

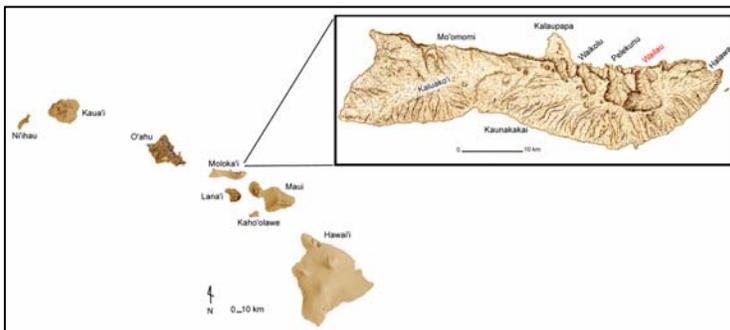
# *Wetland Agriculture in a Remote Valley: Preliminary Results of the Wailau Archaeological Research Project*

*Windy K. McElroy*

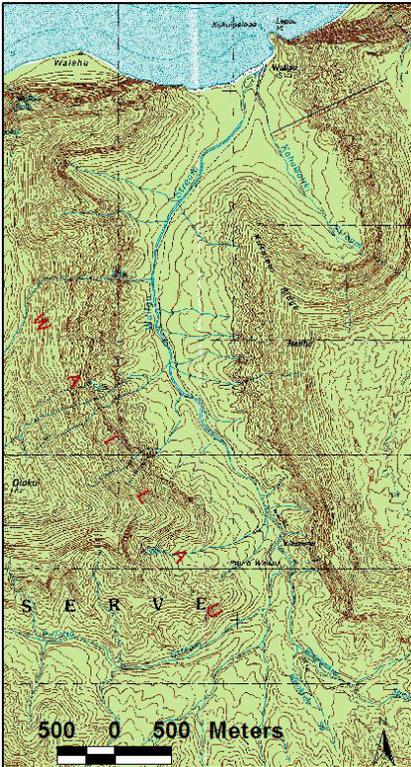


The Wailau Archaeological Research Project was designed to collect data on the development of irrigated agriculture and to provide further training in archaeological field techniques to Moloka'i residents. This is an offshoot of the training program that Cy just talked about and it served as the advanced course for that program. Fieldwork took place for two months in 2005 and one month in 2006, with the primary focus on

documenting the large wetland field complexes, or *lo'i* in Wailau. My presentation will first take you through what it was like to live and work in this remote valley for three months, and then I'll share some of the project's preliminary results with you.



Wailau is one of four valleys on the wet windward coast of Moloka'i, that stretches from Hālawā Valley on the east to Kalaupapa Peninsula on the west. Wailau Valley was a major area of taro production in the pre-contact era until the 1930s when the valley was abandoned.



Wailau is made up of this smaller broad valley on the east and a deep narrower valley on the west, with two major streams flowing down – Kahawai'iki Stream and Wailau Stream.

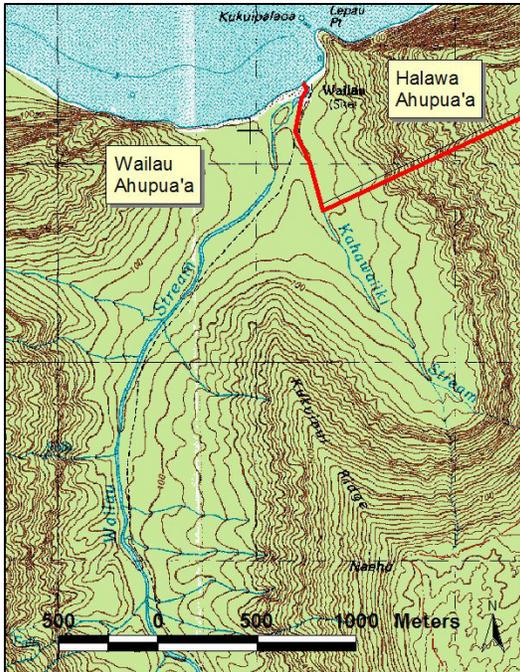


The two streams converge near the coast, where the terrain opens up to a boulder beach,

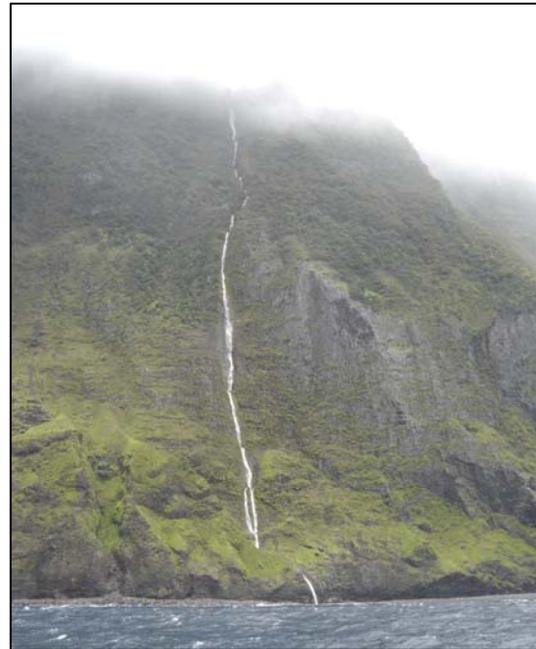
with a small black sand beach on the west side.



