & placed in dryer for 4 hrs. 10 min. MK
2/22/2022: Mechanically cleaned the object using an air abrasive unit with aluminum oxide to remove flashing. min. MK
3/4/2022 - 3/7/2022: Applied multiple coats of corrosion inhibitor 5% tannic acid in deionized water to the object. 10 min. MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

DESALINATION

Date	pH	Cl- (ppm)
12/17/21	started	
12/28/21	13.58	90.6
1/20/22	13.62	12.1
solution changed		
1/27/22	13.6	3.09
removed		

HOTWASH

Date	pH
1/28/22	9.65
2/4/22	6.47
2/18/22	6.99

Storage and Display Recommendations
--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.008**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	iron horseshoe

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description-
1/3 of an iron horseshoe with 3 holes

Dimensions-
Max H: 2.82cm, Max L: 9.96cm, Max W: 1.05cm, & Wgt: 93.1g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with air abrasion & hand tools as needed, while preserving what remains of the original surface.
• Desalinate in a solution of 1% sodium hydroxide (NaOH) in reverse osmosis water to remove soluble salts (chlorides).
• Remove any remaining soluble salts left behind from desalination solution by washing in repeated changes of warm reverse osmosis water, until pH is neutralized.
• Apply protective coatings of 5% tannic acid in deionized water followed by 10% Paraloid B48N/67 in acetone/xylene. Apply multiple coats if necessary.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
11/30/2021: Mechanically cleaned the object using an air abrasive unit with aluminum oxide. 25 min. MK
12/22/2021: Placed object in 1% sodium sesquihydrate in reverse osmosis water to desalinate. min. MK
12/28/2021 - 1/20/2022: Monitored the chloride levels weekly & changed solution as necessary. MK
1/20/2022: Removed the object from desalination & placed in hot wash with reverse osmosis water at 60 °F to remove any remaining soluble salts. min. MK
1/27/2022 - 2/18/2022: Monitored pH & changed water daily, until pH remained neutral. MK
2/18/2022: Removed from hot wash & placed in dryer for 4 hrs. 10 min. MK

2/22/2022: Mechanically cleaned the object using an air abrasive unit with aluminum oxide to remove flashing. min. MK
3/4/2022 - 3/7/2022: Applied multiple coats of corrosion inhibitor 5% tannic acid in deionized water to the object. 10 min. MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

DESALINATION

Date	pH	Cl- (ppm)
12/17/21	started	
12/28/21	13.58	90.6
1/20/22	13.62	12.1
solution changed		
1/27/22	13.6	3.09
removed		

HOTWASH

Date	pH
1/28/22	9.65
2/4/22	6.47
2/18/22	6.99

Storage and Display Recommendations

--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.009**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	large iron key

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description-
Large, decorative iron key

Dimensions-
Max H: 4.47cm, Max L: 13.51cm, Max W: 1.13cm, & Wgt: 73.8g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with air abrasion & hand tools as needed, while preserving what remains of the original surface.
• Desalinate in a solution of 1% sodium hydroxide (NaOH) in reverse osmosis water to remove soluble salts (chlorides).
• Remove any remaining soluble salts left behind from desalination solution by washing in repeated changes of warm reverse osmosis water, until pH is neutralized.
• Apply protective coatings of 5% tannic acid in deionized water followed by 10% Paraloid B48N/67 in acetone/xylene. Apply multiple coats if necessary.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
11/30/2021: Mechanically cleaned the object using an air abrasive unit with aluminum oxide. 30 min. MK
12/22/2021: Placed object in 1% sodium sesquihydrate in reverse osmosis water to desalinate. min. MK
12/28/2021 - 1/20/2022: Monitored the chloride levels weekly & changed solution as necessary. MK
1/20/2022: Removed the object from desalination & placed in hot wash with reverse osmosis water at 60 °F to remove any remaining soluble salts. min. MK
1/27/2022 - 2/18/2022: Monitored pH & changed water daily, until pH remained neutral. MK
2/18/2022: Removed from hot wash & placed in dryer for 4 hrs. 10 min. MK

2/22/2022: Mechanically cleaned the object using an air abrasive unit with aluminum oxide to remove flashing. min. MK
3/4/2022 - 3/7/2022: Applied multiple coats of corrosion inhibitor 5% tannic acid in deionized water to the object. 10 min. MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

DESALINATION

Date	pH	Cl- (ppm)
12/17/21	started	
12/28/21	13.58	90.6
1/20/22	13.62	12.1
solution changed		
1/27/22	13.6	3.09
removed		

HOTWASH

Date	pH
1/28/22	9.65
2/4/22	6.47
2/18/22	6.99

Storage and Display Recommendations

--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.010**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	half of an iron mouth harp

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description-
50% of an iron mouth harp

Dimensions-
Max H: 0.79cm, Max L: 5.21cm, Max W: 0.64cm, & Wgt: 4.9g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with air abrasion & hand tools as needed, while preserving what remains of the original surface.
• Desalinate in a solution of 1% sodium hydroxide (NaOH) in reverse osmosis water to remove soluble salts (chlorides).
• Remove any remaining soluble salts left behind from desalination solution by washing in repeated changes of warm reverse osmosis water, until pH is neutralized.
• Apply protective coatings of 5% tannic acid in deionized water followed by 10% Paraloid B48N/67 in acetone/xylene. Apply multiple coats if necessary.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
12/15/2021: Mechanically cleaned the object using an air abrasive unit with aluminum oxide. 10 min. MK
12/22/2021: Placed object in 1% sodium sesquihydrate in reverse osmosis water to desalinate. min. MK
12/28/2021 - 1/20/2022: Monitored the chloride levels weekly & changed solution as necessary. MK
1/20/2022: Removed the object from desalination & placed in hot wash with reverse osmosis water at 60 °F to remove any remaining soluble salts. min. MK
1/27/2022 - 2/18/2022: Monitored pH & changed water daily, until pH remained neutral. MK
2/18/2022: Removed from hot wash & placed in dryer for 4 hrs. 10 min. MK

2/22/2022: Mechanically cleaned the object using an air abrasive unit with aluminum oxide to remove flashing. min. MK
3/4/2022 - 3/7/2022: Applied multiple coats of corrosion inhibitor 5% tannic acid in deionized water to the object. 10 min. MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

DESALINATION

Date	pH	Cl- (ppm)
12/17/21	started	
12/28/21	13.58	90.6
1/20/22	13.62	12.1
solution changed		
1/27/22	13.6	3.09
removed		

HOTWASH

Date	pH
1/28/22	9.65
2/4/22	6.47
2/18/22	6.99

Storage and Display Recommendations

--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.011**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	UID iron object

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description-
Iron object with one end bent over on itself

Dimensions-
Max H: 3.4cm, Max L: 6.7cm, Max W: 2.31cm, & Wgt: 103.6g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with air abrasion & hand tools as needed, while preserving what remains of the original surface.
• Desalinate in a solution of 1% sodium hydroxide (NaOH) in reverse osmosis water to remove soluble salts (chlorides).
• Remove any remaining soluble salts left behind from desalination solution by washing in repeated changes of warm reverse osmosis water, until pH is neutralized.
• Apply protective coatings of 5% tannic acid in deionized water followed by 10% Paraloid B48N/67 in acetone/xylene. Apply multiple coats if necessary.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
11/30/2021: Mechanically cleaned the object using an air abrasive unit with aluminum oxide. 20 min. MK
12/22/2021: Placed object in 1% sodium sesquihydrate in reverse osmosis water to desalinate. min. MK
12/28/2021 - 1/20/2022: Monitored the chloride levels weekly & changed solution as necessary. MK
1/20/2022: Removed the object from desalination & placed in hot wash with reverse osmosis water at 60 °F to remove any remaining soluble salts. min. MK
1/27/2022 - 2/18/2022: Monitored pH & changed water daily, until pH remained neutral. MK
2/18/2022: Removed from hot wash & placed in dryer for 4 hrs. 10 min. MK

2/22/2022: Mechanically cleaned the object using an air abrasive unit with aluminum oxide to remove flashing. min. MK
3/4/2022 - 3/7/2022: Applied multiple coats of corrosion inhibitor 5% tannic acid in deionized water to the object. 10 min. MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

DESALINATION

Date	pH	Cl- (ppm)
12/17/21	started	
12/28/21	13.58	90.6
1/20/22	13.62	12.1
solution changed		
1/27/22	13.6	3.09
removed		

HOTWASH

Date	pH
1/28/22	9.65
2/4/22	6.47
2/18/22	6.99

Storage and Display Recommendations

--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.012**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	cu alloy spoon

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description-
Large cu alloy spoon

Dimensions-
Max H: 5.64cm, Max L: 16.5cm, Max W: 0.33cm, & Wgt: 34.7g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with hand tools, while preserving what remains of the original surface.
• Apply BTA (corrosion inhibitor under vacuum to insure thorough impregnantion.
• Apply protective coating of 10% Paraloid B48N/67 in acetone/xylene.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
12/13/2021: Mechanically cleaned the object under the microscope, using a scalpel & glass bristle brush. 60 min. MK
3/3/2022: Applied 1% BTA in ethanol under vacuum; 5 min; MK
3/7/2022: Applied 10% Paraloid B48N/B67 w/v in acetone/xylene coating; 5 min; MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

Storage and Display Recommendations

--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

Conservation Report

Maryland Archaeological Conservation Laboratory

Conservation Work Order No. **2021.030**
Conservation Object No. **2021.030.013**

Project	Nickerson Site
Contact	Craig Chartier
Provenience	/,
Artifact	cu alloy spoon handle

Requested Service

--Not recorded--

Examination and Treatment Proposal

Description-
Rounded cu alloy spoon handle

Dimensions-
Max L: 6.01cm, Diam: 1.27cm, & Wgt: 11.6g

Treatment Proposal-
• Document before treatment condition of object with photographs & written record, including dimensions & a brief description.
• Mechanically clean with hand tools, while preserving what remains of the original surface.
• Apply BTA (corrosion inhibitor under vacuum to insure thorough impregnantion.
• Apply protective coating of 10% Paraloid B48N/67 in acetone/xylene.
• Document after treatment condition of object with photographs & written record.

