

The Search for Amelia Earhart: Expeditions to Nikumaroro



Archeological Society of Maryland
Montgomery County, MD , October 2019
Lew Toulmin, PhD, FRGS



Llewellyn “Lew” Toulmin, Ph.D.

- Former Chair, Section on Emergency Management, American Society for Public Administration
- Consultant to 20+ US Federal agencies and 30+ foreign countries
- Fellow of the Royal Geographical Society & of the Explorers Club
- Expeditions in search of missing aircraft, persons, battlefields, plantations and towns
- Ph.D. in public administration & economics
- Traveled to 145 of the 196 countries on Earth
- Co-founder, Missing Aircraft Search Team



Today we will cover these topics:

- ✓ The exciting life of Amelia Earhart (AE)
- ✓ The disappearance and search
- ✓ Theories re the disappearance
- ✓ Expeditions to Nikumaroro
- ✓ Evidence for Niku
- ✓ Conclusions



Flag of the Republic of Kiribati

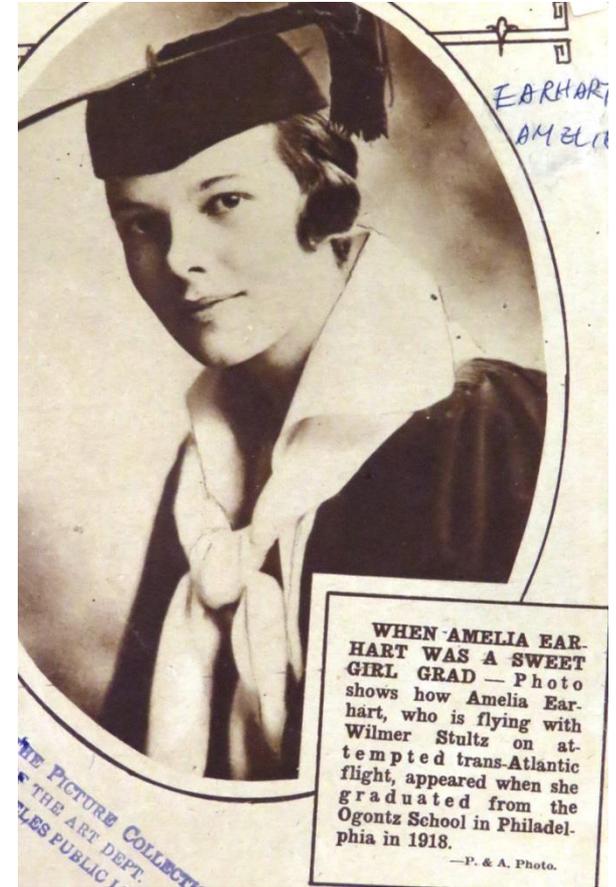


Nikumaroro island, Rep. of Kiribati

The Exciting Life of Amelia Earhart



Tomboy "Milly" born 1897, Atchison, KS...



...schooled in Chicago & Philly



- 1919: Nurse's aide
- 1920: first air ride
- 1921: pilot's license
- 1924: teacher of Syrian immigrant kids
- 1927: Lindbergh trans-Atlantic; woman?
- 1928: AE trans-Atlantic in 3-person crew, 1st woman, lectures, book
- 1931: marries George Putnam
- 1932+: new records, lectures

She was the first to fly a gyrocopter across the US, and set other records



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**Amelia Earhart in Autogyro
Makes Climb of 19,000 Feet**

Does 18,500 Feet on First Test; Finds on Second
Trial Machine Will Go No Further; Blown
20 Miles from Field.

WILLOW GROVE, Pa., April 8 — (AP) Amelia Earhart today added another outstanding performance to her brilliant flying record by taking an autogyro to a height of 19,000 feet on her second trial.

She said she enjoyed the blue and hoped to try another later for today.

Miss Earhart went to bed shortly after 11 o'clock after a two-hour rest.

Miss Earhart made her first appearance of her autogyro before a crowd of about 100 people at Pitcairn Field, north of Willow Grove.

She said she enjoyed the blue and hoped to try another later for today.

Miss Earhart went to bed shortly after 11 o'clock after a two-hour rest.

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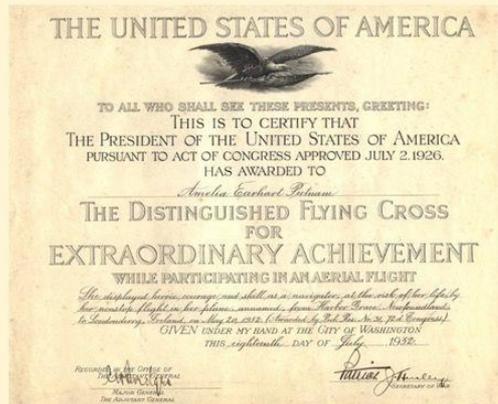
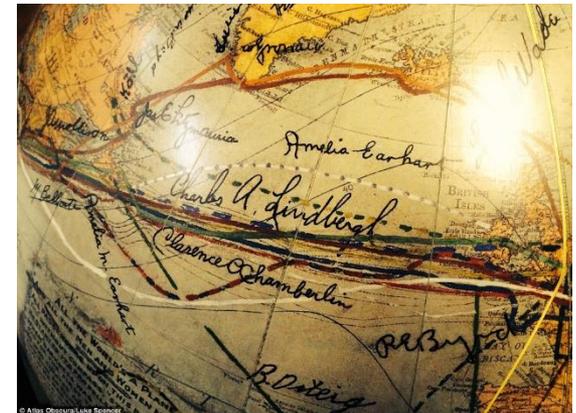
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First woman to fly solo trans-Atlantic, 1932



Amelia Earhart was awarded the Distinguished Flying Cross for her solo flight across the Atlantic Ocean in 1932.



Gold Medal was presented to Amelia Earhart by President Hoover in Washington on June 21, 1932.

Then – a new plane for the ultimate project



1937

AMELIA

The Disappearance and Search



The Purdue Exponent

Published Daily by Students of Purdue University

LAFAYETTE, INDIANA, THURSDAY, MARCH 18, 1937

NUMBER 118

VOLUME XLVIII

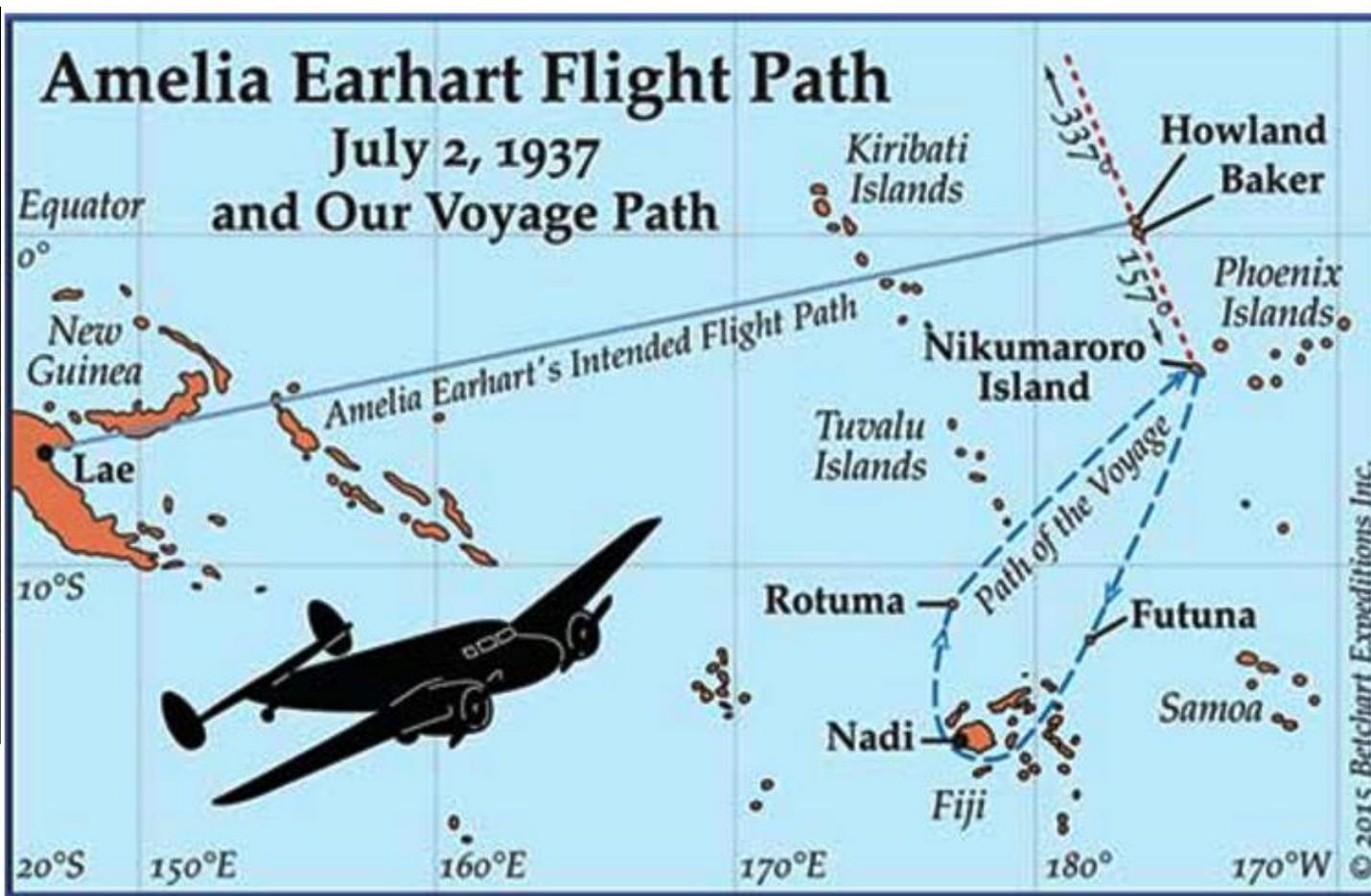
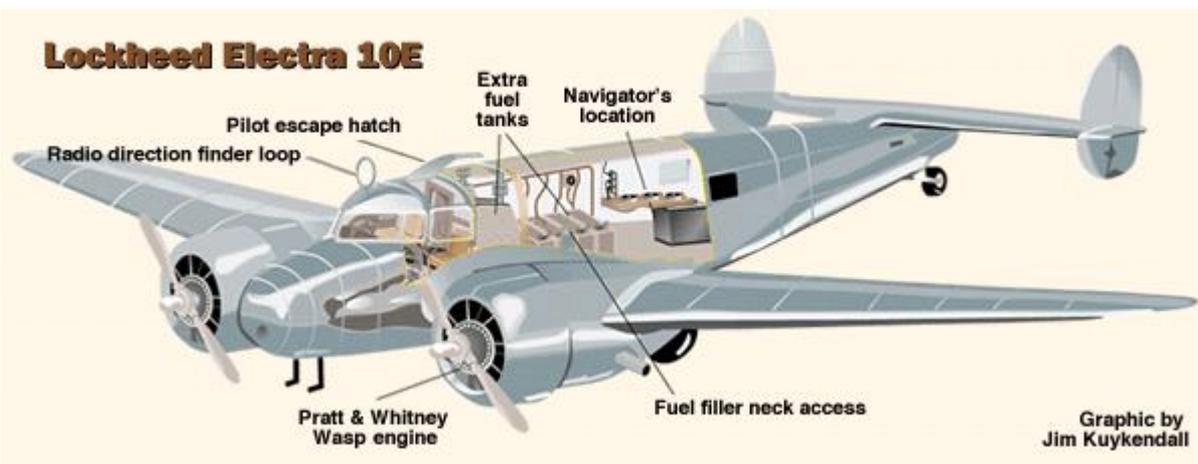
EARHART STARTS ON WORLD FLIGHT



