STATE HISTORIC PRESERVATION DIVISION ARCHAEOLOGICAL INVENTORY SURVEY ACCEPTANCE LETTER

APPENDIX

D-2

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD., STE 555
KAPOLEI, HI 96707

August 4, 2020

IN REPLY REFER TO:
Log No.: 2020.01586
Doc. No.: 2008AM02
Archaeology

Glen Ueno, Administrator
County of Maui
Department of Public Works
Development Services Administration Division
250 South High Street
Wailuku, Maui, Hawai‘i 96793

Dear Glen Ueno:

SUBJECT: **Chapter 6E-42 Historic Preservation Review –**
Miki Basin Industrial Park Project
Archaeological Inventory Survey
Kamoku Ahupua‘a, Lāhaina District, Lāna‘i Island
TMK: (2) 4-9-002:061 por.

This letter provides the State Historic Preservation Division's (SHPD) review of the draft report titled, *Archaeological Inventory Survey for the Miki Basin 200 Acre Industrial Development* (DiVito et al., May 2018), produced by T.S. Dye and Colleagues, Archaeologist, Inc. (TSD) for the Pūlama Lāna‘i, Miki Basin Industrial Park project. SHPD received a draft environmental assessment (EA) report (Ho‘okuleana LLC, June 2020) for the project on December 5, 2019 (Log No. 2019.02674) and a final EA report on July 8, 2020 along with a cover letter prepared on behalf of Pūlama Lāna‘i, an HRS 6E Submittal Form, the subject archaeological inventory survey (AIS) report (Log No. 2020.01586).

The Miki Basin Industrial Park project is a 200-acre master-planned light and heavy industrial development on land adjoining the Lāna‘i Airport, the Maui Electric Company (MECO) 5-acre power plant and the existing 20-acre Miki Basin Industrial Condominium. The current submittal does not include a permit set, however Pūlama Lāna‘i indicates the proposed 200-acre Miki Basin Industrial Park is planned to be developed incrementally over a 30-year period.

TSD initially completed the subject AIS in 2016 (Log No. 2016.02655) and the report was subsequently withdrawn by Pūlama Lāna‘i. TSD conducted additional archaeological work in the project area and presented the findings from both survey efforts in the current AIS report (DiVito et al., May 2018). The report indicates the AIS was conducted to identify historic properties and cultural materials in the project area to support a proposed zoning change and construction activities associated with the Miki Basin Industrial Park project.

The subject AIS report includes a detailed analysis of historic land use, cultural practices in the area, an artifact analysis section, a summary of previous archaeological investigations, and the results of the archaeological testing. The survey included a 100 percent coverage pedestrian survey of the project area conducted using transects spaced at 10-meter (m) intervals. Subsurface testing of the project area included the excavation of 31 backhoe trenches. The test trenches were excavated to 145 cm below ground surface, measured 3 to 4 m in length, and were each 1 m wide. The GPS data for the locations of each trench excavation was recorded and the locations are depicted on a map of the project area. The report includes soil descriptions using Munsell colors and USDA descriptions and attributes.

TSD identified two historic properties during AIS testing (Table 1). SIHP # 50–40–98–1980 is comprised of two features including a lithic scatter and an eroded exposed fire-pit. SIHP # 50-40-98-1981 is a subsurface truncated fire-pit feature. TSD assessed SIHP # 50–40–98–1980 and 50–40–98–1981 as significant for the information on Hawaiian history and prehistory that they have yielded. The report indicates the Miki Basin Industrial Park project will adversely impact both historic properties and it is recommended that data recovery excavation be conducted as mitigation for SIHP #s 50-40-98-1980 and 50-40-98-1981.

Table 1: Historic properties identified within the current project area.

SIHP # 50-40-98-	Formal Type	Significance Assessment	Description	Mitigation
1980	artifact scatter and fire-pit	d	Surface lithic scatter and exposed fire-pit	Data recovery
1981	fire-pit	d	Subsurface fire-pit (Backhoe Trench 21)	Data recovery (tested)

The report meets the minimum requirements of HAR §13-275-6. **It is accepted**. Please send two hard copies of the document, clearly marked FINAL, along with a copy of this acceptance letter and text-searchable PDF version of the report to the Kapolei SHPD office, attention SHPD Library. Additionally, please send a digital copy of the final AIS report (DiVito et al., May 2018) to lehua.k.soares@hawaii.gov.

The current submittal includes a cover letter from Pūlama Lānaʻi dated July 5, 2020 that requests an HRS 6E-42 project effect determination of "*effect, with proposed mitigation commitments*," with mitigation in the form of data recovery. Honua Consulting recommends that a data recovery plan be developed for SIHP #s 50–40–98–1980 and 50–40–98–1981 and a program of archaeological monitoring for the Miki Basin Industrial Park project.

SHPD concurs with the significance assessments and mitigation recommendations for SIHP #s 50–40–98–1980 and 50–40–98–1981. However, the **SHPD notifies the County of Maui** that our office has not yet received a County permit submittal triggering an HRS 6E-42 review. Therefore, our division cannot make a project effect determination at this time.

SHPD requests to be consulted prior to the issuance of any permits associated with the Miki Basin Industrial Park project on the subject property, allowing our division the opportunity to review the proposed project and to make an HRS 6E project effect determination in accordance with HAR §13-284-3 and, if necessary, any appropriate mitigation.

Please contact Andrew McCallister, Historic Preservation Archaeologist IV, at Andrew.McCallister@hawaii.gov or at (808) 692-8010 for matters regarding archaeological resources or this letter.

Aloha,

Alan Downer

Alan S. Downer, PhD
Administrator, State Historic Preservation Division
Deputy State Historic Preservation Officer

cc: Keiki-Pua S. Dancil, Pūlama Lānaʻi, kdancil@pulamalanai.com
Trisha Kehaulani Watson, Honua Consulting, watson@honuaconsulting.com
Kurt Matsumoto, Pūlama Lānaʻi, kmatsumoto@pulamalanai.com
Daniel E. Orodenker, Land Use Commission, daniel.e.orodenker@hawaii.gov

ARCHAEOLOGICAL DATA RECOVERY PLAN AND ARCHAEOLOGICAL DATA RECOVERY REPORT

APPENDIX

D-3

Pūlama Lānaʻi

January 6, 2021

Alan Downer, Ph.D.
Deputy State Historic Preservation Officer
State Historic Preservation Division
Kakuhihewa Building
601 Kamokila Boulevard, Suite 555
Kapolei, Hawaii 96706

By HICRIS

Dear Dr. Downer:

Subject: Miki Basin Industrial Park Project
Data Recovery Plan and Data Recovery Report
Project No.: 2020PR33693, Log No. 2020.01586, Doc. No.: 2008AM02
Kamoku Ahupuaʻa, Lāhaina District, Lānaʻi Island
TMK: (2) 4-9-002:061 (por.)

Pūlama Lānaʻi respectfully submits the Data Recovery Plan (**Exhibit A**) and Data Recovery Report (**Exhibit B**) for the Miki Basin Industrial Park Project located at Kamoku Ahupuaʻa, Lāhaina District, Lānaʻi Island TMK: (2) 4-9-002:061 (por.) for the State Historic Preservation Division review per 6E-42, Hawaii Revised Statues (HRS) in connection to the 2nd Draft Environmental Assessment for the State Land Use District Boundary Amendment, Docket No. A19-809.

On July 8, 2020 Pūlama Lānaʻi submitted a final EA report with a cover letter, an HRS 6E Submittal Form, and an archaeologically inventory survey (AIS) report titled *Archaeological Inventory Survey for the Miki Basin 200 Acre Industrial Development* (DiVito et al., May 2018) (Log No. 2020.01586).

On August 4, 2020, SHPD provided a letter to the County of Maui (Log No. 2020.01586, Doc. No.: 2008AM02) accepting the AIS and concurring with the significance assessments and mitigation recommendations for SIHP #s 50-60-98-1980 and 50-40-98-1981, which included a recommendation that a data recovery plan be developed. Additionally, SHPD notified the County of Maui that their division could not make a project effect determination as their office had not received a County permit submittal triggering an HRS 6E-42 review.