Treatment Description

11/29/2021: Examined & took Before Treatment photo. 5 min. MK
12/13/2021: Mechanically cleaned the object under the microscope, using a scalpel & glass bristle brush. 20 min. MK
3/3/2022: Applied 1% BTA in ethanol under vacuum; 5 min; MK
3/7/2022: Applied 10% Paraloid B48N/B67 w/v in acetone/xylene coating; 5 min; MK
3/8/2022: Applied final coating of 10% Paraloid B48N/B67 in acetone/xylene to the object. 5 min. MK
3/10/2022: Took After Treatment photo & photoshopped. 5 min. MK

Tech Monitoring

Storage and Display Recommendations

--Not recorded--

Conservator / Examiner	Monica Kitner
Begin Date	11/29/2021
Completed Date	--Not recorded--

Images

Main Image Folder: --Not recorded--

Other Images:

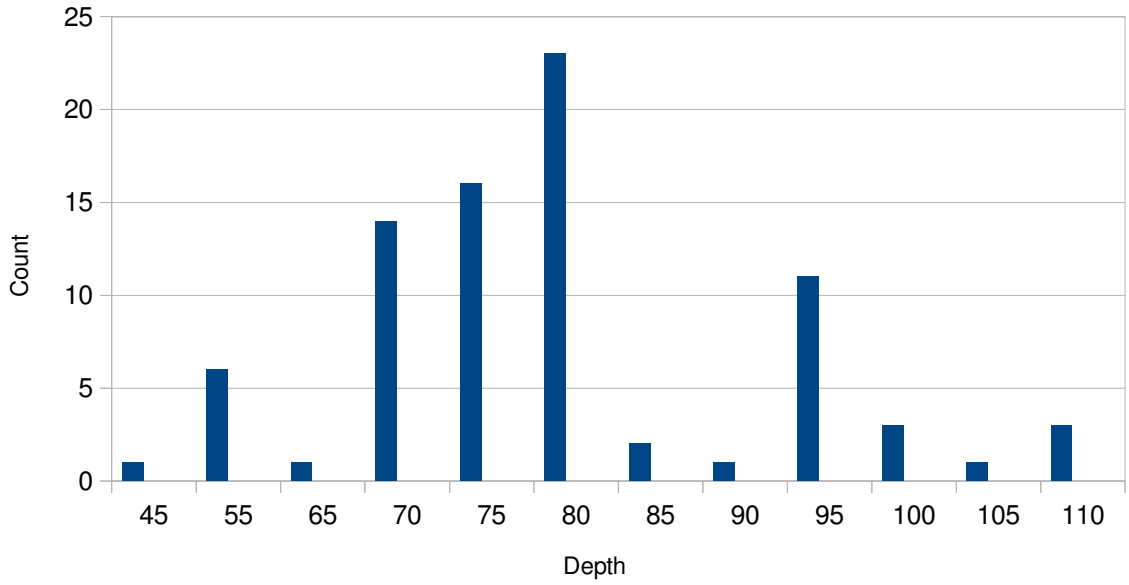
Flotation Results

During the course of the archaeological fieldwork, one gallon soil samples were collected from each indiviudal excavation level and context of each feature encountered. These samples were collected so that various research topics could be explored in the future such as soil chemistry, botanical analysis, parasite analysis, and environmental reconstruction. A total of over 400 soil samples were processed by flotation and samples from the contexts associated with the barn cellarhole (Feature 75 [F75]), the palisade trench (Feature 64 [F64]), the eastern hearth (Feature 47 [F47]) and the native American storage pit (Featyure 144 [F144]) were selected for detailed scanning and further analysis. The remaining samples have been retained for future research. The samples were scanned under low and high magnification and notes were taken on the abundance of charcoal and shell, the soil texture, and the size of the shell and charcoal fragments present. Seeds, insect parts, and land snail shells were removed during scanning along with any larger artifacts such as flakes, pottery, bones, buckles, or buttons.

The seeds, insect parts, and land snail shells were further analyzed to provide data on the past environment and the construction of the selected features. The seeds can provide information on the foods utilized by the inhabitants at the site and the types of plants growing around the site in the past. Seeds can be problematical though, as the general, but untested over a long period of time, archaeological rule of thumb is that unburned seeds are recent seeds and should not be analyzed. This may be true of shallow features that may have been impacted but bioturbation, but deep pit features, contexts that had been sealed, may contain archaeological seeds, seeds from plants that existed when those layers were formed. For the present analysis it has been assumed that the archaeological seeds present have the potential to represent archaeological remains and are not the result of recent activities. The comparison of seeds present by depth was helpful in coming to this conclusion as, if the seeds were the recent result of bioturbation, the same species in similar proportions should be present through the depth of the feature. If, on the other hand the seeds were deposited archaeologically, they should be unevenly distributed thoughout the feature.

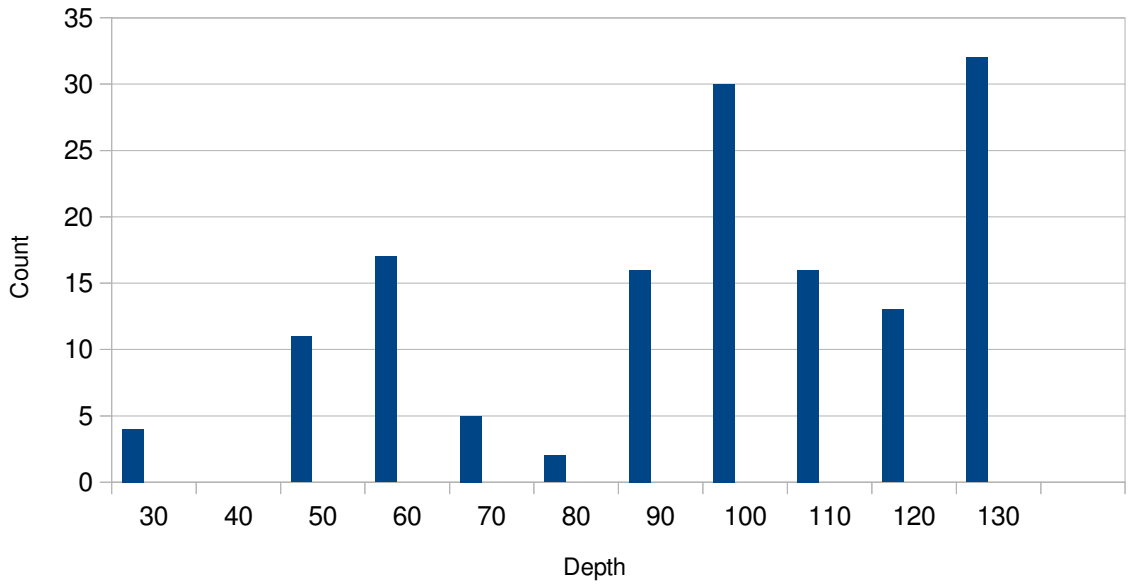
Land snails only exist within the upper leaf litter and decaying matter of a site and their presence deep within a feature is a good indication that the feature was left open for an extended period of time when it was in use, long enough for a leaf litter or decomposition layer to form. Insect parts can be used to help determine how long a feature had been left open and to what degree bioturbation (the mixing up of the soils) may have affected the archaeological deposits.

