# Review of Explorations, Archaeological Findings and Original Workings at Smith's Cove Oak Island, Nova Scotia



Presentation By
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and
John Wonnacott
August 12, 2006
Western Shore
Nova Scotia



### **Format of Presentation**

### 1. Part 1 by Les MacPhie

Review of Searchers' work at Smith's Cove

### 2. Part 2 by John Wonnacott

Engineering analysis of original work at Smith's Cove

### **Outline for Part 1 of Presentation**

- 1. Objectives of Review
- 2. Geological Setting
- 3. Review of Findings by Searchers up to 1965 at Smith's Cove
- 4. Findings by Triton in 1970 Excavation at Smith's Cove
- 5. The Location of the 1850/66 Cofferdam
- 6. Evaluation of Carpentry Marks, Saw Marks and Nails Associated with the Timber Structure
- 7. Summary of Evidence for Time Frame of Smith's Cove Workings
- 8. Conclusions on Flood System, Timber Structure and Time Frame of Smith's Cove Workings
- 9. Acknowledgements

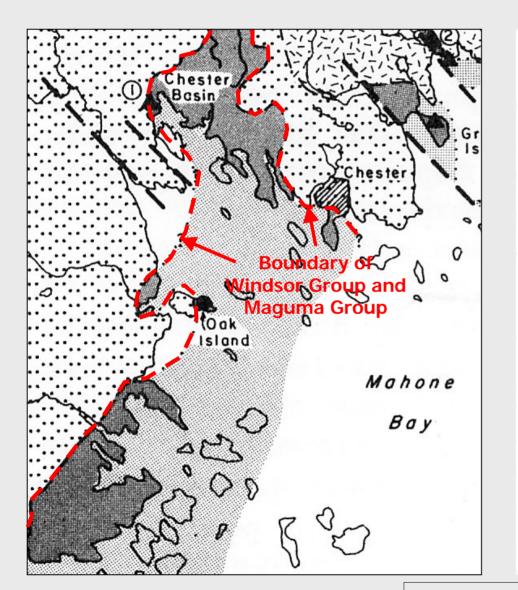
# 1. Objectives of Review

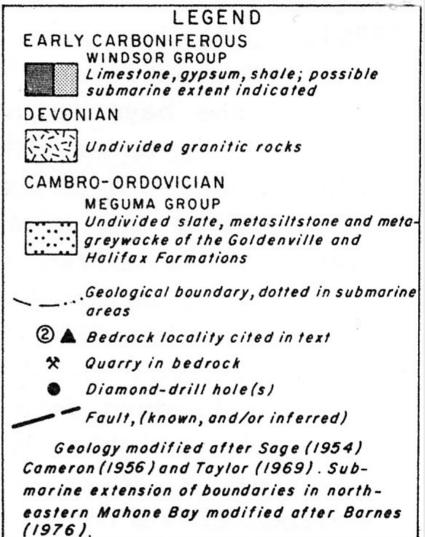
- 1. Provide a review and analysis of major explorations by Searchers in the Smith's Cove area with the objectives of:
  - Examining the evidence for the flood tunnel
  - Evaluating the timber structure exposed in 1970 as original work or Searchers' work and
  - Defining the time frame of the original workings.
- 2. Share information and ideas with the ultimate objective of solving the Oak Island Mystery by the cooperative effort of researchers and interested parties.

# 2. Geological Setting

- Bedrock and surface geology
- 2. Glacial flow and deposition
- 3. Sea level rise
- 4. Offshore bottom conditions at Smith's Cove
- 5. Recent changes from aerial photos 1929 to 1992
- 6. Conclusions on geology

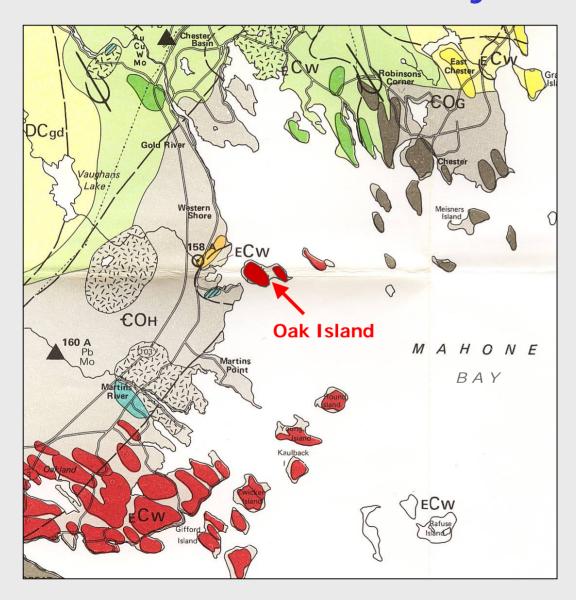
# **Bedrock Geology Western Mahone Bay**

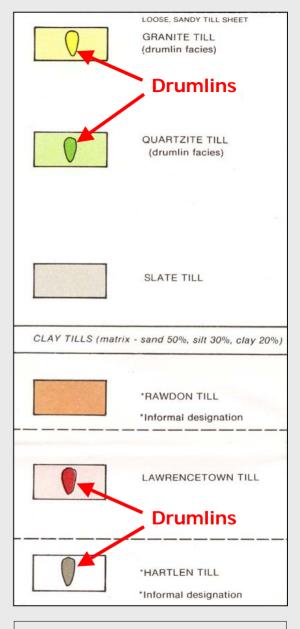




Ref: Giles 1981

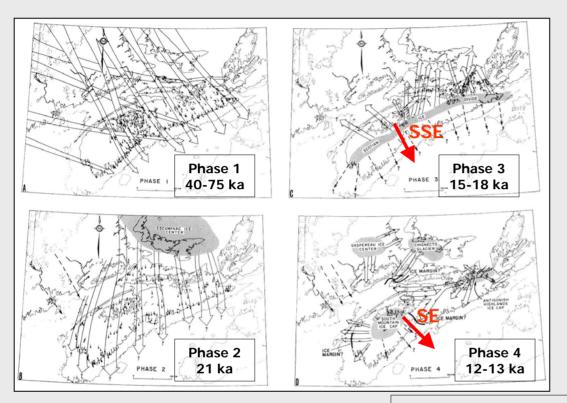
# Surface Geology and Drumlins Western Mahone Bay