A series of intact *lo'i* forms an agricultural system distributed across almost the entire 2,312-acre valley. Trails, habitation remains, and ceremonial structures are part of the cultural landscape as well.



A unique thing about Wailau is that the valley is made up of two *ahupua'a*. The large western portion comprised Wailau Ahupua'a, while a small strip of land on the east was part of Hālawa Ahupua'a, which extends east all the way to Hālawa Valley.



Vehicular access ends at Hālawa Valley, so Wailau is only accessible by a long and dangerous hiking trail, by helicopter, or by boat during the calm summer months. The valley is set between rugged cliffs that rise 3,000 ft from the ocean, and these are listed as the tallest sea cliffs on earth in the Guinness Book of World Records.



We set up our camp near the confluence of the two streams, and this is also very close to the ocean which would be off to the right in the photo. And when you come in by boat, the boat can't land because it's so rough and because of all the boulders, so we have to swim all of the equipment in.



We build our kitchen and lounge area from scratch, so we cut down bamboo, tie them together to make a frame, put tarps over it, and anchor it down.



This is the finished kitchen from our 2005 season.

There's no electricity or running water in the valley – our only power source was a set of solar panels we used to charge the GPS units.





We get our drinking water from a spring, bathe in the river,

and wash dishes & laundry in the river. We use all biodegradable soaps so we don't disturb the delicate stream ecosystem



that includes *hihiwai* & *o'opu* found in abundance. We also use only biodegradable flagging tape, so we don't leave any rubbish behind.



Because of its inaccessibility, Wailau hosts few year-round residents and has escaped the widespread development that has destroyed many of the archaeological resources in other parts of our state. It is this rare condition that makes the valley a prime source of information about the past, although surprisingly little archaeology has taken place there.

There is one family that lives in Wailau permanently. Their place is about a mile inland & they've reinstated the old *lo'i* on their land.

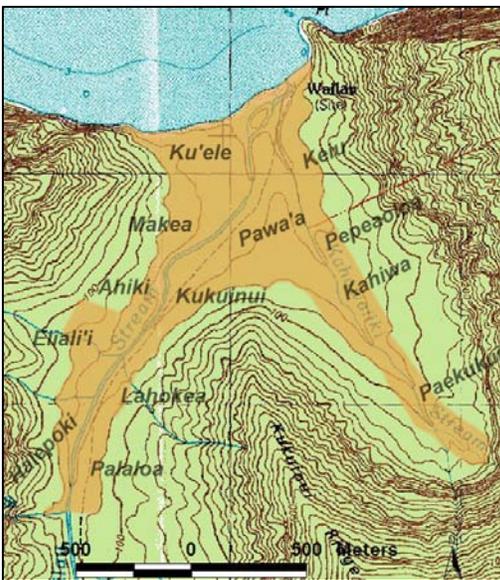
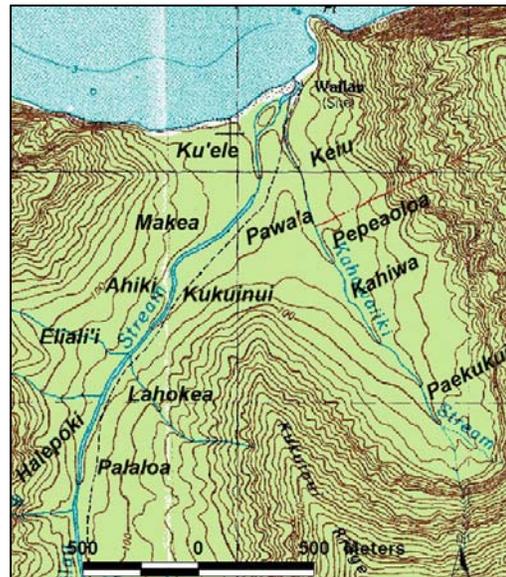


We were fortunate enough to work on their property and it was really nice because they already did the vegetation clearance, which made it easier to map, compared to the other *lo'i* systems, that are typically severely overgrown with bamboo, *hau*, or clidemia.

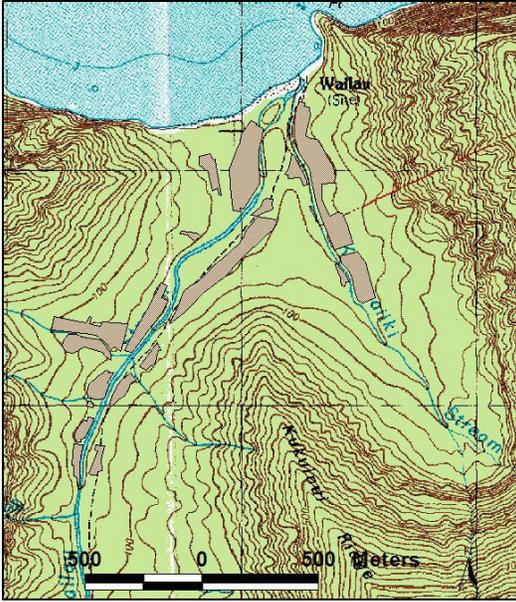


For my crew I had a total of 23 students and volunteers over the two field seasons. Only one of them stayed the entire three months with me, so in general I had a crew of about six at a time.