HONOLULU OFFICE 733 Bishop Street, Suite 1500, Honolulu, Hawaii 96813 • **TEL** 808.237.2001 • **FAX** 808.566.6927
LĀNAʻI OFFICE 1311 Fraser Avenue, PO Box 630310, Lānaʻi City, Hawaii 96763 • **TEL** 808.565.3000 • **FAX** 808.565.3881

Pūlama Lāna'i has further refined the uses within the Miki Basin Industrial Park Project and has submitted a Second Draft Environmental Assessment for the State Land Use District Boundary Amendment, Docket No. A19-809, published in *The Environmental Notice* on November 23, 2021[1]. It should be noted that the project area has not changed.

The Data Recovery Plan for Sites 50-40-98-1980 and 50-40-98-1981 (**Exhibit A**) was completed on May 9, 2018, and the Data Recovery Report (**Exhibit B**) was completed on February 28, 2019. We sincerely apologize for implementing the Data Recovery Plan before seeking SHPD concurrence. *Figure 1* identifies the location of SIHP sites 50-40-98-1980 and 50-40-98-1981 relative to the Miki Basin Industrial Park Project area.

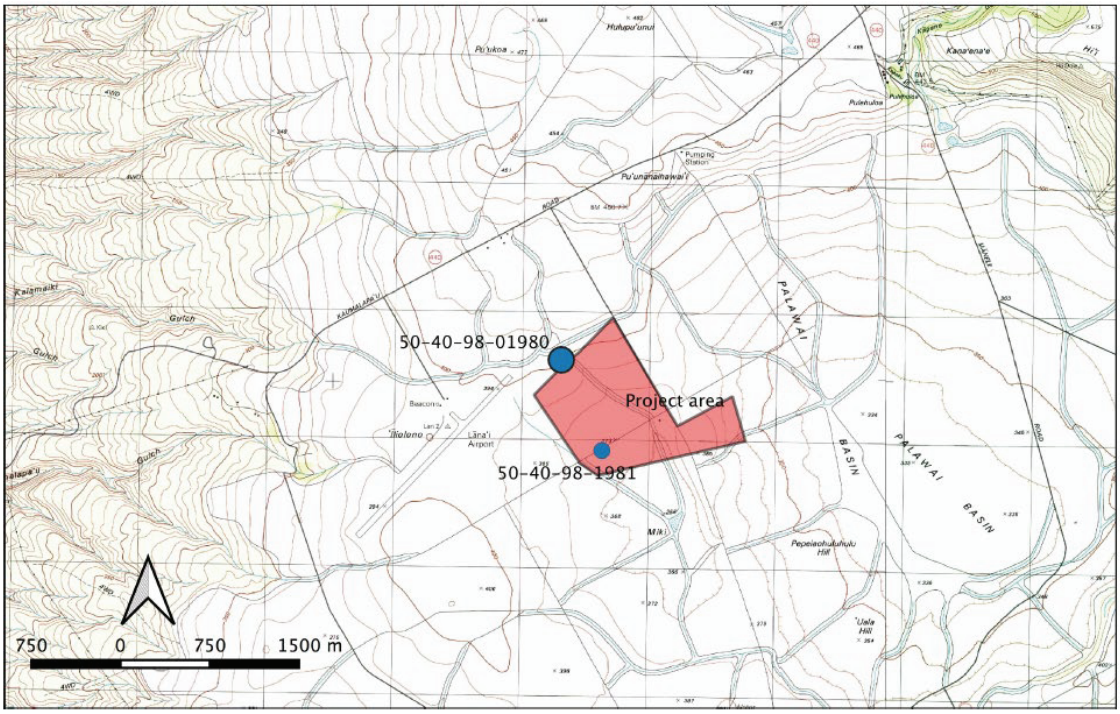


Figure 1. Location of Sites 50-40-98-1980 and 50-40-98-1981 (blue dots) and the Miki Basin Industrial Park Project area (red polygon) on a USGS quadrangle map.

Thank you for your review of the submitted materials.

Mahalo,

Keiki-Pua Dancil
Keiki-Pua Dancil (Jan 6, 2022 16:30 HST)

Keiki-Pua S. Dancil, Ph.D.
Senior Vice President of Government Affairs & Strategic Planning

cc: Trisha Kehaulani Watson, Honua Consulting, watson@honuaconsulting.com

[1] http://oeqc2.doh.hawaii.gov/Doc_Library/2021-11-23-LA-2nd-DEA-Miki-Basin-Industrial-Park.pdf

Exhibit A

Archaeological Data Recovery Plan

T. S. Dye & Colleagues, Archaeologists, Inc.
735 Bishop St., Suite 315, Honolulu, Hawai'i 96813

Archaeological Data Recovery Plan for Sites 50-40-98-1980 and 50-40-98-1981 Within the Miki Basin 200 Acre Industrial Development*

Lands of Kalulu and Kaunolū, Lahaina District, Lāna'i Island, TMK: (2) 4-9-002:061

Thomas S. Dye, PhD

May 9, 2018

Management Summary

At the request of Pulama Lāna'i, and pursuant to Hawaii Administrative Rules §13-278-3, T. S. Dye & Colleagues, Archaeologists has prepared an archaeological data recovery plan for Sites 50-40-98-1980 and 50-40-98-1981, located at Kalulu and Kaunolū, Lahaina District, Lāna'i Island. The data recovery plan follows the recommendations set out in the inventory survey report and proposes to carry out technological analyses of lithic materials collected from Site 50-40-98-1980, and charcoal identification and dating of the *fire-pits* at Sites 50-40-98-1980 and 50-40-98-1981.

Contents

*Prepared for Pulama Lāna'i, 1311 Fraser Avenue, P.O. Box 630310, Lāna'i City, HI 96763

Figures

1 Introduction

At the request of Pulama Lāna'i, T. S. Dye & Colleagues, Archaeologists has prepared an archaeological data recovery plan for Sites 50-40-98-1980 and 50-40-98-1981 located in the lands of Kalulu and Kaunolū, Lahaina District, Lāna'i Island (fig. 1). Sites 50-40-98-1980 and 50-40-98-1981 are located in the land parcel identified on tax maps as TMK: (2) 4-9-002:061.

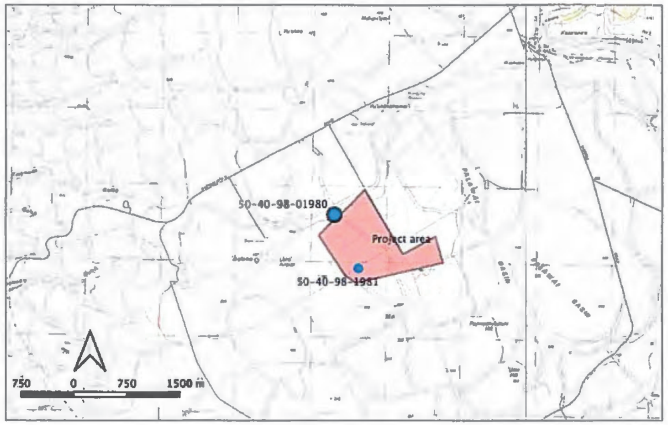


Figure 1: Location of Sites 50-40-98-1980 and 50-40-98-1981 and the Miki Basin 200 Acre Industrial Development on a USGS quadrangle map.

2 Sites 50-40-98-1980 and 50-40-98-1981

Site 50-40-98-1980 is located in the northernmost portion of the *project* area in a highly eroded area along the fence line boundary with the Lāna'i Airport (fig. 1). The site comprises two components, a lithic scatter and an eroded and exposed fire-pit.

The lithic scatter is located on the crest of a slope and extends south along a drainage cut. The scatter covered an area of approximately 30 × 120 m (meter) and, at the time of survey, contained 30 or more pieces of flaked basalt. All of the artifacts that were observed and collected from the scatter came from within or adjacent to the existing drainage in areas that lacked vegetation. A cowry shell fragment and several pieces of branch coral were observed within the scatter. Three adze rejects, a hammerstone, a waterworn pebble *manuport*, and a piece of branch coral were collected from the scatter (fig. 2). No artifacts were observed or collected in the vegetated areas around the drainage. This suggests that the artifacts have either moved downslope from a higher location as a result of water erosion or that the site has eroded and deflated over time. In either case, the artifacts would have been secondarily deposited from their original position.