EARHART'S FLIGHT PATH

With departure dates from select cities







JULY 2, 1937

- 0646: "About 100 miles out..."
- 0741: "We are on you but cannot see you...flying at 1000 feet..."
- 0804: "We cannot hear you..." (AE unable to get RDF directions)
- 0843: "We are on the line 157-337... flying north and south"



Tiny Howland is in this photo, taken at 1000 ft.

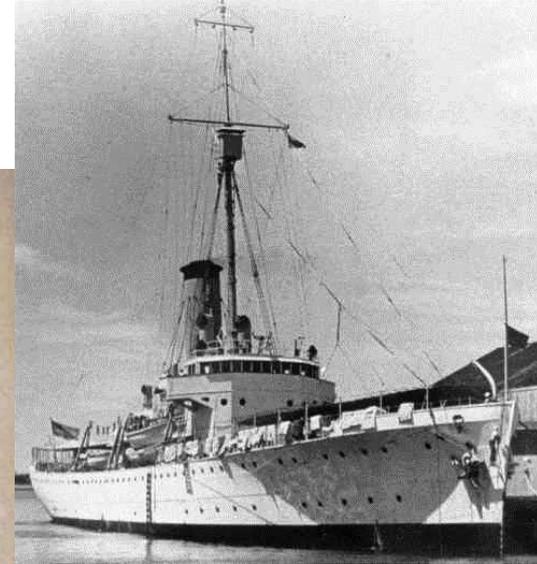


Howland: 1.5 x 0.5 miles, 15 ft. high

Apparent crash
of the Electra
by 1040...



...USCG cutter
Itasca begins search



DAILY NEWS
**EARHART PLANE
 LOST AT SEA**



Amelia Earhart Missing on World Flight

Evidently searching their mark, Amelia Earhart and Fred Noonan (left), her navigator, were believed down in the Pacific near Howland Island, an 8,550-mile trip from Los Angeles, Calif. Friends thought they would find her some time. This picture was made at Kowloon, India, as the two fliers were greeted by Vincent Sikorski (right) on board there on globe-girdling flight.

1937. P P TWO CENTS in New York City. THREE CENTS Elsewhere Except in U.S. and Its Postal Zone. FOUR CENTS Elsewhere Except in U.S. and Its Postal Zone.

MISS EARHART FORCED DOWN AT SEA, HOWLAND ISLE FEARS; COAST GUARD BEGINS SEARCH

FUEL HAD RUN LOW
 Fliers Were Near Goal When Last Reported but Saw No Land

PLANE EQUIPPED TO FLOAT
 Has Sealed Gasoline Tanks and a Rubber Lifeboat for Emergency at Sea

ROUTE OF EARHART

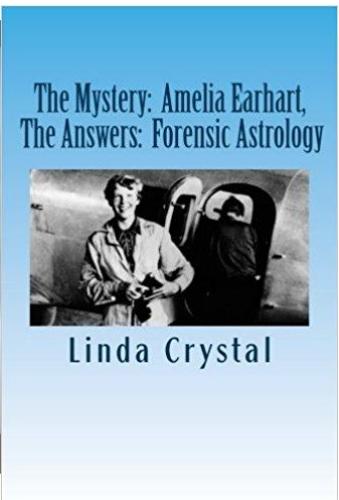
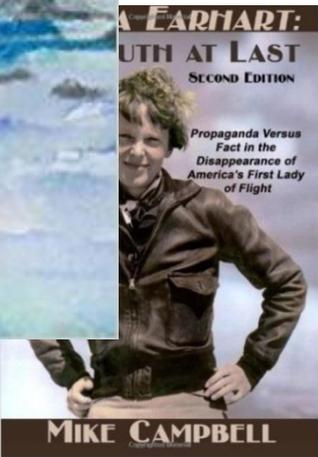
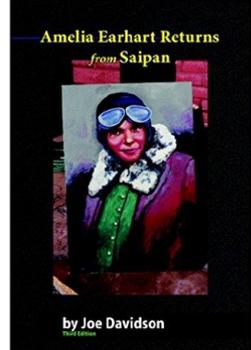
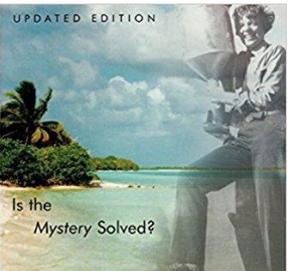
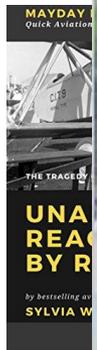
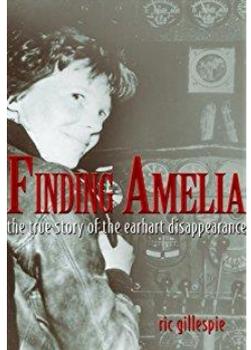
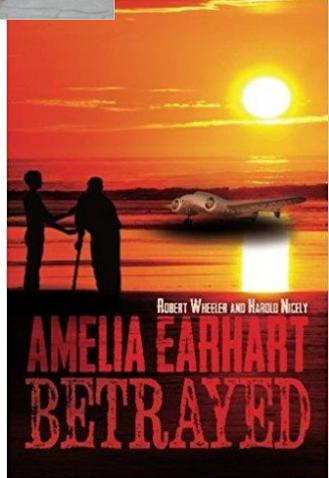
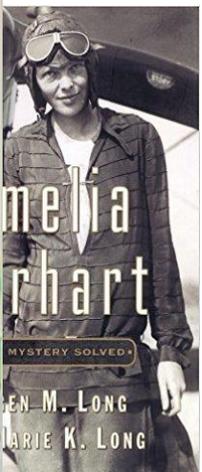
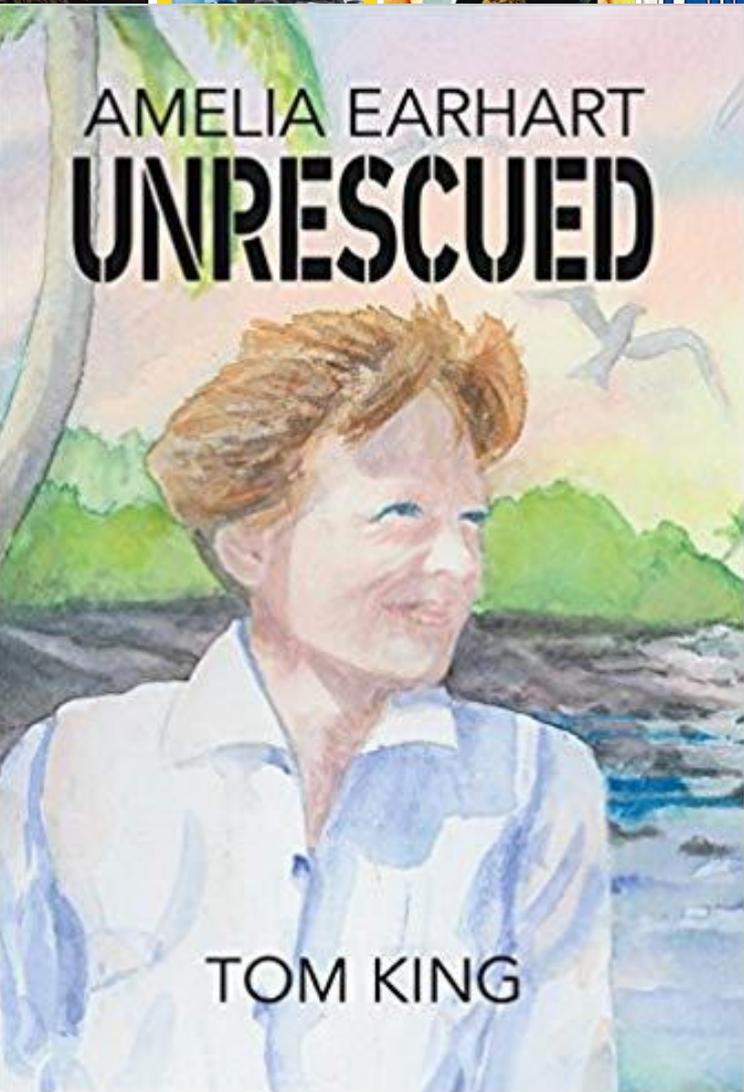
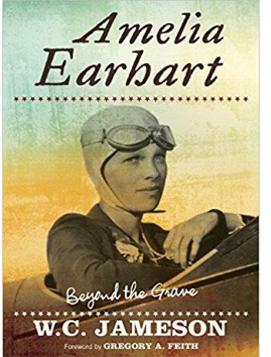
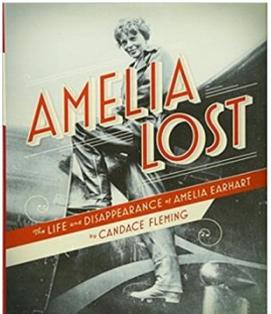
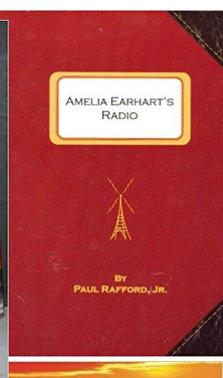
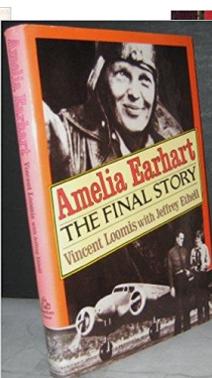
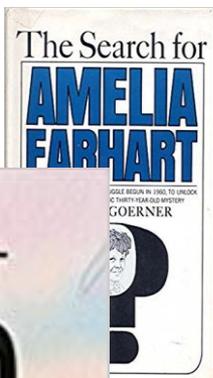
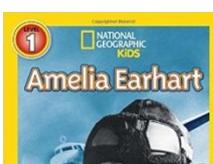
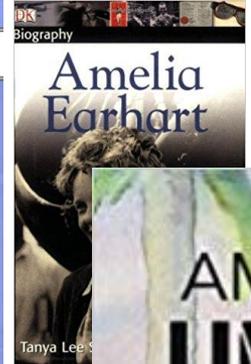
UNIVERSAL NEWSREEL