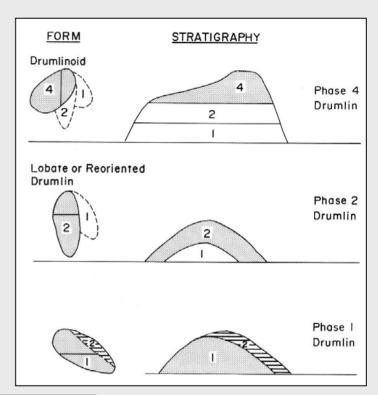




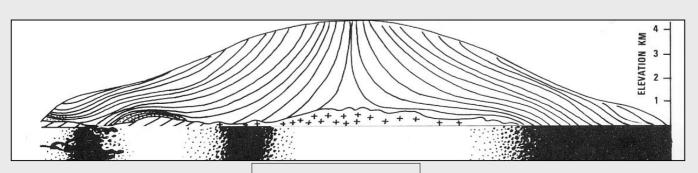
Ref: Stae and Fowler 1981

### **Effect of Glacier Flow on Drumlin Formation**



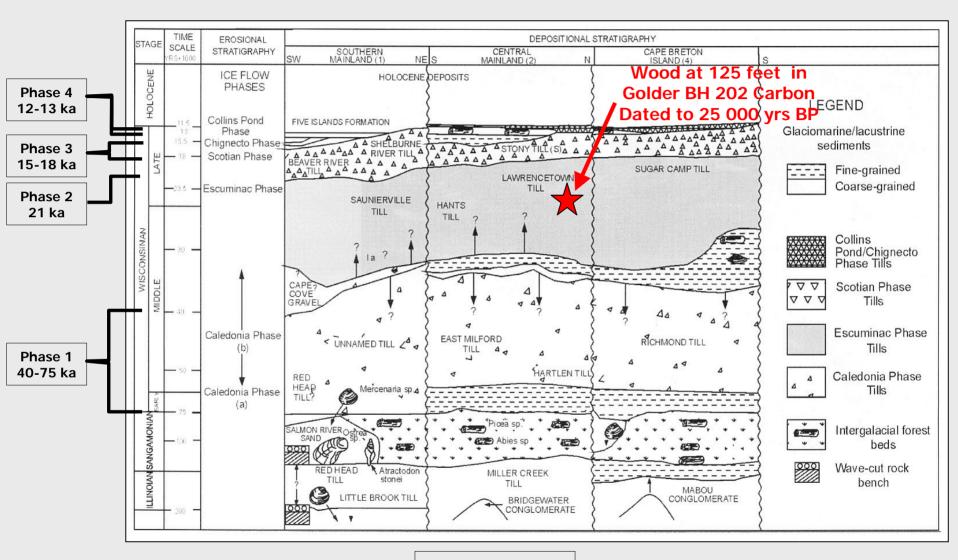


Ref: Stae and Brown 1989



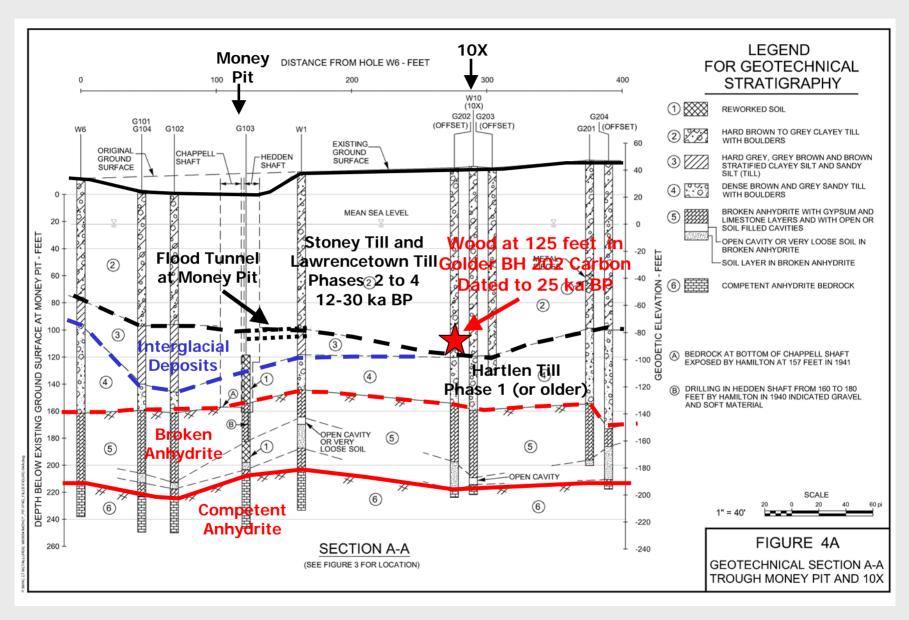
Ref: Eyles 1983

# Chart of Glacial Deposition in Nova Scotia

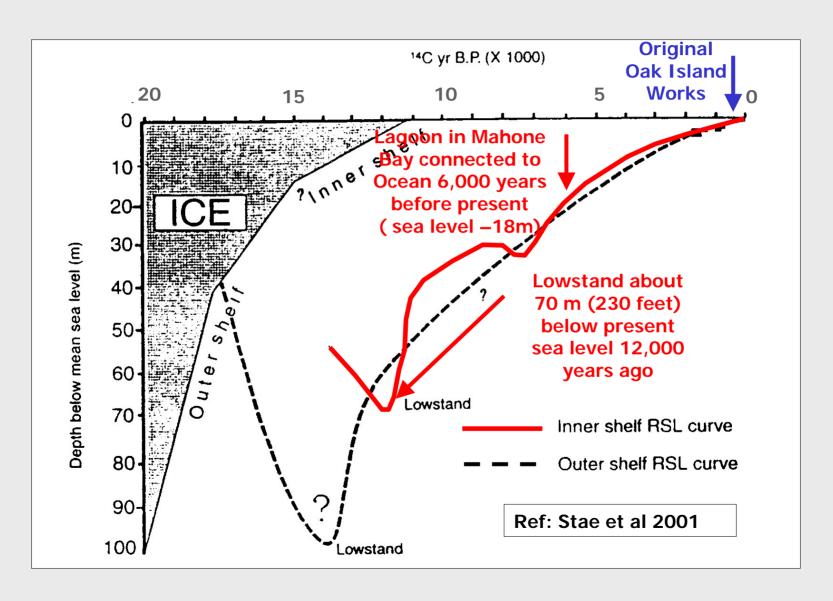


Ref: Stae 2004

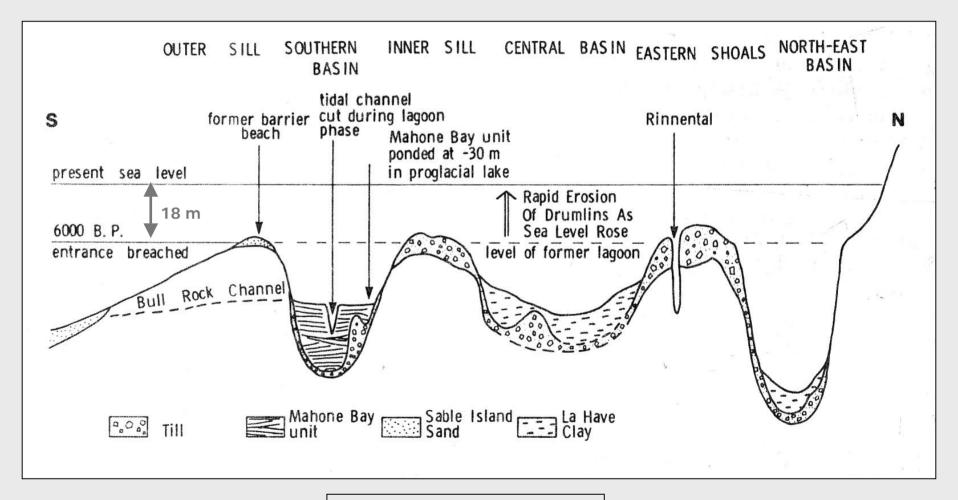
# Glacial Till Layers at Money Pit and 10X



### Relative Sea Level Curve for Atlantic Canada



# Connection of Mahone Bay to Ocean 6000 Years BP

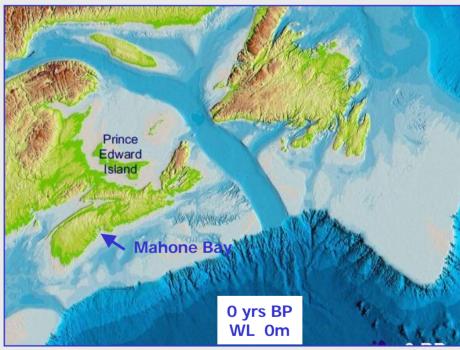


**Ref: Barnes and Piper 1978** 

# PEI not an island Continential Shelf Mahone Bay a Laguon 8000 yrs BP WL -30m

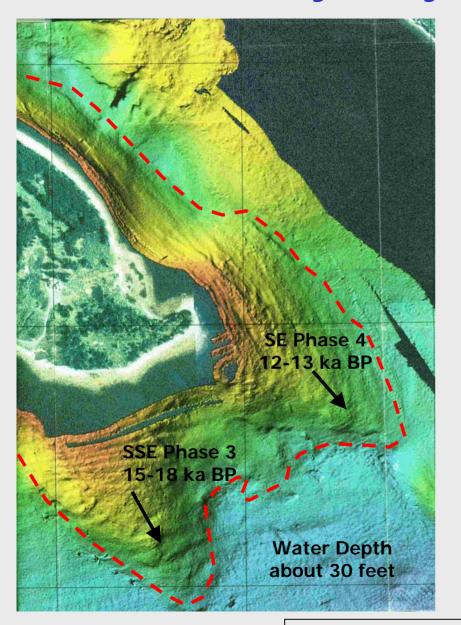
# Prince Edward Island Mahone Bay Connected to Ocean 6000 yrs BP WL -18m

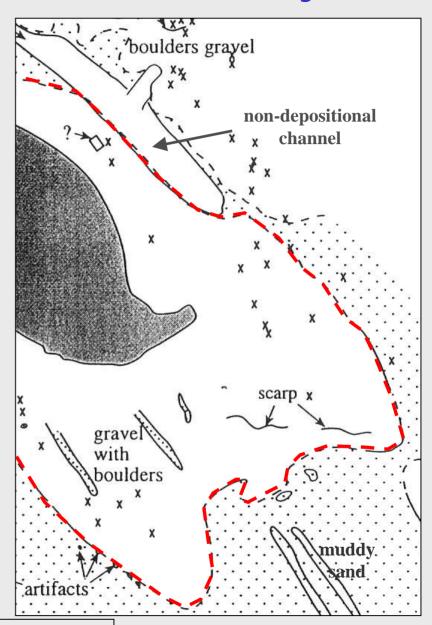
# Land Submergence with Rise in Sea Level



Ref: Daigle 2005

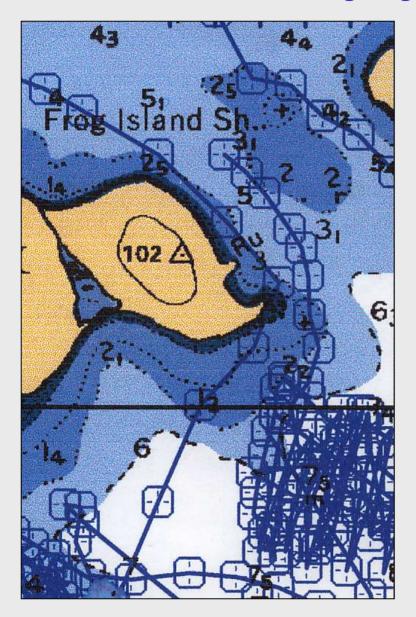
# Mutlibeam Bathymetry at Oak Island July 1996

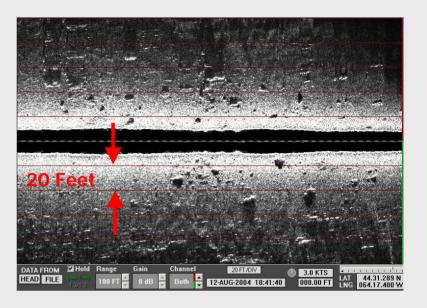


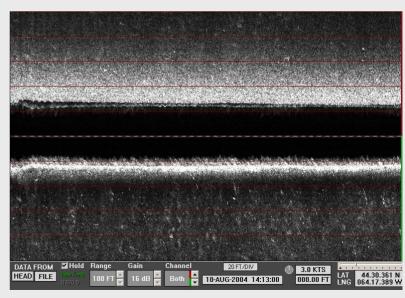


**Ref: Fader and Courtney 1998** 

# **Side Scan Survey by Dave Delaney Aug 05**







### Oak Island Air Photos 1929 to 1992









# **Conclusions on Geology**

- 1. The deep soil deposits at the east end of Oak Island consist of drumlin formations resulting from different phases of glacial advance over the past 75 thousand years.
- 2. The deep soil deposits are glacial tills of low permeability and the presence of natural pervious zones is very unlikely.
- 3. The sea bottom features around Oak Island are mainly the result of different directions of glacial advance followed by erosion and wave action during sea level rise.