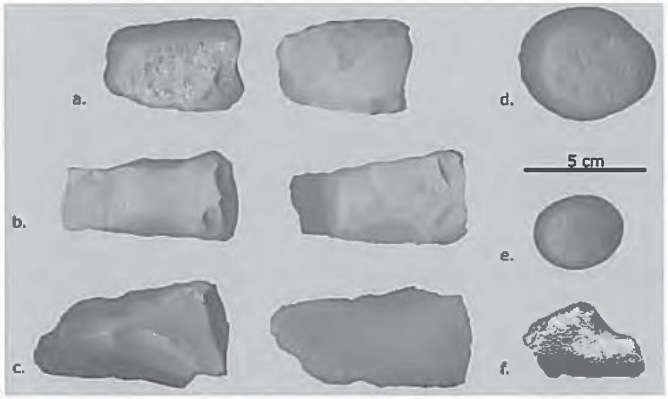


Figure 2: Artifacts collected from the Context 18 lithic scatter, part of Site 50-40-98-1980: *a*, dorsal and ventral views of an adze reject, distal portion; *b*, dorsal and ventral views of an adze reject, proximal portion; *c*, dorsal and ventral views of an adze reject, distal portion; *d*, waterworn cobble hammerstone; *e*, waterworn pebble manuport; *f*, branch coral. The three adze rejects are depicted with the dorsal side to the left and the ventral side to the right.

The second component of Site 50-40-98-1980 was an exposed fire-pit remnant located within the lithic scatter on the crest of the slope in a heavily eroded area. The *fire*-pit remnant was observed over an approximately 75 cm (centimeter) diameter area and had exposed charcoal and a few small cobble-size fire-affected rocks on the surface and eroding downslope. No black plastic or tubing was observed in or around the fire-pit because the plow zone in this location had completely eroded away. It is likely that the fire-pit had originally been truncated by plows when the pineapple field was cultivated. Following documentation of the fire-pit remnant, the fire-pit was bisected twice to determine its size and stratigraphic position (fig. 3).

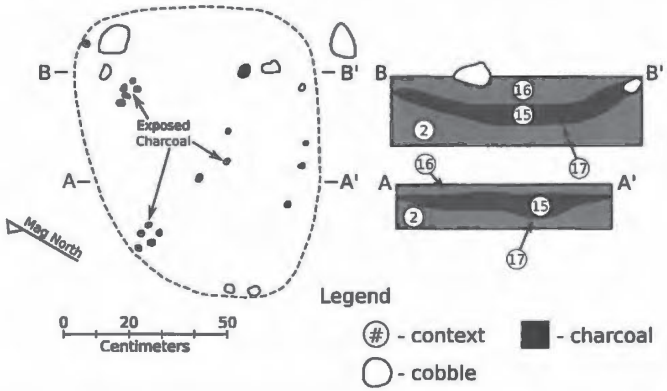


Figure 3: Sketch map and cross section drawing of a subsurface fire-pit recorded at Site 50-40-98-1980.

The first bisection point, A to A', cut the fire-pit in half to expose the stratigraphic section. Following bisection, a 15 cm deep profile was exposed. Context 16, a loose red silty *clay* loam sediment, was present from the current ground surface to a depth of 3 cm. It appears that the sediment has been deposited over the fire-pit due to water erosion along the drainage. The fire-pit, Context 15, is a band of charcoal that extends from 3 cm below surface to a depth of 12 cm. The fire-pit at this location is approximately 60 cm wide and is basin shaped. The interface between the Context 15 fire-pit and the material it had been dug into, the Context 2 dark reddish brown silty clay loam hard pan soil, was recorded as Context 17. The Context 2 soil was present to the base of excavation at 15 cm below surface.

The second bisection point, B to B', was cut just in front of the two rocks that were exposed on the surface. Following bisection, a 20 cm deep profile was exposed. Context 16, a loose red silty clay loam sediment, was present from the current ground surface to a depth of 6 cm. The sediment has been deposited over the fire-pit due to water erosion along the drainage. The fire-pit, Context 15, is a curved band of charcoal that extends from 6 cm below surface to a maximum depth of 15 cm. The fire-pit at this location is approximately 75 cm wide and is basin shaped. The interface between the Context 15 fire-pit and the material it had been dug into, the Context 2 dark reddish brown silty clay loam hard pan soil, was recorded as Context 17. The Context 2 soil was present to the base of excavation at 20 cm below surface. A charcoal sample was collected from each profile after bisection for wood taxa identification and ^{14}C analysis.

A subsurface cultural deposit recorded as Site 50-40-98-1981 was identified in a backhoe trench (see fig. 1, p. 2). The deposit was a truncated fire-pit remnant exposed in the southern profile of the backhoe trench (fig. 4). The fire-pit was truncated by the plow zone layer, Context 1, present to a depth of 35 cm below surface. The upper portion of the fire-pit appears to have been destroyed by a plow moving east to west; charcoal from the fire-pit is scattered an additional 65 cm to the west within the plow zone. The fire-pit remnant is approximately 65 cm in width, approximately 10 cm thick, basin shaped, and is present between 35 and 45 cm below surface. A single rounded volcanic cobble was observed within the feature. The fire-pit had been excavated into Context 2, a dark reddish brown silty clay hardpan soil present to a depth of 100 cm below surface. The interface between the fire-pit and the Context 2 soil it had been excavated into was recorded as Context 13. Context 2 overlay Context 9, a dark brown silty clay loam present to the base of excavation at 150 cm below surface. A charcoal sample was collected from the Context 12 fire-pit for wood taxa and ^{14}C analysis.

Sites 50-40-98-1980 and 50-40-98-1981 were evaluated as significant for the important information on Hawaiian history and prehistory that they have yielded.

3 Research Objectives

The inventory survey report recommended that a data recovery plan be developed and implemented prior to construction activities at the Miki Basin 200 Acre Industrial Development. It was further recommended that the data recovery plan develop research questions that can be addressed with data yielded by the following laboratory tasks:

Site 50-40-98-1980 Analysis of the wood charcoal collected from the Context 15 fire-pit for taxa identification and ^{14}C dating. Analysis of artifacts collected from the Context 18 lithic scatter to further investigate the tool-making reduction sequence utilized on the island [12].

Site 50-40-98-1981 Analysis of the wood charcoal collected from the Context 12 fire-pit for taxa identification and ^{14}C dating.

The research objectives of the proposed data recovery investigations include gathering data on the history of vegetation change on Lāna'i in an effort to date two periods of change, one during the traditional Hawaiian period and the other in the mid nineteenth

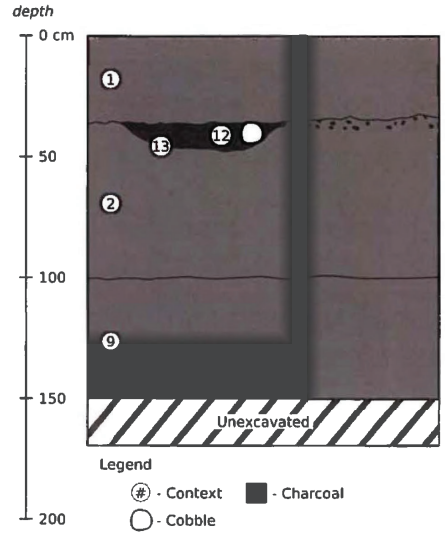


Figure 4: Stratigraphic profile of the south face of the backhoe trench showing the fire-pit, Site 50-40-98-1981, as contexts 12 and 13. Note that the fire-pit has been truncated by the plow zone, Context 1.

century when sheep and goats were raised on the island [7], and to complete paired technological and geochemical sourcing analyses of the lithic artifacts to determine the reduction sequences for the flaked stone implements, and to determine likely source locations for the fine-grained, tool-grade basalt items in the collection.