60 PLANES SCAN SEA IN VAIN FOR MISS EARHART

Theories re the Disappearance



Lots of theories!

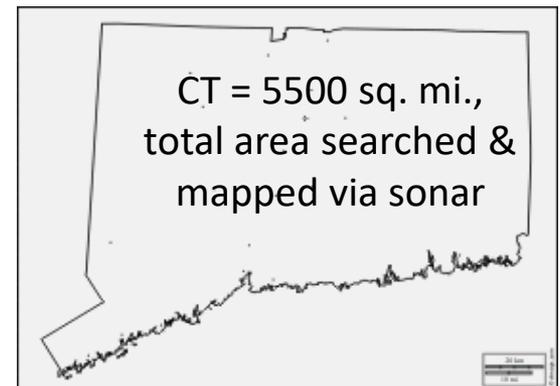
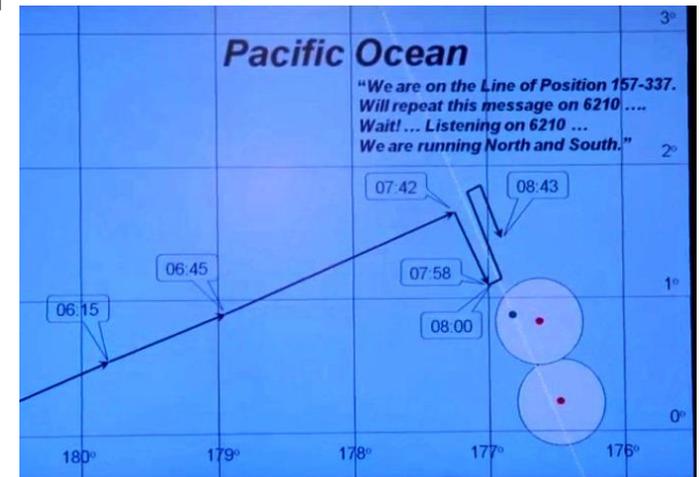
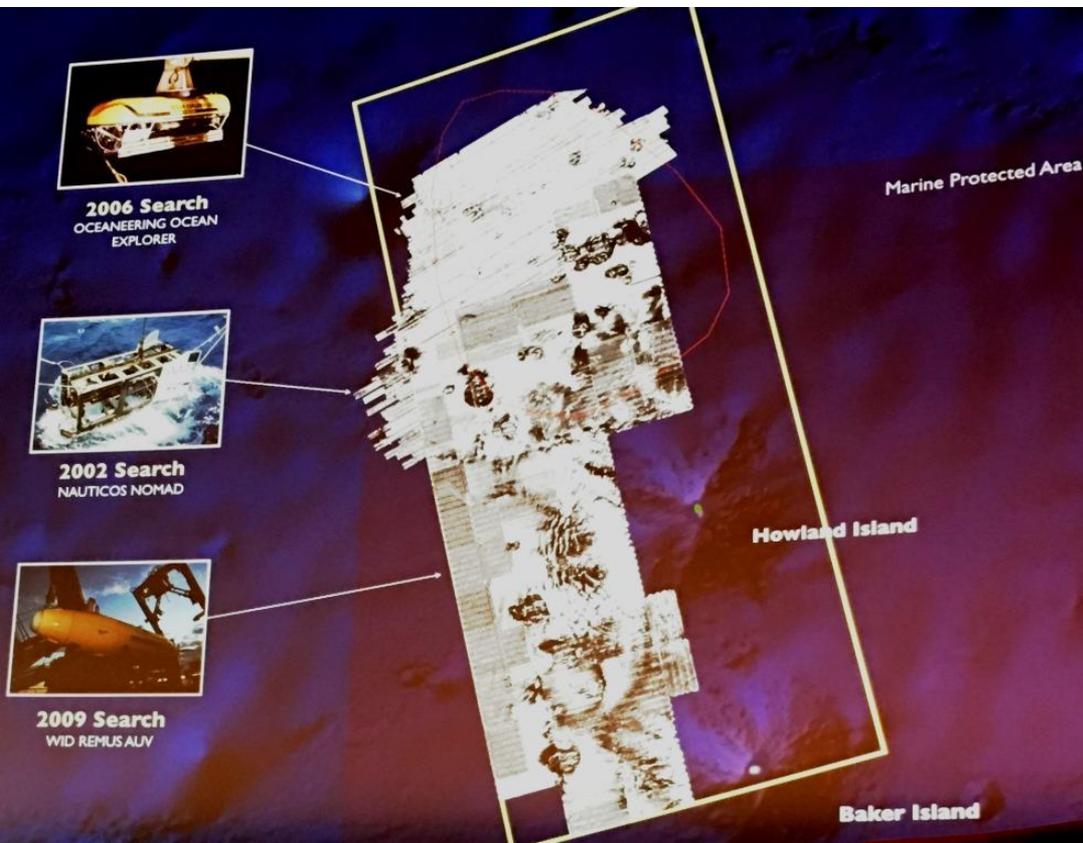


Crashed at Sea?

- 1989: mapping search by Longs N+W of Howland
- 1994: Timmer/Williamson attempt
- 1999: search by Timmer 45 days w/ side scan NW of Howland
- 2002: Kammerer attempt; Elgin Long 27 day search
- 2006: Nauticos/Waite search 687 sq. mi. NW of Howland
- 2009: Nauticos/Waite search 2000 sq. mi W of Howland
- 2017: Nauticos/Eustace search 960 sq. mi. N/S of Howland



Mermaid Vigilance + AUV used by Nauticos in early 2017



Alternate theories

EXCLUSIVE **Street Edition**

AMELIA EARHART KILLED ON SAIPAN

San Mateo Times
DEVOTED TO THE INTEREST OF SAN MATEO COUNTY

WITNESSES, PLANE PARTS
Mystery of 23 Years Is Solved

BY LINWOOD MCGEEHE DAY
(Copyright 1959 by the Associated Press Company)

Val. 60—No. 157, 2 Sections, 24 PAGES SAN MATEO, CALIFORNIA, FRIDAY, MAY 1, 1960 15¢ PER COPY—25¢ PER MONTH

SAN MATEAN SAYS JAPANESE EXECUTED AMELIA EARHART

San Mateo Times
DEVOTED TO THE INTEREST OF SAN MATEO COUNTY

WOMAN'S STORY:
Aviatrix Died Before Saipan Firing Squad

By LIN DAY
(Copyright 1959 by the Associated Press Company)

A San Mateo woman who may have been one of the last to see Amelia Earhart alive, says that the famed aviatrix was executed by a Japanese firing squad even while the U. S. Navy was spending \$4,000,000 in a futile search for the missing flier and her navigator, Fredrick Noonan.

Mr. Josephine Bianco Akizawa of 15 South Idaho Street, has identified pictures of Amelia as the "American lady pilot" she saw taken into custody on the remote island of Saipan in July, 1937.

The woman flier was accompanied by a man, she said, an American also dressed in aviator's garb.

She said Mrs. Akizawa's story has been partially known by a few far gone years, but it is the first time that it has been published in full details of what she saw in the remote grower area. If she is correct, she has not only solved a riddle that has puzzled the world for 23 years, a number of known facts have been solved.

