TIGHAR TRACKS



es, we're going back. TIGHAR has committed to mounting another expedition to Nikumaroro in May/June of 2010. Niku VI will be our tenth trip (see page 3) to the remote Phoenix Islands to test the hypothesis that Amelia Earhart and Fred Noonan landed and eventually died on the uninhabited, waterless atoll then known as Gardner Island. If we're successful in raising the needed funds, this expedition will be equipped with unprecedented search capability.

While our archaeological team continues the excavation of the Seven Site, a Sub Aviator Systems manned submersible will search for the wreckage of the Earhart Electra in the deep water off the island's western reef.

The expedition vessel will be our old friend *Nai'a*, the 120-foot motor-sailer we've used on three previous trips.

Staging out of Apia, Samoa, we'll conduct this expedition in two segments.

Segment One May 18 – 31, 2010 **Segment Two** June 1 – 14, 2010

Midway through the expedition the ship will make a run to Apia and back so that no team member has to be away from home for more than two weeks. While the ship is away, a Castaway Corps of experienced volunteers will remain on the island to continue the archaeological work.

As currently envisioned, the team for each segment will consist of 15 people:

> Five will be the support team for the submarine.

➤ Ten members of each segment's team will be TIGHAR Project Team Members (PTMs) and Sponsor Team Members (STMs). PTMs are selected from among qualified TIGHAR members. Their expenses, Los Angeles-to-Los Angeles, are covered by TIGHAR. STMs are selected from among individuals who are willing to contribute \$50,000 for a berth on the team.



Here's the itinerary:

Niku VI First Segment

May 19, 2010

Team One arrives in Apia, Samoa on Air New Zealand nonstop from Los Angeles and embarks for Nikumaroro aboard *Nai'a*.

May 22 to 28

Team One conducts archaeological operations at Nikumaroro.

May 28

Team One departs for Samoa minus the Castaway Corps who remain on the island to continue working.

May 31

Nai'a arrives in Apia and Team One members who are returning to the U.S. depart nonstop for Los Angeles on Air New Zealand.

June 1

Nai'a reprovisions in Apia.

Niku VI Second Segment

June 2

New team members arrive on Air New Zealand nonstop from Los Angeles and Team Two embarks for Nikumaroro aboard *Nai'a*.

June 5 to 11

Team Two conducts archaeological operations at Nikumaroro.

June 11

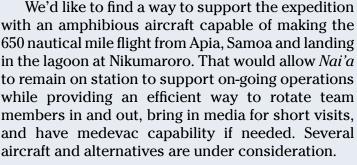
Team Two departs for Samoa

June 14

Nai'a arrives in Apia and Team Two returns nonstop to Los Angeles on Air New Zealand.

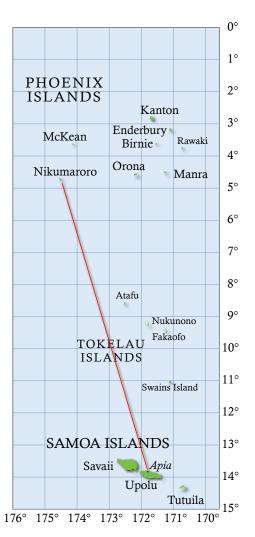
AMPHIBIOUS AIR SUPPORT











HOW YOU CAN PARTICIPATE

To fund the basic expedition – a year of preparation, the expedition itself, and the post-expedition analysis of results – we'll need to raise \$500,000. To fund the expanded version of the expedition that would include a manned submersible to search for the airplane and amphibious aircraft support between Nikumaroro and Samoa will probably be that much again. We do not for one minute think it will be easy to fund a million-dollar expedition in the midst of the Great Recession but, with your help, we're confidant we can do it.

Become a Friend of the Expedition

We're asking you, as a TIGHAR member, to pick an amount you're willing to donate each month from August 2009 to July 2010. Whether it's \$100, \$50 or \$5, it's a year of monthly support we can count on as we put this expedition together – and that's very important to us. Please use the enclosed form or go to Friends of the Expedition on the TIGHAR website to make your pledge. We'll list you (but not your pledge amount) on the TIGHAR website as a Friend of the Expedition and send you a Niku VI Friend of the Expedition T-shirt as a thank you.

Volunteer to go on the Expedition as a Project Team Member (PTM)

PTMs donate their time. TIGHAR covers all other expenses. Most of the PTMs on Niku VI will, necessarily, be skilled veterans of previous trips, but we always try to include a few first-timers. To qualify for consideration as a PTM you need to be:

- · a TIGHAR member
- · in good health and good physical condition
- a graduate of a TIGHAR Field School in Aviation Archaeology.