The first period of vegetation change that will be investigated involves a process identified as landscape transport [2; 8], whereby the Polynesian settlers of Hawai'i established about 28 species of plants brought to the islands from a homeland in the southern hemisphere [13:321 ff.]. This process has been dated to the mid-fifteenth century on O'ahu Island [6], but thus far has proved elusive on Lāna'i, where native plants dominate firewood throughout the traditional Hawaiian sequence. For example, wood charcoal from five taxa introduced by Polynesians, including cf. *kou*, *ipu*, *kukui*, *'ulu*, and *'ōhi'a 'ai* was recovered in small amounts (generally less than 1% by weight) in all of the charcoal collections from two sites at the coastal settlement in Kaunolū [1]. Based on the available dating evidence, the charcoal collections at Kaunolū date to late in the traditional Hawaiian sequence and to the early historic period. The lowland native forest at Kaunolū appears to have persisted into the early historic period. Similarly, several collections of firewood charcoal from Hulopo'e insecurely dated to the period AD 1300–1850 were composed

primarily of native woods, with trace occurrences of *'ulu* and *kō* [10]. Two fire-pits dated to around the early historic period on the coast at Mānele [5] were fueled almost entirely with native species, and a somewhat earlier fire-pit located inland near Lāna'i City [4] also yielded predominantly native firewood.

The second period of vegetation change in the mid-nineteenth century involves the nearly complete collapse of the native lowland dry forest with the introduction of grazing herbivores [7]. To date, fire-pits from this recent period have not been identified and investigated on Lāna'i.

The research objective for the stone artifacts is to characterize the chaîne opératoire for the tools fashioned from fine-grained basalt. An attempt will be made to identify the source of the rock with non-destructive geochemical analysis, describe the reduction sequence along the lines set out by Weisler [12], and classify tools according to function [11], as far as possible given the fragmentary materials.

4 Data Needs, Methods, and Curation

The data needed to address the research objectives were collected during the inventory survey and comprise the contents of the two fire-pits and the secondarily deposited stone artifacts collected at Site 50-40-98-1980.

Field methods are not required to acquire and analyze the data because exhaustive field collections were made during the archaeological inventory survey.

The laboratory work needed to carry out the data recovery investigation includes charcoal identification at the Wood Identification Laboratory of International Archaeological Research Institute, accelerator mass spectrometry (AMS) dating of one specimen of short-lived wood charcoal from each of the fire-pits, and calibration of the laboratory results with the BCal software package [3]. Non-destructive geochemical characterization with EDXRF will be carried out at the University of Hawai'i at Hilo [9].

The procedure for depositing collections after the conclusion of the proposed data recovery project involves returning them to Lāna'i Island, where they will be redeposited at the Lāna'i Culture and Heritage Center, where they are currently stored.

The plan does not call for additional fieldwork. Thus, we do not anticipate that human burials will be disinterred.

Sites 50-40-98-1980 and 50-40-98-1981 were not determined significant under criterion "e," which pertains to sites that have "an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts-these associations being important to the group's history and cultural identity" (§13-275-6(b)(5)). Thus, there is no requirement that consultation with members of the relevant ethnic group be undertaken during preparation of this plan.

Glossary

clay Fine earth particles less than 0.002 mm.
cobble Rock fragment ranging from 76 mm to less than 250 mm.
fire-pit A pit of varying depth, often bowl shaped at the base, usually identified by a concentration of charcoal and/or burned material in the fill, especially at the feature interface.
manuport A natural object found in an unnatural position, having been carried there by man.
project The archaeological investigation, including laboratory analyses and report preparation.

Hawaiian Terms

ipu The gourd, *Lagenaria siceraria*.
kō Sugarcane, *Saccharum officinarum*, was introduced to Hawai'i by Polynesian settlers, who cultivated it widely. The stalk was chewed between meals for its sweetness, brought on long journeys to ease hunger, and eaten in times of famine; juice from the stalk was fed to nursing babies, and used as a sweetening agent in medicinal herbal concoctions; the leaves were used as thatching for houses; the leaf midrib was used for plaiting braids that were made into hats; the stem of the flower was used to make darts for a child's game.
kou A native tree, *Cordia subcordata*, with a wood prized for its grain and ease of carving. It was used for carving a wide variety of objects from platters to images of gods; the leaves were made into dye and the flowers were also used in *lei* making.
kukui The candlenut tree, *Aleurites moluccana*, introduced to Hawai'i by Polynesian settlers. The outer husk of the fruit or nut was used to make a black dye for tapa and tattooing; sap from the fruit was used as medicine to treat thrush, and used as a purgative; the hard shell of the nut was used in *lei* making; the kernel of the nut was the source of an oil that was burned for illumination and also used as a wood varnish for surfboards and canoes; the kernel was also chewed and spit on rough seas to calm the ocean and baked kernels were mixed with salt and chili pepper to make a relish (*'inamona*); the trunk was used to make canoes and floats for fishing nets; a reddish dye was made from the bark and/or root; a gum exuded from wounded bark was used to treat tapa; the flower was mixed with sweet potato to treat thrush; the leaves were used in a poultice for swelling and infection.
'ōhi'a 'ai The mountain apple, *Syzygium malaccensis*, a forest tree growing up to 50 ft. high. Traditionally the trunk of the tree was used for house posts and rafters, enclosures for temples, and to carve idols. The fruit was eaten raw or dried. The bark was made into an infusion to remedy sore throats and a dye was also made from the bark.
'ulu 1. Discoidal, smooth stone as used in *'ulu maika* game; 2. Breadfruit, *Artocarpus altilis*.

Bibliography

1. Allen, M. S. and G. M. Murakami (1999). Lana'i island's arid lowland vegetation in late prehistory. *Pacific Science 53*, 88–112.

2. Anderson, E. (1952). *Plants, Man and Life.* Berkeley, CA: University of California Press.

3. Buck, C. E., J. A. Christen, and G. N. James (1999). Bcal: An on-line Bayesian radiocarbon calibration tool. *Internet Archaeology 7*.

4. Dye, T. S. and K. Maly (2016, October). *Archaeological Inventory Survey for the Proposed Lāna'i Well #7, Land of Paoma'i, Lahaina District, Lāna'i Island, TMK: (2) 4-9-002:001 por.* Prepared for Pūlama Lāna'i. Honolulu, HI.

5. Dye, T. S., K. Maly, C. E. Sholin, and N. J. DiVito (2013, November). *Archaeological Inventory Survey Addendum for Mānele Small Boat Harbor Modifications.* Prepared for Lanai Resorts LLC. Honolulu: T. S. Dye & Colleagues, Archaeologists.

6. Dye, T. S. and C. E. Sholin (2013). Changing patterns of firewood use on the Waimānalo Plain. *Hawaiian Archaeology 13*, 30–68.

7. Hobdy, R. (1993). Lāna'i—A Case Study: The Loss of Biodiversity on a Small Hawaiian Island. *Pacific Science 47*(3), 201–210.

8. Kirch, P. V. (1982). The impact of the prehistoric Polynesians on the Hawaiian ecosystem. *Pacific Science 36*, 1–14.

9. Mills, P. R., S. P. Lundblad, J. G. Smith, P. C. McCoy, and S. P. Naleimaile (2008). Science and sensitivity: A geochemical characterization of the Mauna Kea adze quarry complex. *American Antiquity 73*, 743–758.

10. Tomonari-Tuggle, M. J., H. D. Tuggle, and J. S. Athens (2000, April). *Archaeology on a South Coast Landscape, Hulopo'e, Lāna'i, Hawai'i.* Prepared for Lanai Company. Honolulu: International Archaeological Research Institute.

11. Turner, M. (2005). Functional and technological explanations for the variation among early new zealand adzes. *New Zealand Journal of Archaeology 26*, 57–101.

12. Weisler, M. (1990). A technological, petrographic, and geochemical analysis of the Kapohaku adze quarry, Lanai, Hawaiian Islands. *New Zealand Journal of Archaeology 12*, 29–50.