Land Snails



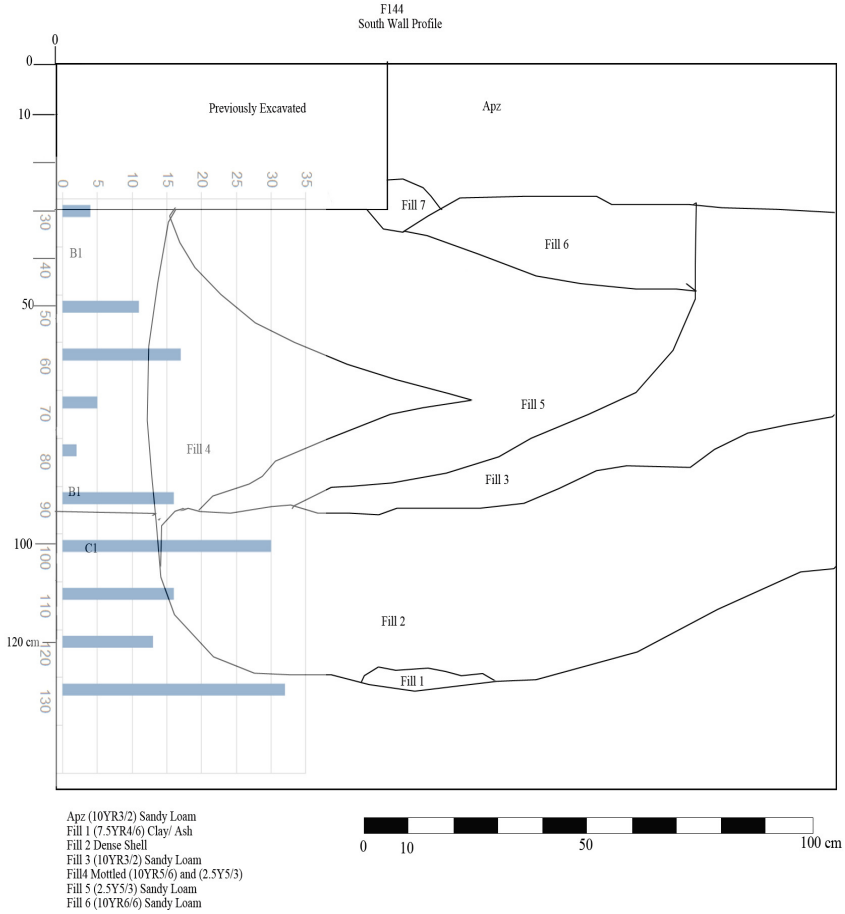
Feature 75

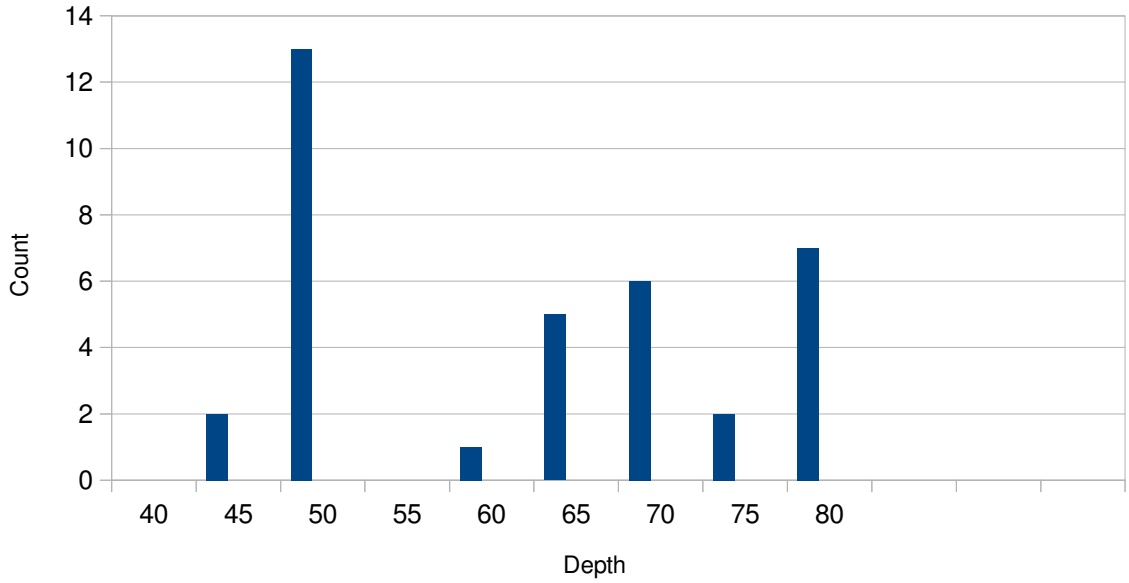
Analysis of the distribution of snails in Feature 75, the cellarhole, shows three peaks for the occurrence of snails. This indicates that the cellar was filled in stages and not all at one time, with enough time between the filling episodes for a leaf litter to develop which was colonized by the snails.



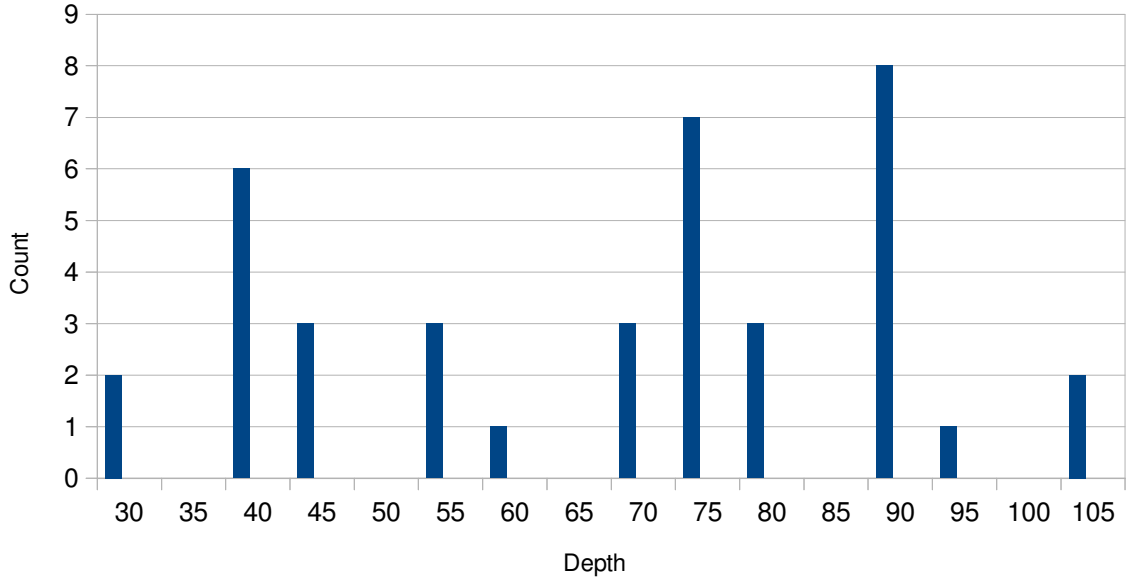
Feature 144

Snail analysis for Feature 144 (the Native storage pit) showed two main concentrations of snails, at the bottom and closer to the top. This shows that the feature was slowly filled iniattly, allowing multiple leaf litters and snail colonizations to develop, followed by a period of sterile fill, possibly even washed in soils, which was then followed by another, more limited, period of filling and litter develop before it was completely filled.





Feature 64 Palisade Trench (U160)

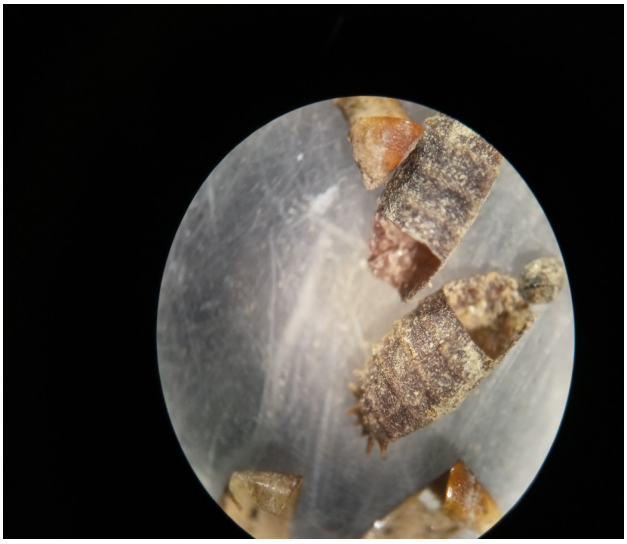


Feature 64 Palisade Trench (U184)

The analsyis of the ditribution of the snails in two sections of the palisade trench showed initial development of leaf litter in both units, possibly when the trench was first dug, then followed by a sterile period, and being capped with another period of leaf litter development, probably when the posts were either removed or decomposed. The presence of snails and seeds at the bottom of the trench may indicate that it was not built hastily, but may have been dug and then eventually erected over an extended period of time.

Insect remains

Insect remains, identified as dermatid beetle and ants, were found in Feature 64 (ants), Feature 75 (dermatid beetle casings), and Feature 144 (dermatid beetle shells and casings). The ant remains likely just represent colonization of the area by the insects, but the presence of the dermatid beetles shows the presence of rotting animal matter. Dermatid beetles (a.k.a. skin, larder, leather, hide, carpet beetles) are scavengers that feed on dry animal or plant material. They generally arrive at rotting material between 5 and 11 days after it is deposited with life cycles (arrival, egg deposition, hatching, pupal stage, and emergenc eof adults, happening within a 40-50 day window. The presence of erupted pupal cases in Features 75 and 144, in deeper layers in both cases (90-95 cm in F75 and 70-80 cm in F144) indicate that these layers were exposed for an extended period of time, long enough for the beetles to arrive, lay eggs, have the eggs hatch, and for the pupae to hatch.



F75 U224 I soil 90-95 cmbs

Seeds
Eight species of wild plants, three species of domestics, and one unidentified species were identified in the flot samples:

Wild Species
Common Cinquefoil (*Potentilla simplex*)
Redroot Pigweed (*Amaranthus retroflexus*)
Knotweed (*Polygonum sp.*)
Common Yarrow (Modern?) (*Achillea millefolium*)
Goosefoot, Lamb's Quarters (*Chenopodium sp.*)
Carpetweed (*Molluga verticillata*)
Common Chickweed (*Stellaria media*)
Nodding Spurge (*Euphorbia nutans*)

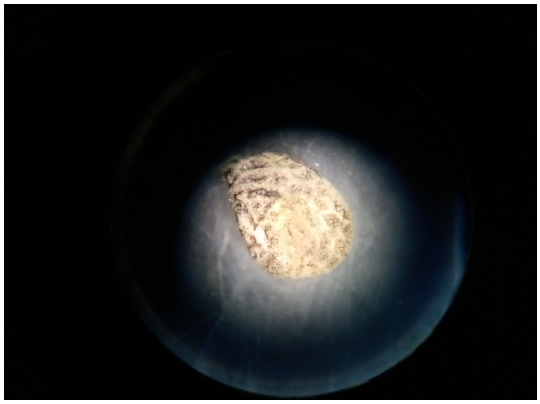
Domestic Species
Maize
Beans
Barley

Unknown
1 species, circular flat seed, this casing, 2 mm in diameter- could not find an identification