We're now accepting registrations for a Field School in Idaho in September. See the enclosed flyer for details.

Volunteer to go on the Expedition as a Sponsor Team Member (STM)

Sponsor Team Members have been an essential and successful part of TIGHAR's many expeditions to Nikumaroro. STM's make a \$50,000 contribution to help fund the expedition in exchange for one of the berths on either the first or second segment.

In the past, the greatest obstacle to recruiting Sponsor Team Members has been the month-long duration of the expeditions. Many people who can financially afford to be an STM can't afford the time. By doing Niku VI in two segments we've shortened the time commitment to two weeks and doubled the number of STMs we can accommodate.

If you're in a position to consider becoming a Sponsor Team Member on the Niku VI expedition, please contact Gillespie at ric@tighar.org.



STARRING

hen we launched The Earhart Project in 1988 there were two competing theories about what happened to Amelia Earhart and Fred Noonan. The public seemed to be evenly split between adherents of "crashed & sank" and fans of "captured by the Japanese."

The theory that the lost aviators died as castaways on an uninhabited island wasn't even on the radar. Twenty-one years of science-based research, nine TIGHAR expeditions, and two critically acclaimed books later, that possibility has become so widely accepted that AT&T used it as the basis for a tonguein-cheek television commercial about internet access.

As we once more take on the daunting task of planning and funding an expedition to Nikumaroro, it's worth reviewing how we got from where we started to where we are today.

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"We are on the line 157 337.
Running on line north and south."
USCG Itasca radio log, July 2, 1937
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The TIGHAR hypothesis is based on navigational logic and the assumption that Earhart was where she said she was and doing what she said she was doing in the last in-flight radio message heard by the Coast Guard. Two islands, McKean and Gardner (now Nikumaroro) are on the line she said she was following. If the flight reached either island, some remnant or relic of the airplane and/or its crew should still be there.

One day on McKean was enough to eliminate that tiny jumble of jagged coral with its reeking guano lagoon. Nikumaroro, however, proved to be rich with tantalizing clues. To be sure, our field work on the island turned up some false leads and dead ends, but nothing to contradict the basic premise that this was where the flight ended. Meanwhile, our archival research was and Fred NOON

Amelia EARHART

distilling the facts of the Earhart case from the myriad myths and rumors.

The first big break came in 1998 with the discovery of documents confirming a story that a British Colonial Service officer had found the bones of a female castaway on Nikumaroro in 1940. The bones were sent to British headquarters in Fiji and apparently lost, but we reasoned that if we could locate the place on the island where Gerald "Irish" Gallagher discovered a partial skeleton, sextant box, fragments of a man's and a woman's shoe, campfire, etc., there might be other things there that he missed. Our initial excavation of the Seven Site in 2001 revealed artifacts and features that reinforced our suspicion that the site was where the castaway lived and died.

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"It is a test of true theories not
only to account for but to predict
phenomena."
William Whewell, 19th century
polymath and scientist
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We predicted that further archaeological work at the Seven Site would produce evidence supportive of the hypothesis that we had found the right place. Our prediction proved true. The 2007 Niku V expedition brought back artifacts that appear to be the personal effects of an American woman of the 1930s trying desperately to survive in a harsh and unfamiliar environment (see "Smoking Guns," *TIGHAR Tracks*, Oct. 2008). We have also discovered that the serial numbers reported to have been on the sextant box found near the skeleton strongly suggest that the sextant it once contained was a type known to have been carried by Fred Noonan (see "Numbers Game," *TIGHAR Tracks*, Oct. 2008). Was Amelia Earhart the hapless soul who died at the Seven Site? Almost certainly, but almost isn't good enough.

On The Way to DNA

Even the most ardent skeptics acknowledge that DNA from Earhart and/or Noonan would clinch the case. During our excavations at the Seven Site in 2007 we were under the impression (correct at that time) that to have any hope of extracting DNA we would



need to find a bone or a tooth. We found plenty of bones – 1,401 to be exact – but they were the bones of small fish, birds, and turtles uncovered during the excavation of former cooking fire sites. No human bones, no human teeth. Bummer.