13. Ziegler, A. C. (2002). *Hawaiian Natural History, Ecology, and Evolution.* Honolulu: University of Hawai'i Press.

Exhibit B
Archaeological Data Recovery Report

T. S. Dye & Colleagues, Archaeologists, Inc.
735 Bishop St., Suite 315, Honolulu, Hawai'i 96813

Archaeological Data Recovery Report for Sites 50–40–98–1980 and 50–40–98–1981 Within the Miki Basin 200 Acre Industrial Development*

Lands of Kalulu and Kaunolū, Lahaina District, Lāna'i Island, TMK: (2) 4–9–002:061

Thomas S. Dye, PhD

February 28, 2019

Management Summary

At the request of Pulama Lāna'i, and pursuant to Hawaii Administrative Rules §13–278–4, T. S. Dye & Colleagues, Archaeologists has prepared an archaeological data recovery report for Sites 50–40–98–1980 and 50–40–98–1981, located at Kalulu and Kaunolū, Lahaina District, Lāna'i Island. It reports on technological analyses set out in a data recovery plan, including EDXRF analysis of lithic materials collected from Site 50–40–98–1980, and charcoal identification and dating of the *fire-pits* at Sites 50–40–98–1980 and 50–40–98–1981. The lithic analysis indicates the secondarily deposited adze rejects collected from the surface of the Miki Basin 200 Acre Industrial Development project were flake blanks likely derived from outcrops on Lāna'i Island and that rock from sources on Maui and Hawai'i Islands is absent from the collection. The wood charcoal and dating analyses from the two fire-pits at Sites 50–40–98–1980 and 50–40–98–1981 further strengthen the conclusion based on earlier analyses that native forests on Lāna'i persisted into the nineteenth century, with little evidence for cultivation of canoe plants brought to the islands by Polynesian settlers. The persistence of native forest plants on Lāna'i contrasts with the Waimānalo Plain on O'ahu Island, where by the mid-fifteenth century AD canoe plants were typical sources of firewood.

*Prepared for Pulama Lāna'i, 1311 Fraser Avenue, P.O. Box 630310, Lāna'i City, HI 96763.

Contents

Figures

1 Introduction

At the request of Pulama Lāna'i, T. S. Dye & Colleagues, Archaeologists has prepared an archaeological data recovery report for Sites 50–40–98–1980 and 50–40–98–1981 located in the lands of Kalulu and Kaunolū, Lahaina District, Lāna'i Island (fig. 1). Sites 50–40–98–1980 and 50–40–98–1981 were identified and inventoried by DiVito et al. [10]. A data recovery plan was drawn up a few years later [12] that followed recommendations set out in the inventory survey report [10]. The data recovery plan proposed to carry out technological analyses of lithic materials collected from Site 50–40–98–1980, and charcoal identification and dating of the fire-pits at Sites 50–40–98–1980 and 50–40–98–1981. This document presents the results of these technological analyses and interprets them in the context of research questions having to do with the tempo of vegetation change on Lāna'i following discovery and settlement by Polynesians, and characteristics of lithic technology to determine reduction sequences for certain tools and likely source locations for the fine-grained, tool-grade basalt used to fashion the tools.

2 Data Recovery Plan

The data recovery plan for the project is summarized in the following sections.

2.1 Sites 50–40–98–1980 and 50–40–98–1981

Sites 50–40–98–1980 and 50–40–98–1981 are located in the land parcel identified on tax maps as TMK: (2) 4–9–002:061.

Site 50–40–98–1980 is located in the northernmost portion of the *project* area in a highly eroded area along the fence line boundary with the Lāna'i Airport (fig. 1). The site comprises two components, a lithic scatter and an eroded and exposed fire-pit.

The lithic scatter is located on the crest of a slope and extends south along a drainage cut. The scatter covered an area of approximately 30 × 120 m (meter) and, at the time of survey, contained 30 or more pieces of flaked basalt. All of the artifacts that were observed and collected from the scatter came from within or adjacent to the existing drainage in areas that lacked vegetation. A cowry shell fragment and several pieces of branch coral were observed within the scatter. Three adze rejects, a hammerstone, a waterworn pebble *manuport*, and a piece of branch coral were collected from the scatter (fig. 2). No artifacts were observed or collected in the vegetated areas around the drainage. This suggests that the artifacts have either moved downslope from a higher location as a result of water erosion or that the site has eroded and deflated over time. In either case, the artifacts would have been secondarily deposited from their original position.

The second component of Site 50–40–98–1980 was an exposed fire-pit remnant located within the lithic scatter on the crest of the slope in a heavily eroded area. The fire-pit remnant was observed over an approximately 75 cm (centimeter) diameter area and had exposed charcoal and a few small cobble-size fire-affected rocks on the surface and eroding downslope (fig. 3). No black plastic or tubing was observed in or around the fire-pit because the plow zone in this location had completely eroded away. It is likely

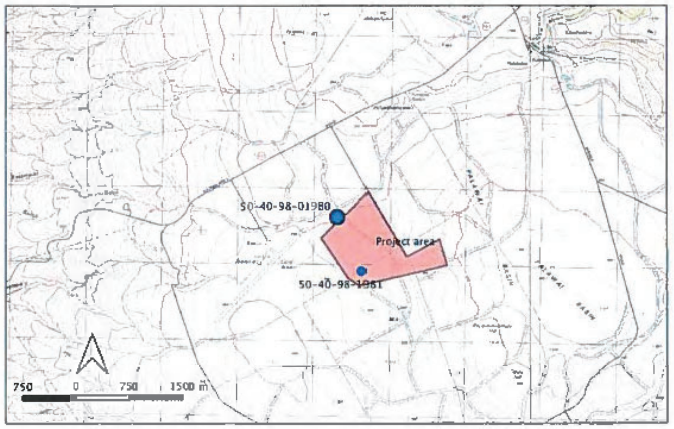


Figure 1: Location of Sites 50–40–98–1980 and 50–40–98–1981 and the Miki Basin 200 Acre Industrial Development on a USGS quadrangle map.

that the fire-pit had originally been truncated by plows when the pineapple field was cultivated. Following documentation of the fire-pit remnant, the fire-pit was bisected twice to determine its size and stratigraphic position (fig. 4).

The first bisection point, A to A', cut the fire-pit in half to expose the stratigraphic section. Following bisection, a 15 cm deep profile was exposed. Context 16, a loose red silty *clay* loam sediment, was present from the current ground surface to a depth of 3 cm. It appears that the sediment has been deposited over the fire-pit due to water erosion along the drainage. The fire-pit, Context 15, is a band of charcoal that extends from 3 cm below surface to a depth of 12 cm. The fire-pit at this location is approximately 60 cm wide and is basin shaped. The interface between the Context 15 fire-pit and the material it had been dug into, the Context 2 dark reddish brown silty clay loam hard pan soil, was recorded as Context 17. The Context 2 soil was present to the base of excavation at 15 cm below surface.

The second bisection point, B to B', was cut just in front of the two rocks that were exposed on the surface. Following bisection, a 20 cm deep profile was exposed. Context 16, a loose red silty clay loam sediment, was present from the current ground surface to a depth of 6 cm. The sediment has been deposited over the fire-pit due to water erosion along the drainage. The fire-pit, Context 15, is a curved band of charcoal that extends from 6 cm below surface to a maximum depth of 15 cm. The fire-pit at this location is

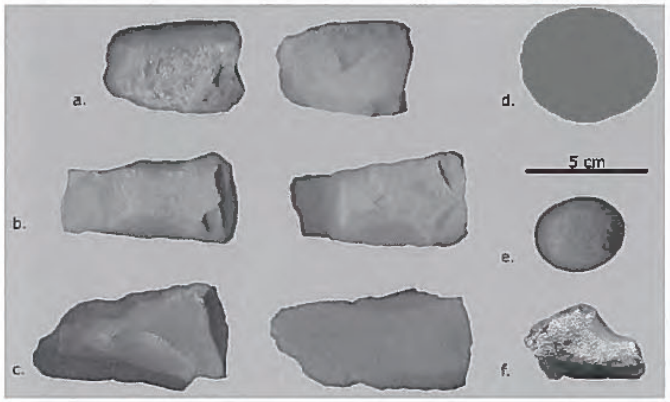


Figure 2: Artifacts collected from the Context 18 lithic scatter, part of Site 50–40–98–1980: *a*, dorsal and ventral views of an adze reject, distal portion; *b*, dorsal and ventral views of an adze reject, proximal portion; *c*, dorsal and ventral views of an adze reject, distal portion; *d*, waterworn cobble hammerstone; *e*, waterworn pebble manuport; *f*, branch coral. The three adze rejects are depicted with the dorsal side to the left and the ventral side to the right.

approximately 75 cm wide and is basin shaped. The interface between the Context 15 fire-pit and the material it had been dug into, the Context 2 dark reddish brown silty clay loam hard pan soil, was recorded as Context 17. The Context 2 soil was present to the base of excavation at 20 cm below surface. A charcoal sample was collected from each profile after bisection for wood taxa identification and ^{14}C analysis.