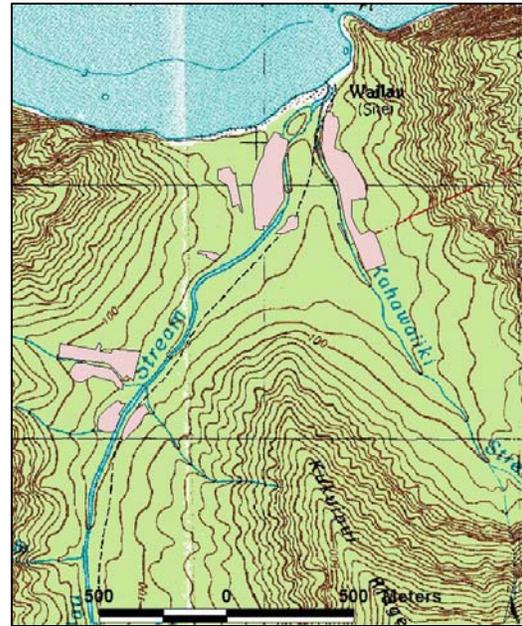
For the archaeological work we did reconnaissance, intensive survey, mapping, and excavation. We used the traditional place names for our survey areas, and those are the names you see here.



For the reconnaissance, I wanted to get a general idea of where the *lo'i* systems were located throughout the valley, so we did a quick walk through of pretty much the entire valley to about a mile-and-a-half inland, and that's the brown area on this map.



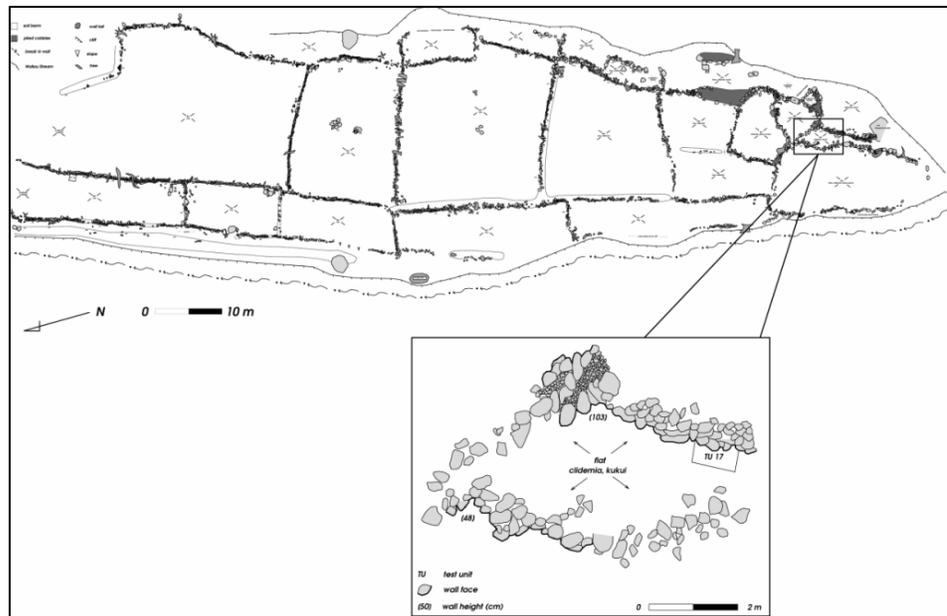
What we found is that there are *lo'i* just about everywhere & they continued farther inland along Wailau Stream as well. We were able to get GPS points for all the *lo'i* systems we found on the recon, and that's what these 19 polygons are.



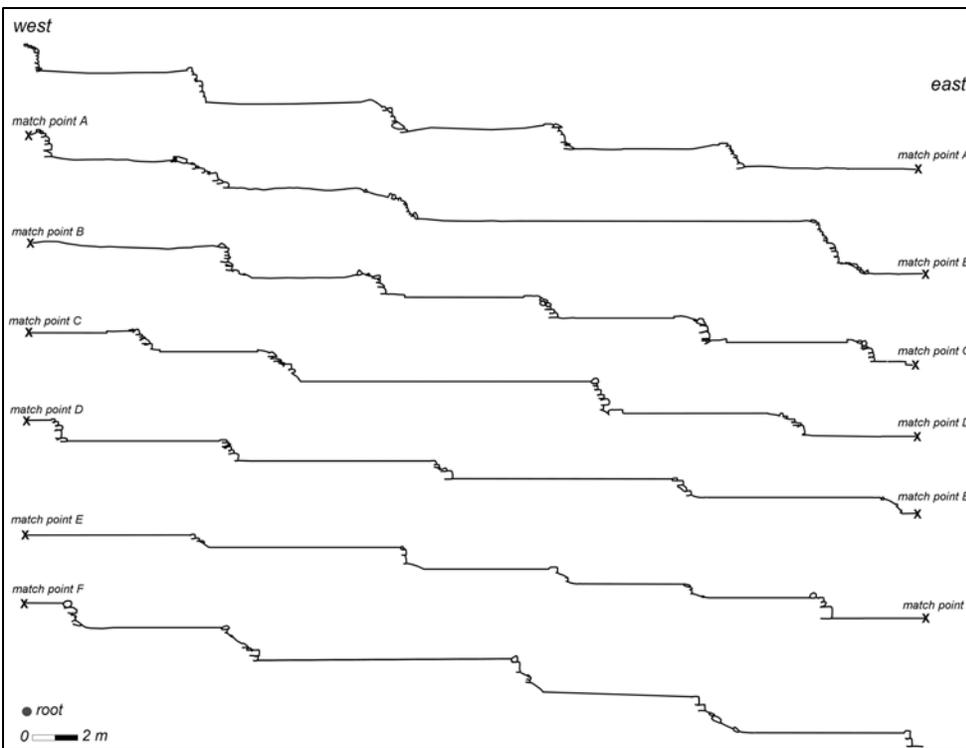
I selected these ten *lo'i* systems for intensive survey. For these we did either plane table and alidade mapping or tape and compass line maps.