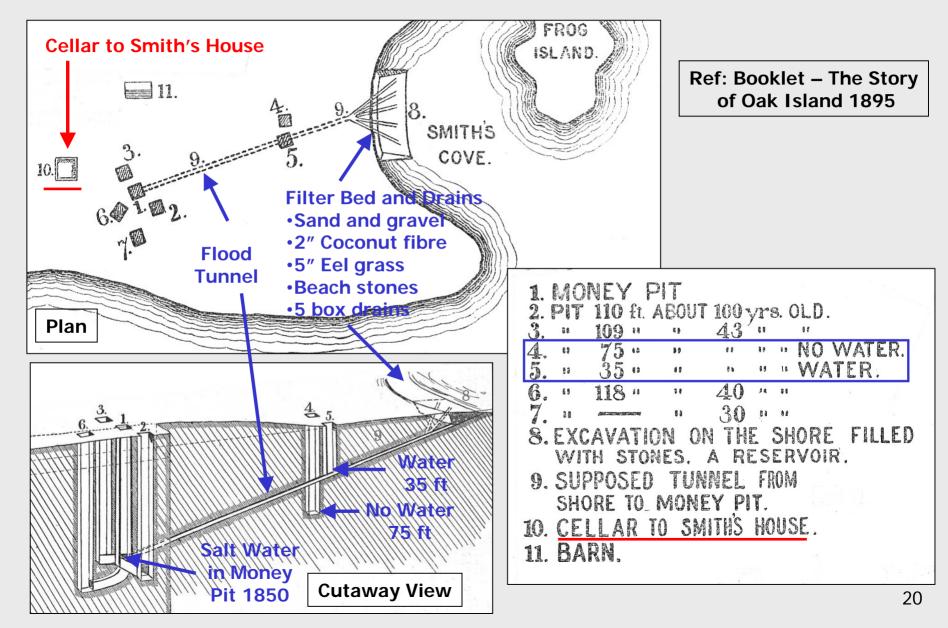
# 3. Review of Findings by Searchers up to 1965 at Smith's Cove

- 1. List of major explorations and earthworks at Smith's Cove
- 2. Review of historical information on flood system at Smith's Cove
- 3. Interpretation of evidence for flood tunnel
- 4. Conclusions on filter bed and flood tunnel

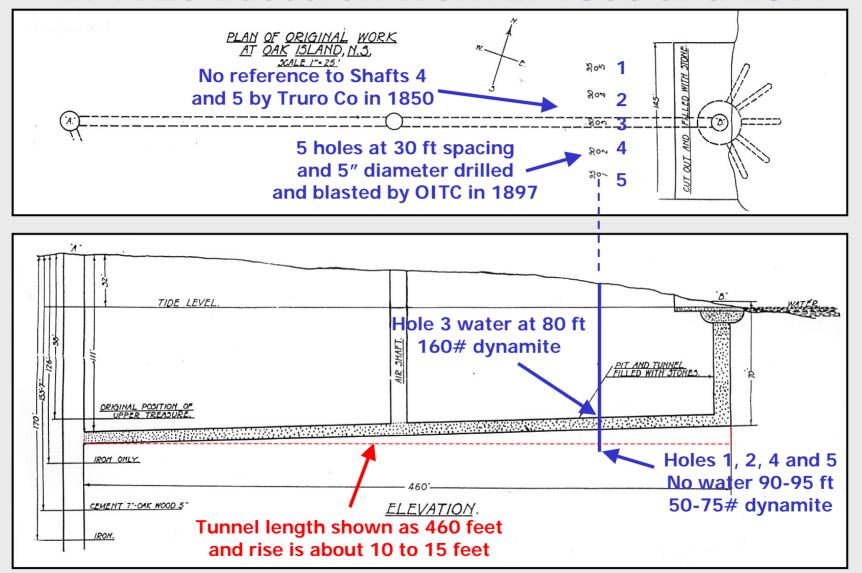
# List of Major Explorations and Earthworks at Smith's Cove up to 1965

- 1. 1850 cofferdam and excavation by Truro Syndicate
- 2. 1866 cofferdam and excavation by Halifax Group
- 3. 1897 drilling and down hole blasting by Oak Island Exploration Company near shore to block flood tunnel
- 4. 1937 Gilbert Hedden finds timbers with cross members attached by oak pegs
- 5. 1960 to 1965 exploration by Robert Restall
- 6. 1965 exploration by Robert Dunfield

# Drawing of Flood Tunnel and Filter Bed Published in 1893/95 Based on Work in 1850



# Drawing of Flood Tunnel and Filter Bed Published in 1926 Based on Work in 1850 and 1897



Ref: Booklet – History of Oak Island, Nova Scotia, and of the Work Done There at Different Times to Recover Buried Treasure 1926

# Summary of Flood Tunnel Evidence at Shafts 4 and 5 (1850) and Holes 1 to 5 (1897)

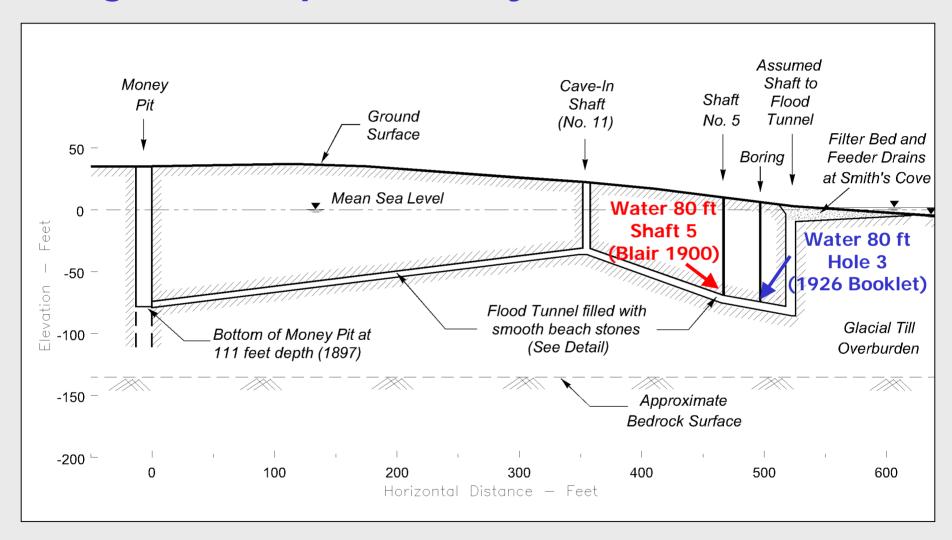
Source	Author(s)	Description
The Nova Scotian Aug 20, 1861	Unknown	Two shafts struck flood tunnel No depth reported
Liverpool Transcript Oct 16, 1862	J. B. McCully Manager of Operations Truro Company 1845-50	Shaft struck water, piles driven No depth reported Flow at Money Pit reduced
Letter 1863	James McNutt Oak Island Association	Shaft struck drain at 75 feet, spiles driven Flow at Money Pit reduced
The Colonist Jan 2 and 7, 1864	A Member of the Oak Island Association	Shaft struck drain at 74 feet, piles driven Flow at Money Pit reduced
Prospectus of the Oak Island Treasure Company 1893/95	Frederick Blair and Adams A. Tupper (at OI Summers 1850-51-63)	Shaft 4 to 75 feet, no water Shaft 5 to 35 feet, struck water after prying up a large boulder
Prospectus of Oak Island Treasure Company, 1900	Frederick Blair and others	First shaft no water, no depth reported Second shaft water at 80 feet after prying up large boulder, no ref to 5 holes (see Note)
History of Oak Island Booklet, 1926	Frederick Blair and others	No ref to Shafts 4 and 5 Detailed results given for 5 holes in 1897 and flood tunnel at 80 feet (see Note)

Note: In 1897 the Oak Island Treasure Company drilled 5 holes of 5 inch diameter to depths of 80 to 95 feet across the alignment of the flood tunnel at a location 50 feet from the high water line. No water in Holes 1, 2, 4, and 5, set off 50 to 75 pounds of dynamite in each hole. Hole 3 in the middle found salt water and boulders at 80 feet, set off 160 pounds of dynamite.

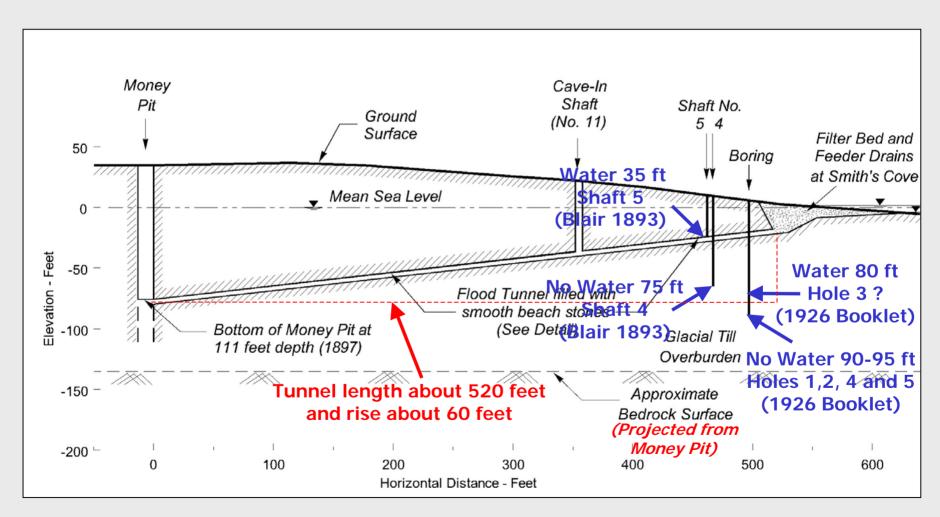
# **Summary of Flood Tunnel Evidence at Cave-in Pit**

Source	Author(s)	Description
Various	Various	Sophia Sellars oxen fell into Cave-in Pit in 1878
Prospectus of Oak Island Treasure Company, 1900	Frederick Blair and others	Excavated to 52 feet in 1894 in previously dug circular hole 6 to 8 feet diameter. Drilled to 16 feet below bottom of pit, next day salt water in pit.
History of Oak Island Booklet, 1926	Frederick Blair and others	The workers of the Oak Island Treasure Company opened the Cave-in Pit to 55 feet, found salt water at that depth and quit.