A subsurface cultural deposit recorded as Site 50–40–98–1981 was identified in a backhoe trench (see fig. 1, p. 4). The deposit was a truncated fire-pit remnant exposed in the southern profile of the backhoe trench (fig. 6). The fire-pit was truncated by the plow zone layer, Context 1, present to a depth of 35 cm below surface. The upper portion of the fire-pit appears to have been destroyed by a plow moving east to west; charcoal from the fire-pit is scattered an additional 65 cm to the west within the plow zone. The fire-pit remnant is approximately 65 cm in width, approximately 10 cm thick, basin shaped, and is present between 35 and 45 cm below surface. A single rounded volcanic cobble was observed within the feature. The fire-pit had been excavated into Context 2, a dark reddish brown silty clay hardpan soil present to a depth of 100 cm below surface. The interface between the fire-pit and the Context 2 soil it had been excavated into was

Figure 3: Exposed charcoal and fire-affected cobbles indicating the location of the fire-pit at Site 50–40–98–1980. The scale is marked in 10 cm increments.

recorded as Context 13. Context 2 overlay Context 9, a dark brown silty clay loam present to the base of excavation at 150 cm below surface. A charcoal sample was collected from the Context 12 fire-pit for wood taxa and ^{14}C analysis.

Sites 50–40–98–1980 and 50–40–98–1981 were evaluated as significant for the important information on Hawaiian history and prehistory that they have yielded [10:96].

2.2 Research Objectives

The inventory survey report recommended that a data recovery plan be developed and implemented prior to construction activities at the Miki Basin 200 Acre Industrial Development. It was further recommended that the data recovery plan develop research questions that can be addressed with data yielded by the following laboratory tasks:

Site 50–40–98–1980 Analysis of the wood charcoal collected from the Context 15 fire-pit for taxa identification and ^{14}C dating. Analysis of artifacts collected from the Context 18 lithic scatter to further investigate the tool-making reduction sequence utilized on the island [28].

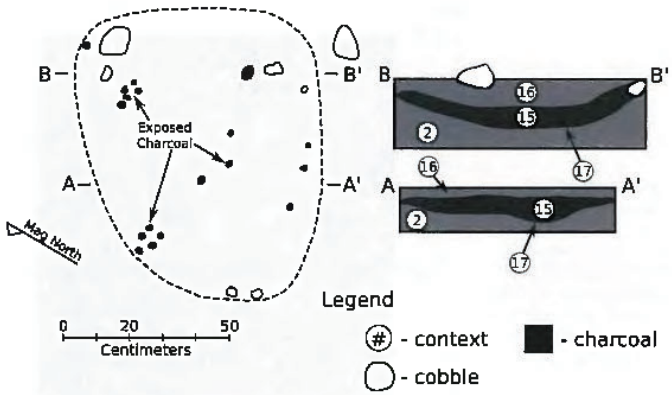


Figure 4: Sketch map and cross section drawing of a subsurface fire-pit recorded at Site 50–40–98–1980.

Figure 5: Stratigraphic profile of the bisected fire-pit at Site 50–40–98–1980. The scale is marked in 10 cm increments.

Site 50–40–98–1981 Analysis of the wood charcoal collected from the Context 12 fire-pit for taxa identification and ^{14}C dating.

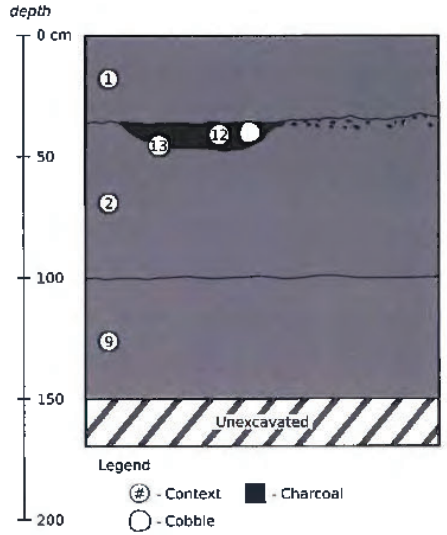


Figure 6: Stratigraphic profile of the south face of the backhoe trench showing the fire-pit, Site 50–40–98–1981, as contexts 12 and 13. Note that the fire-pit has been truncated by the plow zone, Context 1.

The research objectives of the proposed data recovery investigations include gathering data on the history of vegetation change on Lāna'i in an effort to date two periods of change, one during the traditional Hawaiian period and the other in the mid nineteenth century when sheep and goats were raised on the island [19], and to complete paired technological and geochemical sourcing analyses of the lithic artifacts to determine the reduction sequences for the flaked stone implements, and to determine likely source locations for the fine-grained, tool-grade basalt items in the collection.

The first period of vegetation change that will be investigated involves a process identified as landscape transport [3; 20], whereby the Polynesian settlers of Hawai'i established about 28 species of plants brought to the islands from a homeland in the southern hemisphere [29:321 ff.]. This process has been dated to the mid-fifteenth century on O'ahu Island [16], but thus far has proved elusive on Lāna'i, where native plants dominate firewood throughout the traditional Hawaiian sequence. For example, wood charcoal from five taxa introduced by Polynesians, including cf. *kou*, *ipu*, *kukui*, *'ulu*, and *'āhi'a 'ai* was recovered in small amounts (generally less than 1% by weight) in all of the charcoal collections from two sites at the coastal settlement in Kaunolū [2]. Based on the available dating evidence, the charcoal collections at Kaunolū date to late in the

Figure 7: Stratigraphic profile of truncated fire-pit at Site 50–40–98–1981. Note the black plastic mulch in the deposit above the fire-pit. The scale is marked in 10 cm increments.

traditional Hawaiian sequence and to the early historic period. The lowland native forest at Kaunolū appears to have persisted into the early historic period. Similarly, several collections of firewood charcoal from Hulopo'e insecurely dated to the period AD 1300–1850 were composed primarily of native woods, with trace occurrences of *'ulu* and *kō* [25]. Two fire-pits dated to around the early historic period on the coast at Mānele [15] were fueled almost entirely with native species, and a somewhat earlier fire-pit located inland near Lāna'i City [14] also yielded predominantly native firewood.

The second period of vegetation change in the mid-nineteenth century involves the nearly complete collapse of the native lowland dry forest with the introduction of grazing herbivores [19]. To date, fire-pits from this recent period have not been identified and investigated on Lāna'i.

The research objective for the stone artifacts is to characterize the chaîne opératoire for the tools fashioned from fine-grained basalt. An attempt will be made to identify the source of the rock with non-destructive geochemical analysis, describe the reduction

sequence along the lines set out by Weisler [28], and classify tools according to function [26], as far as possible given the fragmentary materials.

2.3 Data Needs, Methods, and Curation

The data needed to address the research objectives were collected during the inventory survey and comprise the contents of the two fire-pits and the secondarily deposited stone artifacts collected at Site 50–40–98–1980.

Field methods are not required to acquire and analyze the data because exhaustive field collections were made during the archaeological inventory survey, when both fire-pits were fully excavated and diagnostic materials were collected from the secondary deposit of stone artifacts at Site 50–40–98–1980.