Species	F47	F64	F75	F144
Maize	Many		1	1
Beans	Many			
Barley	Many			
Cinquefoil	1	3	2	1
Pigweed		1	3	
Knotweed	1	4		1
Yarrow		2		
Goosefoot		30	12	5
Carpetweed		1	9	4
Chickweed				2
Spurge				2
Unknown			8	4

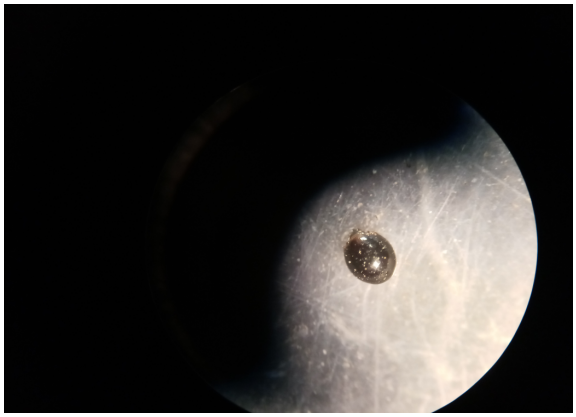
The presence of a vareity of seeds in the deep features and a lack of the same in the shallow feature (F47), supports the idea that the seeds are ancient versus modern assitions to the assemblage. I contend that the deep features allowed for the preservation of seeds and thus these are ancient seeds. showing us that the environment around them at the time of thier filling was open, sunny, and disturbed by human activity. The presence of numerous goosefoot seeds at the bottom of Feature 64 may indicate that the feature was initially dug in the late summer. A few of the seeds appeared burned and may have been used as food, but the vast majority were unburned and were probably just accidental inclusions into the features. The Chickweed seed found at the site came fom the upper layer of Feature 144 and appears to be a recent introduction

Common Cinquefoil (*Potentilla simplex*)
A sprawling low plant native to New England with yellow flowers that blooms in the spring and mid summer for about one month. It prefers full to partial sun and moist to dry conditions in disturbed to high quality habitats. It is indicative of sunny conditions without forest cover and potentially disturbed soils. It can be eaten when young and was used medicinally by both the Natives and Colonists.



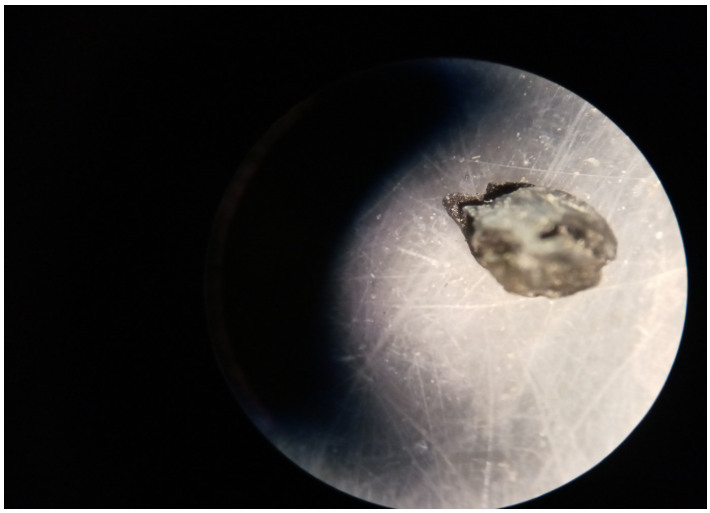
F144 90cmbs dark soil

Redroot Pigweed (*Amaranthus retroflexus*)
A tall and erect summer annual and a major weed of crops that thrives in hot weather. The seeds can be collected and ground into flour and the young shoots and leaves can be eaten. It grows in open areas that often are either disturbed or under cultivation due to the fact that the seeds need light to germinate. It is indicative of open and potentially disturbed areas.



F75U228 60 cmbs

Knotweed/ Smartweed (*Polygonum sp.*)
Knotweed/ smartweed is a member of the buckwheat family and has several varieties native to New England. It is low plant with clusters of steeds on a drooping stem. The plant can be eaten when young and the seeds can be collected and ground into flour. The plant was used medicinally by Native people as well. It is often found in moist disturbed soils.

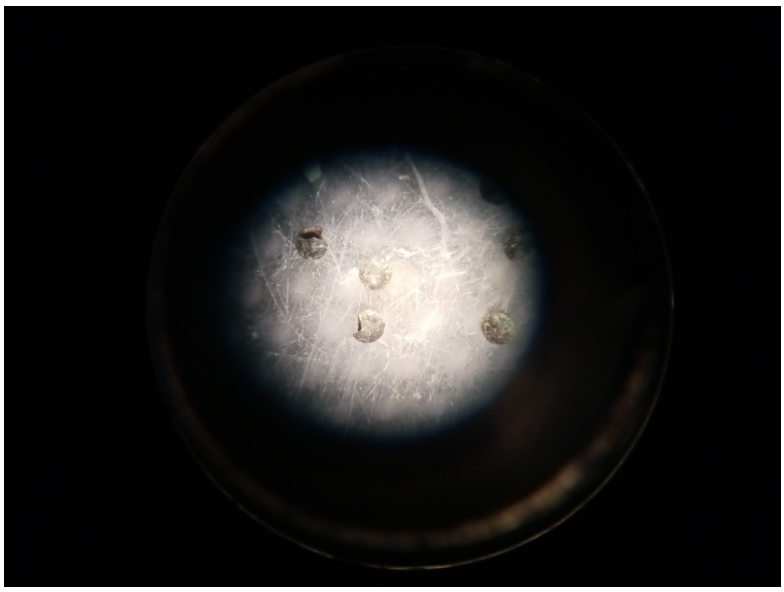


F75 U223 55 cmbs

Common Yarrow (*Achillea millefolium*)
Yarrow is a member of the aster family growing up to three feet tall with both native and non-native species found in New England. It preferes sunny locations with thin sandy soil and is often found on disturbed ground. The seeds mature in late summer to early fall and the plant was used medicinally by both the Natives and Colonists. The presence of yarrow seeds is indicative of sunny, non-forested habitats.

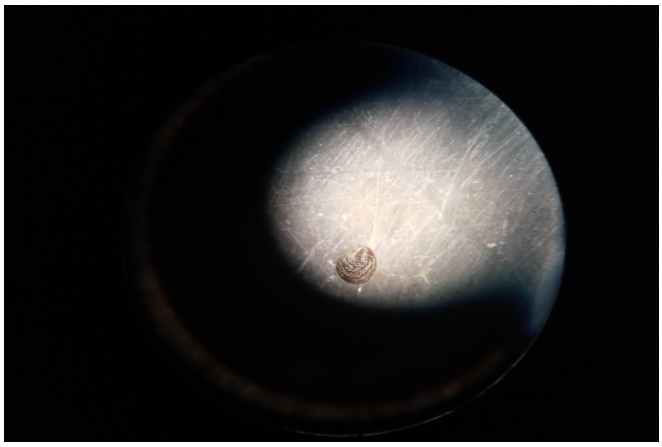
F64 U160 75 cmbs (along with a pigweed seed)

Goosefoot, Lamb's Quarters (*Chenopodium sp.*)
Chenopodium are preennial herbs prefering alkaline and oftentimes disturbed soils in a sunny to partially sunny location. It is used as a leaf vegatable and the seeds can be ground into a flour. It is one of the plants believed to have been an early cultigen by Native people, preceeding the introduction of maize. They are still eaten today as quinoa. It is indicative of a full to partially shaded, potentially disturbed, area.



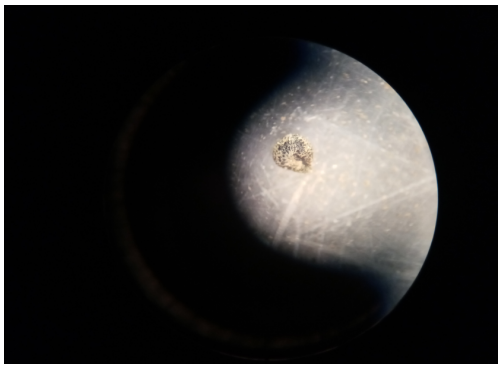
F64 U183 70 cmbs

Carpetweed (*Molluga verticillata*)
A low, sprawling plant that is native to the Americas and may be native to New England. It flowers in July to September and grows in disturbed, sunny areas. It was used both as an edible and as a medicinal plant by Native people. Its presence indicates and open, sunny habitat.



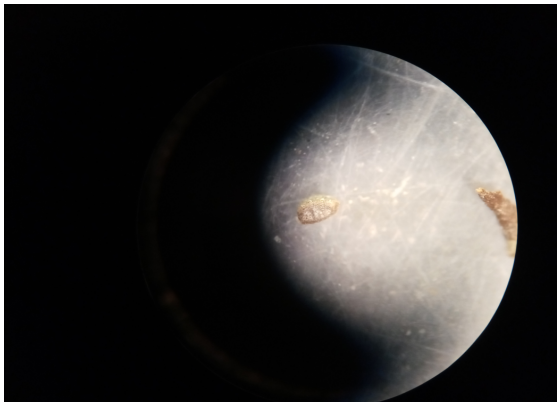
F75 U228 60 cmbs

Common Chickweed (*Stellaria media*)
An invasive plant native to Eurasia that has become established in New England. This low plant is common in lawns, meadows and open sunny locations including disturbed areas. Its presence indicates an open, sunny, and potentially disturbed environment. It is edible and is eaten and used as an herbal remedy today. .



F144 30 cmbs

Nodding Spurge (*Euphorbia nutans*)
A native plant commonly found in New England. It is an annual herb with flowers in distinct clusters at the tips of branches. It usually grows under a foot tall in sandy soils along river banks and lake shores and in disturbed, open areas, preferring sunny, warm locations. They flower in summer and early fall and die off by the first frost. The presence of these seeds indicates open conditions possibly near water.