Amelia Earhart Pulson was 39 at the time women to have one on each side when she started to early July for a trans-Pacific hop from Los Angeles. The destination was the tiny island of Howland, 2500 miles to the west.

"Last Flight" A widely known author, speaker and lecturer in addition being one of the world's best liked, she had published a book reputedly entitled "Last Flight" in 1937.

JOSEPHINE BIANCO AKIZAWA

So Pr Or

Ex-Serviceman Claims He Saw Earhart Grave

A former U.S. Army sergeant who served in Saipan says he was shown the unmarked island grave of two white people "who came from the sky," while he was serving there in 1944. He believes it to be the grave of Amelia Earhart and Fred Noonan and says he can find it again.

The Times has forwarded information given it by Thomas E. Devine of New Haven, Conn. to Saipan for further checking.

Devine told of visiting the grave site along with his buddy, Pfc. John R. Boggs of Denver, Colo.

Boggs told the Times today he remembers the visit to the cemetery with Devine and said that while he cannot recall the exact developments that took place there that he does know that Devine is "a very intelligent and dependable man."

Devine told the New Haven Evening Register that he had never connected the information given him by a Chamorro native in 1944 with the Amelia Earhart

of Amelia Earhart was about 100 feet ahead with her navigator over the 1000 feet island of Saipan and a operative aviation rigged the real five reasons of the "First Lady of the Air."

year and Maximo (the mystery is a mystery in Saipan, as said Hilda Stankiewicz, reveal the down-...)

Castro Graft 2 More Oil Refineries

Several witnesses place of 1937 clearly spot where the... for possession of the...

A Top Justice Department Official Exposes The Long-Buried Scandal

AMELIA EARHART climbs out of her small plane.

JAMES GOLDEN, a Justice Department official, accuses FDR of covering up Amelia Earhart's "mysterious" death in 1937.

FDR's Amelia Earhart 'Watergate'

By LEON FREILICH

Record Price Paid for S.M. PoloProperty

An all-time record price of \$87,500 an acre, the highest ever paid for professional-administrative office property on the Peninsula was paid yesterday in the sale of some two acres, for a total

Betrayed by FDR?

Marshall Islands?



Objects found by Parker Hannifin Corp on Endrikin island Mili Atoll, RMI in 2015



“Flight to Freedom”
1943 movie



New Guinea?



10:11 / 1:23:59

Re-appeared
in NJ?

28 * THE EVENING NEWS
Newark, N.J., Tuesday, November 10, 1970

Claim N.J. Woman Is Amelia Earhart

NEW YORK (UPI)—Two former Air Force officers published a book yesterday claiming Amelia Earhart was captured 33 years ago by the Japanese on a spy mission survived eight years of captivity and may be living today under the name of Irene

yesterday, had "no comment" to the report she was a friend of Mrs. Bolam's.

The book was published by McGraw-Hill. Klaas is an account executive with ABC radio in San Francisco and Gervais is liaison officer for the Clark County, Nev., Sheriff's Office.



AMELIA EARHART



MRS. GUY BOLAM

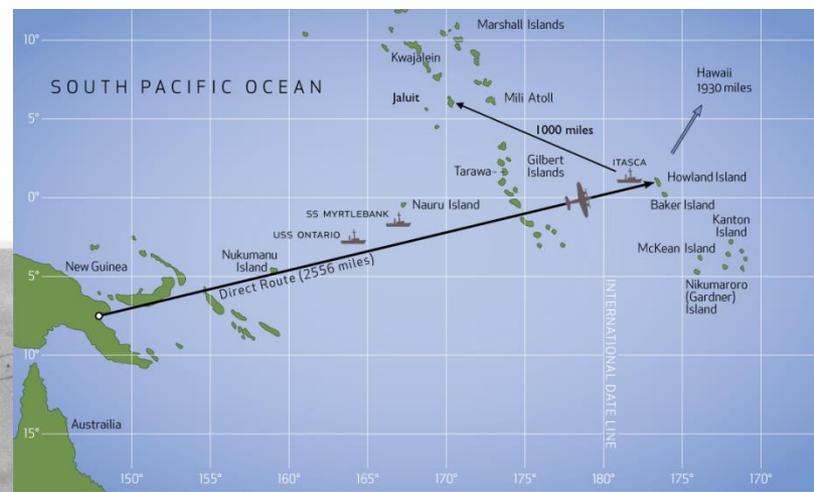
Tokyo Rose(s)?



Captured
by aliens?



History Channel claims this pic shows AE+FN + plane! **See them?**



PL-MARSHALL ISLANDS, JALUIT ATOLL, JALUIT ISLAND. ONI #14381
JALUIT HARBOR.

Me neither!

Japanese blogger found this pic in 30 minutes on-line
– from 5 Oct 1935 – 2 yrs before the crash!

ヤルット島ジャボールの港

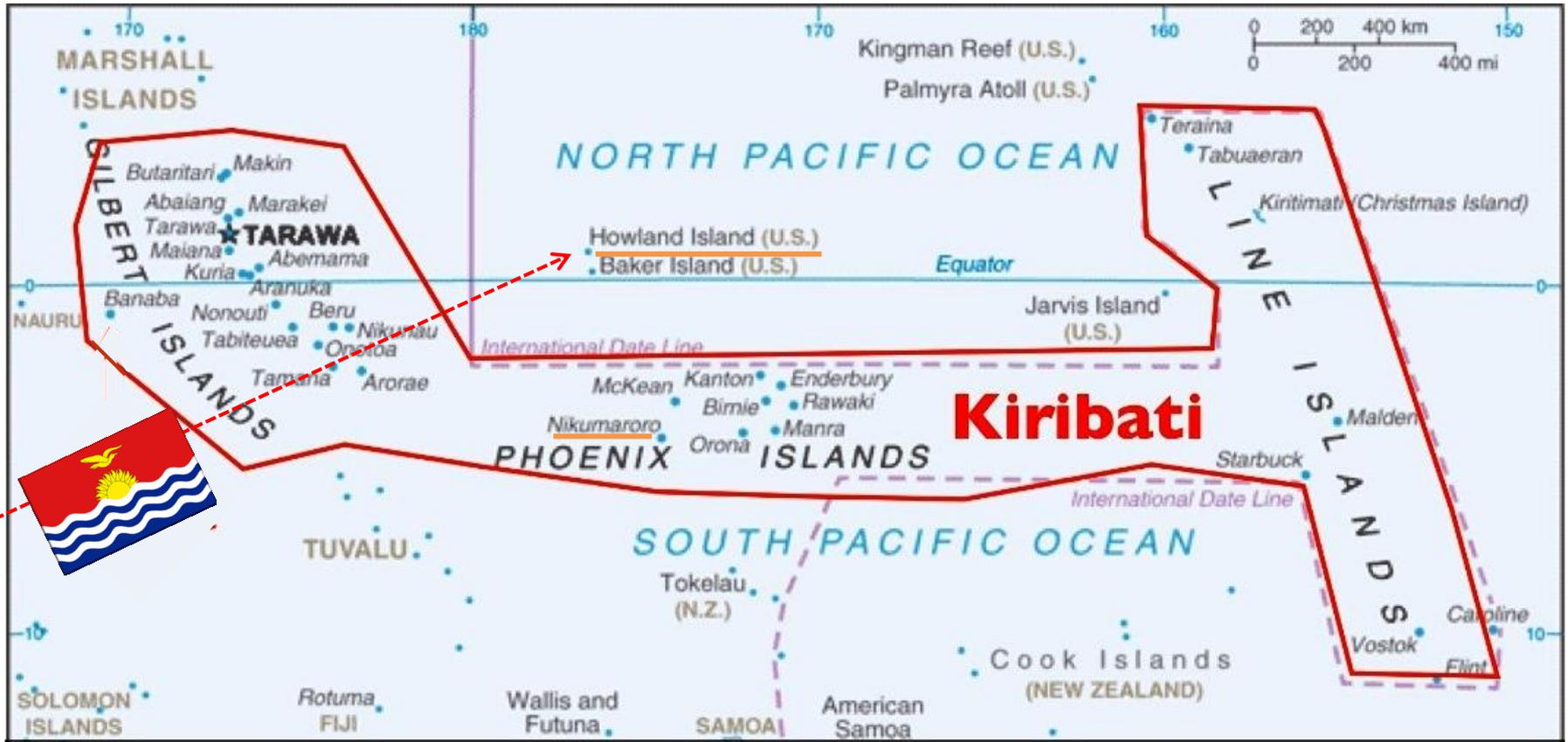


ジャボールの港は海に見る良港である。月一河内地からの大船がゆ
らしい数々の物資に船積をふくらまして入港すると、マーシャル群
島の各地から、大酋長のスクーター、小酋長のボートが従ふてジャ
ボール港に到着して来る、そしてジャボールを賑やかにする。

Expeditions to Nikumaroro



Kiribati (“keer e bas”) is both huge and tiny



Seattle

2750 miles across



Boston

Land area size: 313 sq. mi.; only 5 x area of DC

Total area size: 1.35 million sq. mi.; 5 x area of Texas!

