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Penn State MGIS

Summer 2024

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A Case Study: Using
Geographic
Information Systems
to investigate an
incident from the
Vietnam Conflict.

Presentation Outline

- Introduction
- Study Area
- Methodology
- Hypothesis
- Results
- Project Challenges
- Discussion



Introduction

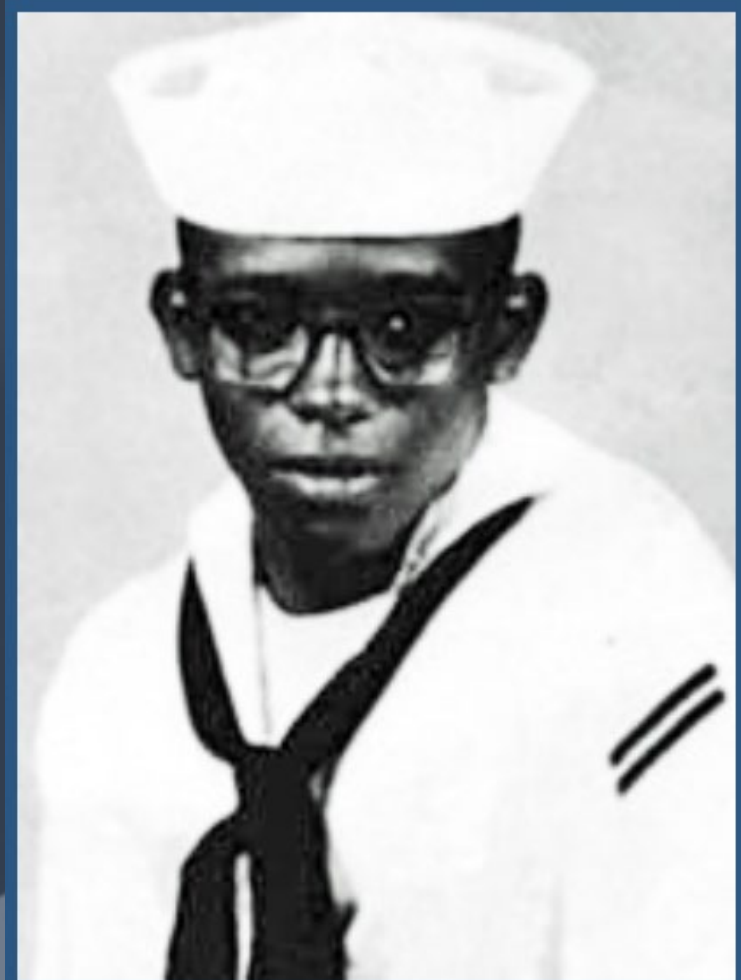
Petty Officer Third Class

1st Marine Division, 1st Battalion, 1st
Marines, H S

From: Charleston SC

Born: May 14, 1947

KIA: May 29, 1967



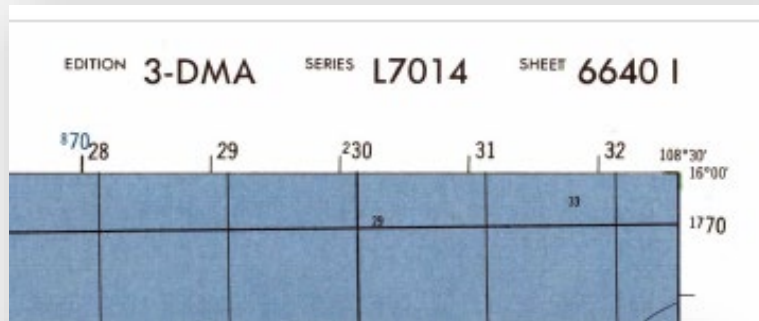
John Henry Garner
Vietnam War

Study Area

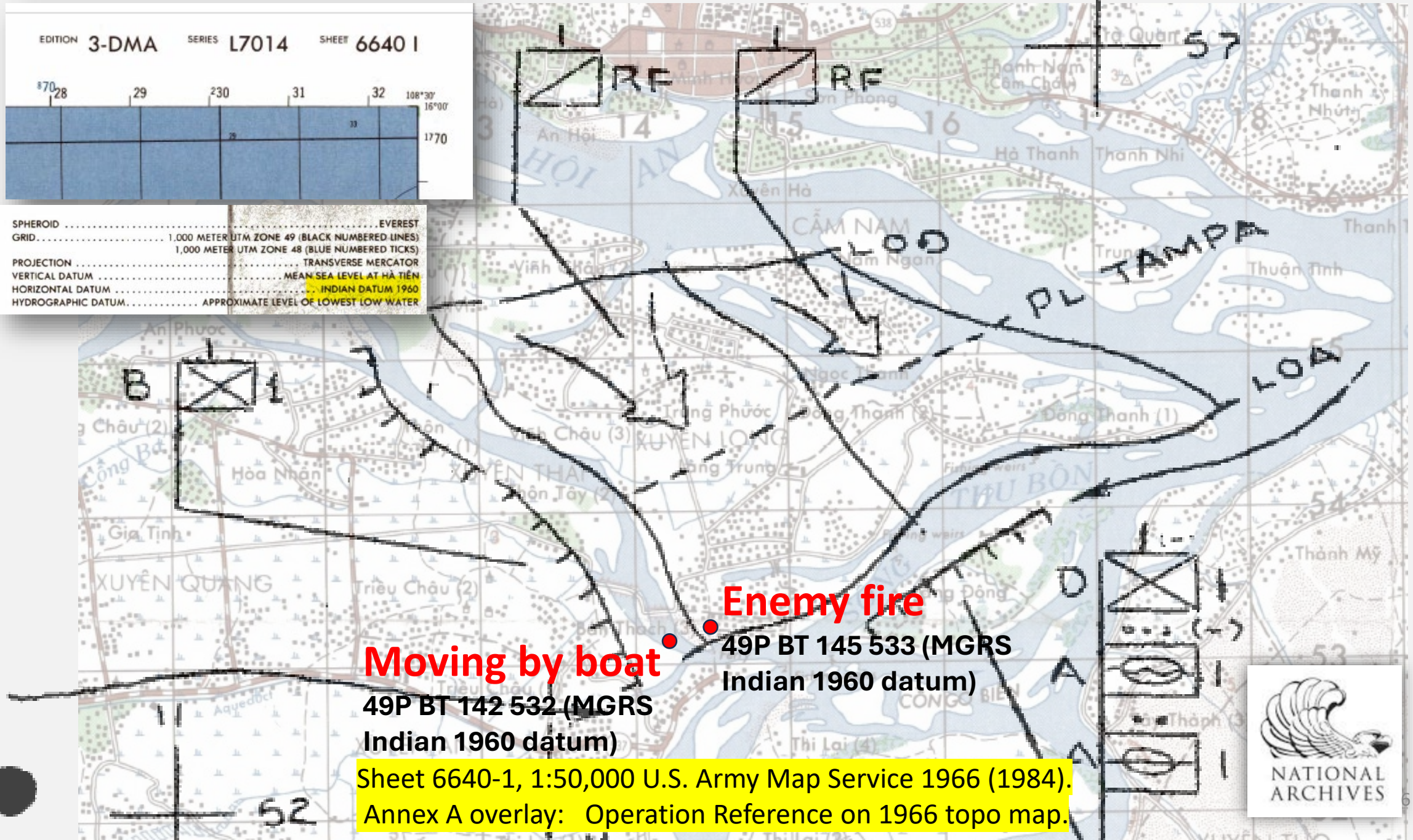


Methodology

1. Collect documentation and Imagery.
2. Plot location information from incident and investigation reports.
3. Georeference historic imagery
4. Overlay historic imagery, current imagery, and maps.
5. Digitize the change of river and land use change in Area of Interest.
6. Measure shoreline change and document the changes.



SPHEROID EVEREST
GRID 1,000 METER UTM ZONE 49 (BLACK NUMBERED LINES)
1,000 METER UTM ZONE 48 (BLUE NUMBERED TICKS)
PROJECTION TRANSVERSE MERCATOR
VERTICAL DATUM MEAN SEA LEVEL AT HÀ TIÊN
HORIZONTAL DATUM INDIAN DATUM 1960
HYDROGRAPHIC DATUM APPROXIMATE LEVEL OF LOWEST LOW WATER



Enemy fire
49P BT 145 533 (MGRS
Indian 1960 datum)
Moving by boat
49P BT 142 532 (MGRS
Indian 1960 datum)