There were, however, some important finds; a zipper, a broken jack knife, some broken bottles - all of which, after extensive research, proved to be from the mid-1930s and consistent with items Earhart may have had with her. Other significant finds were less obvious at first. When you're digging an archaeological site you collect anything unusual, whether you know what it is or not. What laboratory analysis later showed to be pieces of early twentieth century cosmetic were just tiny hunks of red-colored stuff to the volunteers sifting coral rubble at the Seven Site. A small shard of glass with a distinctive beveled edge was just a piece of broken glass until we got home and discovered that it fit another shard found on an earlier trip. Together, we had enough to match the object to an American 1930's compact mirror.

Among the hundreds of artifacts, objects, and



samples collected from the Seven Site were a few desiccated chunks of an unidentified brown substance. We later wondered if they might be coprolites – the archaeological term for fossilized fecal material.

Experts were unable to give us a firm yes or no but, if the material was what we suspected it was, there just might be DNA present. TIGHAR member Dr. Ryan Parr of Genesis Genomics connected us with Molecular World, a top-notch DNA laboratory in Thunder Bay, Ontario that specializes in extracting "ancient DNA."

A few of us had touched the material with our



bare hands before we realized what it might be so, to remove any contamination, the lab scraped off the exterior surface. After many tries they were successful in extracting DNA from the remaining material. It was mitochondrial (mt) DNA and it was badly degraded, but they were able to sequence it and determine its profile. MtDNA is passed in the female line and, given the apparent strength of the possibility that it was Earhart-related, an Earhart family member generously consented to providing a DNA sample for reference. For a while we thought we might have our long-sought smoking gun but, to everyone's surprise, not to say dismay, the mtDNA from the island material did not match the Earhart sample. Instead, it matched Ric's. He had briefly touched the material with ungloved fingers while initially trying to figure out what it might be. Molecular World's extraordinary ability to detect, extract, and profile the faintest traces of DNA had defeated their own attempts to eliminate any contamination from the material being touched.

We still don't know whether or not the stuff is coprolite and what the heck it is if it's not. What is painfully apparent is that, given the recent advances in DNA extraction capability, had we been careful to handle artifacts like the zipper and broken pocket knife with tweezers or gloves, we might well have been able to extract the castaway's DNA from those objects. Needless to say, archaeological protocols at the Seven Site during Niku VI will be designed to protect any recovered artifact or material from contamination.

Although all of the cleared surface area at the



Seven Site has been swept with metal detectors, only about 5% of the area has been archaeologically examined (dug and screened). Non-metallic artifacts, such as the compact mirror and cosmetic, were found because they happened to be near a metal detector "hit." Based on what has been found already, the probability that more non-metallic artifacts will turn up seems high – as does the possibility for recovering DNA.

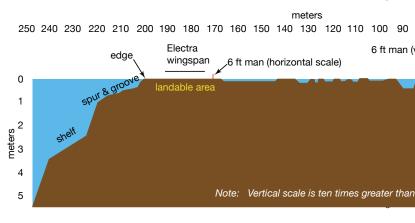
Funding permitting, Niku VI will include a deep



water search for wreckage of the Earhart Electra off the island's western reef. The available evidence suggests that the plane was landed on the reef just north of the Norwich City shipwreck and remained there for several days and nights while Earhart and Noonan used the radio to call for help. The hypothesis we'll be testing goes something like this:

At some time before the Navy overflight on July 9, rising tides and surf washed the aircraft over the edge where it hung up and was obscured from view by breakers. Battered by the sea, the plane broke up; some components tumbling down the steep reef slope into deep water, some remaining wedged on the reef edge to be seen by the Gilbertese settlers who began to arrive in 1939. By 1944 any obvious trace of the wreck seems to have been gone. In the 1950s, debris from the plane, possibly churned up by storms, started to appear on the reef-flat and beaches where it was salvaged, brought to the village, and cut up to make fishing lures, combs, and decorative objects. By the time the island settlement was evacuated in 1963, the plane wreck on the reef edge was an old story known to only a few. TIGHAR's searches in the abandoned village have turned up scraps left over from the consumptive use of airplane skins and components – some are clearly WWII debris imported from other islands (probably Kanton) but some appear to be civilian in origin and consistent with Earhart's Electra. Our previous searches of the reef edge and

Cross-section of reef flat at presumed low tide, landable area dry, c





slope have found no aircraft debris down to the relatively shallow depths accessible to scuba divers but, of course, those depths are also susceptible to storms. What has always been needed is a way to

search the greater depths of the reef slope where wreckage would rest undisturbed. Complicating the search is the fact that during a storm in January 1939, the stern half of Norwich City broke off and tumbled down the reef slope in that same area. Ship wreckage is a much better magnetic target than the few steel components of the Electra, so magnetometry is out. Sonar paints an image with sound, but if pieces of airplane are mixed in with pieces of the ship it might

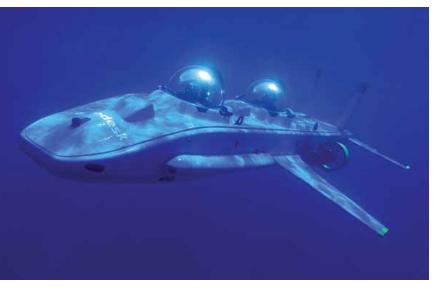
aircraft location; alm sea.