F144 130 cmbs

Maize (*Zea mays*)
Maize was a plant grown in New England for at least a thousand years and possibly as long as 3000. The variety found here is an 8-row flint maize that would have colored "party-colored" in the period, like the decorative corn available around Thanksgiving that people today, hang on their doors. It needs cleared gound and continual maintanence to keep it free of weeds as it grows. Maize was dried in the fall and stored in below ground storage pits by the Natives and in barns and houses by the English. It was probably the most important grain in New England in the period.

Beans (*Phaseolus vulgaris*)
Beans wre grown for the mature bean sead itself, which was used in soups and even for bread, but also for the leaves, which can be eaten, and the vines, which can be used as animal fodder. In New England it was often grown and eaten by the Natives in conjunction with maize, which are companion plants and create a complete protein when eaten. It is probable that succotash (corn and beans cooked together) was a dish served in the Nickerson home.

F47 U65 30 cmbs

Barley (*Hordeum vulgare*)
Barley was used by the Colonists in the 17th century for bread, soups, and especially for making beer. Barley has a short growing season and is drought-tolerant, being more adaptable to a variety of soil conditions than wheat is.

F47 U65 30 cmbs

Feature	Unit	Soil	Depth	Snails	Seeds	Beetles
F47	53	SW	20-25 cm	0	0	
F47	83	SE	22-30 cm	0	0	
F47	65		25-30 cm	0	many maize, barley, beans	
F47	42	NW	30 cm	0	0	
F47	66	SW	30-35 cm	0	1 Knotweed, several barley	
F47	55	SE	35-40 cm	2	0	
F47	67	SE	35-40 cm	0	0	
F47	42	NE	37-45 cm	1	0	
F47	83	SW, SE	40-45 cm	0	0	
F47	52	NE	45 cm	1	0	
F47	53	NW	45 cm	0	0	
F47	55	SW	45 cm	0	1 Cinquefoil	
F47	64	NE	45 cm	0	Maize, 3 barley	
F47	54	SE	49 cm	0	0	
F47	65	NE	50 cm	0	0	
F47	66	NW	50 cm	0	0	
F47	67	SW	50 cm	0	0	
F47	81	NE	50 cm	0	0	
F47	83	SE	50 cm	0	0	
F64	183		25-30 cm	2	2 Chenopodium, 1 Knotweed	
F64	183		30-35 cm	0	0	
F64	18		35-40 cm	2	0	
F64	160		35-40 cm	0	0	
F64	160		35-40 cm	0	0	
F64	183		35-40 cm	1	0	
F64	184		35-40 cm	3	1 Cinquefoil	
F64	160	subsoil	40-45 cm	0	0	
F64	160		40-45 cm	2	0	
F64	183		40-45 cm	0	0	
F64	184		40-45 cm	3	1 Knotweed	
F64	183		45-50 cm	0	0	
F64	160		45-50 cm	13	1 Knotweed	ant parts
F64	183		50-55 cm	3	0	
F64	184		50-55 cm	0	0	

F64	183		55-60 cm	0	0	
F64	160		55-60 cm	1	1 Chenopodium	
F64	184		55-60 cm	1	1 Knotweed	
F64	160		60-65 cm	5	1 Carpetweed	
F64	184		65-70 cm	3	0	ant parts
F64	160		65-70 cm	6	1 Chenopodium	
F64	183		65-70 cm	0	25 Chenopodium	
F64	160		70-75 cm	2	2 Common Yarrow, 1 Pigweed	
F64	186		70-75 cm	7	1 Cinquefoil	
F64	184		75-80 cm	3	0	
F64	160		75-80 cm	7	1 Chenopodium	
F64	184		85-90 cm	8	0	
F64	184		90-95 cm	1	0	ant parts
F64	184		100-105 cm	2	1 Cinquefoil	
F75	222		40-45 cm	0	0	
F75	217	dark soil	40-45 cm	1	0	
F75	222	Light soil	40-45 cm	0	3 Carpetweed	
F75	222		45-50 cm	0	4 Unknown	
F75	223		50-55 cm	6	1 Chenopodium	
F75	222	Light soil	50-55 cm	0	2 Unknown	
F75	222	Dark soil	55-60 cm	1	0	
F75	228		55-60 cm	0	3 Chenopodium, 1 Carpetweed, 1 Pigweed	
F75	215	ash, pink soil	55-65 cm	3	3 Chenopodium, 2 Pigweed	
F75	223		60-65 cm	5	0	
F75	222	Dark soil	60-65 cm	3	0	
F75	226	A soil	60-65 cm	1	0	
F75	224	F soil	60-65 cm	2	0	
F75	222		60-65 cm	0	4 Chenopodium	
F75	217		60-70 cm	0	0	
F75	218	dark soil	60-70 cm	1	1 Cinquefoil, 1 Unknown	
F75	218	light soil	60-70 cm	0	1 Chenopodium, 1 Pigweed	
F75	224	A soil	65-70 cm	2	0	
F75	223	F soil, clay	65-70 cm	13	0	
F75	223	I soil	70-75 cm	9	0	
F75	223	H soil	70-75 cm	9	0	

F75	223	J soil	70-75 cm	3	0	
F75	223	A soil	70-75 cm	2	0	
F75	214		75-80 cm	2	0	
F75	223	D soil	80-85 cm	1	1 Chenopodium	
F75	225	A soil	85-90 cm	7	0	
F75	223	H soil	85-90 cm	2	1 Cinquefoil	
F75	215	Light soil	85-90 cm	0	1 Chenopodium	
F75	215	Dark soil	85-90 cm	2	5 Carpetweed	
F75	224	L soil	90-95 cm	1	0	
F75	215	light soil	90-95 cm	1	0	
F75	222	dark soil	90-95 cm	0	0	
F75	204	dark soil	90-95 cm	0	0	
F75	215	dark soil	90-95 cm	1	0	
F75	224	I soil	90-95 cm	2	1 maize	Beetle casings
F75	224	L soil	95-100 cm		0	
F75	223	H soil	95-100 cm	0	0	
F75	223	L soil	95-100 cm	3	1 Chenopodium	
F75	224	Clay?	100-105 cm	0	0	
F75	223		100-105 cm	1	0	
F75	224	L soil	100-105 cm	0	0	
F75	223/2	L soil	105-110 cm	1	0	
F75	223/2	N soil	105-110 cm	0	0	
F75	223/2	H soil	105-110 cm	2	0	
F144	340	light soil	20-30 cm	0	2 Chickweed	
F144	340	dark soil	20-30 cm	4	4 Unknown, 2 Chenopodium, 1 Carpetweed	
F144	340		40-50 cm	11	3 Carpetweed	
F144	340		50-60 cm	17	0	
F144	340	Light soil	60-70 cm	0	0	
F144	340	dark soil	60-70 cm	5	0	
F144	340	dark soil	70-80 cm	7	0	
F144	340	light soil	70-80 cm	2	1 Knotweed	9 beetle shells, 2 casings
F144	340	light soil	80-90 cm	0	0	
F144	340	Dark soil	80-90 cm	16	1 Cinquefoil, 3 Chenopodium	
F144	340		90-100 cm	30	0	
F144	340		100-110 cm	16	0	

F144	340		110-120 cm	13	0	
F144	340	below soil	120-130 cm	2	0	
F144	340	light soil	120-130 cm	15	2 Nodding Spurge	

Interpretation of the Results of Radiocarbon Dating

Two of the features identified during the 2018 or 2019 field season were chosen for radiocarbon dating: Feature 144 (the storage pit found at the end of the last day of fieldwork in 2019) and the shell midden in Unit 130 that was intersected by the Nickersons when they built their house. These features were selected because of the following factors: they needed to be Native features as the historical features and component could be better dated by artifacts than by radiocarbon samples; they needed to have similar materials being dated (either bone, shell, or charcoal); and they needed to be features that contained other artifacts that would help with the interpretation of the site. So, both features contained shell, both were suspected to be prehistoric, and both had other materials aside from the shell associated with them that would help interpret the site better. In the case of Feature 144, the storage pit, soil samples were also processed from this feature so those results could now be associated with a specific period of the past, and the feature contained decorated shell-tempered pottery, maize, animal bones (especially birds and dogfish), chipping debris, and a variety of shellfish species. Dating the feature, which was a storage pit that the Natives would have stored food in for the winter similar to the ones that the Pilgrims discovered in 1620, would help to better understand how they used this piece of land prior to the arrival of the Nickersons. The shell midden in Unit 130 also contained a variety of shellfish and bone as well as evidence of flintknapping.

Radiocarbon dating is based on the principle that is based on measuring the amount of Carbon 14 (C14) present in a given sample of organic material. Animals and plant take up C14 (radiocarbon) a radioactive isotope of carbon, throughout their lives. Upon death the C14 begins to radioactively decay to C13 at a known and invariable rate. By measuring the ratio of C13 to C14, an accurate measurement of the time since death can be determined (within a range). The amount of C14 in the atmosphere has varied over time, and researchers have studied the variations and are able to factor that into the dates as well to make them even more accurate. Shellfish have been found to be carbon reservoirs as well, meaning that dates obtained from them tend to be older than a date from carbon from the same feature due to the fact that shellfish tend to pick up old carbon and incorporate that into their shells in the ocean. All these elements must be factored into to arrive at a reliable date.

