

TIGHAR TRACKS

November 2010

Review & Update



After twenty-two years of rigorous research and ten grueling expeditions, TIGHAR has brought new understanding to an iconic American mystery. Our unwavering determination to follow the trail of evidence in the face of countless dead ends and disappointments has won international respect and recognition, exemplified most recently in the Discovery Channel two-hour special *Finding Amelia*.

Before we go over the latest results from the analysis of this year's expedition, let's quickly review why we did what we did.

WHERE TO FIND AMELIA?

- ❖ In July 1937, Amelia Earhart and Fred Noonan disappeared on a flight from Lae, New Guinea to Howland Island.
- ❖ Multiple lines of historical evidence suggest that the missing flight landed at Gardner Island (now Nikumaroro), an uninhabited atoll 350 nautical miles southeast of Howland.
- ❖ In 1940, the partial skeleton of a castaway was found on Gardner Island.
- ❖ The bones were subsequently lost, but modern forensic analysis of measurements taken at the time suggest that the skeleton was that of a white female of roughly Earhart's height.
- ❖ The remains of a man's shoe, a woman's shoe, and a box that had once contained a sextant were found with the bones but later lost. Numbers



reported to have been on the box match a type of sextant Fred Noonan is known to have used.

- ❖ In 2001 and 2007 TIGHAR conducted archaeological investigations of a site on the island that matches the description of where the castaway's remains were found. We call it the Seven Site after a nearby natural coral formation in the shape of the numeral seven.
- ❖ As with most archaeological sites, artifacts and features found at the Seven Site date from several different times and types of activity. Everyone who was there – whether it be castaway(s) trying to survive, Gilbertese colonists planting coconuts, Coast Guardsmen from the Loran station doing some target shooting, and even our own earlier expedition teams – left their own puzzle pieces behind. The trick is in figuring out which pieces go with which puzzle.

We may never have a complete picture of everything that has happened at the Seven Site but the questions we most want to answer are:

- ❖ How much of what we're finding was left behind by the castaway(s)?
- ❖ What do those things tell us about how, and how long, the castaway(s) survived?

And the biggest question:

- ❖ Were Amelia Earhart and Fred Noonan the castaways of Gardner Island?

Our work at the site in 2001 and 2007 confirmed the presence of features and artifacts that are consistent with castaway behavior – bird and fish bones



among deposits of charcoal and ash that appear to describe catch-as-catch-can meals caught and cooked by someone who was not a Pacific Islander; giant clams that had been opened like a New England oyster, the empty shells laid out as if to collect rain water; pre-war American bottles with melted bottoms that had once stood in a fire as if to boil drinking water.

Some of the artifacts found were gender-specific. Two pieces of thin plate glass with distinctive beveled edges fit together and match the mirror of an American 1930s-vintage makeup compact. Small pieces of red material test out to be chemically consistent with early 20th century cosmetic. (Earhart is known to have carried a compact on her travels.) Remnants of the contents of a small bottle made in New Jersey in 1933 test as lanolin and oil (hand lotion?). Part of a broken pocket knife came from the same type of knife – a bone handled, double-bladed jack knife – listed in an Army inventory of Earhart’s Electra made after the accident in Hawaii that ended her first world flight attempt.

Although nothing found at the Seven Site could be shown to have an unmistakable connection to Earhart or Noonan, there was more than enough to justify a more thorough examination of the site, especially considering the possibilities offered by recent advances in DNA research. The plan for the 2010 expedition therefore included an intense archeological excavation of the area where previous work suggested the castaway(s) had lived and died.

WHERE TO FIND THE ELECTRA?



Independent of the archaeological work at the Seven Site is the question of what became of the airplane. An exhaustive scientific analysis of radio distress

calls heard for several days after the disappearance shows beyond reasonable doubt that the plane was on land and on its wheels during that time. By the time Navy search planes flew over the island a week after the disappearance the radio calls had stopped and no airplane was seen. The flight leader did, however, report seeing “signs of recent habitation” on an island that had been officially uninhabited since 1892. Numerous witness accounts by later settlers and a 1953 aerial photo that shows what appears to be a debris field of light colored metal on the reef surface led us to theorize that Earhart had landed the Electra on a smooth and level section of the reef at the western end of the island that dries at low tide. We reasoned that rising tides and surf could have moved the plane seaward until it became hung up on the reef

edge and beaten apart by the breaking waves. If that is what happened, the wreckage of the plane should be in the deep water off the edge of the reef.