These are some examples of our maps.

This is one of our plane table and alidade maps. It shows a small *lo'i* system in Lahoeka, about a mile inland along Wailau Stream. The inset shows the detail of the map.

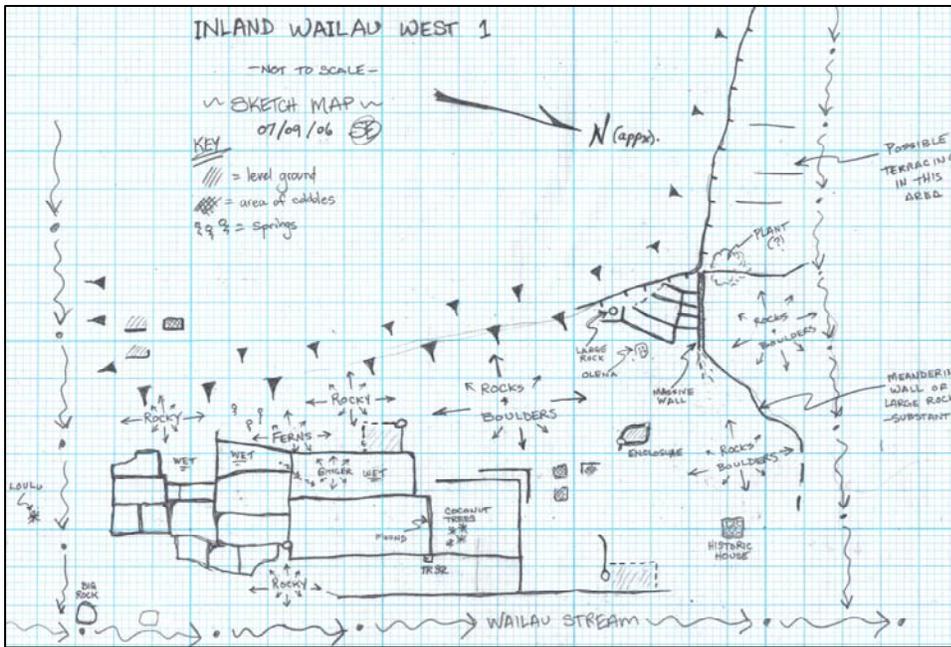


This is one of our tape and compass line maps. It shows a *lo'i* complex in Halepoki, a little farther inland and across the stream from the last complex you saw.



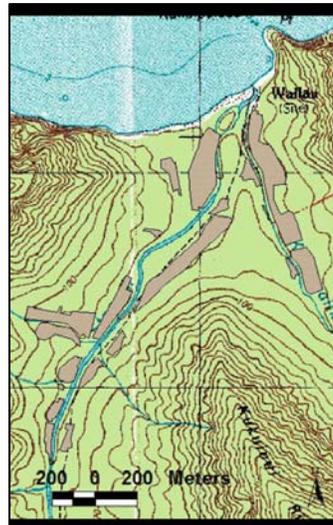
We also did cross-section maps. This is actually one long map that's cut into sections to fit on the screen, so match point A on the right connects to match point A on the left, and match point B on the right connects to

match point B on the left, and so on, so that it shows the *lo'i* stepping down the slope.

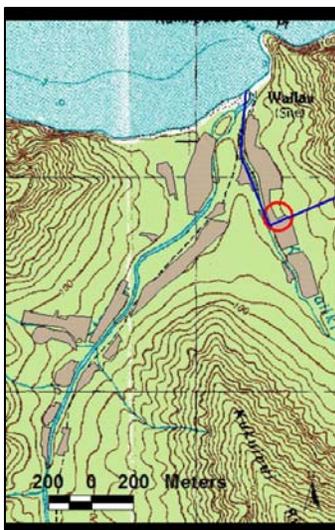


For the *lo'i* that were not selected for intensive survey we did rough sketch maps, like this one, drawn by Steve Eminger. This complex is in Halepoki; it's the farthest inland of the maps you've seen so far.

I don't have time to go over the results of every survey area, so I just chose a couple interesting areas to share with you.