Sheet 6640-1, 1:50,000 U.S. Army Map Service 1966 (1984).
Annex A overlay: Operation Reference on 1966 topo map.



Witness statement during JPAC instigation on 28 August, 2013.

((B)) MR. MAY WAS ADAMANT THAT THE BURIAL LOCATION WAS JUST SOUTH AND WEST OF THE TIP OF THE SANDBAR. HE POINTED OUT THREE POINTS OF REFERENCE FROM THE SANDBAR THAT MR. MAY CALLED THE HIGH GROUND (STICK ONE, SEE PARA F, BELOW): A BRIDGE, APPROXIMATELY 168 METERS TO THE WEST AT AN APPROXIMATE 301 DEGREE AZIMUTH; A LARGE CHANNEL OR COVE ON THE OPPOSITE (SOUTH) SIDE OF THE RIVER (49P BT 136 535) THAT HAS BEEN THERE SINCE THE INCIDENT AT AN APPROXIMATE AZIMUTH OF 235 DEGREES; AND ANOTHER LARGE CHANNEL AT AN APPROXIMATE AZIMUTH OF 146 DEGREES AND APPROXIMATELY 250 METERS. AT THE TIME OF THE INCIDENT, THE RIVER WAS MUCH NARROWER AND YEARS OF FLOODING HAS MADE IT WIDER. THE CONCRETE BRIDGE TO THE WEST WAS ONCE A SHORT BAMBOO BRIDGE. FROM THE SANDBAR TO THE NORTH OF THE RIVER, THERE IS A SMALL SHALLOW CHANNEL FULL OF WATER, APPROXIMATELY 20 METERS WIDE AND APPROXIMATELY 50 CENTIMETERS DEEP, THAT DIVIDES THE SANDBAR FROM THE NORTH BANK. FLOODING IN 1989 CREATED THIS SMALL BACK CHANNEL AND AT THE TIME OF THE INCIDENT THERE WAS A CONTINUOUS STRETCH OF LAND GOING TO THE HIGH GROUND (TOWARDS THE CONCRETE ROAD AND HOUSES) ON THE NORTH SIDE OF THIS CHANNEL. THIS CHANNEL CONTINUES TO THE EAST APPROXIMATELY 100 METERS AND THEN MERGES IN WITH THE MAIN BODY OF THE RIVER.