In 1999, former Nikumaroro resident Emily Sikuli marked a spot on a map where she saw wreckage in 1940 or ’41 that her father told her was the remains of an airplane. Earlier this year, forensic imaging specialist Jeff Glickman of Photek discovered unexplained man-made debris on the reef edge in an October 1937 photo of the island’s western shoreline – in the same spot Emily marked eleven years ago.

With good reason to believe that the wreckage of the Electra lies somewhere on the reef slope off the west end of the island, we included an underwater search down to a depth of 300 meters (1,100 feet) in the planning for the 2010 expedition.

Niku VI

RESEARCH UPDATE

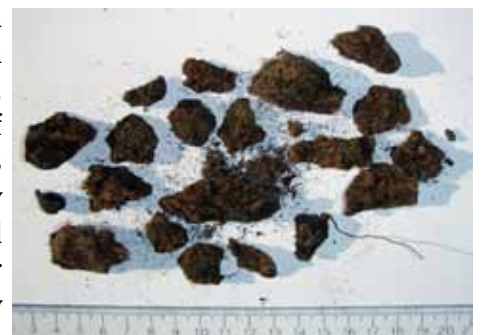
The Niku VI expedition in May and June of 2010 was the largest, longest, most complex and most expensive TIGHAR expedition ever, and the most successful. Just how successful must await the analysis of the artifacts, faunals (bones, clam shells, etc), and data collected during the expedition – a process that has barely begun. Here’s what we know so far and what we’re doing to find out more.

DNA

No “touch” DNA was found on the artifacts collected during the Niku VI expedition. That’s disappointing but not surprising. We knew the odds of retrieving DNA from objects exposed to Nikumaroro’s harsh environment for over 70 years were slim to none, but we gave it our best shot. The good news is that there is still a possibility that DNA can be extracted from other material recovered from the site.

THE PUTATIVE POOP

In 2007, our excavations at the Seven Site produced a few pieces of something that looks like chunks of brown dirt – except there is no dirt at the Seven Site. The ground surface there is comprised of finger-sized pieces of calcium carbonate known as coral rubble. We wondered if the brown chunks might possibly be fecal material that was near, or even in, the body



of the castaway as it decomposed. Dr. Kristin Sobolik, an anthropologist at University of Maine, Orono with extensive experience with prehistoric “coprolite” (fossilized feces) examined the material and suggested that we consult Dr. Cecil M. Lewis, Jr. of the Molecular Science Laboratories at Oklahoma University in Norman, OK. Dr. Lewis is one of the few scientists who have been successful in extracting ancient DNA from prehistoric bone and fecal material. Our brown chunks are now in Oklahoma where Dr. Lewis will try to discover whether there is human DNA present.

THE FICKLE FINGER

Dr. Lewis will also try to extract DNA from the one bone recovered from the Seven Site that may be human. It's part of a phalanx – finger bone – and at first we assumed it was from the turtle whose remains we found nearby (sea turtles have finger bones in their flippers.) But when TIGHAR's Senior Archaeologist, Dr. Tom King, catalogued the turtle bones he discovered that we have only parts of the carapace and plastron (the shell and underbelly). No limb bones. If whoever brought the turtle to the Seven Site didn't bring the legs, how did a phalanx get there? Strange as it seems, human and turtle phalanges look very much alike and we know that none of the hand bones of the castaway were found in 1940. Could the bone be a human finger? Tom sent the mystery bone to TIGHAR's forensic anthropologist Dr. Karen Burns asking if she could say with certainty that it was or was not human. She couldn't. So now the well-traveled phalanx is at Oklahoma University where Dr. Lewis will try to extract human DNA.



ARTIFACTS

In 2001 and 2007 we used metal detectors to identify specific areas or “units” to excavate. This time we methodically and meticulously dug nearly the entire area. Not surprisingly, we found many non-metallic artifacts that we had missed in the earlier searches. Some, such as more shards of shot Coast Guard crockery, are not surprising while others, such as a tiny red glass bead, are totally puzzling.

Of particular interest are two glass containers. Both are broken and some pieces are missing, but in each case enough of the object is present to make a general identification.

Artifact 2-9-S-1 is a small glass jar of a type known as an “ointment pot.” It has a flared base and the interior bottom is rounded so as allow the contents



to be scooped out with a fingertip. It originally had a screw-on lid but no lid was found. We don't know what it contained except to say that the amount was three ounces or less. We haven't yet found an exact match but ointment pots of this general type were popular for cold cream and other feminine personal care products as early as 1900. This appears to be another gender-specific artifact. Research continues.