# Flood Tunnel and Filter Bed Profile Original Interpretation by Harris and MacPhie



# Flood Tunnel and Filter Bed Profile New Interpretation of Evidence

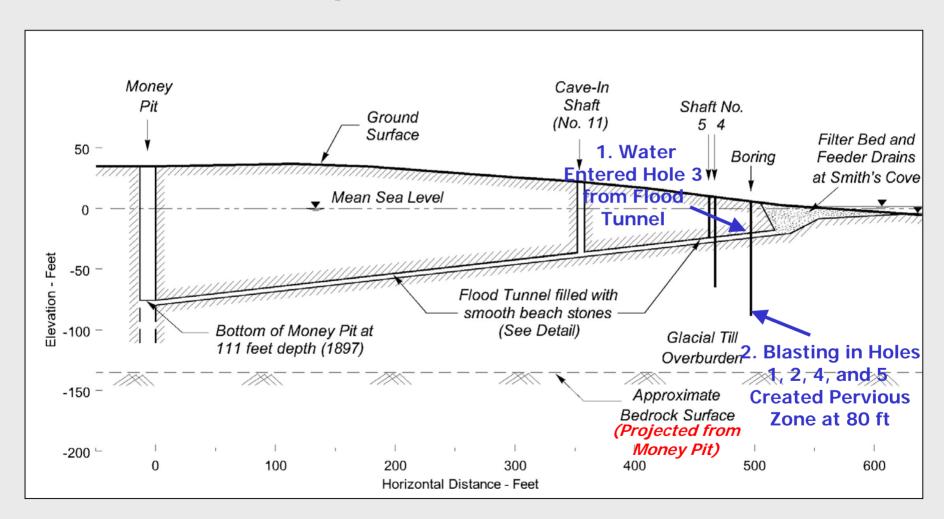


# Possible Interpretations of Salt Water in Hole 3 in 1897

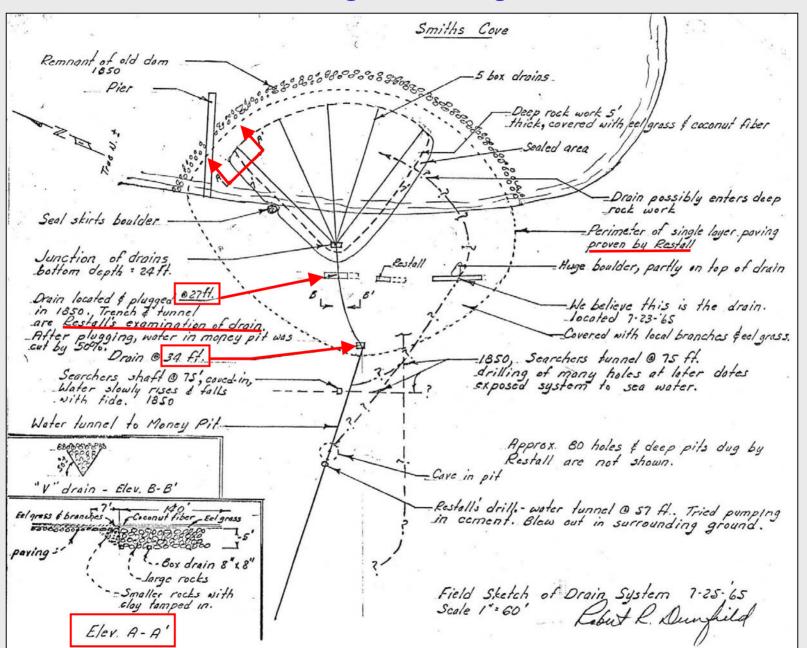
Two possible interpretations of how Hole 3 in 1897 encountered salt water and boulders at 80 feet depth

- 1. Hole 3 was close to the flood tunnel and, when the hole was at 80 feet (say on boulders in the till), the salt water broke in from the flood tunnel which projects to a depth of about 30 feet at Hole 3.
- 2. The extensive blasting in Holes 1, 2, 4 and 5 disturbed the till (and possibly bedrock) at 80 to 95 feet depth making a highly pervious zone which yielded salt water in Hole 3 at 80 feet. Based on the Ghyben-Hertzberg relationship salt water would be expected at this location.

# Flood Tunnel and Filter Bed Profile Possible Interpretations of Water in Hole 3



# **Sketch of Drain System by Dunfield 1965**



### The Case for the Flood Tunnel

- 1. The possible presence of pervious zones in the till is remote due to the geological origin of the till.
- 2. If the flood system was natural, the original workers would have been flooded out.
- 3. Salt water was encountered on second flooding of the Money Pit in 1850 and fresh water would be expected at that depth. Fresh water was found in some inland pits at depths of up to about 130 feet.
- 4. In 1897 the entrance to the flood tunnel at the Money Pit was exposed at 111 to 114 feet depth.
- 5. Blasting in Hole 3 in 1897 caused boiling of water in the Money Pit and Cave-in Pit.

### **Conclusions on Filter Bed and Flood Tunnel**

- 1. The filter bed (with coconut fibre and eel grass) and box drain system in the tidal zone at Smith's Cove is original work.
- 2. A flood tunnel from Smith's Cove to the Money Pit was part of the original work although there is some uncertainty in the configuration of the tunnel profile.

# 4. Findings by Triton in the 1970 Excavation at Smith's Cove

- 1. Overview of 1970 Cofferdam and Excavation
- 2. Photos of artifacts
- 3. Analysis of artifacts
- 4. Photos of U shaped timber structure
- 5. First analysis of U Shaped timber structure

### **Overview of 1970 Cofferdam and Excavation**



**Start of Construction September 1970** 



**Aerial View 1969 Before Cofferdam** 

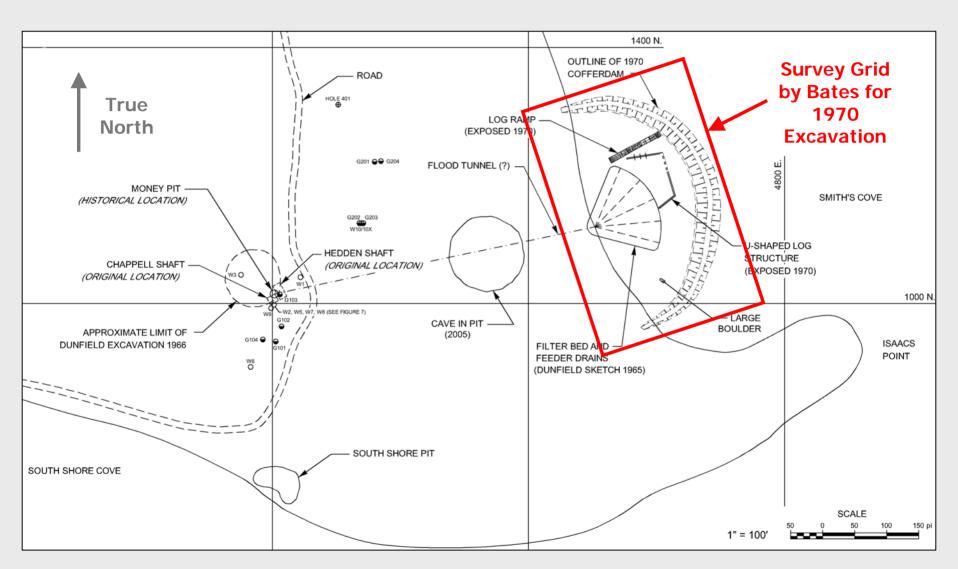


**Wave Action October 4, 1970** 

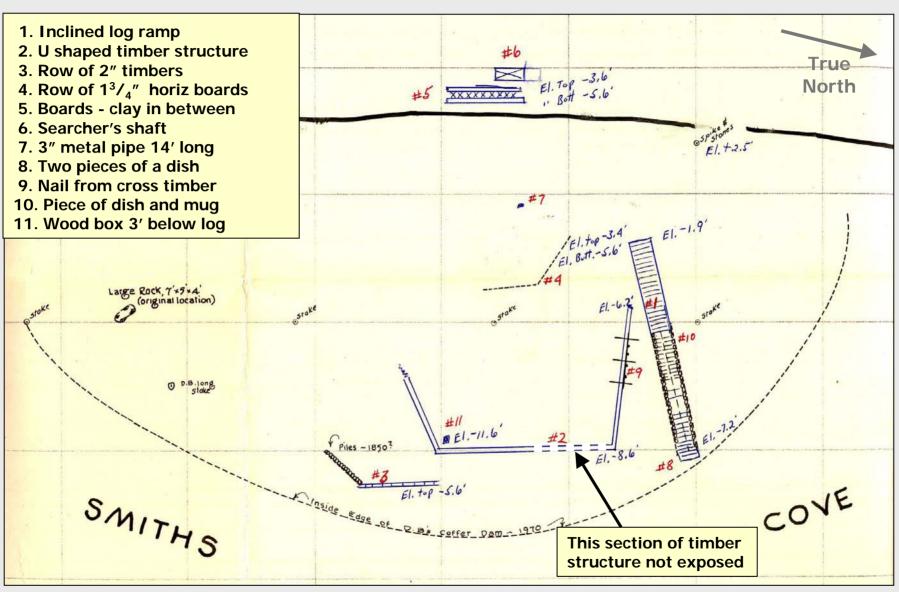


Aerial View October 8, 1970

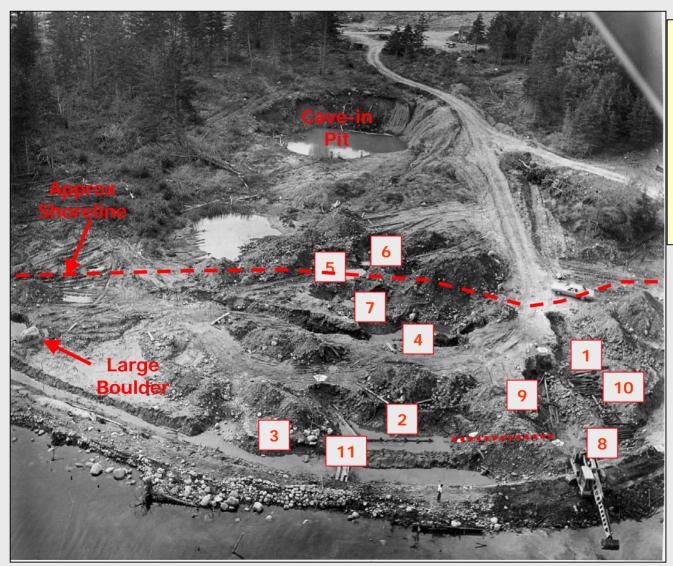
# Plan of 1970 Cofferdam and Excavation at Smith's Cove



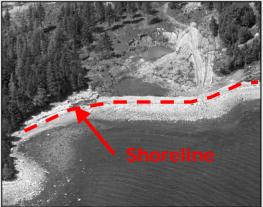
### **Bates and DB Survey of 1970 Excavation**



### Aerial View Oct 8, 1970 and Artifact Locations



- 1. Inclined log ramp
- 2. U shaped timber structure
- 3. Row of 2" timbers
- 4. Row of  $1^3/_{4}$ " horiz boards
- 5. Boards clay in between
- 6. Searcher's shaft
- 7. 3" metal pipe 14' long
- 8. Two pieces of a dish
- 9. Nail from cross timber
- 10. Piece of dish and mug
- 11. Wood box 3' below log



1969

### Photos of Artifacts at Smith's Cove



Wood Box (sides and bottom oak, ends spruce)
Plank 19<sup>1</sup>/<sub>2</sub> inches wide (eastern hemlock)



Wood Box Insitu
3 ft below timber structure

Wrought Iron Rule

Cast Iron, Dish, Wood

#### Photos of Artifacts at Smith's Cove

Spanish American Scissors Reportedly found under a drain at Smith's Cove, scissors are about 8" long

Smithsonian Institution indicated such scissors were made as late as mid 19<sup>th</sup> century