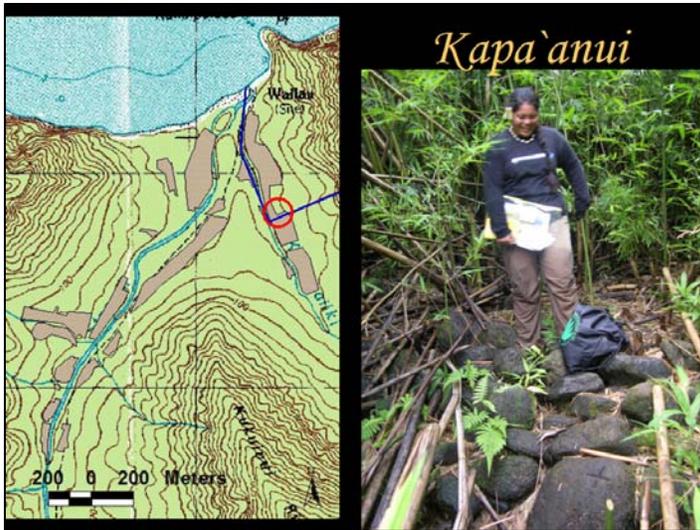
## Survey Results



## Kapa'anui

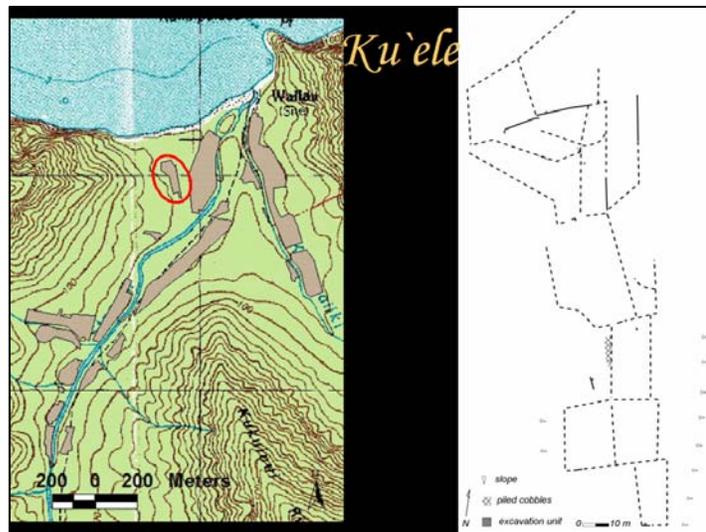


The first one is Kapa'anui and it's interesting because the *ahupua'a* boundary (blue line on map at left) passes right through the *lo'i*, and we think that this wall might mark that boundary.



It's not a very substantial wall, but we found an x etched into the corner of the wall (foreground of photo), and that x is marked on a 1915 map as the *ahupua'a* boundary. The GPS data put it pretty close to where the boundary is marked on the modern topo map.

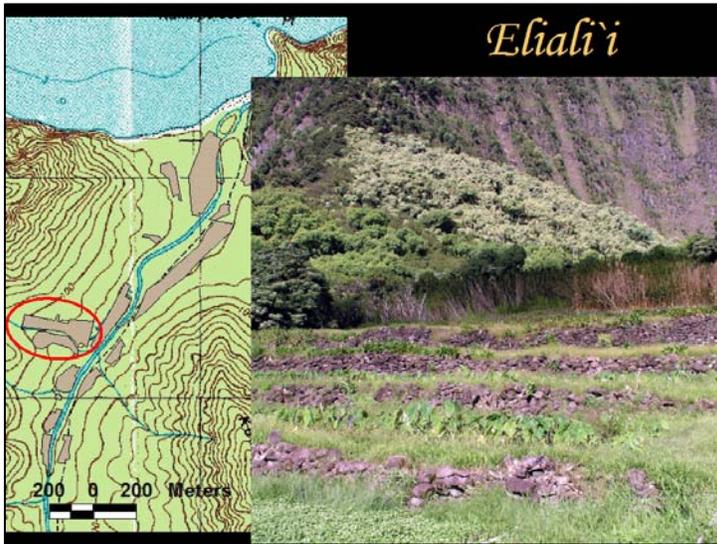
The next area is Ku'e'e. In this *lo'i* system, most of the terraces are just cut into the slope, with very little stonework, and this is unusual because every other system in the valley is made up almost entirely of stone walls. So the dashed lines on the map are cut soil, and the solid lines are stone walls. My field supervisor had the idea that this might be a *lo'i* system that was abandoned before construction was completed. And I think he's right because the system is located in a marginal area, on a relatively dry, steep slope, with no natural water source nearby.



There's a long *'auwai* that runs above it, but the *'auwai* was blocked with stones where it might have branched out to the *lo'i*, and it was never connected to the system.

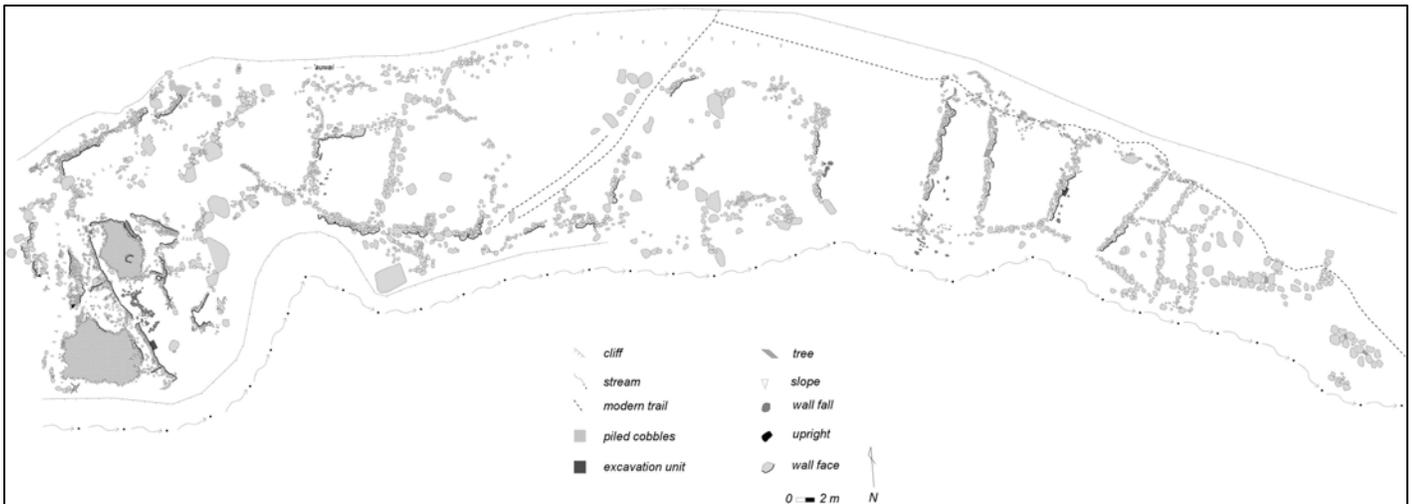


This shows the cut soil construction of the terraces, and we excavated in the center of one of them and there was no pondfield deposit, so I don't think it was ever cultivated, and I'm guessing that it will be late in the chronology.