Population: only 115,000

TIGHAR Niku

Expeditions to Date:



- 1989 Land Search
- 1991 Land and Underwater Search
- 1996 Land Search on Niku
- 1997 Land and Underwater Search
- 1998 Research: In England and on Kanton Is.
- 1999 Land Search
- 2001 Land (7-Site)/Underwater Search
- 2003 Underwater Search
- 2007 Village and 7-Site Search
- 2010 7-Site and Underwater Search
- 2012 --- 2015 --- 2017 --- 2019 (NGS)

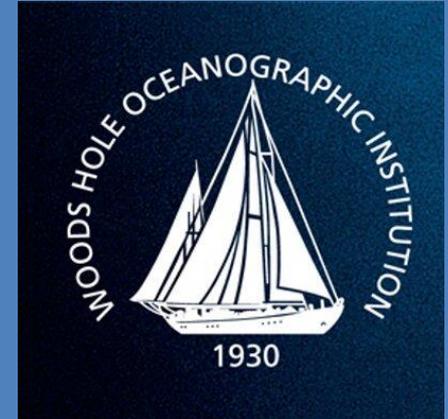
Our 2017 Expedition:



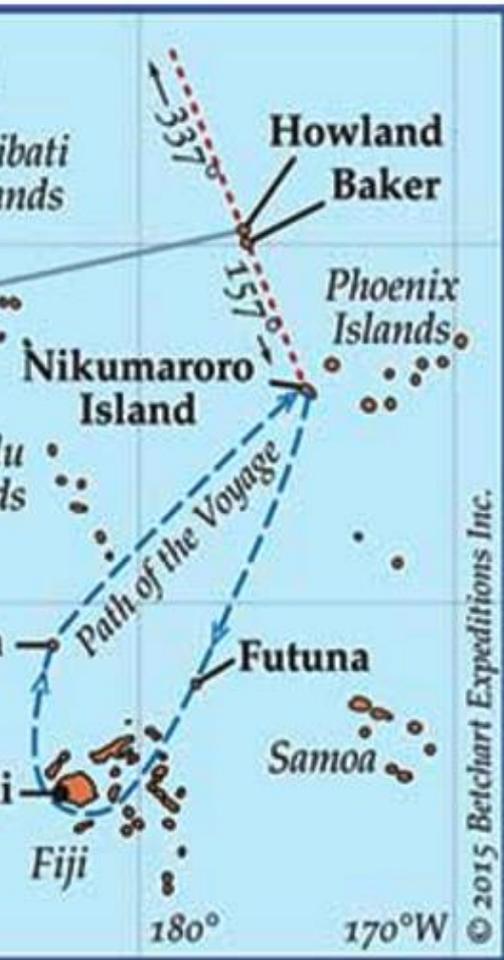
NATIONAL GEOGRAPHIC



The International Group for Historic Aircraft Recovery



Betchart Expeditions INC.



June 21--July 11, 2017

AMELIA EARHART EXPEDITION



TIGHAR NIKU IX 2017

Our effort attracted media attention

The New York Times

Amelia Earhart's Disappearance Still Captivates Searchers, 80 Years Later

USA TODAY

Bone-sniffing dogs will search for Amelia Earhart's remains on remote island



TIGHAR • 2366 Hickory Hill Road • Oxford, PA • 19363 • USA
610-467-1937 • tighar@tighar.org



NATIONAL GEOGRAPHIC

IN SEARCH OF AMELIA EARHART

Exclusive: Bone-Sniffing Dogs to Hunt for Amelia Earhart's Remains

In what may be the best chance yet to learn the famous aviator's fate, forensic dogs are headed to a Pacific island to search for her bones.

< 14 / 16 >



Ten-year-old Marcy and her handler, Miranda Townzen, help law enforcement agencies investigate crime scenes and cold cases.

PHOTOGRAPH COURTESY LYNNE ANGELO

Sniffer dogs on mission to find bones of Amelia Earhart

THE TIMES



A good ship and a great crew



First sight of Niku



Getting ashore and around



A beautiful island



In 7 days on the island I was lucky to work most of the major **sites**



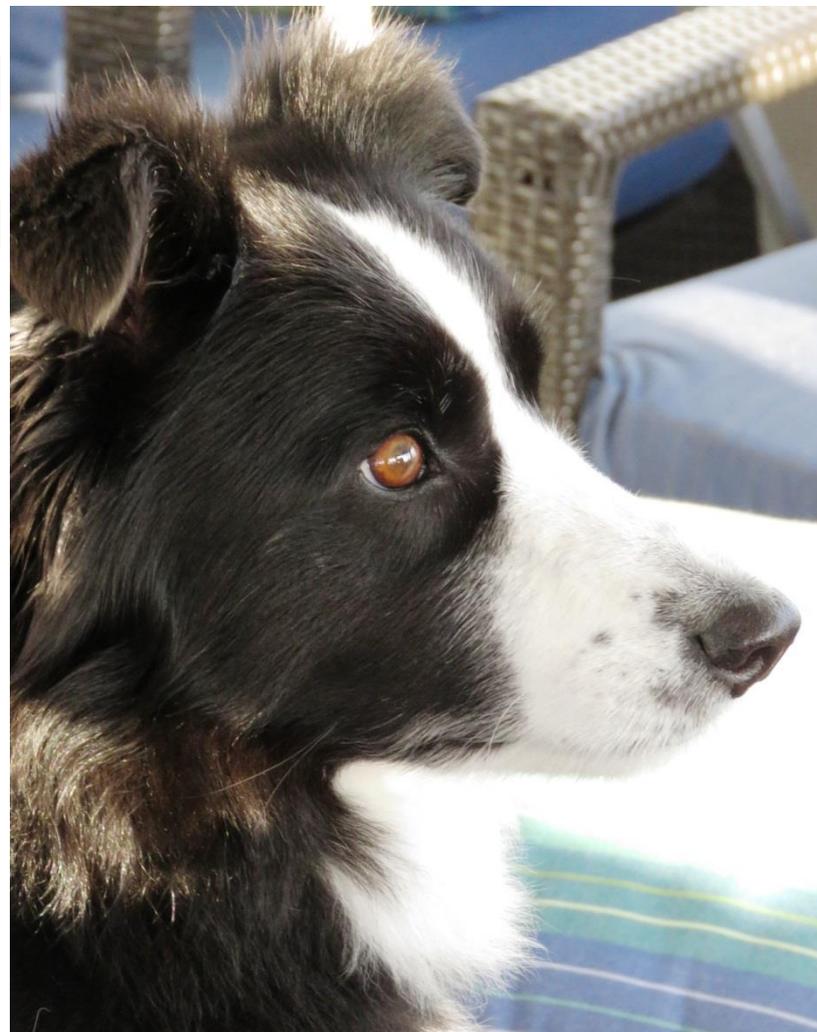
Humans worked hard...



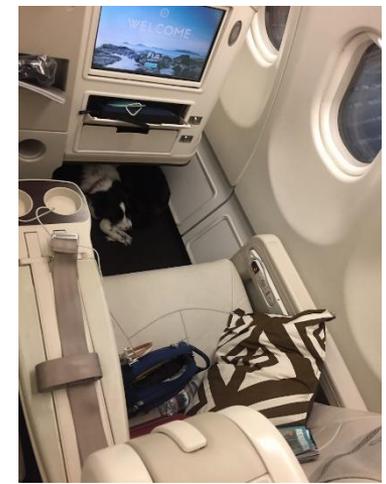
...and were great companions...



...but the dogs were the stars!



HHRD dogs + Niku = DNA!



Dogs confirmed human residue at the Ren Tree, as forecast by TIGHAR



Soil, coral and tree material collected for DNA analysis -- human DNA found!

Neanderthal & Human DNA from Dirt (not just bones or teeth)



April 2017

Neandertal and Denisovan DNA from Pleistocene sediments

Viviane Slon^{1,*}, Charlotte Hopfe¹, Clemens L. Weiß², Fabrizio Mafessoni¹, Marco de la Rasilla³, Carles Laluz-Fox⁴, Antonio Rosas⁵, Marie Soressi^{6,7}, Monika V. Knul⁸, Rebecca Miller⁹, John R. Stewart⁸, Anatoly P. Derevianko^{10,11}, Zenobia Jacobs^{12,13}, Bo Li¹², Richard G. Roberts^{12,13}, Michael V. Shunkov^{10,14}, Henry de Lumley^{15,16}, Christian Perrenoud^{15,17}, Ivan Gušić¹⁸, Željko Kućan¹⁸, Pavao Rudan¹⁸, Ayinuer Aximu-Petri¹, Elena Essel¹, Sarah Nagel¹, Birgit Nickel¹, Anna Schmidt¹, Kay Prüfer¹, Janet

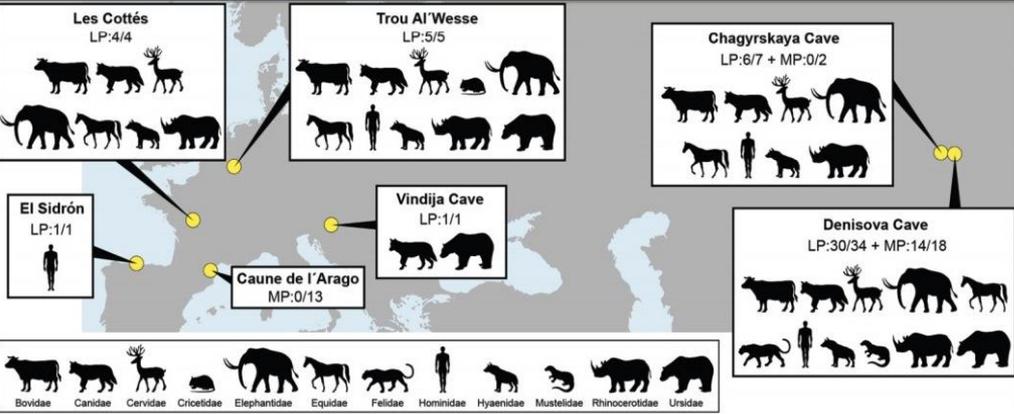
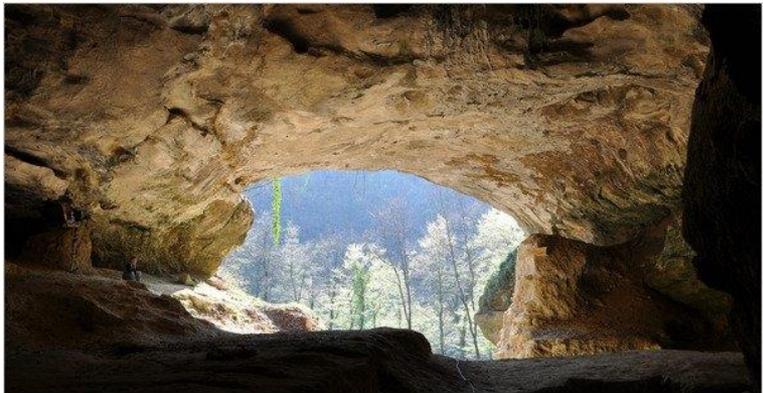


Fig. 1. Ancient taxa detected in Late Pleistocene (LP) and Middle Pleistocene (MP) sediment samples from seven sites. For each time period, the fraction of samples containing DNA fragments which could be assigned to a mammalian family and authenticated to be of ancient origin is indicated. The shaded symbols representing each family are not to scale.