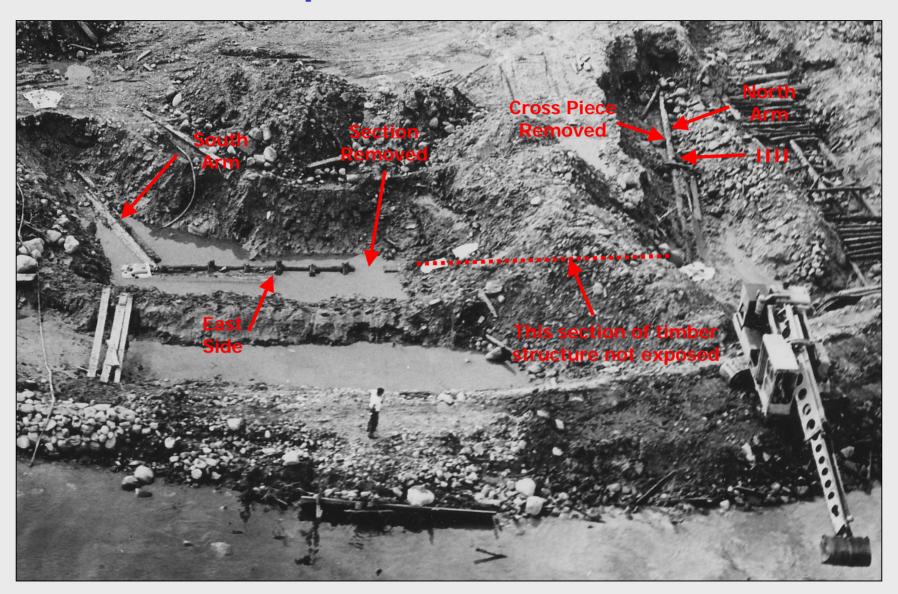
Heart Shaped Stone Found in 1967 in the tidal zone of Smith's Cove at 3 ft depth

Smithsonian Institution indicated stone was "a man-made shape"

#### **Analysis of Artifacts**

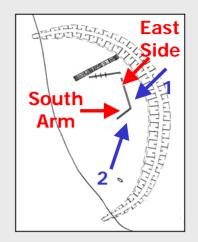
- 1. Metal Rule (DIAND Fortress of Louisbourg Report Nov 25, 1970)
  - -Rule is hand made
  - -Numbers and lines made with set of mixed punches
  - -"Stick my neck out" estimate first half of 19th century (1800 to 1850)
- 2. Metal Rule (Stelco Report Dec 14, 1970):
  - Wrought iron rule (possibly part of square) difficult to date
  - Wrought iron rules introduced late 1500s to early 1600s
  - Figures and marks hand engraved
  - Made before 1783 "as a guess"
- 3. Photo of Wood Box (DIAND Fortress of Louisbourg Report Nov 25, 1970)
  - -Don't know what it is
- 4. Pottery Fragment (DIAND Fortress of Louisbourg Report Nov 25, 1970)
  - -First half of 19th century (1800 to 1850)
- 5. Five Nails/Spikes and one Tool (Stelco Report Sept 25, 1970)
  - -Wrought iron, hand forged
  - -Two microsections show low carbon stock with slag stringers
  - -From microsections and hand working, items produced prior to 1790
  - -Nail from cross piece is machine-sheared from plate 5/32" thick
- 6. Spanish American Scissors (Smithsonian Institution Report Dec 22, 1967)
- -"made in this manner as late as the mid-19th century in North Mexico and Southwest United States"

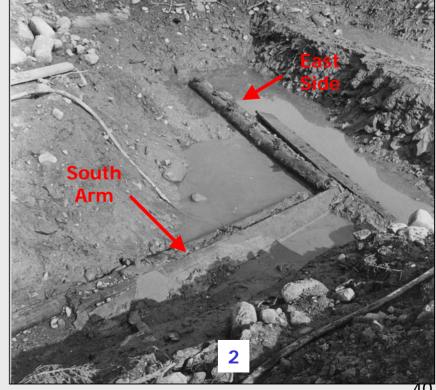
### **U Shaped Timber Structure**



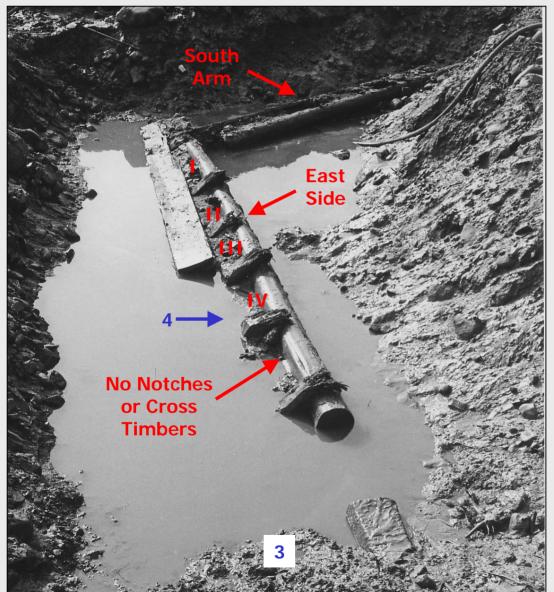
#### **Photos South Arm and East Side of Structure**

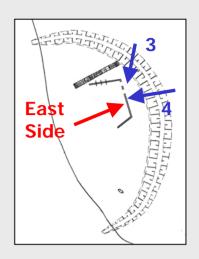


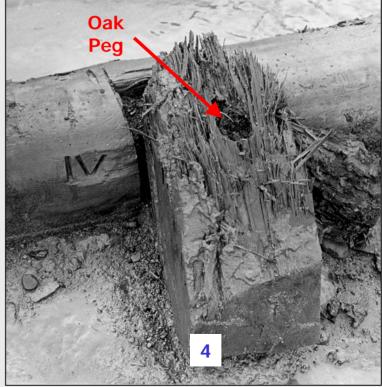




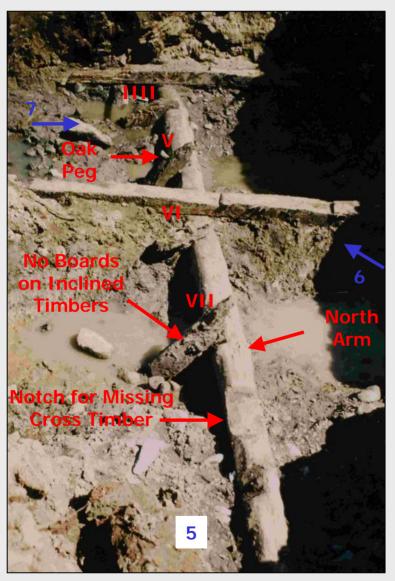
#### **Photos East Side of Timber Structure**

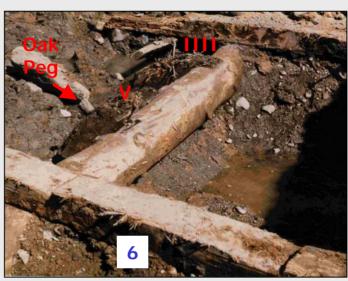


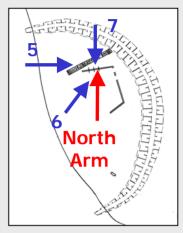




#### **Photos North Arm of Timber Structure**

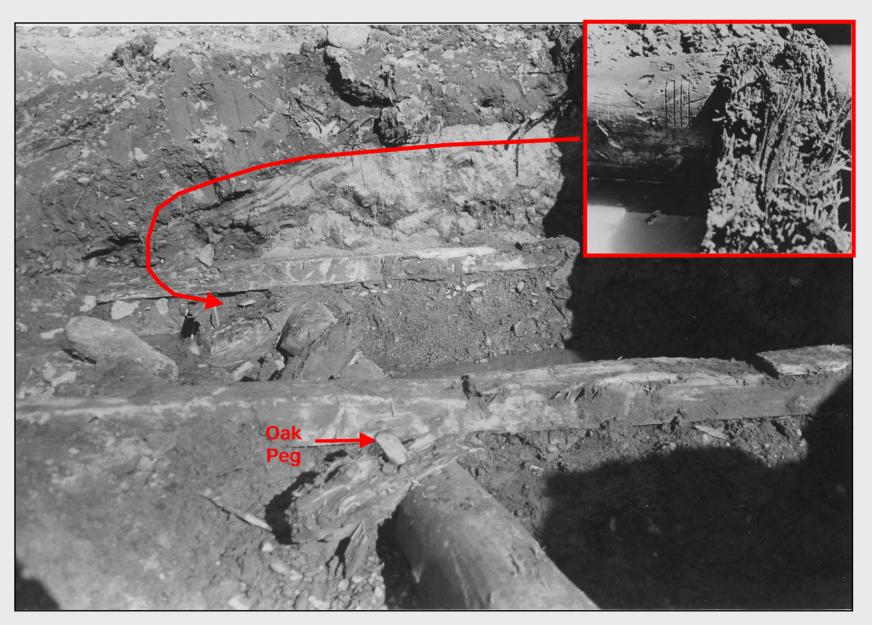








### **Photos North Arm of Timber Structure**



### First Analysis of Timber Structure Original Work or Searchers' Work

- 1. John Dunton (DIAND Fortress of Louisbourg Report Nov 25, 1970) examined photos of the timber structure and did not know what it was "as much in the dark as you."
- 2. The Roman numerals on the the north arm of the timber structure show different workmanship from those on the east side. The cross timbers at the north arm are not present at the east side and the south arm. Could the north arm be of different origin?
- 3. Carbon dating in 1969 and 1970 on samples of the timber structure give dates ranging from about 300 to 1100 years before present (950 to 1650) and cannot be used to reliably determine the age of the structure although one recent result on the north arm gives a later date.
- 4. The wrought iron nails and spikes were dated prior to 1790 by Stelco although one nail from the north arm was machine-sheared (cut nail).
- 5. There is conflicting evidence for the timber structure as original or Searchers' work so two further areas of investigation were pursued:
  - If the timber structure is significantly offset from the 1850 and 1866 cofferdams it is more likely original work. What are the respective locations?
  - The chronology of using Roman numerals to mark timber joints, and of using cut nails, may give a time frame for the timber structure.