The samples from the Nickerson site were found to date as follows:

Unit 130 shell midden 1290+/- 70 years before present (1220-1360 years before present)

Feature 144 Storage Pit 1150+/- 100 years before present (1050-1250 years before present)

It has been found that the reservoir effect for shellfish off of Cape Cod is only 42 years, so 42 years have to be added to the date range making them:

Unit 130 shell midden 1332+/- 70 years before present (1262-1402 years before present)

Feature 144 Storage Pit 1192+/- 100 years before present (1152-1292 years before

present)

These numbers can then be put into an online calibration program called OXCAL and calendar years can be arrived at. These would be:

Unit 130 shell midden 597-878 AD (95-5% accuracy)

Feature 144 Storage Pit 658-1022 AD (95.4% accuracy)

This shows that these two features could have been created at the same time as they overlap in time

between 658 and 878 AD. They, of course, could have also been created at very different times. They do both show evidence of shellfish harvesting, lithic activities, and hunting (as evidenced by the presence of animal bone) but Feature 144 contained maize and pottery while the shell midden in Unit 130 did not. I believe that this shows changing uses of the site over time. The older feature, the shell midden, may represent a period before farming was widely practiced on Cape Cod and when the site was used more as a relatively short stopover location where shellfish were seasonally processed. The storage pit is the result of the less sedentary use of the site for planting, harvesting, and storing maize, something which is known to have become a larger part of Native people's diets as time went on. The date of 658-1022 AD associated with the maize from Feature 144 is one of the earliest reported dates for maize in the area. Unfortunately, the maize kernals have not bee directly dated and the date, while temptingly early, can not be claimed to be as early as it seems until the kernals themselves are directly dated.

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RADIOCARBON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No.	**GX-124559**	Date Received:	11/29/22
Your Reference:	Submission of 11/29/21	Date Reported:	5/16/22
Submitted by:	Craig Chartier 355 Orchard St New Bedford MA 02740		

Sample Name: **WNH F. 130**

AGE = **1290 ± 70 ^{14}C years BP (^{13}C corrected)**

Description: Shells

Pretreatment: Sample was crushed, rinsed with dilute HCl to remove surface carbonate, then digested in HCl.

Comments:

$\delta^{13}C_{PDB}$ = **+1.4 ‰**

Notes: This date is based upon the Libby half life (5570 years) for ^{14}C. The error is +/- 1 s as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.

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RADIOCARBON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No.	**GX-124560**	Date Received:	11/29/22
Your Reference:	Submission of 11/29/21	Date Reported:	5/16/22
Submitted by:	Craig Chartier 355 Orchard St New Bedford MA 02740		

Sample Name: **WNH F. 144**

AGE = **1150 ± 100 ^{14}C years BP (^{13}C corrected)**

Description: Shells

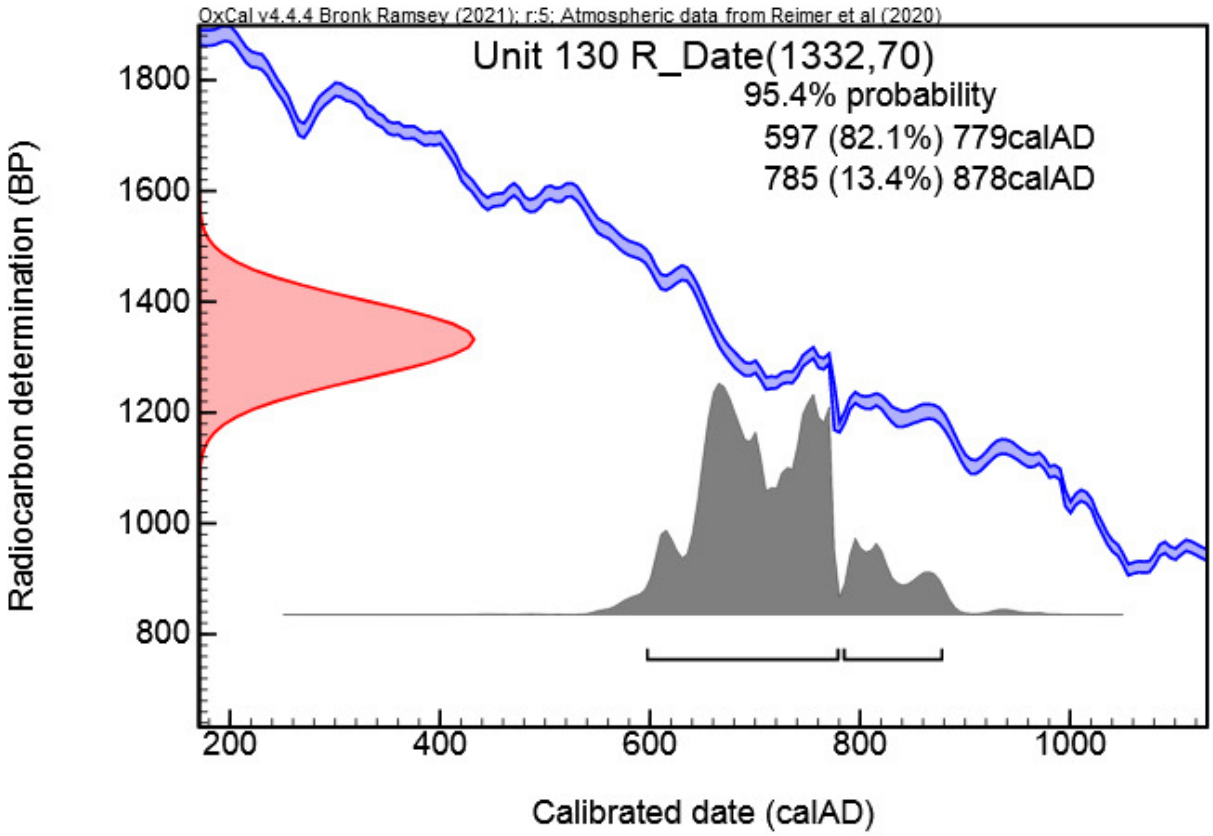
Pretreatment: Sample was crushed, rinsed with dilute HCl to remove surface carbonate, then digested in HCl.

Comments:

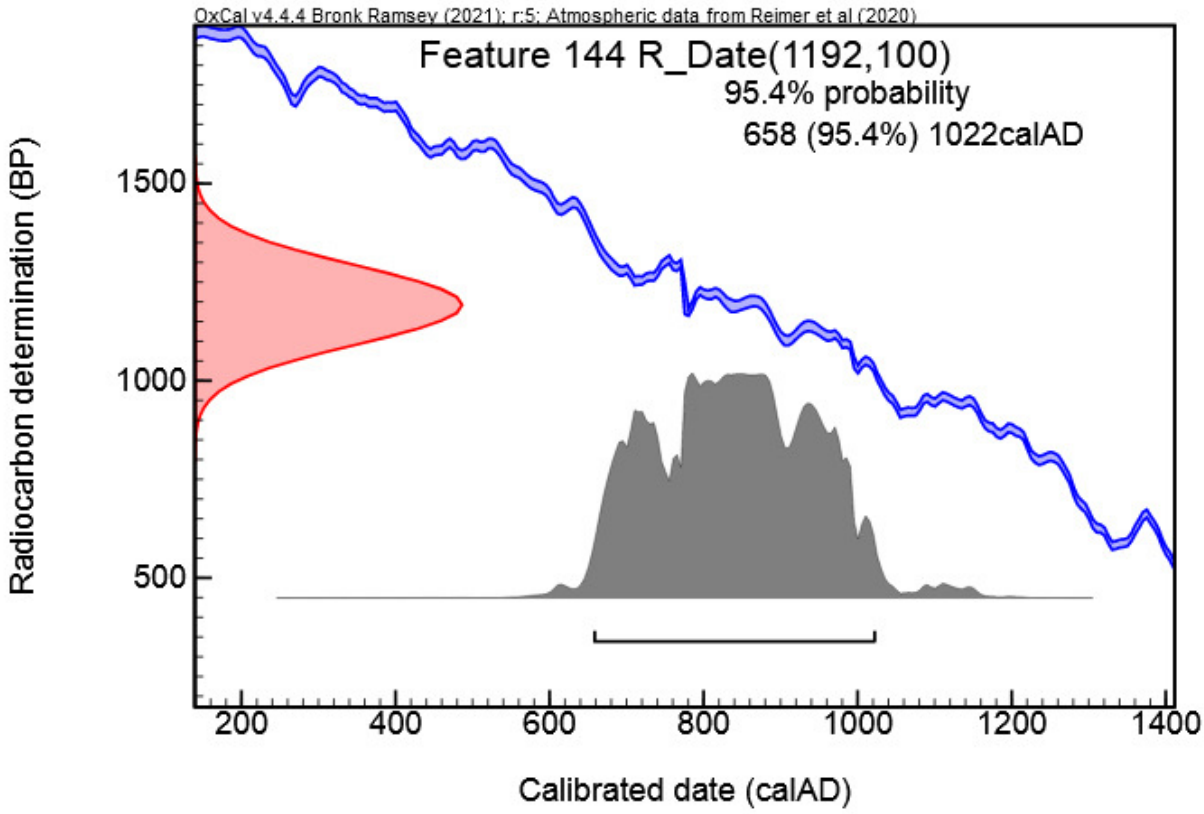
$\delta^{13}C_{PDB}$ = **+0.3 ‰**

Notes: This date is based upon the Libby half life (5570 years) for ^{14}C. The error is +/- 1 s as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.