40 30 20 10 0 80 70 60 vertical scale) shore

be hard to distinguish which is which. The best search technology for this difficult environment

> would seem to be the Mark One Eyeball. The job calls for a manned submersible capable of reaching depths down to a thousand feet, equipped with strong lights (it's dark down there), capable of traveling at a reasonable speed, but

able to stop and hover over a suspicious object. The sub must also be compact and portable enough to be transported on, and deployed from, our expedition ship Nai'a.



Fortunately, there is such a sub. TIGHAR and Nai'a are working with Sub Aviator Systems of Seattle, Washington (www.subaviators.com) for the deployment of their advanced underwater airplane "Super Aviator" as part of the Niku VI expedition. Watch the TIGHAR website (tighar.org) for news as this exciting new aspect of TIGHAR's search takes shape.



The Post-Loss Radio Signals

ne of the most important lines of investigation in the Earhart Project is the gathering and evaluation of reports of radio transmissions received from the Earhart Electra after it was officially declared missing. As was known at the time, critical

components of the aircraft's radio system would be submerged and inoperable if the Electra was afloat on the ocean. If even one of the post-loss radio signals was genuine, the airplane did not go down at sea.

The transmitter (1) was located on the floor in the back of the cabin and might have remained dry if the airplane was floating nose-down, as it almost certainly would. The auxiliary battery (2) nearby might provide current even if the main battery (3), located under the floor farther forward, was submerged. However, before electrical power from either battery could be used by the transmitter, the voltage had to be boosted by a dynamotor (4) that was situated under the pilot's seat. That essential component would be submerged and useless unless the airplane was floating upside down, in which case the transmitting antenna (5) would be under water.

✓IGHAR researchers have gleaned more than a hundred alleged receptions from Coast Guard logs, official message traffic, Pan American Airways memoranda, contemporary newspapers, and in a few cases, individuals who only came forward many years after the event. Each alleged reception has been analyzed by date, time and frequency using the latest radio propagation software to determine the probability, or improbability, that a signal from Earhart's aircraft could have been received as reported. Each reception has also been evaluated according to qualitative factors such as the credibility of the reporting individual or agency, similarity to other reported receptions, and the presence of occult content (accurate information that couldn't otherwise be known to the reporting individual).

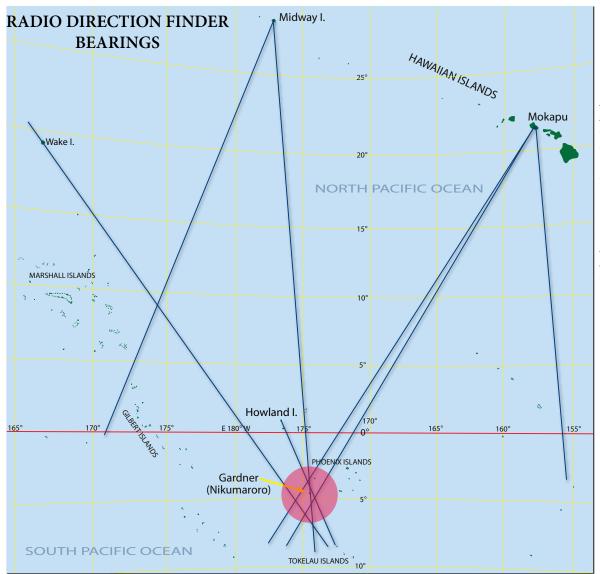
The analysis shows roughly a quarter of the reported radio signals to be not credible. Some were transparent hoaxes while others were simply so unlikely as to be functionally impossible. A significant number, however, appear to be credible. That is not to say that we can be sure they were sent by Earhart or Noonan. Absolute certainty would require Amelia or Fred being here to say, "Yes, I made that call." We can, however, say that one of two conditions was the case:

Either Earhart and Noonan were making radio calls from the Electra on land somewhere in the Phoenix Group of islands

or

2. There was a hoaxer pre-positioned in that region who was able to transmit on Earhart's frequencies, had information about her that was not known to the public, was able to mimic her voice, and knew that she would not reach Howland.