Hypothesis

Bridge in Duy Vinh west of
the Sand bar.

Buddy Newell: Lead
investigator 2013



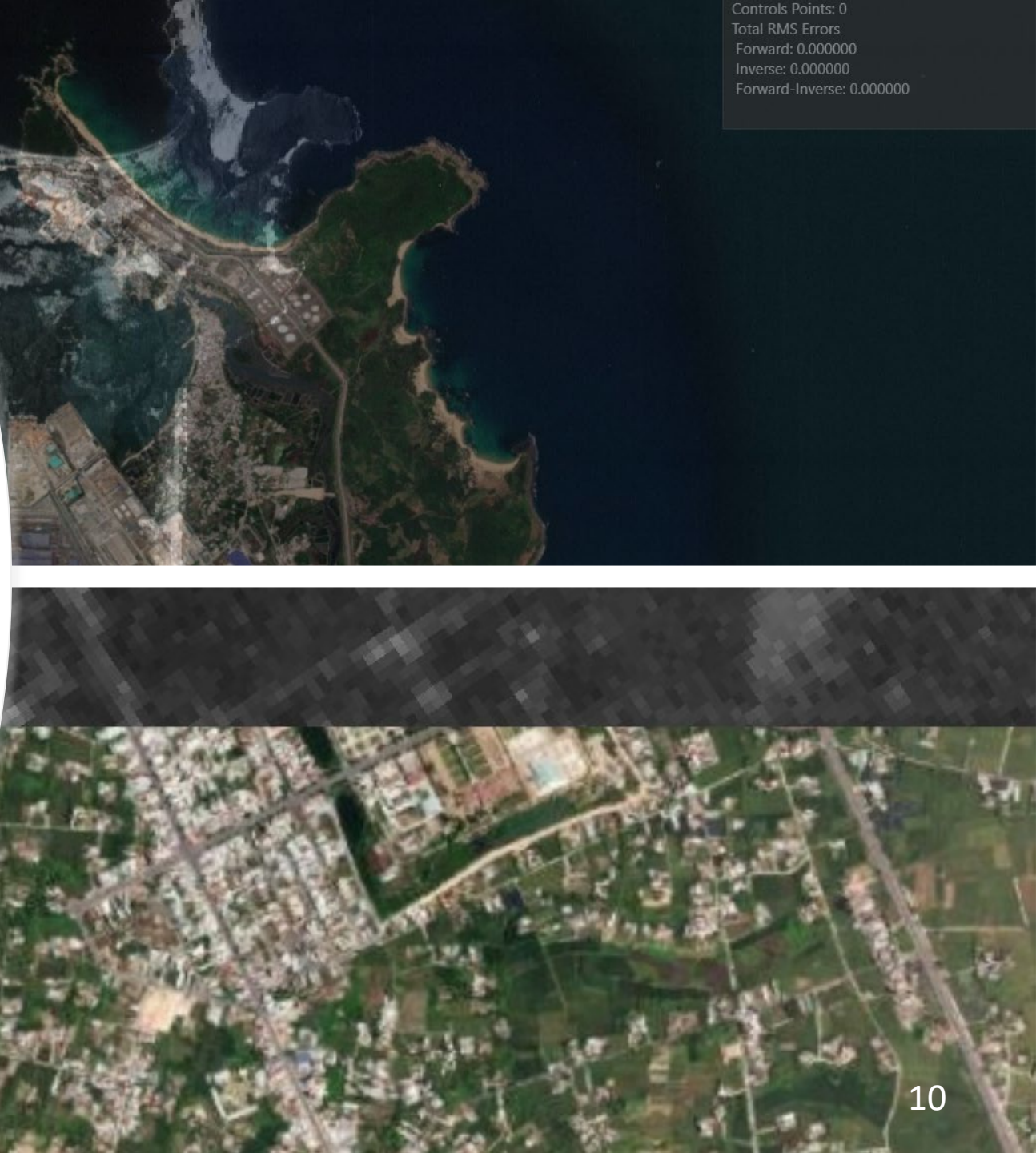
Imagery Sources

Source	Imagery Type	GSD	Details
Library of Congress National Archives	Wartime arial imagery <ul style="list-style-type: none"> • Dec 1968 Imagery (Rainy season) • Mar 1968 Imagery (Dry Season) 	High resolution	<ul style="list-style-type: none"> • Oblique • Few identifying features to current day. • Requires Georeferencing
Earth Explorer	Historic Imagery <ul style="list-style-type: none"> • 1988 SPOT Imagery • 1977 Imagery 	Medium resolution	<ul style="list-style-type: none"> • Oblique • Few identifying features to current day. • Requires Georeferencing
Esri World Imagery	Current Imagery https://livingatlas.arcgis.com/wayback/#active=10&mapCenter=108.33356%2C15.84227%2C16	High resolution	<ul style="list-style-type: none"> • Imagery in dry season only • Imagery hosted via service.
Maxar/Digital Globe Imagery	Current Imagery (2002 & 2014)	High resolution	<ul style="list-style-type: none"> • Imagery in October which is the beginning of the rainy season.