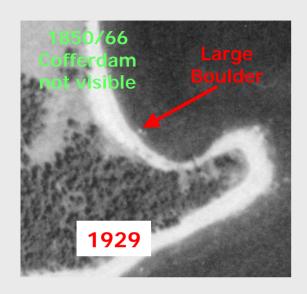
### 5. The Location of the 1850/66 Cofferdam and the Timber Structure

- 1. Relevance of cofferdam and timber structure locations
- 2. Air photos of Smith's Cove 1929 to 1992
- 3. Old photos of Smith's Cove Pre-1897
- 4. Cofferdam surveys compared to air photos
- 5. Survey of U shaped timber structure compared to air photos
- 6. Conclusions on location of 1850/66 cofferdam

### Relevance of the 1850/66 Cofferdam and Timber Structure Locations

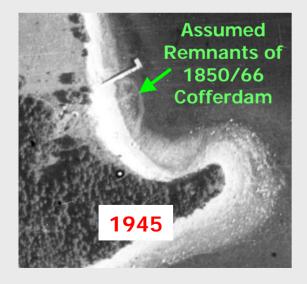
- The U shaped timber structure may be the remnant of cofferdam construction by Searchers in 1850 and 1866 or may be original work.
- 2. The location of the timber structure in relation to the previous cofferdams will provide information to assess this issue.
- 3. If the timber structure is a significant distance from the 1850/66 cofferdam location then it is original work. If the timber structure is at the same location as the 1850/66 cofferdam then it may or may not be original work.

#### Aerial Photos of Smith's Cove 1929 to 1992





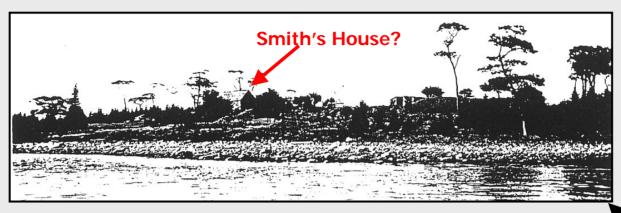


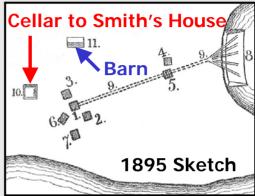


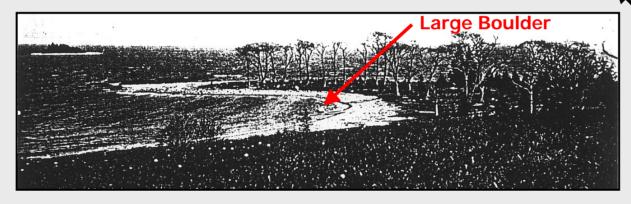




#### Pre-1897 Photos of South Shore and Smith's Cove

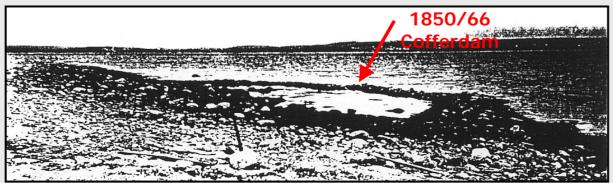






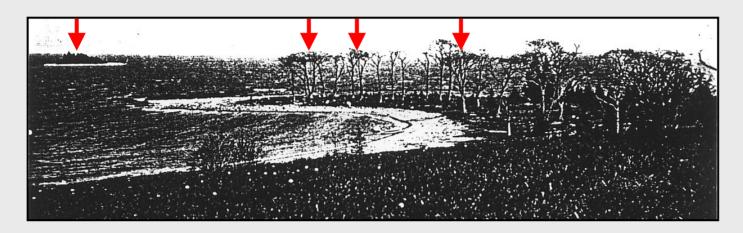
Money Pit Area from South Shore Cove

Smith's Cove Looking toward Isaac's Point at High Tide

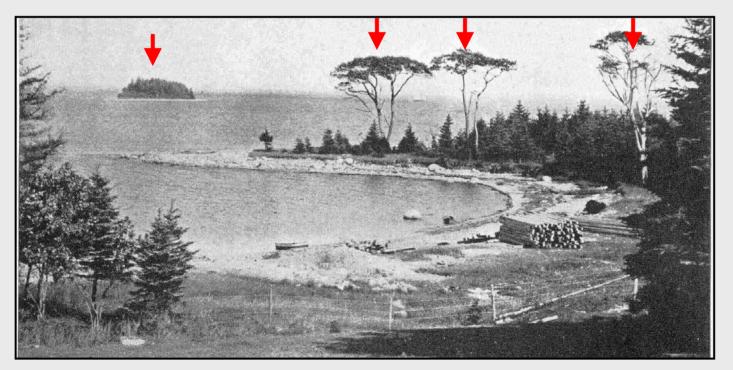


Cofferdam at Smith's Cove Looking Northeast at Low Tide

### Comparative Photos of Smith's Cove Pre-1897 and About 1897

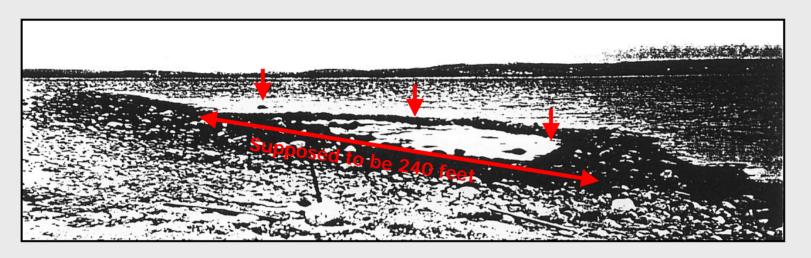


Smith's Cove Looking toward Isaac's Point Pre-1897

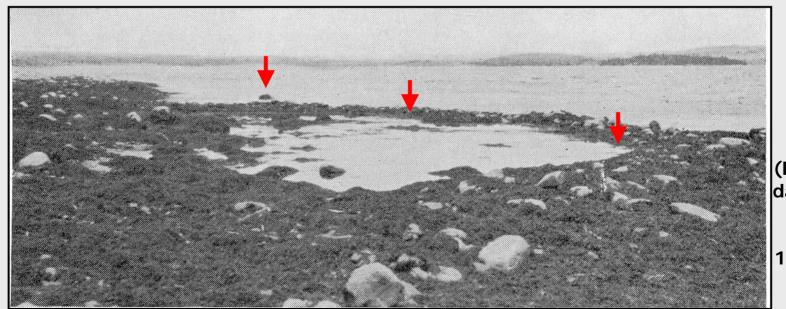


Smith's Cove Looking toward Isaac's Point About 1897 (R V Harris 1958 and 1967)

### Comparative Photos of 1850/66 Cofferdam Pre-1897 and from R V Harris Book

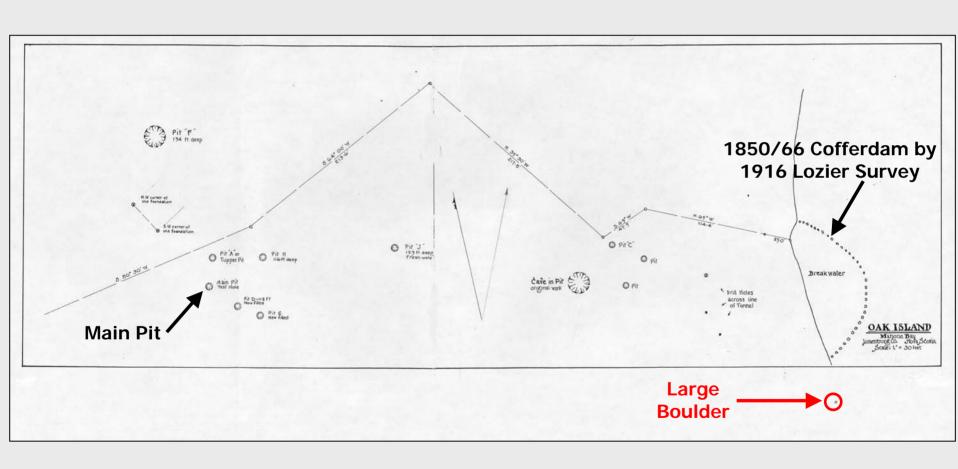


Cofferdam at Smith's Cove Looking Northeast at Low Tide (Pre-1897)

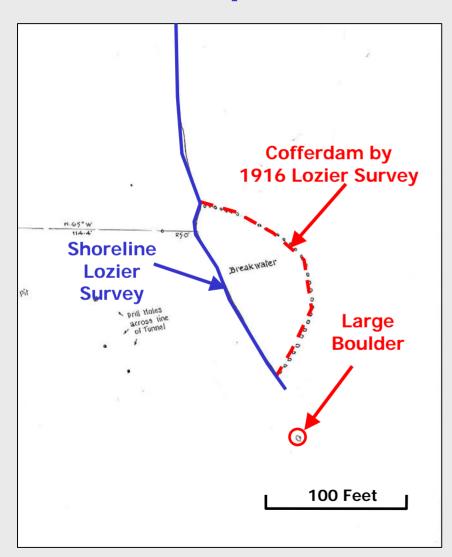


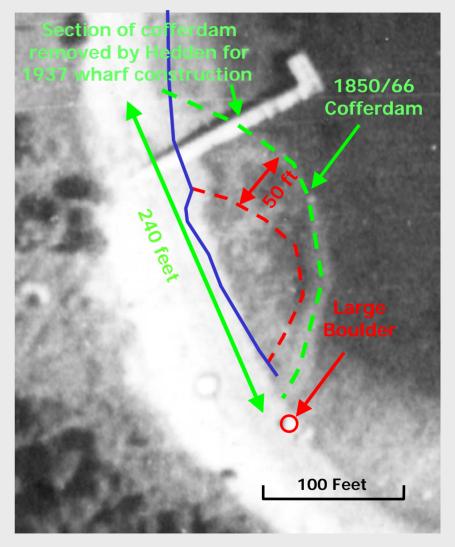
Cofferdam at
Smith's Cove
Looking
Northeast
at Low Tide
(R V Harris Book,
date of photo not
provided but
described as
1866 Cofferdam)