Unit 130 shell midden calibrated



Feature 144 calibrated date

Summary of 2022 Slag Analysis Craig Chartier

Excavations at the site of Fort St. George (1607) in Maine uncovered the remains of four hearths containing evidence of ironworking in the form of the remains of bloomeries where bog iron ore was smelted using what is called the "direct smelting process" (Brain 2016:29) (Figure 1). Simply stated, the direct smelting process involves the iron ore being reduced directly to solid iron and liquid slag with charcoal (or coal) as the fuel source. In this, the simplest form of smelting, iron ore is mixed with the fuel in a small hearth and the fire is encouraged with simple bellows. The carbon in the fuel reacts with the oxygen in the air blast to form carbon monoxide gas, which reacts with the iron oxide in the bog iron ore (which is really hematite {iron/ferric oxide} or limonite {hydrated iron(III) oxide-hydroxides}) to remove the oxygen and leave the iron (Figure 2). The temperatures achieved in these sorts of furnaces are high enough to melt the iron, which accumulates as a hot, pasty particle mass that accumates at the bottom of the furnace. The mass (called a bloom) is then removed from the furnace and consolidated via pounding by the operator into a lump of iron. The lump, from which the slag has been removed, is very low in carbon content and can be cold bent, requiring further work by a blacksmith to make it into usable iron. These furnaces are generally small and inefficient, producing only a few pounds of iron at a time, but well suited to testing of iron sources prior to the establishment of larger scale smelting operations.

The Fort St. George furnaces were simple bowl-shaped hearths averaging 60 cm in diameter and approximately 20 cm deep, although through the use of clay or stone walls, they could have risen much higher as they could have been the bases of shaft furnaces, another simple smelting furnace (Brain 2016:29) (Figure 1). They were charactized by high concentrations of slag, iron, daub, and charcoal and may have been abandoned after one smelt.

Robert Gordon found that the surface indications on the slag that he examined showed that it was once liquid slag that had solidified in place, as opposed to fully flowing slag drained (tapped) out of a more complex furnace (Gordon 2016:65). He concluded that it was consistent with small scale smelting in simple hearths, essentially trial smelting of small batches of ore.

A second site in New England, the Bogastowe Farms Stone House site in Millis, Massachusetts, also showed evidence of simple smelting, this time within the context of a blacksmith forge that appears to have doubled as a furnace (LaCroix 2021:147). The furnace was found beneath the floor of a 17th century house, clearly predating it. It consisted of a 3.8 x 4.8' fiedstone base for the forge and abundant evidence of bog iron ore and smelting/ smithing by products (61 pounds of slag, nails, nail rods, iron bars, coal, charcoal, bog iron, and roasted iron ore) (LaCroix 2021:147) (Figure 3). The absence of tap slag at the site, just like at the Fort St. George site, indicates a technique of not removing the slag during the small scale smelt, but the breaking free of the cooled slag from the firebox after it had hardened, allowing for the removal of the bloom (LaCroix 2021:151). It appears that the site represnted a mid 17th century smithy forge that occasionally served as a bloomery.

Robert Gordon's analysis of the slag from this site again found no flow structure, and his conclusion was that the site represented bloom smelting in a relatively simple, priobably small, hearth in which little highly-fired fluid slag was formed in the smelting process (Gordon 2021:221).

The slag samples submitted to Gordon from the Nickerson site were consistent with the findings from the Fort St. George and Bogastowe Farms Stone House sites, possibly with more evidence of flowing slag than at either of the sites. This is evidenced by the slag that had flowed over the possible tuyere pipe fragment. While Gordon states that the diameter of the pipe appears to be 20 mm and that 10 mm would have been more common, this is the outer diameter measurement of whatever the slag had flowed over. It is only logical that the inner diameter must have been some degree smaller, although it is not possible to determine how much smaller. I maintain that, at the Nickerson site, there was at least a one time trial of the local bog iron which produced a little iron (the bloom fragment we recovered) but not enough to make it economically feasible for William to

set up a full-scale bloomery at the site. The pit outside of the blacksmith forge/ workshop that was found, measured 70 cm in diameter and extended 30 sm below surface, closely matching those from Fort St. George (60 cm in diameter and extending 20 cm below surface). The distribution of slag cooresponds well with the furnace (Figure 4), and burned daub, some of which had slag attached, was found near it as well, supporting the idea that it had some form of superstructure.

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2016 *Fort St. George: Additional Archaeological Investigation of the 1607-1608 Popham Colony.* Occasional Publications in Maine Archaeology No.15, Maine Historical Preservation Commission and the maine Archaeological Society, Augusta, Me.

LaCroix, Paul

2021 *Report on the Bogastowe Farms Stone House Archaeological Investigation, 2009-2012 in Millis, Massachusetts*. Published by the author.

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2016 Appendix C: Reort on the Slag Specimens from Fort St. George. In *Fort St. George: Additional Archaeological Investigation of the 1607-1608 Popham Colony* by Jeffrey Braine, 2016.

2021 Analysis of Ironworking Evidence from Bogastowe Farms Stone House Site. In *Report on the Bogastowe Farms Stone House Archaeological Investigation, 2009-2012 in Millis, Massachusetts* by Paul LaCroix.

Figure 59. Hearths 1 and 2, looking south. Notice that hearth 2 cut into hearth 1 and then was built over it. The bedrock on which both hearths were placed is visible in the lower right corner. (Courtesy of John Bradford)

Figure 60. Hearth 3, looking west. The matchlock trigger lever protrudes from the rocks in the foreground. The flat, stacked rocks emerging in the right background belong to hearth 4. (Courtesy of John Bradford)

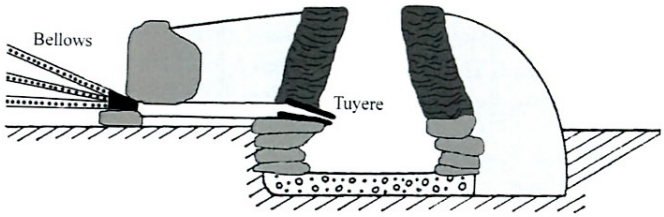

Figure 61. Reconstruction of a bloomery furnace. A bloomery could be a simple bowl hearth or for greater efficiency it could have had an added chimney made of stonework or packed clay as shown here. Evidence for chimneys on Fort St. George hearths 1 and 2 may be provided by the large amount of daub found in the soil layers above the features.

Figure 1. Fort St. George furnaces (From Brain 2016: 31)

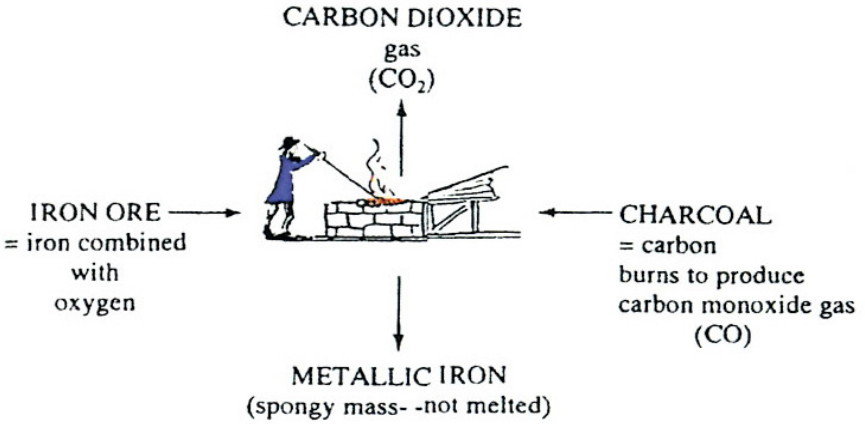

Figure 57. Illustration of an open-hearth bloomery. These furnaces would produce small amounts of iron that could be forged into objects by a blacksmith. (Adapted from Chard 1995, p. 2)

Figure 2. Smelting process (from Brain 2016:29)

Figure 86. Photo of "Parlor" section of Stone House looking west to east. In foreground is the small fieldstone evidence of west wall; proceeding east is first, the furnace base of about ten larger fieldstones, followed by the Dual Fireplace beyond that.

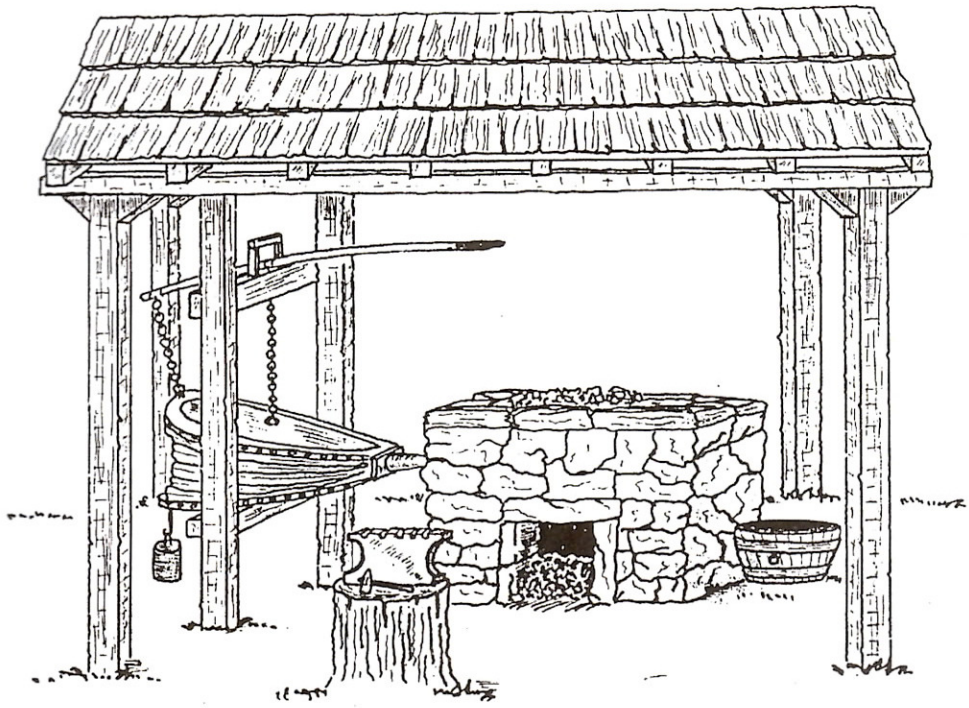

Figure 87. Conjectural Illustration of Bogastowe's Seventeenth Century smithy facilities, view looking east to west (Mirror Image of Illustration Borrowed from M.L. Brown's *Firearms in Colonial America, 1980*.).