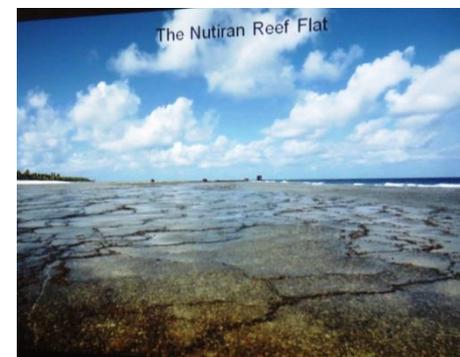
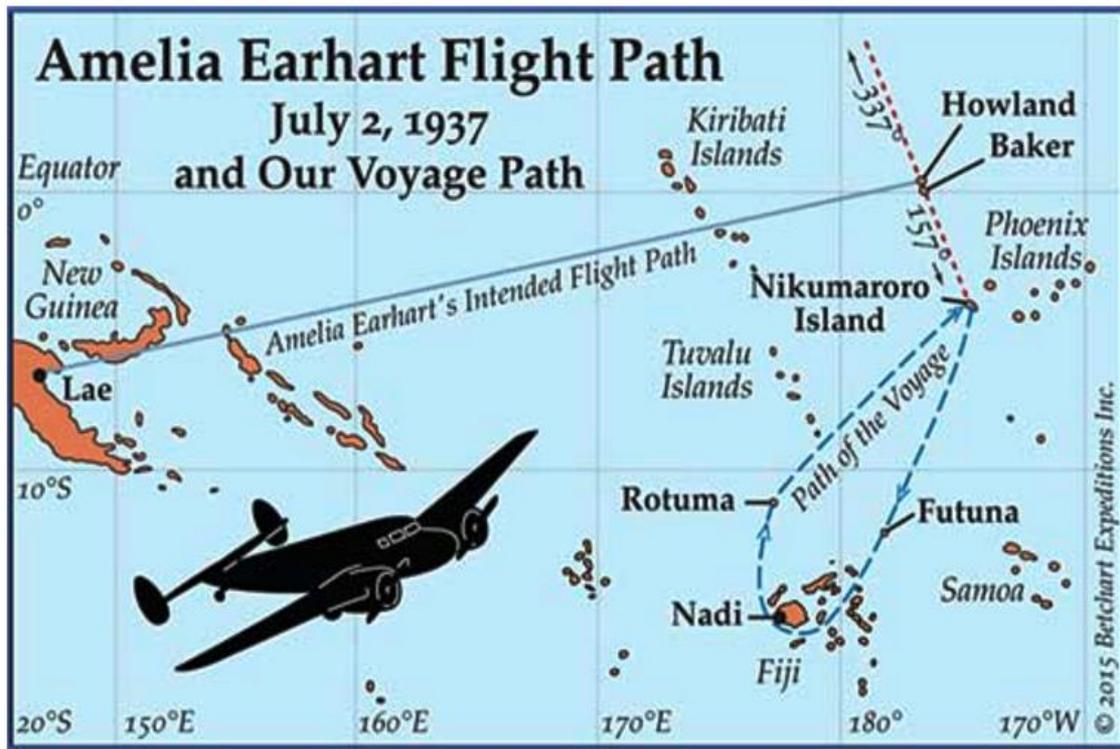


- 85 teaspoon-sized samples of dirt from 7 Euro-caves
- 4 w/ Neanderthal DNA; 1 w/ Denisovan DNA
- Modern DNA “hook” used to find ancient DNA
- Future std. technique?

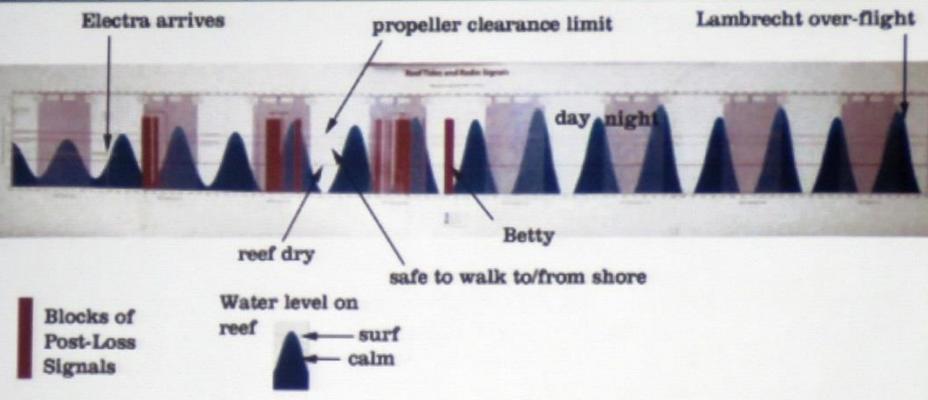
Evidence for Nikumaroro



The TIGHAR theory: complicated, but feasible



Faint Signals Heard From Amelia's Plane



Amelia Earhart: The Lost Evidence

NPG 1304

NAVAL MESSAGE

RECEIVED AT NAVY DEPARTMENT
F5L MUSK V NPM Z NRUI V QUAX P GR 44.

FROM: COMDR HAWIAN SECTION CG
ACTION: ITASCA C G
KNOX

PRIORITY
037 JUL 5 12 40

PASSED TO OPNAV & CINCUS KBR BY RDO HONOLULU FOR APPROPRIATE ACTION

U.S. GOVERNMENT PRINTING OFFICE 4-7143

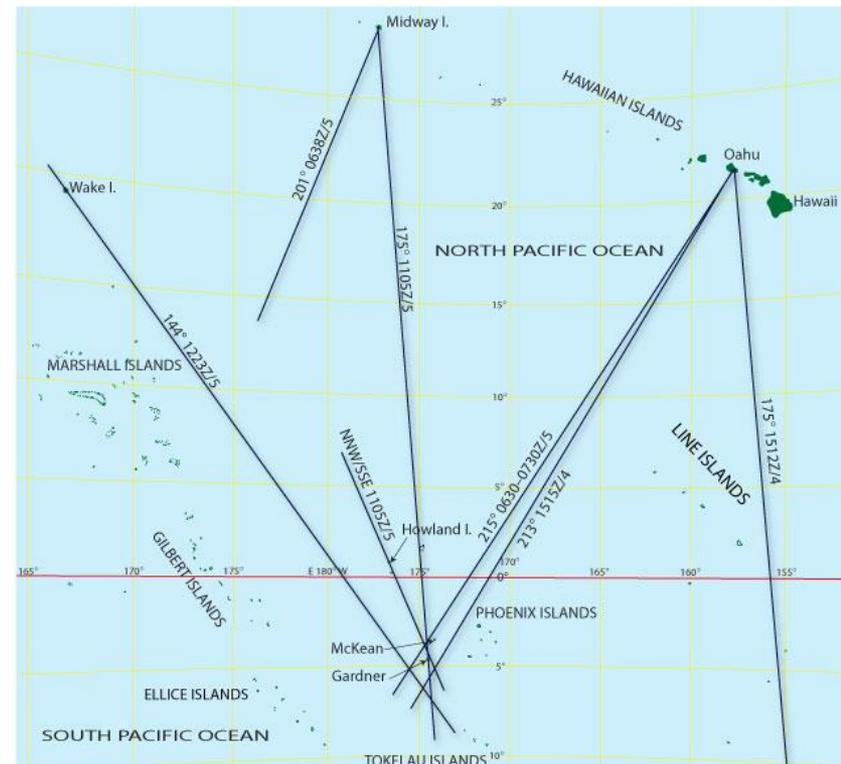
PRIORI TY /KD

8005 FOLLOWING COPIED NAVY RADIO WAILUPE 1130 TO 1230 GCT
QUOTE 281 NORTH HOWLAND CALL KHAQQ BEYOND NORTH MONT HOLD
WITH US MUCH LONGER ABOVE WATER SHUT OFF UNQUOTE KEVED
TRANSMISSION EXTREMELY POOR KEYING BEHIND CARRIER FRAGMENTARY
PHRASES BUT COPIED BY THREE OPERATORS 0242

▶ ⏪ ⏩ 49:03 / 1:23:59

Post-Loss Radio Signals: A Selection

July:	GM Time	Signal	Received at
3	0200	Weak signals, "L-A-T"...	L.A.
3	0400	Weak signs, "erratic, undeciph."	L.A.
3	0517	Carrier wave	Honolulu
3	0530	"Hear her now, weak..."	Itasca
3	0600	(Itasca requests dashes)	
3	0600	Itasca request, responding dashes	HMS Achilles
3	0604-06	"Something like generator start"	Itasca
3	0607	Unreadable, "Earhart" mentioned	Itasca
3	0700	Weak, unreadable	L.A.
3	0800-45	Earhart voice, SOS loud & clear	Amarillo
3	0831-54	Unintel. voice, "like last night"	Nauru



13 bones found in 1940...