Even the most dedicated conspiracy buff would have a hard time accepting the second possibility. It seems safe to conclude that the Electra did not land in the ocean.



Radio bearings from Pan American stations at Mokapu, Midway and Wake; a Coast Guard radio bearing from Howland, and the relative strengths of transmissions received at other locations confirm that the credible post-loss signals emanated from somewhere within the red circle.

The TIGHAR website (www.tighar.org) will soon feature a catalog of all reported post-loss receptions with full details and probability figures for each event. A separate catalog will list only the signals deemed to be credible. In addition, an interactive timeline will present the credible signals in a graphic hour-by-hour representation of day/night, high tide/low tide, and water levels for the reef at Nikumaroro. The correlation between the times when credible messages were sent and the times when conditions on the reef would have permitted messages to be sent is compelling.

Although a 21st century computer analysis reveals many of the post-loss signals to have been almost certainly genuine, the picture was far fuzzier in 1937. Many of the signals were nothing more than basic carrier waves heard on Earhart's frequency. In some cases dashes were heard in response to requests for dashes. When voice was heard it was usually unintelligible. Almost without exception, reports of voice messages with intelligible content were accidental receptions by private citizens who stumbled upon a harmonic of Earhart's primary frequencies. The only message received by professional government operators that contained potentially useful information was the "281 message" received the U.S. Navy radio station at Wailupe, Oahu on the night of July 4th (see sidebar page 10).

Nowhere is there an official record of a government operator hearing a voice transmission in which Earhart identified herself by name and gave potentially useful information about her location and condition. Or is there?



THE STRANGE CASE OF THE MISSING MESSAGE

If an account in Fred Goerner's book *The Search for Amelia Earhart* (Doubleday, 1966) is true, on July 7, 1937 three operators at U.S. Navy Radio Wailupe (the same station that heard the 281 message) heard the voice of a woman who identified herself as Earhart attempting to contact *Itasca* using the ship's call sign and the Electra's radio call sign. Her message contained unambiguous information about her location and condition.

In his book, Goerner describes visiting Elmer Dimity, an inventor and one-time director of The Amelia Earhart Foundation, a group formed in 1937 to raise money for an expedition to continue the search for Earhart. On page 273 Goerner writes:

Among the mass of letters and photo-copies of logs, I found two documents which seemed of great importance. They were duplicates of messages copied by three operators at the Navy radio station at Diamond Head, Oahu, Hawaii, in the first days after the disappearance. On the Fourth of July, 1937, the station had received carrier waves on 3105 kilocycles at approximately 15 and 20 minutes past the hour during the night. At one point a man's voice had been heard, but it was undistinguishable. On the night of July 7, 1937, a woman's voice had been heard saying, "Earhart calling NRU1-NRU1calling from KHAQQ. On coral southwest of unknown island. Do not know how long we will At that point the carrier wave had faded, but a few seconds later the woman's voice broke in and said, "KHAQQ calling, KHAQQ. We are cut a little ..." the wave faded a second time, and the voice was not heard again.

"How did you get these?" I asked Dimity. "One of the operators gave them to me," he replied. "He felt somebody should know about them."

The reception on July 4 is referenced in a July 10, 1937 Pan American Airways memo. "Wailupe reports they heard male voice to say '31' – rest of transmission unreadable." so the Navy station at least informed Pan Am.

The message allegedly heard on the night of July 7 is remarkable. Earhart identifies herself by name and call sign. "On coral southwest of unknown island" is consistent with other credible messages that describe the location as "on reef" and "partially on land, part in water." The location on Nikumaroro where aircraft wreckage was reportedly seen in later years is technically on the west end of atoll but, if you are on the reef in that location, the bulk of the visible land mass is to the northeast creating the impression that you are southwest of the island.

THE 281 DEBACLE

Three Navy operators copied a few cryptic phrases that were sent in poorly keyed Morse code:

"281 north Howland call KHAQQ beyond north don't [or won't] hold with us much longer above water shut off."