Figure 3. Bogastowe Farms Stone House forge (From LaCroix 2021:149)

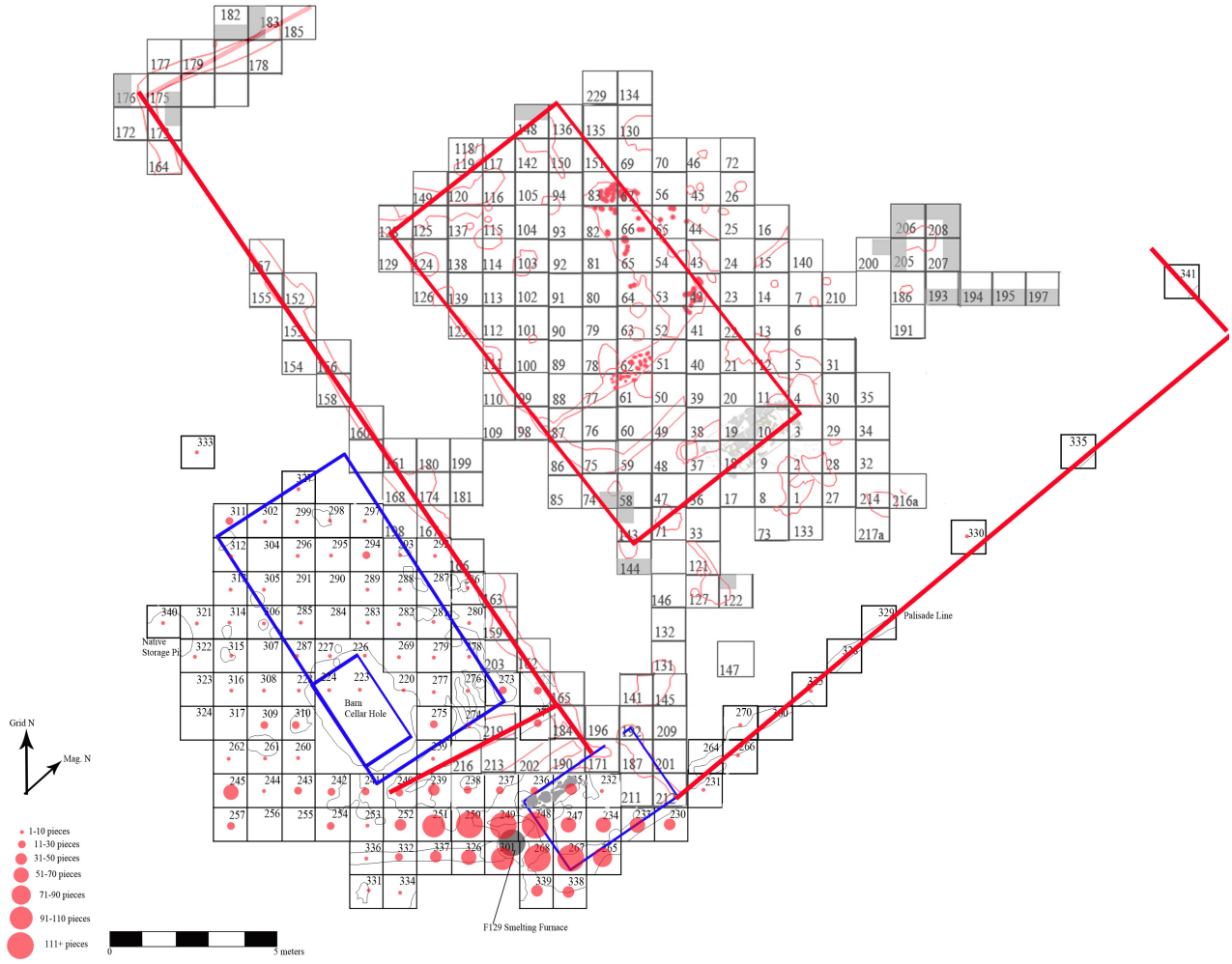

Figure 4. Slag distribution Nickerson Site

Email from Robert Gordon April 25, 2021

Here, attached is an initial report on the Nickerson-site slag specimens you sent for examination. Two of the specimens are consistent with a small-scale bloom smelting trial on the bog ore that you found at the site. Probably the trial was made in smith's hearth, where small quantities of wrought iron can be made by a skilled smith.

Since bloom smelting was a technology well know and extensively practiced in seventeenth-century England it would have been easily transferred to New England. There is supporting evidence for this, first from the excavations at the 1607-08 Fort St. George site in present-day Maine. Here the smith was searching out local ore and testing it in his hearth. This is what the people arriving at the Massachusetts Bay Colony forty years later would have known and brought with them to America. I've included some of the evidence in my recently-published paper on John Winthrop, Jr., attached.

The technique of iron smelting in a pit with a dome cover that you describe had been replaced by simpler, above ground hearths well before the seventeenth century. My guess is that someone with smithing skills at the Nickerson property did the trial on the bog ore found in the area, and my have made a small amount of metal, but went no further with the experiments.

Slag Specimens, Nickerson Excavation, Cape Cod, Preliminary Report

30 November 2021
Robert Gordon

Here is a brief report on the six slag specimens received 24 November 2021 from Craig Chartier. They are from his excavation at the William Nickerson house site in Chatham, Massachusetts, on Cape Cod, and are thought to be from a bloomery smelting trial of bog ore.

'WNH U251 NE 10-20 cm 2019'

The overall size of this specimen as received is about 50 by 50 mm in plan by about 15 mm thick. Its weight is 78 gm.

Tests with a delicately balanced knife blade shows that specimen is slightly magnetic. Visual inspection shows that this is due to iron particles embedded in the surface of slag. The interior of the specimen exposed by grinding off part of one edge revealed dense slag. The matrix is black slag that contains abundant iron particles generally 3 to 8 mm in their longest dimension. They were in the process of consolidating when the slag solidified. At 20x magnification traces of smaller iron particles can be seen within the slag matrix. Aggregation of these smaller particles formed the larger iron grains. The features in this specimen are similar to those commonly found in bloomery smelting slag.

'WNH U249SE F129'

A photograph of this artifact appears as Image 11, 'Tuyere Pipe,' in 'A summary of the 2019 William Nickerson House Dig in 35 Images.'

The overall dimensions of the specimen are 40 mm long by 17 mm wide and 10 mm deep with an additional 15 mm agglomeration of slag at one place. It weighs 17 gm.

The entire specimen is black slag that solidified on a cylindrical surface. It is not magnetic and no iron metal is visible at 20x magnification.

Measurement of the chord and depth of the cylindrical surface show that the slag flowed over, and solidified on, a cylindrical object that was 20 mm in diameter. The external shape of the slag suggests drops of liquid the fell on, covered, and then solidified on the cylindrical object. The bottom part of the slag flow appears to have been later broken off leaving the now-visible fracture surfaces.

The slag is black, free of included iron, and contains traces of fine sand grains. The texture of the cylindrical surface doesn't show what the cylindrical object the slag solidified on may have been, but the surface, an accurate cylinder, was not perfectly smooth.

If the cylindrical object on which the slag solidified were a ceramic tuyere pipe, the hole diameter in the tuyere would have been less than about 10 mm. If it were a metal tuyere nozzle it is unlikely that the outer surface would have survived intact the contact with molten slag. It is more likely that the slag solidified on a solid rod, probably an iron tool, about 20 mm in diameter.

'WNH U138SE P2 8/30/18'

Overall dimensions of this object are 43 by 20 mm. It weighs 11.4 gm.

This appears to be a piece of light weight, light gray color, iron-free slag.

'WNH U192 Su 20-30 cm 9-20-18'

There are three pieces, all iron-free slag.

Interpretation

The available evidence is consistent with a smelting trial of the bog ore that was found at the Nickerson site. The trial may have been done in a common smithing hearth where iron tools were in use. This would be compatible with existing historical and archaeological evidence from seventh-century New England.

A smith was among the men at Fort St. George, the 1607-8 short-lived Popham Colony that was in present-day Maine. Among his other tasks the smith was searching for iron ore that could be bloomery-smelted using the locally abundant wood for charcoal fuel. Iron the colonists made could be used at the

colony or as a possible export commodity. The smith tested his ore samples in his smithing hearth [Gordon 2016].

A 'bloomer' accompanied John Winthrop, Jr., in his 1646 search for an ironworks site in the Massachusetts Bay Colony. The bloomer would have carried out trials to assess ore quality, probably using either a small, cylindrical shaft furnace of the type then common in England, or a smithing hearth. There is some sparse evidence of other early seventeenth-century searches and trials of bog ore elsewhere in Massachusetts, as at the Bogastowe site [LaCroix 2021].

Large-scale bloom smelting was underway at a number of Massachusetts locations contemporary with, and also later than, the Saugus ironworks. These are well documented in the historical record. One substantial late seventeenth-century bloomery forge site now on the National Register awaits full archaeological investigation [Gordon 2021]. A trial by Nickerson at Chatham would fall within the context of these endeavors.

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