Georeferencing Historical Imagery

1. Match up shorelines and geographic features.
2. Look for defining features in historic imagery.
3. Resolution from each type of imagery is different.

Controls Points: 0
Total RMS Errors
Forward: 0.000000
Inverse: 0.000000
Forward-Inverse: 0.000000



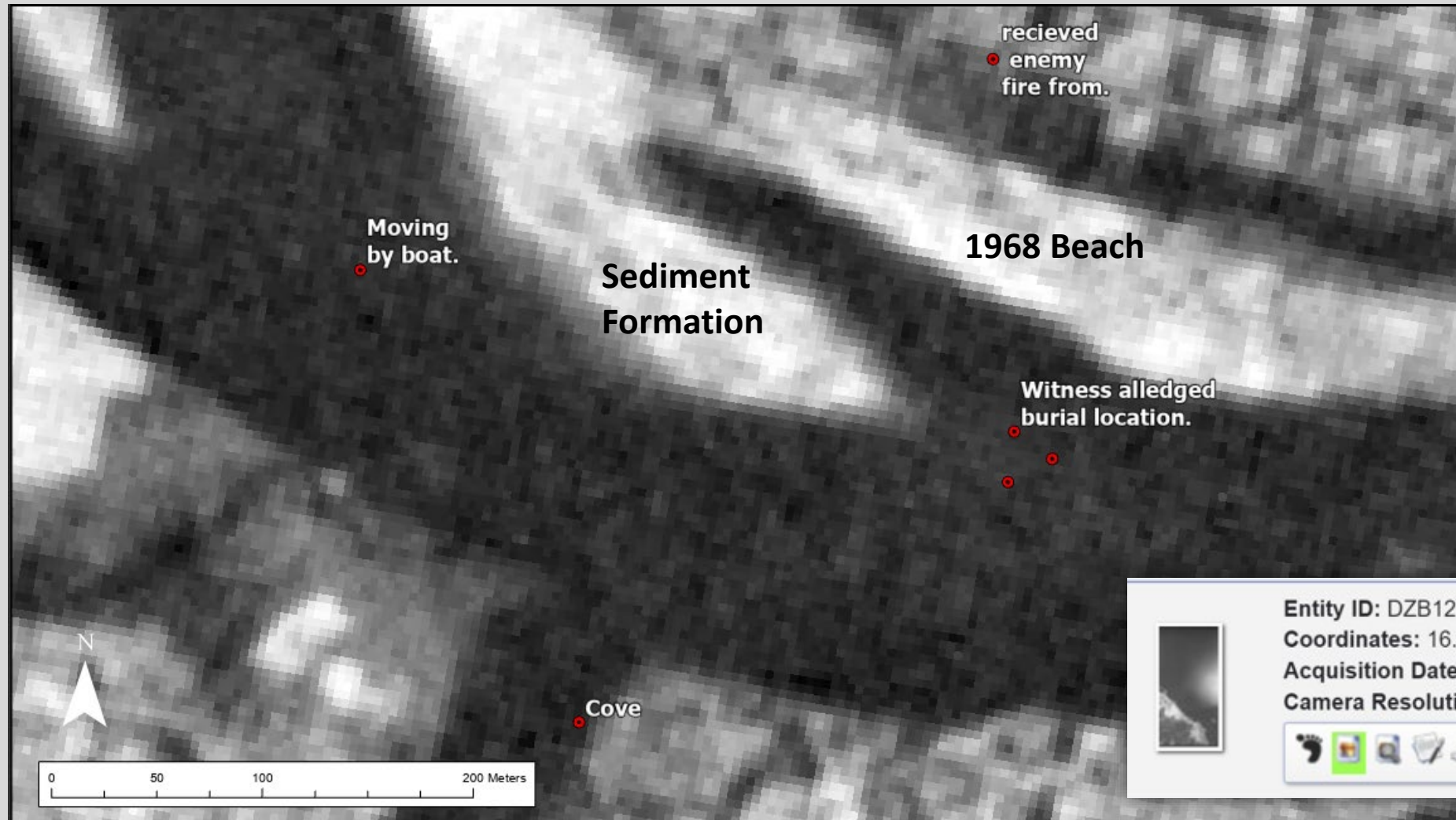
07 March 1968

Giant Dragon T972

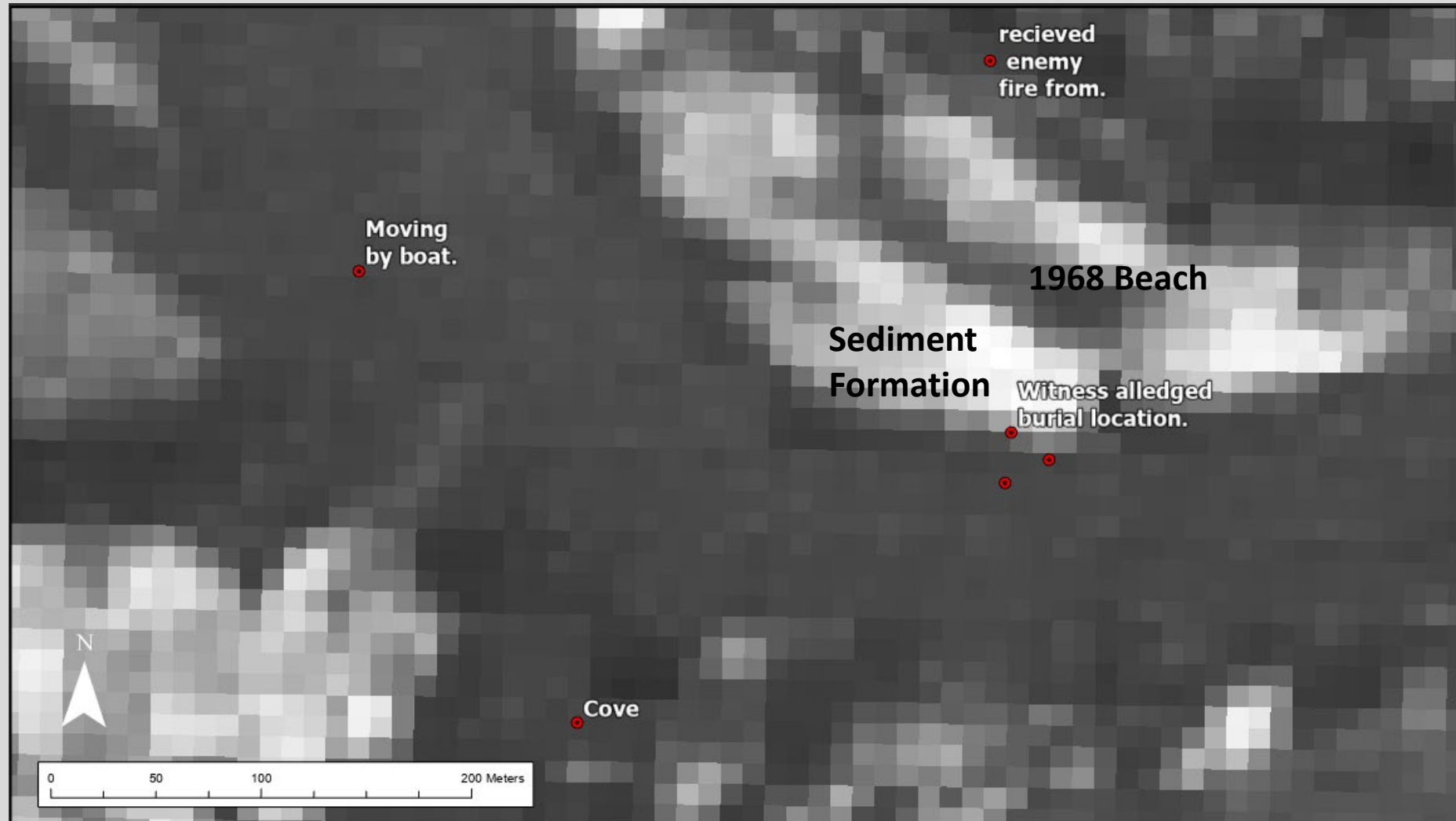
07 MAR 1968



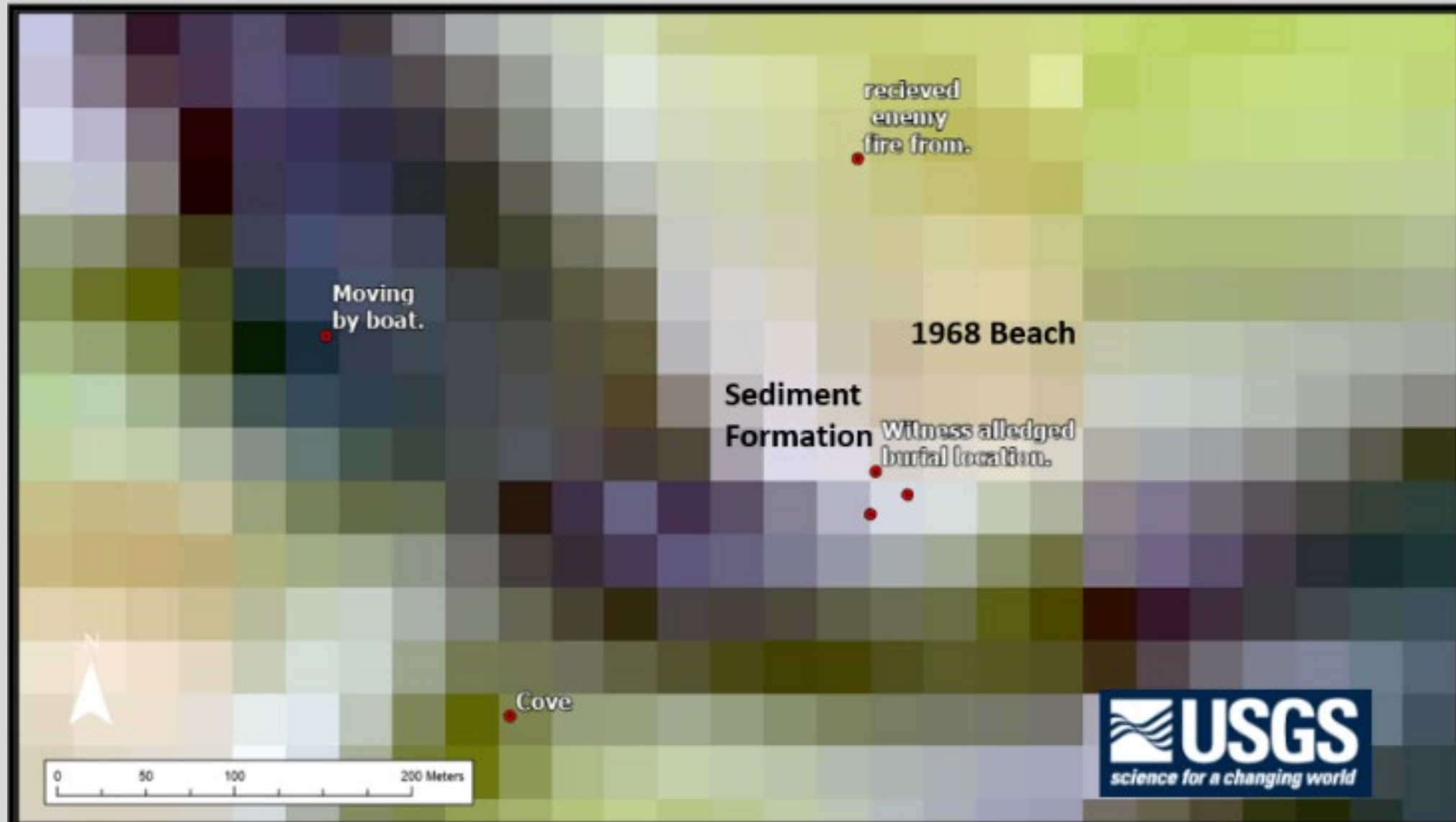
15 October 1977



SPOT Imagery 7 February 1988



Landsat 5: June 19, 1995, 30m GSD



21 October 2002



24 October 2014



☒ 2022-11-02

☒ 2022-03-16

☒ 2020-12-16

☒ 2019-12-12

☒ 2018-03-28

☒ 2017-04-19

☒ 2017-02-27

☒ 2014-02-20

2014-02-20 | x 108,330 y 15,844

1968 Beach

Sediment
Formation

03 April 2024

▼ Data Source		Set Data Source...
Data Type	Tiled Internet Layer	
Server	https://mt1.google.com/vt/lyrs=s&hl=es&z={level}&x={col}&y={row}	
Vertical Units	Meter	



This map includes data from:

Airbus

Imagery from the dates:

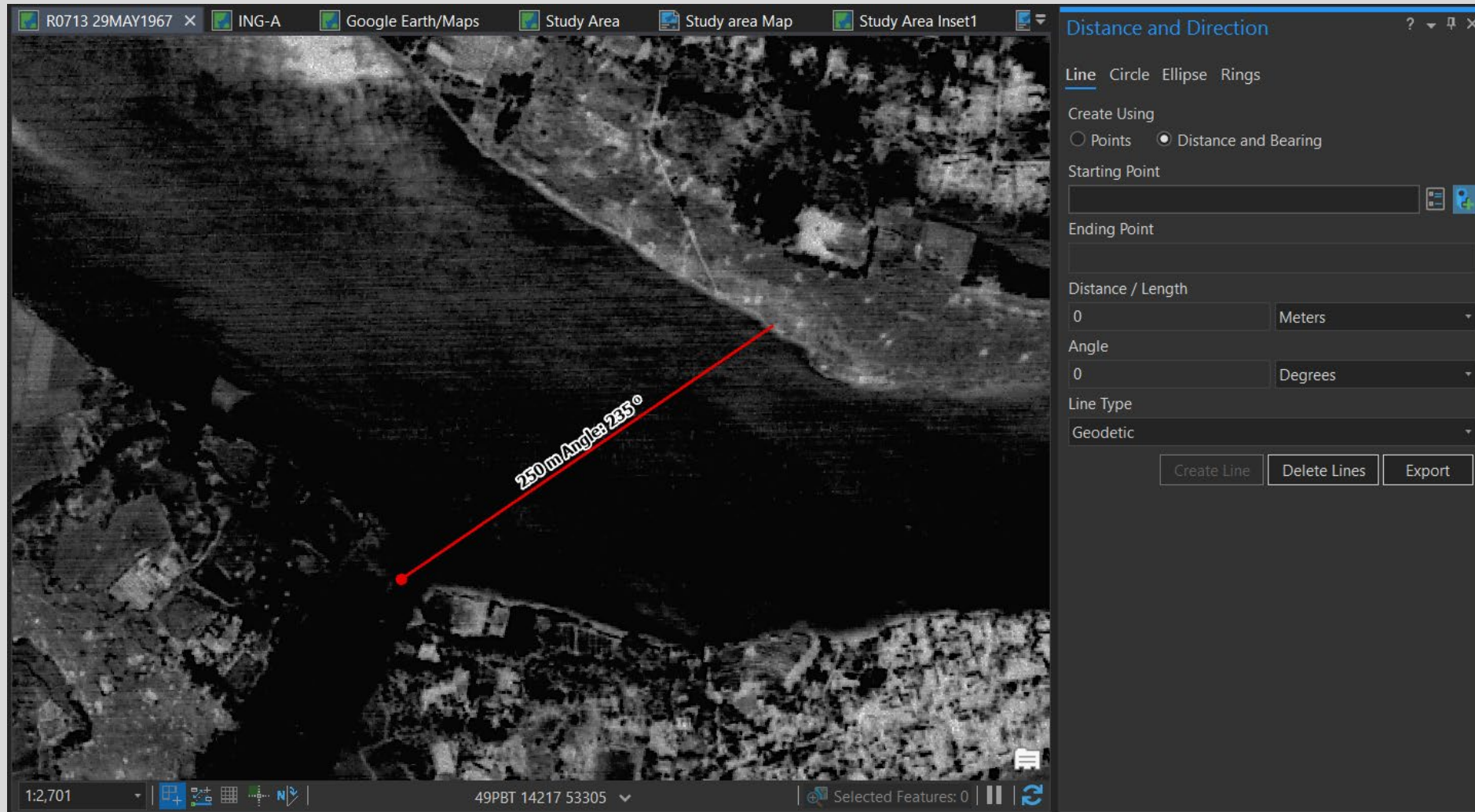
3/4/2024

Digitize shorelines change from select images.

From this witness statement, there are 5 statements to verify with imagery.

1. Was the Cove across the river in 1967? Azimuth 235 degrees/250 meters
2. Was the river narrower during 1967?
3. When did the sandbar appear? Was it present in 1967? Witness states that the channel behind the sandbar appeared after flooding in 1989.