The last area I'm going to show you is Eliali'i. There were two *lo'i* systems here, a large complex with at least 75 terraces, and you can see part of that in the photo.

And then just below it along a side stream is a much smaller system with about 20 terraces and a *heiau*. The *heiau* is on the left side of the map below, and the terraces step down from west to east along a small side stream.



We excavated 66 test units throughout the valley. The emphasis was clearly on the *lo'i*,



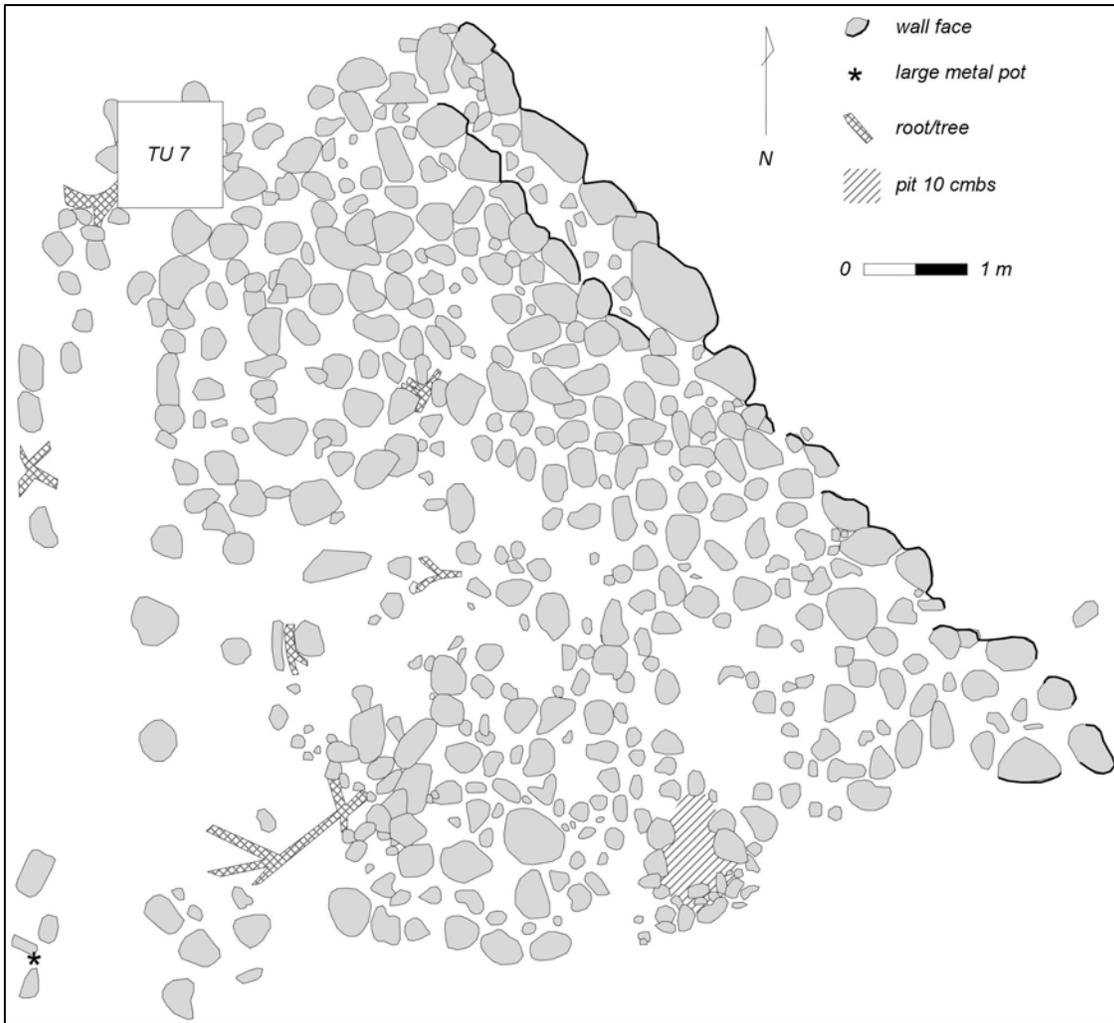


with 60 units placed along *lo'i* terrace walls.