The laboratory work needed to carry out the data recovery investigation includes: i) identification of charcoal from the fire-pits at Sites 50–40–98–1980 and 50–40–98–1981 at the Wood Identification Laboratory of International Archaeological Research Institute (WIDL); ii) accelerator mass spectrometry (AMS) dating of a single specimen of identified, short-lived, wood charcoal from each of the fire-pits; iii) calibration of the AMS dating results with the BCal software package [6] to estimate calendar dates for construction and use of the fire-pits; iv) non-destructive geochemical characterization of the lithic materials collected from Site 50–40–98–1980 with the EDXRF facility at the University of Hawai'i at Hilo [22]; and v) observation of the adze rejects collected from Site 50–40–98–1980 to determine the primary reduction technique used in their manufacture.

The procedure for depositing collections after the conclusion of the data recovery project returned them to the Lāna'i Culture and Heritage Center, where they were previously stored.

The plan does not call for additional fieldwork. Thus, we do not anticipate that human burials will be disinterred.

Sites 50–40–98–1980 and 50–40–98–1981 were determined significant under criterion "d" for the important information on Hawaiian history and prehistory they have yielded [10;96]. Sites 50–40–98–1980 and 50–40–98–1981 were not determined significant for criterion "e," which pertains to sites that have "an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts–these associations being important to the group's history and cultural identity" (§13–275–6(b)(5)). Thus, there is no requirement that consultation with members of a relevant ethnic group be undertaken during preparation of this plan.

3 Laboratory Results

This section presents the laboratory results for the wood charcoal identification and dating, the EDXRF geochemical sourcing analysis, and observations on the reduction sequence for six adze rejects.

3.1 Wood Charcoal Identification and Dating

Wood charcoal collected from the fire-pits at Site 50–40–98–1980 and 50–40–98–1981 was submitted to the Wood Identification Laboratory at International Archaeological Research Institute for identification. Excerpts from the report filed by Jen Huebert follow.

> The freshly fractured transverse, tangential, and radial facets of selected charcoal fragments were examined with an epi-illuminated microscope at magnifications of 50–500×. Taxonomic identifications were made by comparing observed anatomical characteristics with those of woods in the IARII reference collection. Vouchers associated with this collection have been verified and archived at the Department of Botany, University of Hawai'i at Mānoa. Other published references, including books, journal articles, technical documents, and wood atlases, were also consulted.
>
> Samples were first reviewed under low-power magnification to assess the quality of the material and determine the range of plant parts present. For the most part, the charcoal in these samples is firm and somewhat hard. A selection of 40 fragments of various sizes and shapes were selected from each sample for taxonomic identification. These samples were not taxonomically diverse and consist mainly of various shapes and size classes of *'āweoweo* and *'ākoko* (tables 1 and 2). All are genera that include native Hawaiian hardwood species.

Table 1: Taxa identified from charcoal

Family	Taxon	Name	Habit	Origin
Chenopodiaceae	*Chenopodium oahuense*	*'āheahea*	shrub-tree	native
Euphorbiaceae	*Euphorbia* sp.	*'ākoko*	shrub-tree	native
Fabaceae	*Senna* sp.	*kolomona*	tree	?
Malvaceae	*Sida* cf. *fallax*	*'ilima*	shrub	native

Table 2: Charcoal identifications

Taxon	Part	Count	Weight (g)
Site 50–40–98–1981, Context 12			
Chenopodium oahuense	twig	33	16.6
Sida cf. *fallax*	twig	4	1.84
Euphorbia sp.	twig	1	0.27
Site 50–40–98–1980, Context 15			
Euphorbia sp.	twig	37	3.5
Senna sp.	wood	3	0.61

It should be noted that while the native plant *S. fallax* is fairly common in archaeological assemblages there are several post-Contact *Sida*, including *S. rhombifolia* or Cuba jute, which was introduced in the 1830's [23:Table 2], and other species that are naturalized throughout the islands. In a brief review of several new wood specimens, I noted the wood anatomy of these taxa might not be diagnostic to species pending further investigation. *Senna* and *Euphorbia* also have naturalized species that are present today on Lāna'i and should be considered similarly.

Please note the following:

- Indeterminate material was too fragile or warped for taxonomic identification, or derives from small woody herb or fern stems which are rarely diagnostic. I have noted whether material was wood, herbaceous stems, grass stems, etc., whenever possible.
- It is best to choose one fragment of material for radiocarbon dating to eliminate the chance of dating more than one event [4].

Descriptions of the wood anatomy observed in the samples follow.

***Euphorbia* sp.** Smaller diameter vessels, most under 50 μm, round, often chained radially 2–4 (sometimes up to 8–10); fibers medium thickness, fine pits noted on fiber walls; rays uniseriate and sometimes up to 3–4 seriate with occasional radial canals, cells square or upright; intervessel pits oval, alternate, medium-sized.

Sida* cf. *fallax Vessels small, under 40 μm diameter, solitary or by 2–3(4); surrounded by thin sleeve of axial parenchyma; fiber walls very thick; rays narrow, bi-seriate, extremely tall in TLS; intervessel pits alternate, 3-4 μm.

***Senna* sp.** Vessels approximately 100 μm diameter, solitary or in groups or chains of 2–3; fibers medium-thick; axial parenchyma wavy, surrounds vessels and intergrades with fibers; rays uniseriate occasionally widening to 2 cells, a few rays are 2-3 cells wide, short to medium heights, mostly of square and some upright cells; intervessel pits 4-5 μm and also wider, alternate; vessel-ray pits similar.

Two pieces of wood charcoal were selected for ^{14}C dating. A piece of *'ilima* charcoal from the fire-pit at Site 50–40–98–1981and a piece of *'ākoko* charcoal from the fire-pit at Site 50–40–98–1980 were submitted to Beta-Analytic for AMS dating (appendix A). Beta-Analytic assigned the *'ilima* charcoal to Beta-510703 and reported a conventional radiocarbon age of 140 ± 30 BP. Beta-Analytic assigned the *'ākoko* charcoal to Beta-510704 and reported a conventional radiocarbon age of 170 ± 30 BP. The calibrated age estimates indicate both fire-pits were used near the end of traditional Hawaiian times (fig. 8).

3.2 Reduction Sequence

Compared to island groups elsewhere in Polynesia, Hawaiian adzes are remarkably uniform. An early study that compared Hawaiian adzes with adze collections from the Society Islands, Marquesas, and Easter Island in East Polynesia remarked that "[n]o place in East Polynesian exhibits such a steadfast adherence to one form of adz as Hawaii"

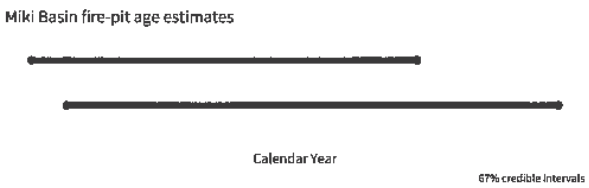


Figure 8: Estimated ages of the Miki Basin fire-pits. Beta-510703 has a 67% credible interval of AD 1681–1862, with a median of AD 1809. Beta-510704 has a 67% credible interval of AD 1668–1810, with a median of AD 1772.

[17:162]. The typical Hawaiian adze was described as "quadrangular (or rectangular) in cross section and, except for some small specimens and a few of medium size, are tanged" [17:162–163]. Adzes with trapezoidal, triangular, lenticular, or plano-convex sections, all common to varying degrees in the other East Polynesian assemblages are either rare or absent from Hawai'i. Hawaiian adzes were manufactured by flaking and grinding, without the pecking technique practiced elsewhere.

Recently, replication experiments have determined reduction sequences for quadrangular adzes from a variety of blank types, including cobbles, flakes, and tabular pieces of rock. The demonstrated

> feasibility of producing adzes from a wide range of blank types means that Hawaiians could have used basalt outcrops and concentrations of subrounded cobbles and boulders, and not simply specialised quarries where large flakes could be obtained. [8:82]

The wide distribution of adze rock in Hawai'i does not mean that adzes were easy to acquire or to produce. In fact, the common Hawaiian quadrangular cross section adze requires great skill to produce.