1.	Orbital width	38.5mm	
2.	Orbital height	33.5mm	
	Orbital index	$\frac{OA \times 100}{ow} = \frac{3350}{38.5} = 87.0$	
			<i>This indicates a European - (Polynesians are about 84.0)</i>
	<u>Skull</u>		
3.	Length	182 mm	
4.	Breadth	137 mm	
	Cephalic index	$\frac{B \times 100}{L} = \frac{13700}{182} = 75.3$	
			<i>This indicates also a European.</i>
	<u>Karl Pearson's formula for stature</u>		
⑤	$S = 70.641 + 2.894 \times H$	Numerus is 32.4	$\therefore \text{height is } 163.406 \text{ cm} = 5 \text{ ft } 4.3 \text{ in.}$
⑥	$S = 78.664 + 2.376 \times T$	Tibia = 37.2	$\therefore \text{height is } 167.051 \text{ cm} = 5 \text{ ft } 5.7 \text{ in.}$
⑦	$S = 84.925 + 3.371 \times R$	Radius = 24.5	$\therefore \text{height is } 170.044 \text{ cm} = 5 \text{ ft } 6.8 \text{ in.}$
	Average of these three measurements		<u>is 5 ft. 5.5 inches.</u>
			<i>J. W. Hooper 14 April 1941</i>



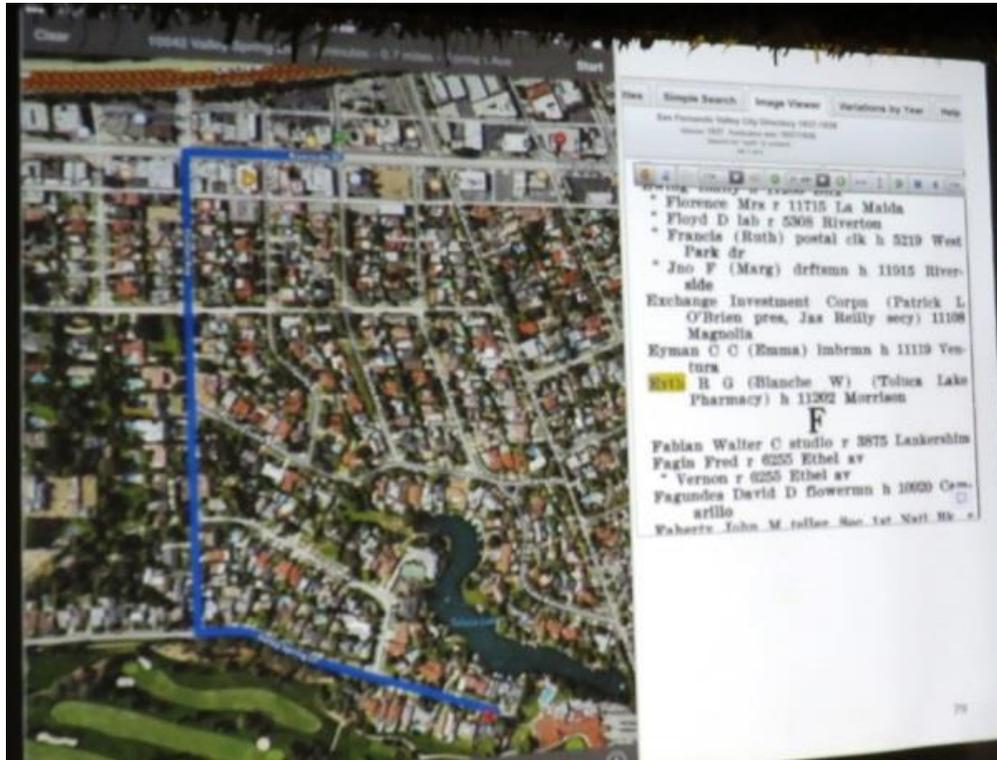
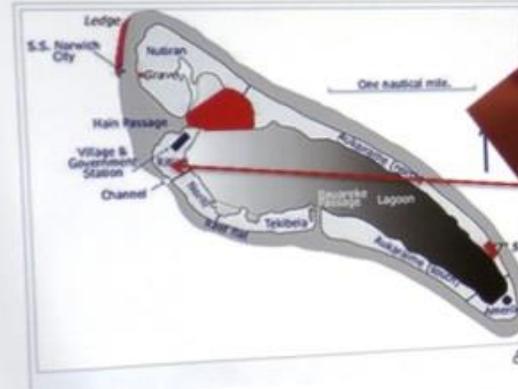
“Body had obviously been lying under a ‘ren’ tree and remains of fire, turtle and dead birds appear to indicate life. All small bones have been removed by giant coconut crabs which have also damaged larger ones.”

1940 official British report

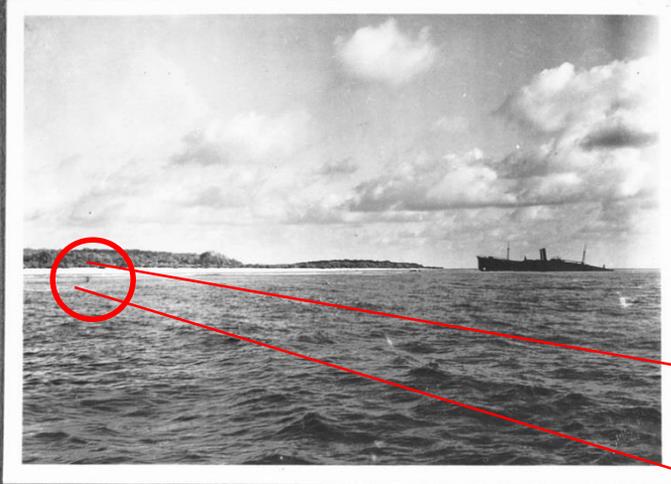
...consistent (?) with AE

A pharmacy vial found on Niku in 2017, from near AE's home?

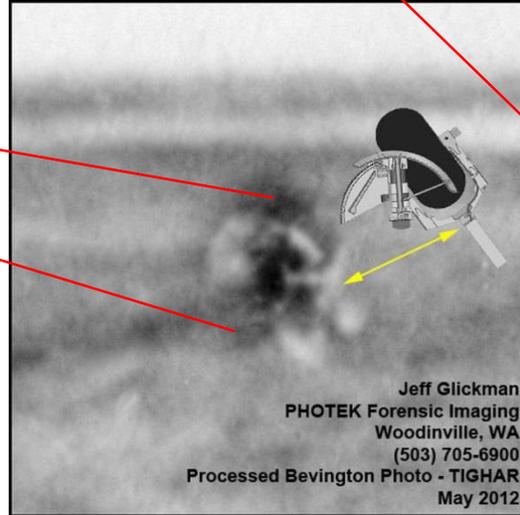
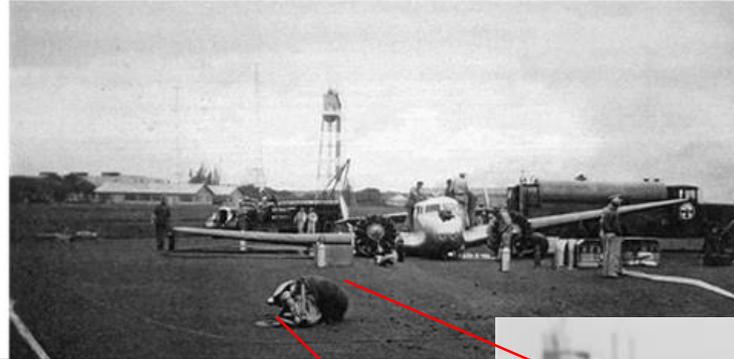
Where found: the New Colonial Village near the Co-Op



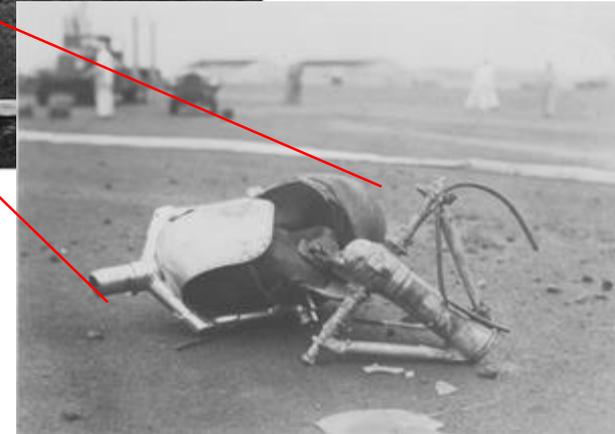
Perhaps bits of the plane were spotted at Niku in a photo...