Two units at hearths that we identified on the surface,



Two units at possible habitation structures, like this enclosure,



one at this historic house platform,

and one just outside the  
*Eliali'i heiau.*



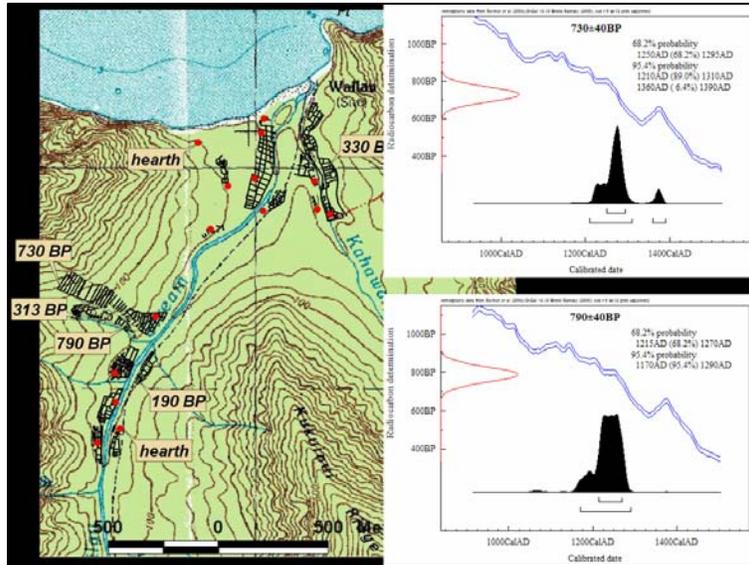
Taxa	Common Name	Origin
<i>cf. Psychotria</i> sp.	<i>Kōpiko</i>	Native
<i>cf. Aleurites moluccana</i>	<i>Kukui</i>	Polynesian Introduction
<i>cf. M. polymorpha</i>	<i>‘Ōhi ‘a lehua</i>	Native
<i>cf. C. trigynum</i>	<i>‘Ōlapa</i>	Native
<i>cf. Bobea</i> sp.	<i>‘Ahakea</i>	Native
<i>cf. O. anthyllidifolia</i>	<i>‘Ulei</i>	Native
<i>cf. Antidesma pulvinatum</i>	<i>Hame</i>	Native
<i>cf. Pittosporum</i> sp.	<i>Hō ‘awa</i>	Native
<i>Diospyros sandwicensis</i>	<i>Lama</i>	Native
<i>Syzygium</i> sp.	<i>Java Plum, etc.</i>	Native + Introductions
<i>Chamaesyce</i> sp.	<i>‘Akoko</i>	Native
<i>cf. sandwicensis</i>	<i>Olomea</i>	Native
<i>cf. Rauvolfia sandwicensis</i>	<i>Hao</i>	Native
<i>cf. Dodonaea viscosa</i>	<i>‘A ‘ali ‘i</i>	Native
<i>cf. Ochrosia compta</i>	<i>Hōlei</i>	Native
<i>cf. Scaevola</i> sp.	<i>Naupaka</i>	Native
<i>Sida fallax</i>	<i>‘Ilima</i>	Native
<i>cf. Artocarpus altilis</i>	<i>‘Ulu</i>	Polynesian Introduction
<i>Cordyline fruticosa</i>	<i>Ti leaf, Kī</i>	Polynesian Introduction
<i>cf. Cocos nucifera</i>	<i>Coconut, niu</i>	Polynesian Introduction
<i>cf. Calophyllum inophyllum</i>	<i>Kamani</i>	Polynesian Introduction
<i>cf. Hibiscus</i> sp.	<i>Hibiscus</i>	Native + Introductions
<i>cf. Senna</i> sp.	<i>Kolomona</i>	Native + Introductions
<i>cf. Rhizophora mangle</i>	<i>Mangrove</i>	Historic Introduction
<i>Pinacea</i>	<i>Pine</i>	Historic Introduction

We recovered charcoal from almost every excavation unit and I had 42 samples taxonomically identified. It turned out to be a very diverse charcoal assemblage, with 31 taxa represented. This table is ordered with the most frequently occurring taxa at the top, so the most common were *kōpiko* and *kukui*, which were each found in 14 samples, and everything from *‘a ‘ali ‘i* down were only found in a single sample.



For the *lo‘i* excavations, our goal was to collect charcoal from beneath the terrace walls to get a solid date that is definitely associated with terrace construction, so in this instance the dates will be *termini ante quem*, or dates before which the terraces were not built.

I got five AMS RC dates so far for the valley, and I'm waiting for results from 15 more samples. This shows the excavated *lo'i* systems and the five radiocarbon dates. The red dots are the locations for the samples that I sent in for dating but don't have results yet. I tried to sample from diverse environmental contexts throughout the valley – from the