Itasca's commanding officer interpreted the message to mean that the plane was afloat 281 miles north of Howland and went racing to the rescue. Arriving at the location the next evening, a lookout saw a meteor and took it to be a flare. *Itasca* radioed, "Earhart from *Itasca*. We see your flares and are proceeding toward you." Navy Radio Wailupe overheard the transmission and forwarded the word to other commands. Somebody leaked the news to the press and *Itasca* was immediately bombarded with requests for photos of the rescue and interviews with Earhart. The false alarm was extremely embarrassing to all concerned.

The phrase "Do not know how long we will.." is similar to "won't hold with us much longer" in the 281 message and "We can't hold on much longer" in another credible report.

As startling as the content of the July 7 message is the fact that it does not appear in the official message traffic. If Goerner's account is accurate, the best postloss transmission received by government operators was never relayed to the searchers. Why? We can only speculate.

On July 7 the battleship *Colorado* reached the search area and launched its planes in an unsuccessful attempt to locate and inspect Winslow Reef. Expectations were high that Earhart and Noonan would be found on one of the Phoenix Islands in the days to come. It may be that after the embarrassment of the 281 debacle the night before, and with rescue of the lost fliers possibly imminent, the commander at Wailupe decided to lay low.

Unfortunately, Goerner does not mention the frequency on which the July 7 transmission was heard or the time. Both are necessary for checking propagation conditions and assessing the probability that a signal from Nikumaroro could be heard as reported.

TIGHAR researchers are currently trying to document that the July 7 Wailupe reception happened as described by Goerner and get the frequency and time information so that we can assess its credibility.



LOGISTICS LOGISTICS LOGISTICS

Successful military campaigns and successful historic aircraft recoveries are the result of careful and thorough logistical planning. When the operation takes place in a remote region half way around the world, logistical preparation becomes the defining factor in whether the endeavor will succeed or fail.

In June, a TIGHAR expedition to the Marshall Islands gathered logistical data for the recovery and conservation plan we'll be submitting to the Navy later this year. The expedition team also dove on both TBD-1 Devastators in Jaluit lagoon to check on their condition and assess how difficult it will be to get lifting slings under the one we'll be recovering – BuNo 1515 (aka "the deep airplane"). The answer, fortunately, was – not difficult at all. That's good because the rarity of this aircraft and its long submersion in salt water dictate that the recovery be done with archaeological precision. We're currently aiming for the recovery to take place in 2011 during the Centennial of U.S. Naval Aviation.



The June expedition was led by TIGHAR Director of Historic Aircraft Recoveries Russell E. Matthews.

AECom senior engineer Al Baycora (left) and Peter Fix, Ass't Director of Texas A&M's Center for Maritime Archaeology and Conservation check a building supplies store in Majuro for materials we'll need in recovering and conserving the TBD.







Col. Van T. Hunn USAF (ret) is TIGHAR's Director of International Affairs - Pacific Region. Here he presents TIGHAR's most recent shipment of medical supplies to Dr. Batol Biten MD of the Jaluit Health Center. TIGHAR's donations of educational and medical supplies to the Jaluit community are delivered to the Marshall Islands courtesy of TIGHAR sponsor FedEx.



Al Baycora plays the coveted Jaluit Wharf gig to an appreciative audience.



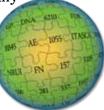
TIGHAR 2.0

As we approach TIGHAR's twenty-fifth aniversary we're making major upgrades to the TIGHAR website (www.tighar.org) and expanding TIGHAR's presence and visibility on the internet. The new TIGHAR News Blog (http://tighar.org/news/) is up and running.



We've replaced the venerable but outdated Earhart Search Forum listserve with greatly expanded forum capability giving TIGHAR members a venue for expression and discussion on a virtually

unlimited range of aviation history topics (tighar.org/news/ related forum). Also fully operational is the "Ameliapedia" (tighar.org/wiki/ Ameliapedia), a Wikipedia-style on line encyclopedia that is destined to be



the go-to source for reliable information related to all aspects of the Earhart disappearance.

And the best is yet to come. We'll soon be unveiling:

an entirely new interactive home page

Theater with TIGHAR a a video clips from TIGHAR expeditions and rare vintage aviation films

GHAL a TIGHAR for Teachers section with educational programs that

use TIGHAR's investigation of the Earhart disappearance as a vehicle for teaching math, science and social studies.



We'll also be expanding on to Facebook, YouTube, and other social networking sites. It's a new world of digital communication and we're building a new TIGHAR to thrive in it. We'll continue to publish and mail TIGHAR Tracks on paper for those who prefer the printed page, but if you would just as soon have it as a PDF we're happy to give you that option (and save TIGHAR the printing and postage). Just go to www. tighar.org and let us know.