Artifact 2-9-S-50 is a bottle that contained a Mennen product. This bottle was more shattered than the ointment pot and we don't have much of it, but we have enough to tell that it was about a three-ounce size and that the word Mennen appeared vertically on both side edges in a distinctive art-deco style. Both Mennen Skin Bracer and Baby Oil were sold in similar bottles in the 1930s and '40s but we have not yet been able to pin down an exact match. In any case, it's the fourth glass container found at the site that held three ounces or less of a personal care product.



Many, many more artifacts were collected and await identification and analysis.

Ten artifacts are currently at a materials analysis lab in Delaware to determine what they're made of.

Eight pieces of broken glass are being examined by an archaeologist in Vermont with special expertise in identifying chipping on sharp edges that suggest secondary use as a tool.

The estimated cost of expert artifact analysis contracted for so far is \$3,200.

Answers are expensive.

FAUNALS

Careful excavation revealed that the Seven Site is dotted with the remains of small fires on which meals of bird, fish, possibly turtle, and maybe even rat were cooked. There are also deposits of clam shells of several different varieties. We already know that the fish bones we collected at the site in 2007 are not typical of meals eaten by Pacific islanders. Veterans of the Coast Guard station tell us that when they had cookouts they brought hot dogs from the mess hall. Are all of the meals cooked and eaten at the Seven Site attributable to a western castaway or are some meal sites more typical of islanders? It's an important question because if we can figure out how much food the castaway(s) consumed we can get a rough idea of how long they were there. Also, if we can find out whether any of the birds were juveniles we can get an idea of the time of year they were killed.

Something over two thousand fish bones, most of them smaller than a house key, are now at the Anthropology Department of the University of Alabama in Birmingham for analysis.

A similar number of bird bones are at the Bishop Museum in Honolulu to be identified and cataloged.

The mollusks are in Guam with Micronesian Archaeological Research Services.

The estimated cost of all professional faunal analysis contracted for so far is \$10,600.

Answers are expensive.

THE UNDERWATER SEARCH

The reef slope drops off much more steeply than anyone knew. The ROV got great HD video footage of what is basically a cliff face that is too steep to catch aircraft wreckage. The only man-made objects encountered, aside from debris from the *Norwich City* shipwreck, were what appeared to be a semi-circle of wire (but may also have been a piece of “whip coral”) and a couple of pieces of rope. Perhaps coincidentally, these objects were seen deep on the reef slope below where we think the airplane went over the edge.

Despite frustrations and mishaps, the ROV search gave us the first detailed picture of the underwater environment at Nikumaroro below scuba depth (about 100 feet). We had the capability to search down to 300 meters (1,100 feet) but it turned out that that’s where we need to begin to search. At that depth you reach the base of the cliff where the slope begins to shallow out. It’s where anything that went over the reef edge that was too heavy to be swept away by surf or currents is most likely to have come to rest. Three hundred meters is also the transitional area where the last faint traces of sunlight from the surface fade to the total blackness of the deep ocean. Airplane wreckage in this “twilight zone” should not be obscured by coral growth.



**“WE’RE
GONNA NEED
A BIGGER
BOAT.”**

During the Niku VI expedition the ROV was operated from both *Nai’a* and *VuSI* – good ships, but they were chosen for their suitability to transport and support the land archaeological team. With no way to hold a steady position while being pushed about by wind and

waves, the ships were acceptable platforms for only a relatively shallow search. To conduct a search at depths well below 300 meters we’ll need a more sophisticated ROV with a much longer tether and a ship with “dynamic positioning” – powerful thrusters linked to a GPS system that allow the ship to maintain a rock-solid position over a particular spot on the ocean bottom. The daily charter rate for such ships is at least double the rate for the ships we’ve used in the past.

Answers are expensive.

NIKU 7



TIGHAR will return to Nikumaroro in July 2012 on the 75th anniversary of the Earhart disappearance, or sooner if possible, to conduct a deep water search for whatever survives of the Earhart Electra. There may also be a ground component to continue archaeological work at the Seven Site. We’ll have more details as the plan evolves.

In the meantime:

We’ll continue to analyze the artifacts, faunals, and data collected at the Seven Site.

Forensic examination and analysis of the 1937 photo that may show aircraft wreckage on the reef will continue.

A complete catalog and analysis of the radio distress calls heard for several days after Earhart’s disappearance is nearing completion.

There are some new possibilities in our efforts to find the bones that were sent to Fiji in 1940.

We’re planning a research trip the Solomon Islands to examine British colonial records in the archives in the capital of Honiara and conduct interviews with surviving former residents of Nikumaroro.

Watch the TIGHAR website (www.tighar.org) for updates and opportunities to participate.

As always, your continued support makes it all possible. Thank you.