4. When was the concrete bridge constructed?
5. Witness states he buried the body 15 meters from the shoreline, approximately 80 centimeters (2062 feet) deep, perpendicular to the shore (06-3VM).

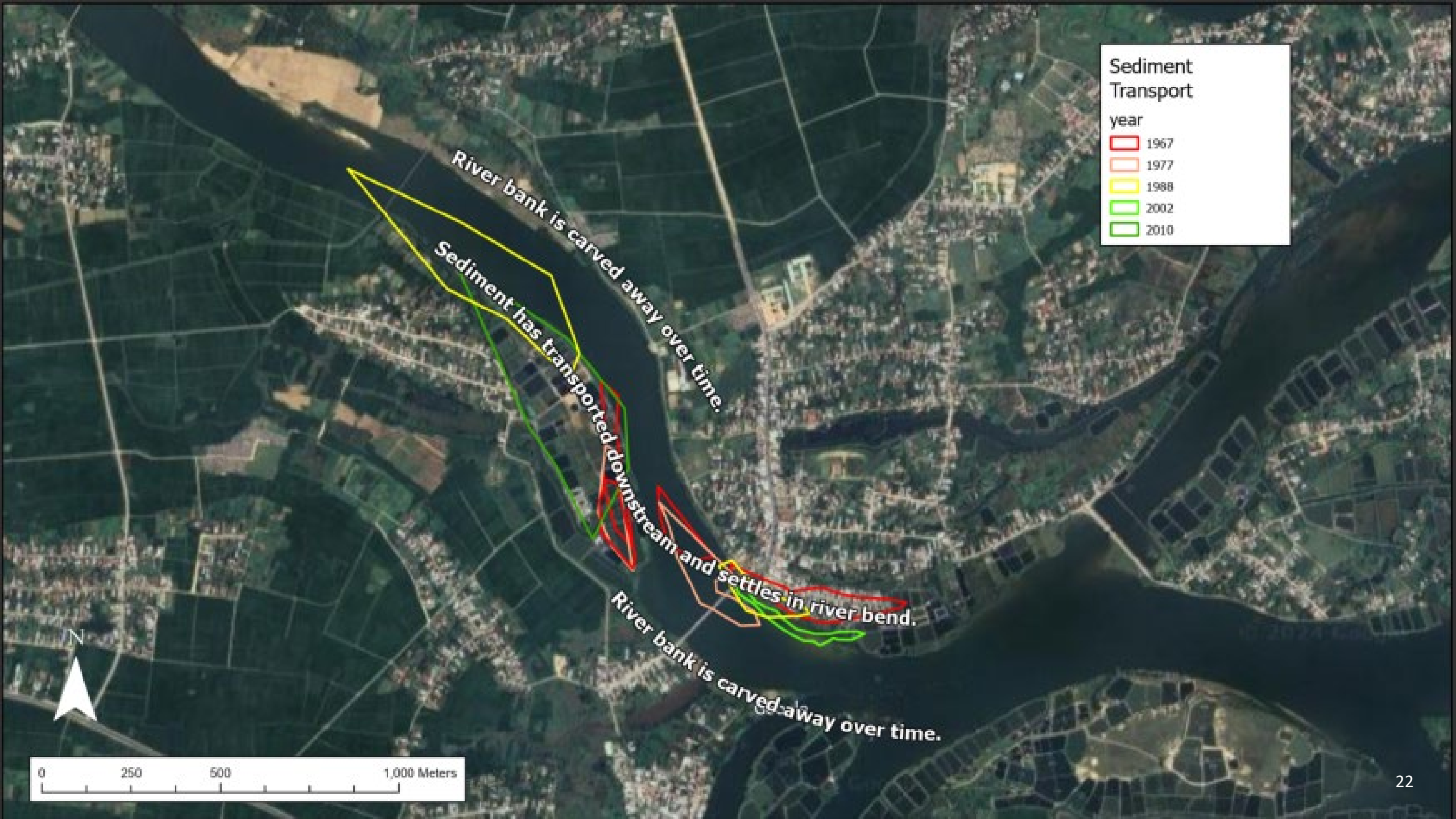
Was the Cove across the river in 1967? Azimuth 235 degrees/250 meters (2014). **YES!**



Was the river narrower during 1967? Depends!