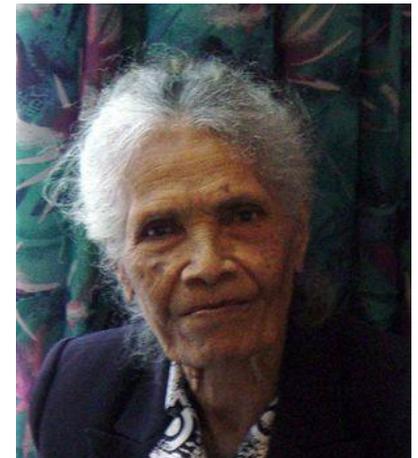
Gardiner Is. and the wreck



Jeff Glickman
PHOTEK Forensic Imaging
Woodinville, WA
(503) 705-6900
Processed Bevington Photo - TIGHAR
May 2012

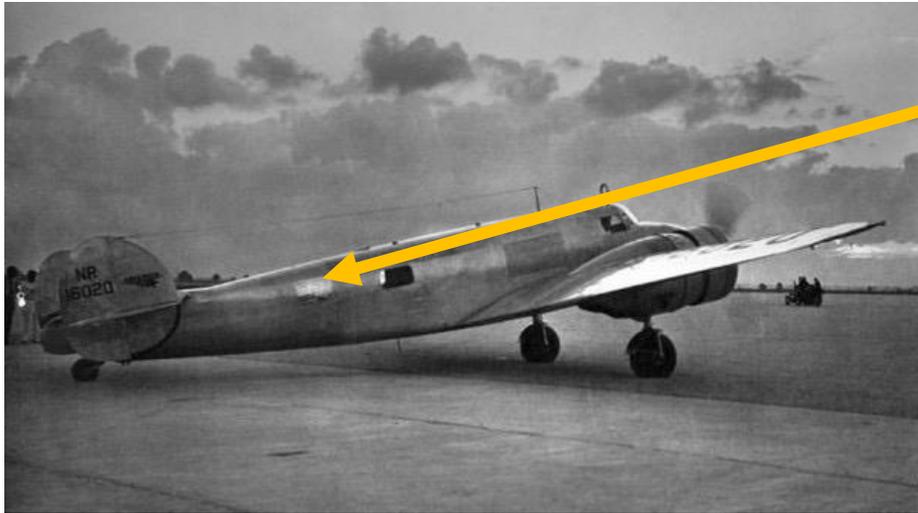


...and by an eyewitness:



Emily Sikuli

Aircraft skin found 1991



- Aircraft aluminum.
- Hand-stamped label and the font type indicate pre-1938 manufacture.
- Attached rivet is pre-1940 style and it is not a flush riveted head as used on WW II aircraft.
- Possible match to 1937 patch covering window

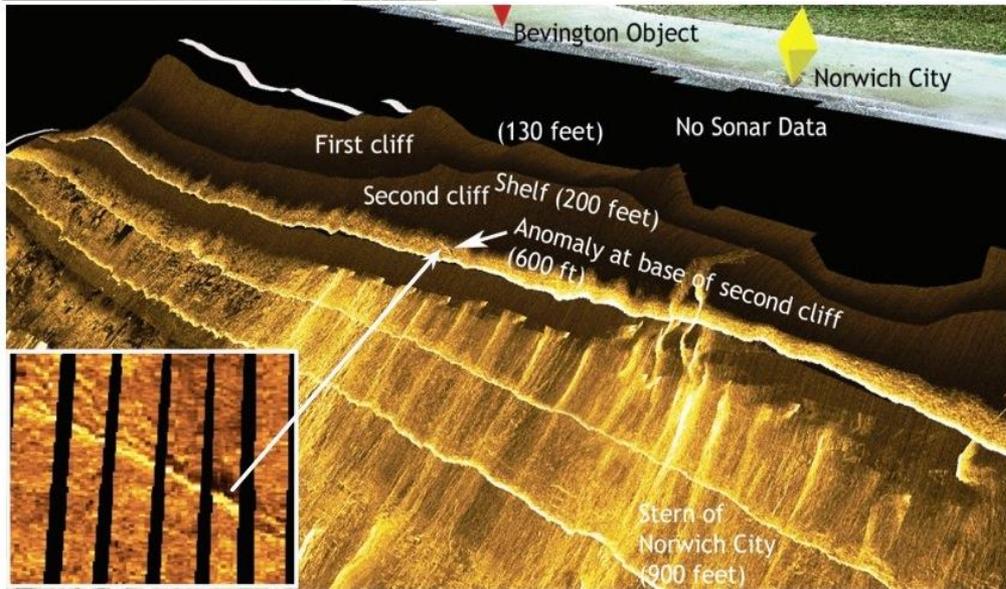
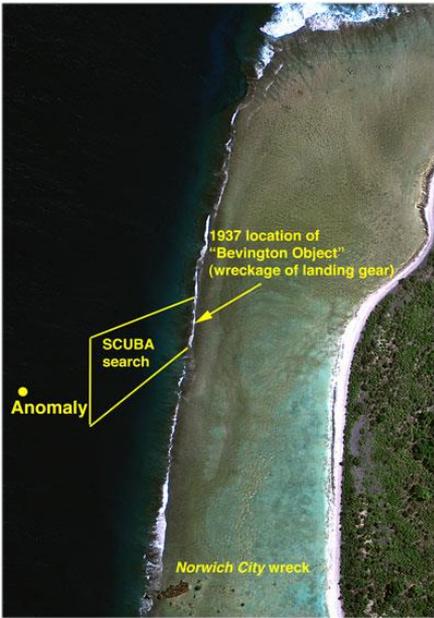
Plexiglas found on Niku in 1996



- Matches Lockheed Window Specs as in:
- *Correct material, Polymethyl methacrylate*
- *Correct curvature*
- *Correct thickness, 1/8 inch*
- It does not match any window on a World War II airplane



Limited searches done underwater thru 2017...



...with no success

The August 2019 Niku NGS Follow-up Expedition



Bob Ballard and *Nautilus*



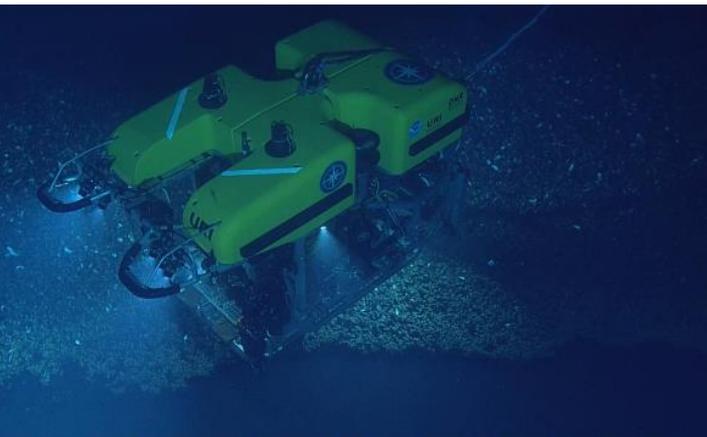
MV Taka



Tom King, PhD



Fred Hiebert PhD, NGS



Lynn Angeloro & Berkeley



2019 NGS/TIGHAR, Tom King Expedition Efforts

1. The 2019 Effort included:

- A. Bob Ballard's crew aboard the research vessel *Nautilus*.
- B. Land archaeology team at the 7-Site.
- C. Team that visited Tarawa Island, search for lost bones.



2. The 2019 team visually examined underwater:

- a) 100 percent of the island down to 750 meters [2,400 feet].
- b) 100 percent of the primary zone visually down to 900 meters [3,000 ft].
- c) Metal objects collected, analysis pending.
- d) The island rises thru 5,000 meters [3 mi, 16,000 ft] of ocean; areas not searched?

3. Niku 2019 Island Archaeology: Dog alerted, additional soil collected, one bone found, analysis pending.

4. Tarawa Island Research: Hiebert and team visited Tarawa, examined fragments of a human skull in the Cultural Centre.

**WATCH THE NATIONAL GEOGRAPHIC
TV SPECIAL, OCTOBER 20, 2019**

VIEW IT AS A SCIENTIST



Images from the 2019 Expedition to Niku



Researchers use UV light to find human remains in the coral



Skull fragments possibly from Niku at the Cultural Centre and Museum in Tarawa



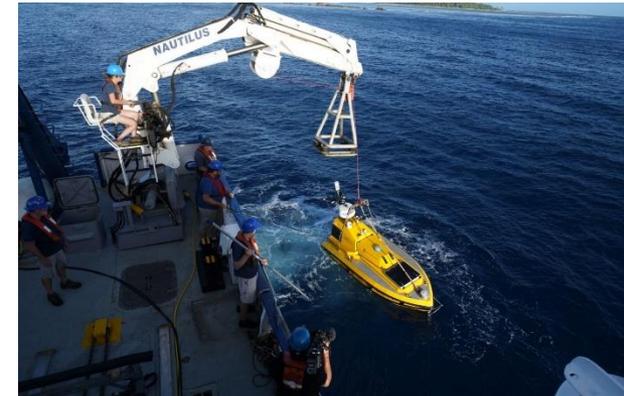
Fred Hiebert of NGS and Jamie Bach collecting possible DNA



Border Collie Berkeley on Niku



Divers in the primary search area, on the NW slope of Niku



Autonomous sonar vessel being launched from *Nautilus*

More Images from 2019



Searching the bottom of the "skull hole," where dogs alerted



Examining rubble from "skull hole"



Big Ren tree area being excavated



Excavating thru 1 trillion pieces of coral, each of which looks like bone

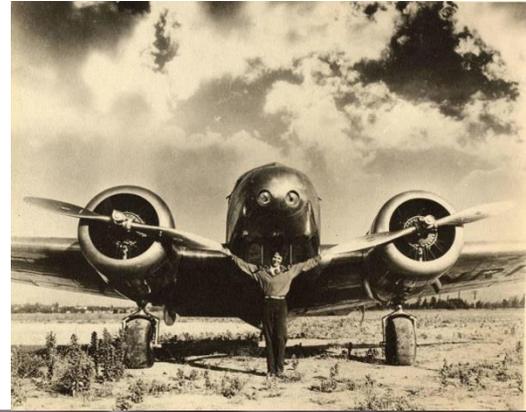


Berkeley detecting near the Big Ren tree

Conclusions



So, where are they?



My estimate:

- 30% chance they crashed at sea near Howland, probably S not N
- 9% chance Marshall islands
- >1% other conspiracy theories
- **60% landed & died on Niku**



Last photo of AE/FN



**IMHO Niku proven to
“a preponderance of the evidence”–
but not “beyond a reasonable doubt”**



**THANKS!!!
QUESTIONS?**