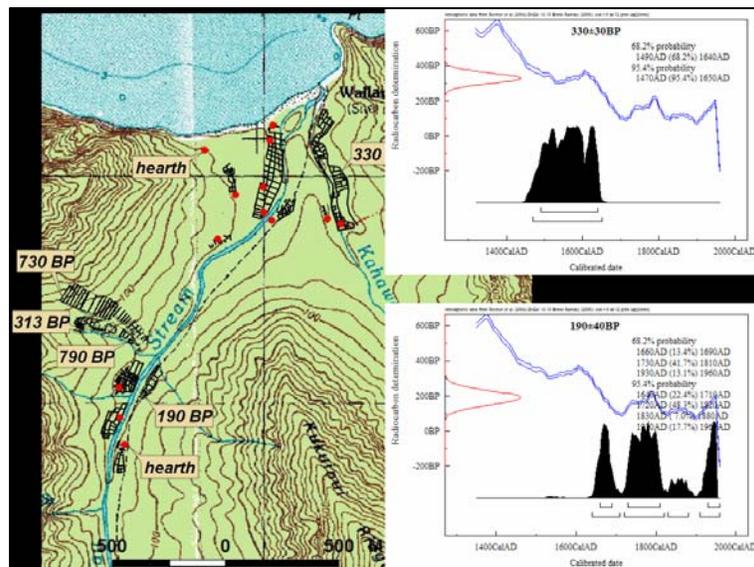


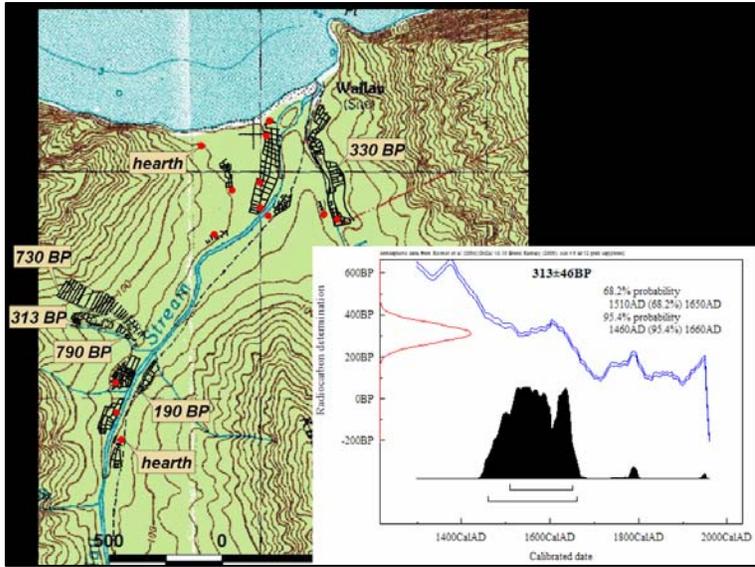
large systems on the broad flat plains along the main streams, the simple barrage terraces on the small side drainages, *lo'i* systems near the coast, and those farther inland. When I have all the dates back I'll be looking at factors such as effort, risk, and production output in relation to the timing of *lo'i* construction in the different areas.

For the five dates I have so far, four are for *lo'i* and one is for the Eliali'i *heiau*. At

790 and 730 BP, the Eliali'i *lo'i* dates are the oldest; they're very close together & similar to Kirch's (2002) date of 770 BP for a coastal *lo'i* in Waikolu Valley, just east of Kalaupapa. These calibrate to about AD 1200.

The *lo'i* along the major streams produced more recent dates – 330 BP, or about AD 1550 for a large system in the small Hālawa Ahupua'a portion of the valley, and 190 BP for the Lahokea system along Wailau Stream, downslope of Eliali'i. Excavation of this latter system also produced a few historic items deeper than the wall foundations, indicating that this one is a recent construction.





The Eliali'i *heiau* returned a date of 313 BP, which is much more recent than the *lo'i* it's associated with. This calibrates to the late 1500s, the same time period as the coral thorium dates recently reported by Weisler et al. (2005), and Kirch & Sharp (2005) for leeward Moloka'i *heiau*.

In conclusion, a lot was accomplished during the Wailau Archaeological Research Project. We did a reconnaissance of the entire valley floor from the coast to a mile-and-a-half inland, and we identified 19 *lo'i* systems. Ten of these were intensively surveyed and mapped in detail. We excavated 66 test units and had 42 charcoal samples taxonomically identified. We sent in 20 samples for radiocarbon dating and have results for five of those so far. And most importantly 23 students and volunteers were trained in archaeological field



techniques and were able to experience the dramatic beauty of Wailau.

**Mahalo Nui Loa**

<p style="text-align: center;"><u>Funding</u></p> <p>National Science Foundation          Moloka'i Rural Development Project          University of Hawai'i          Garcia and Associates</p> <p style="text-align: center;"><u>Moloka'i Logistics</u></p> <p>Elizabeth Johnson    Bob Granger          Yama Kahio'oa'a    Bill Feeter          Walter Naki        Joe Reich</p> <p style="text-align: center;"><u>Special Thanks</u></p> <p>Michael Graves    Tom Dye          Eric Komori        Gail Murakami          JoLynn Guinness    Alan Brown          Malia Akutagawa    Lahela Han</p>	<p style="text-align: center;"><u>Crew</u></p> <p>Steven Eminger    Alvin Burrows          Kyle Eminger     Kaleo Dudoit          Makani Gregg    Ben Zablan          Nani'ehau 'Keama Pu'u Zablan          Marion Ano        Nona Nahoia          Susan Marshall    Kari Nishioka          Manuwai Peters    Pualani Puaoi          Dave Whitehill    Amanda Simms          Cassidy DeBaker    Carly Antone          Dave Quisenberry    Jeff Putzi          Jace Mikulanec    Josh Pastrana          Nalani Kealoha-Copp</p>
---	--

References

Kirch, P. 2002. *From the 'Cliffs of Keōlewa' to the 'Sea of Papaloa' An Archaeological Reconnaissance of Portions of the Kalaupapa National Historical Park, Moloka'i, Hawaiian Islands.* Berkeley: Oceanic

Archaeological Laboratory, Archaeological Research Facility, University of California Berkeley.

Kirch, P. and W. Sharp 2005. Coral <sup>230</sup>Th Dating of the Imposition of a Ritual Control Hierarchy in Precontact Hawaii. *Science* 307:102-104.

Weisler, M., K. Collerson, Y. Feng, J. Zhao, and K. Yu. 2005. Thorium-230 Coral Chronology of a Late Prehistoric Hawaiian Chiefdom. *Journal of Archaeological Science* 33 (3):273-282.