# Part of the Lozier Survey of 1916 (Redrawn)



# Cofferdam from 1916 Lozier Survey Compared to 1850/66 Cofferdam

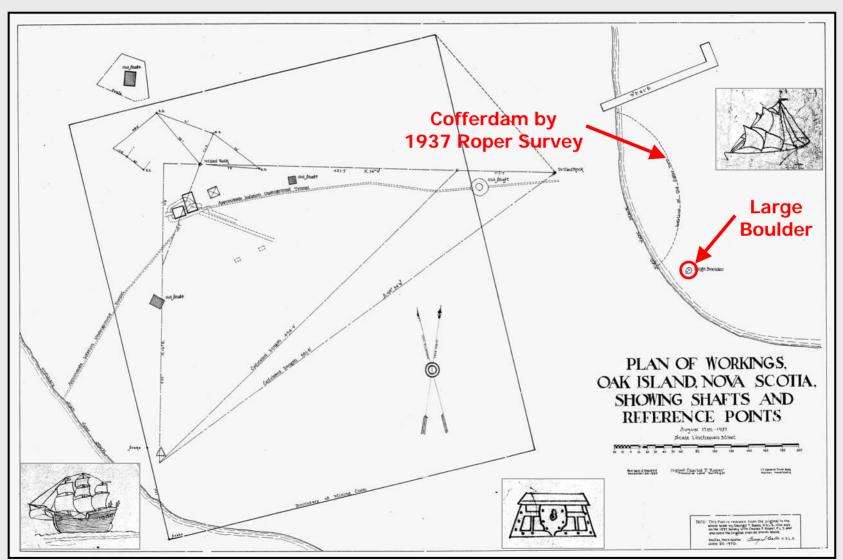




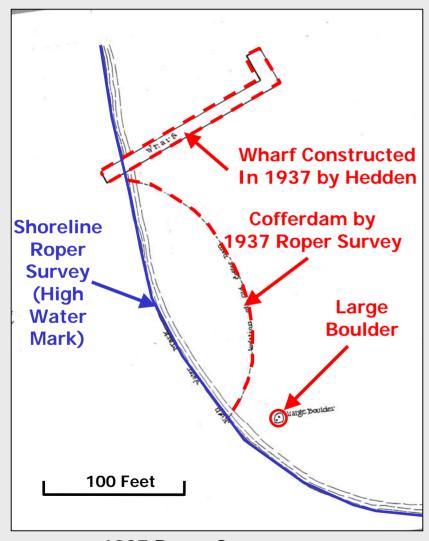
1916 Lozier Survey

1945 Air Photo with Cofferdam by Lozier Survey

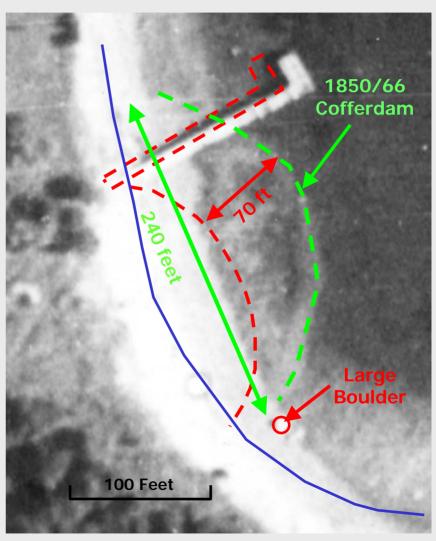
### The Roper Survey of 1937 Redrawn by George T Bates 1970



# Cofferdam from 1937 Roper Survey Compared to 1850/66 Cofferdam

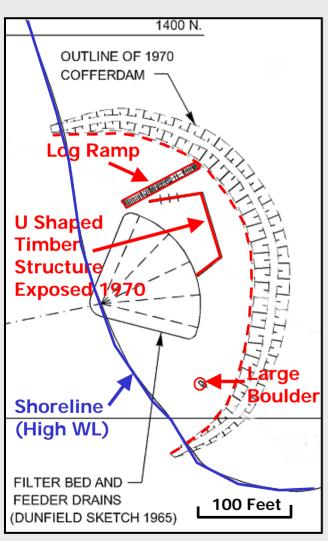


**1937 Roper Survey** 

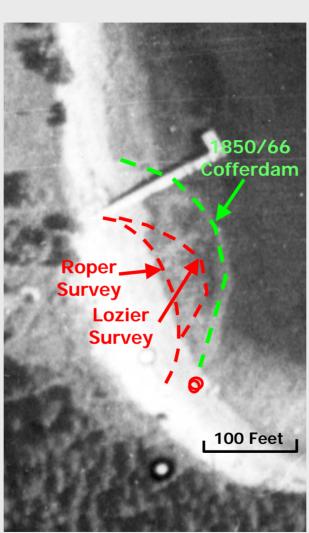


1945 Air Photo with 1866 Cofferdam by Roper Survey

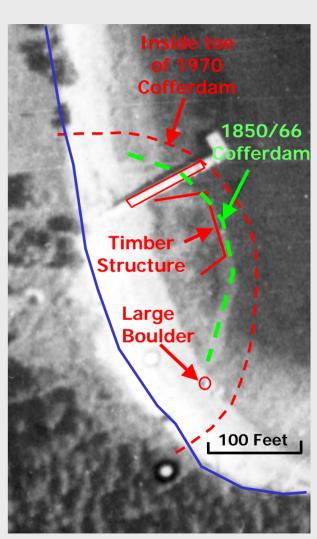
### 1970 U Shaped Timber Structure Compared to 1850/66 Cofferdam on 1945 Air Photo



**Sketch of Smith's Cove** 



1945 Air Photo with Cofferdams by Lozier and Roper Surveys



1945 Air Photo with 1970 and 1850/66 Cofferdams, 55 and Timber Structure

### Conclusions on the Location of the 1850/66 Cofferdam and the Timber Structure

- 1. The Lozier survey of 1916 and the Roper survey of 1937 show the cofferdam some 50 to 70 feet closer to shore than the inferred location of the 1850/66 cofferdam shown on the 1945 air photo.
- 2. The 1929 and 1931 air photos were taken at higher tide and the location of the 1850/66 cofferdam cannot be seen, thus these photos cannot be used to verify the cofferdam location shown on the Lozier and Roper surveys.
- 3. It has been assumed that the Lozier and Roper surveys are not necessarily accurate. This assumption suggests that the east side of the U shaped timber structure corresponds to the alignment of the 1850/66 cofferdam.
- 4. A likely scenario is that the remnant of the earth structure is along the alignment of the 1850 cofferdam and that the U shaped timber structure is along the alignment of the 1866 cofferdam.

### 6. Evaluation of Carpentry Marks, Saw Marks and Nails Associated with the Timber Structure

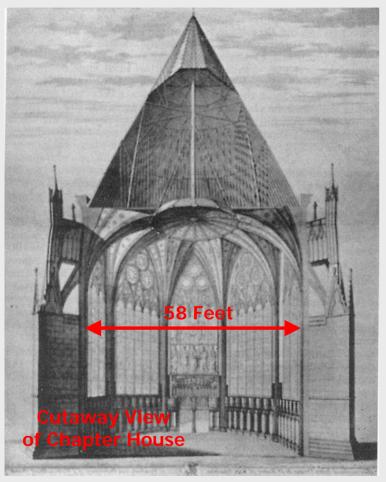
- 1. Carpentry marks on old timber structures
- 2. Saw marks on boards
- 3. Evaluation of nails

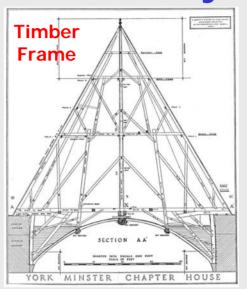
# Carpentry Marks on Timber Frames The Scribe Rule and the Square Rule

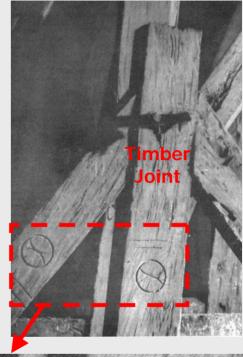
- 1. The Scribe Rule and the Square Rule are terms used to define the transition between the traditional method (with carpentry marks) and the standard method (without carpentry marks) of timber framing. In New England, this transition started in the 1830s.
- 2. The Scribe Rule is the name given to the traditional method of laying out the timber frame on the ground in the Carpenter's yard and making each joint a unique fit. The timbers are then marked with Roman numerals or equivalent for assembly at the building site.
- 3. The Square Rule is the name given to the standard method of defining a list of required timbers and preparing them (sometimes in different yards) to a standard pattern for each type of joint.

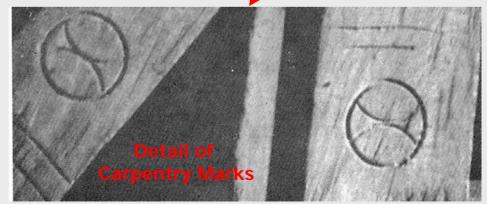
Carpentry Marks on Timber Frames York Minster Chapter House, U. K.