Data and dataframe in WGS84 UTM Z11N. Measurements in Meters.



When did the sandbar appear?

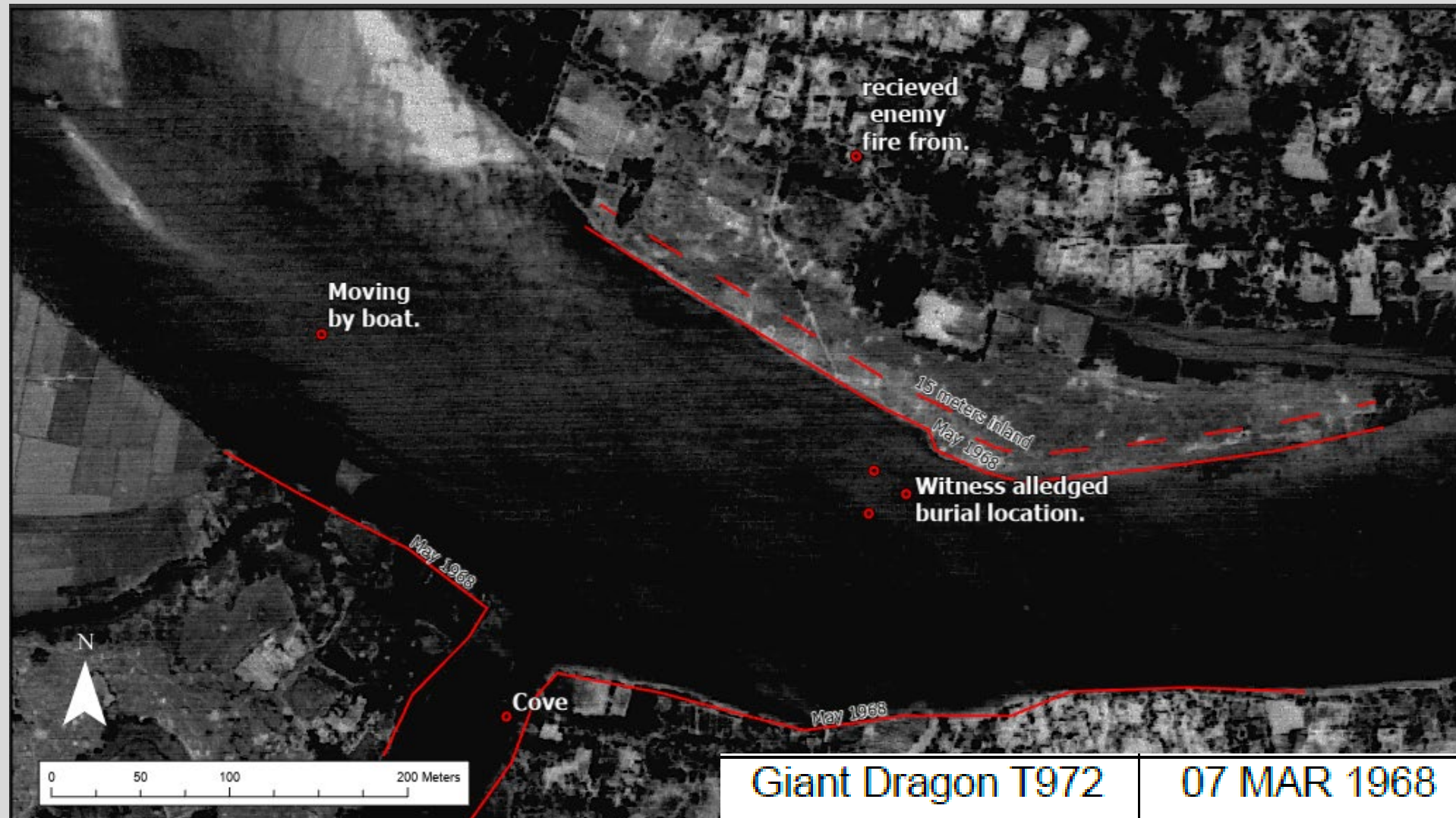
Was it present in 1967?

Witness states that the channel behind the sandbar appeared after flooding in 1989.



Results

Adjusted alleged burial location.



Results

Adjusted alleged burial location.



Location	LAT	LONG(WGS84)	
A	15.84364	108.329863	Witness alleged burial location.
B	15.84352	108.330032	Witness alleged burial location.
C	15.84342	108.329837	Witness alleged burial location.
D	15.84422	108.330213	Witness Point A relocated
E	15.84411	108.330383	Witness Point B relocated
F	15.844	108.330188	Witness Point C relocated
H	15.8438	108.330344	15 meters from 1968 Shoreline
I	15.84388	108.330101	15 meters from 1968 Shoreline

Research Conclusion

- Imagery Comparison
 - Indicates witness identified location was not the 1967 shoreline but an alluvial deposit.
 - Historical imagery overlays reveal a new research location for the alleged burial area.





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