Late 13th Century





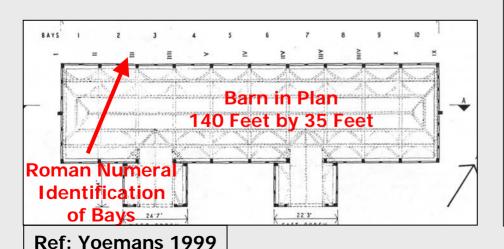


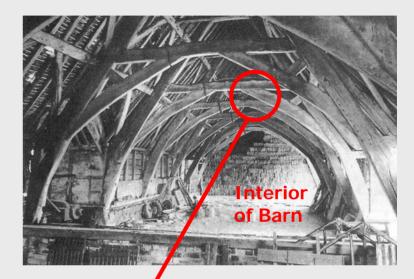


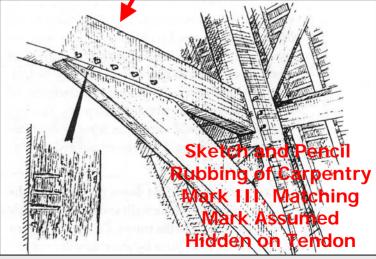
Ref: Yoemans 1999

### Carpentry Marks on Timber Frames Leigh Court Barn, Worchester, U. K., ca 1325

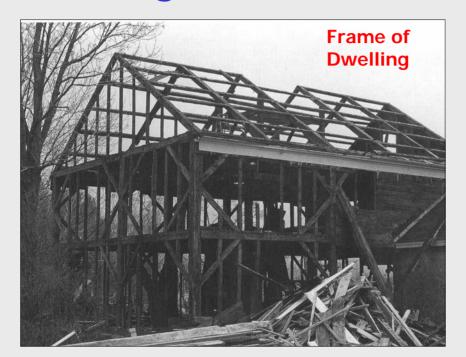


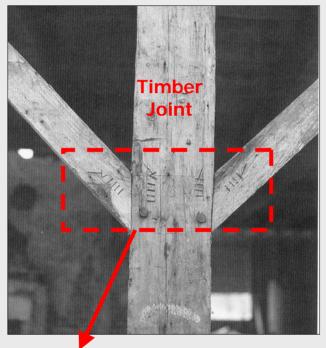


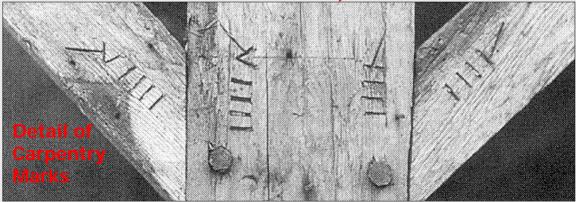




# Carpentry Marks on Timber Frame Dwelling, Deerfield, New Hampshire, ca 1800

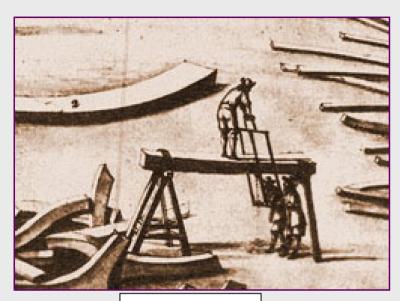




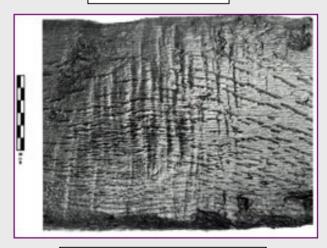


Ref: Garvin 2001

#### **Pit Saws**

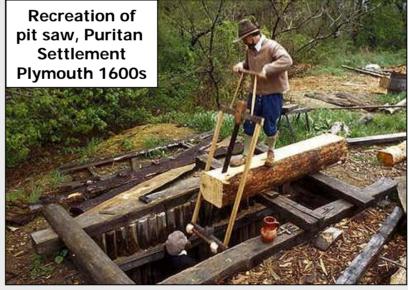


Pit saw used in ship building



Pit saw marks on wood from ship Belle 1600s



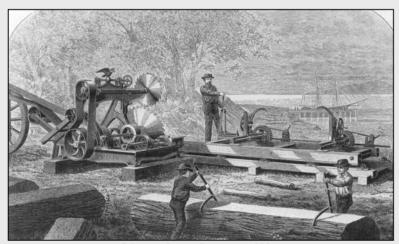


#### **Old Sawmills and Saw Marks on Boards**

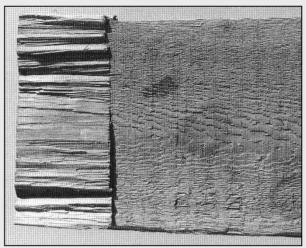
Ref: Garvin 2001



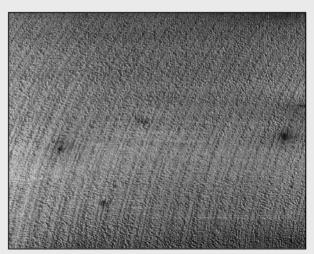
Reciprocating Sawmill
Used in New England from the
mid 1600s to the mid 1800s



Circular Sawmill Used in New England from the early 1800s



Board with Vertical Saw Marks from Reciprocating Blade

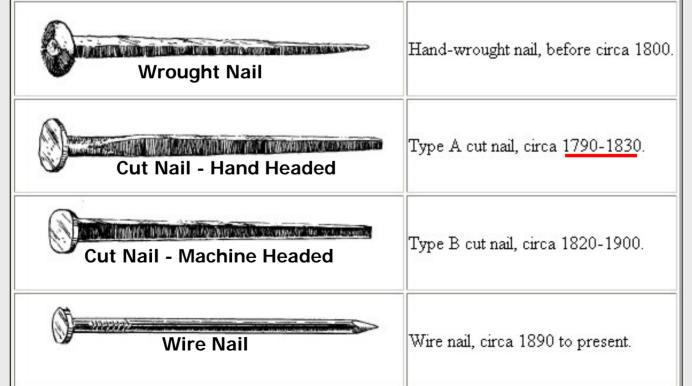


Board with Curved Saw Marks from Circular Blade

### **Evolution** of Nails



Ref: glasgowsteelnail.com



Ref: uvm.edu (Univ Vermont)

### Conclusions on Carpentry Marks, Saw Marks and Nails

- 1. Carpentry marks (Roman numerals) were used for centuries and were phased out in New England about 1830.
- 2. There is no reliable date for phase out of pit saws although they were uncommon in New England since water powered reciprocating sawmills were introduced in the mid 1600s, essentially with first settlement.
- 3. Cut nails were first manufactured in New England (not UK) starting in 1790. This is a reliable date.

# 7. Summary of Evidence for Time Frame of Smith's Cove Workings

- 1. Summary of evidence for original and Searchers' work at Smith's Cove
- 2. Time chart giving range of dates for components of Smith's Cove workings
- 3. Conclusions

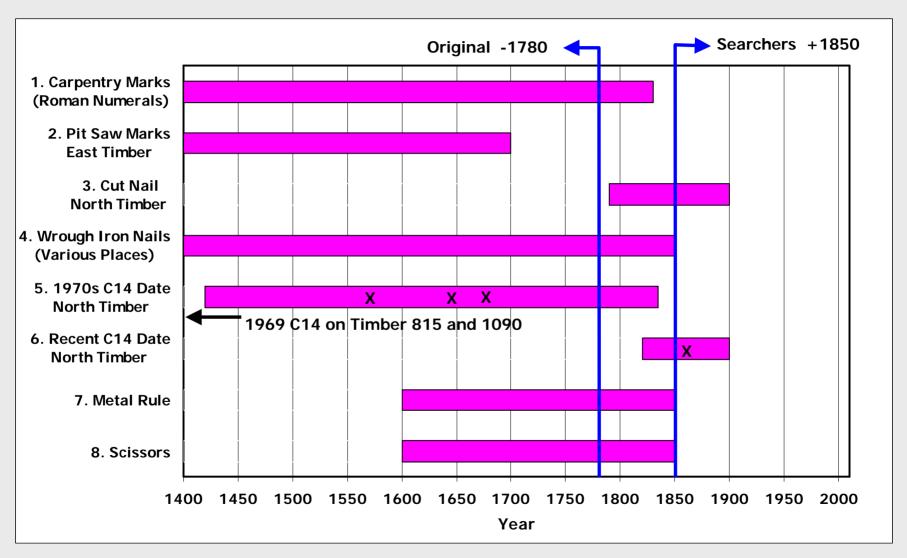
### Summary of Evidence for Original and Searchers' Work at Smith's Cove

Items Related to U Shaped Timber Structure	Original -1780	Searchers +1850
1. Carpentry marks on timber structure (phased out about 1830 in New England)	L	Р
2. Pit saw marks on boards at east side of timber structure (pit saws phased out in 1600s)	L	Р
3. One cut nail embedded in a cross piece at the north arm of timber structure (used 1790 to 1900)	No	Yes
4. Five hand-forged wrought iron nails and spikes in timber structure (Stelco: pre 1790, phased out early 1800s but used as late as about 1900)	L	Р
5. Carbon dating by Brock Univ in 1970 of inclined beam, log sill and oak peg from north arm of timber structure (1570±150 yrs, 1645±115 yrs, 1676±159 yrs)Note 1	L	Р
6. Recent carbon dating of log sill in north arm of timber structure (1860±40 years)	Р	L
Other Items	Original -1780	Searchers +1850
7. Metal Rule (Stelco: such rules introduced late 1500s to early 1600s, dates to before 1783 as a guess) (Louisbourg: 1800 to 1850 as an estimate)	Р	L
8. Spanish American scissors (made to mid 1800s)	L	Р
Lamanda I. Likala. D. Dagaible (samuet be evaluded)		

Legend: L - Likely P - Possible (cannot be excluded)

Note 1: Carbon dating by Brock Univ in 1969 on inclined beam and oak peg from timber structure indicated dates of 815±110 yrs and 1090±140 yrs.

# Time Chart Giving Range of Dates for Components of Smith's Cove Workings



# 8. Conclusions on Flood System, Timber Structure and Time Frame of Smith's Cove Workings

- 1. The flood tunnel exists and is man made. The filter bed and flood tunnel are original work.
- 2. The most likely alignment of the flood tunnel is a uniform upward slope from 114 feet depth at the Money Pit to about 25 feet depth near the shore (length about 520 feet, vertical rise about 60 feet allowing for 29 feet difference in ground elevation, slope about 11.5% or 6.6 degrees or 8.7H:1V).
- 3. The artifacts found at Smith's Cove cannot be specifically related to Searchers' work or original work and thus cannot be used to select a reasonable time frame for the original filter bed and flood tunnel work.
- 4. The north arm of the timber structure is Searchers' work. The east side and south arm of the timber structure are likely Searchers' work. Therefore the evidence from the timber structure cannot be used to select a time frame for the original filter bed and flood tunnel work.
- 5. The time frame of the original filter bed and flood tunnel work is best estimated considering information from other areas of Oak Island and the historical context. The time frame of the original work is judged from all evidence to be about 1650 to 1750.

### Treasure from the Conceptión (Leftovers) Nuestra Senora de la pura y limpia Conceptión

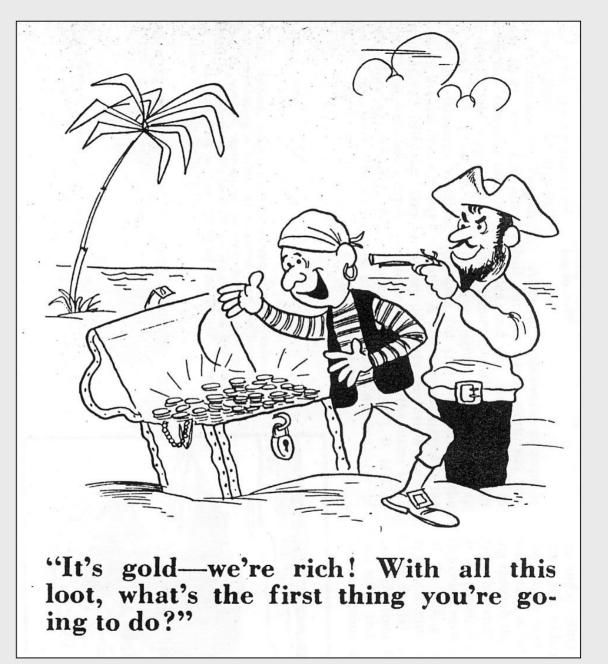


Articles Recovered in 1978 by Burt Webber Ref: National Geographic July 1996





# When the Treasure is Found



### 9. Acknowledgements

The following people provided information, assistance and advice during the preparation of this presentation:

- Dan Blankenship
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