> Hawaiian quadrangular adzes require precise bidirectional flaking of four right-angled edges, while also creating flat faces on all sides. This is very difficult to achieve on tough basalt using basalt hammer stones. The extremely large and refined examples of prehistoric Hawaiian adzes indicate very high levels of skill and use of hammer stones of different sizes, weights and stone material. [8:71]

It has been estimated that reasonable skill in producing quadrangular section adzes in Hawai'i might have taken "several years of instruction and practice to achieve … [which] may explain the huge numbers of broken and rejected preforms on quarries across the Hawaiian archipelago" [8:82].

An early study of adze-making at the sources along the bench at the east end of the Pālawai Basin observed that "the corners of bowlders have been broken off to furnish the cores" [18:77]. Subsequently, a more detailed study determined that adze blanks at Kapohaku were flakes, rather than cobbles or tabular pieces of rock [28], consistent with Emory's observation. The striking platform of the flake became the poll of the finished adze and the flake termination became the cutting edge. Adzes made from flakes: i) are typically thin relative to width and exhibit a cross section that is rectangular, rather than square [8]; ii) often increase in width toward the cutting edge; and iii) are relatively lightweight. These characteristics identify tools suited for everyday household and gardening tasks, rather than felling large trees in old growth forests.

The six adze rejects collected during the inventory survey (fig. 9) are flakes that can be classified as adze blanks because they each lack the three bi-directionally flaked edges that identify a preform [7]. They appear to have been rejected early in the reduction sequence.

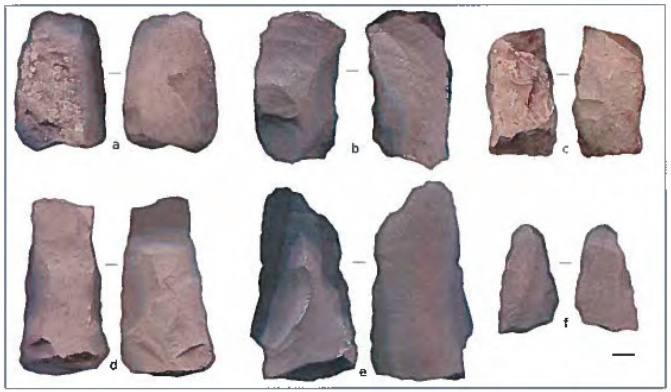


Figure 9: Dorsal (left) and ventral (right) surfaces of secondarily deposited adze rejects included in the EDXRF analysis: *a*, Lāna'i source assignation; *b*, Kīlauea source assignation; *c*, Waiāhole source assignation; *d*, Lāna'i source assignation; *e*, Kīlauea source assignation; *f*, Kīlauea source assignation. The scale bar is 1 cm.

3.3 Lithic Sourcing

Fine-grained rock suitable for adze manufacture is widely distributed around the islands. Exposures of the highest quality adze rock that were heavily exploited have been identified as "quarries" despite their being surface exposures that could be exploited without

the deep excavation typically associated with quarrying [9; 24]. Adze-quality rock was also found outside the "quarries", perhaps most typically as cobbles and small boulders in stream beds, but also as boulder outcrops from which flakes might be removed. The large number of potential sources complicates efforts to identify the rock source of an adze or an adze reject.

Sourcing can be accomplished by a variety of means, including; i) description of thin sections and comparison with a reference collection of source thin sections [9]; ii) destructive analyses that yield high-quality geochemical data that can be compared to published analyses of geologic exposures [24]; and iii) non-destructive EDXRF analyses that yield limited geochemical data that can be compared to EDXRF analyses of source materials [22]. A two-stage characterization process is sometimes employed to maximize the utility of results and minimize the destruction of samples [21]. At the first stage, large numbers of samples are analyzed non-destructively with EDXRF to establish geochemical groups and identify outliers. At the second stage, a few samples are selected for destructive analysis, typically in the hope of identifying the local sources of groups and identifying imports among the outliers. For example, in a study of fine-grained basalt artifacts collected from habitation and ritual structures in the Kahikinui district of Maui, EDXRF analysis of 328 artifacts divided them into 17 groups. The EDXRF results were, in most cases, insufficient to assign groups to particular source locations or quarries. Nevertheless, plausible inferences based on the EDXRF results were followed up by destructive wavelength dispersive X-ray fluorescence (WDXRF) analysis of nine samples. WDXRF analysis typically yields results that can confidently assign samples to particular source locations or quarries based on published geochemical analyses. In the Kahikinui case, WDXRF was designed primarily to firm up the identification of one of the EDXRF groups, Group I, as having originated at the well-known Mauna Kea adze quarry. The adze rock at Mauna Kea is extremely fine-grained and isotropic, two qualities that enhance its value as a raw material for adze manufacture [9]. The WDXRF analysis yielded results that confirmed a Mauna Kea origin for six Group I samples, and this made it possible to assign the other four samples in Group I a Mauna Kea origin based on the EDXRF results [21].

The WDXRF analysis also matched EDXRF group D with a source at Kaunolū. Twenty-five of the Kahikinui artifacts were assigned to Group D, which would make Kaunolū the leading supplier of imported adze rock to the Kahikinui sites. About 8% of the adze rock analyzed from the Kahikinui sites originated on Lāna'i.

Adze rocks collected on Lāna'i have been analyzed with EDXRF at least twice, once for the Miki Basin 200 Acre Industrial Development project, and earlier for an unreported project that focused on artifacts held by the Lāna'i Culture and History Center. The non-destructive EDXRF analysis has obvious benefits for museum specimens with potential for public display, but, as noted above, it yields data that are unlikely to assign artifacts to particular source locations or quarries. As a preliminary stage of analysis, EDXRF can suggest a range of possible source locations or quarries, and it can usefully exclude some potential source locations or quarries. The information provided by EDXRF might point to certain artifacts as potential imports, with geochemical compositions unlikely to be found near the collection location, whose source location might be identified with

additional analysis. At the same time, the EDXRF analysis might also identify artifacts that cannot be sourced to a particular location, but whose geochemical composition is similar to what might be expected from sources near the collection location.

In these circumstances, a statistical framework that can be used to distinguish possible imports from likely local artifacts based on EDXRF information might prove useful. One way to do this is with a statistical technique known as discriminant analysis. Briefly, discriminant analysis uses so-called training data to establish a set of targets and then assigns instances from a set of test data to one or another of the targets. In the present case, the training data are EDXRF analyses of adze-quality rock from potential source locations, and the test data are the EDXRF analyses of the Lāna'i artifacts. In the ideal case, where all of the potential rock sources are included in the training data, and the geochemical analysis is able to distinguish among them confidently, then the discriminant analysis will correctly assign each instance of test data to its source location. In real-world situations that fall short of this ideal, the discriminant analysis assignments are best interpreted more loosely, as indications of a local or non-local source and as guides for future inquiry.

The discriminant model for EDXRF analysis of Lāna'i artifacts falls short of the ideal situation. Caution in the interpretation of results is clearly warranted. EDXRF training data from potential sources lacks information from many known quarry locations. The quarry data for the training set are found on the Geoarchaeology Laboratory, UH Hilo web site and include Kīlauea and Mauna Kea on Hawai'i Island, Nu'u and Haleakalā on Maui Island, and Waiāhole on O'ahu Island. In addition, training data were collected in 2011 by Mills and Lundblad from several locations on Lāna'i (fig. 10). These Lāna'i training data are lumped together in the analysis as a single Lāna'i source.

EDXRF analysis provides abundance estimates for several elements with varying degrees of precision and accuracy. Consequently, analyses of EDXRF results typically focus on a subset of elements chosen either because they are specifically applicable to the question at hand or because the EDXRF method yields relatively precise and/or accurate estimates for them. The present analysis focused on the elements Nickel (Ni), Copper (Cu), Rubidium (Rb), Strontium (Sr), Yttrium (Y), Zirconium (Zr), and Niobium (Nb). These are the elements chosen by the Hilo Geoarchaeology team for a principal components analysis of many of these same training data [21]. Using these seven elements, the discriminant analysis carried out here distinguishes Haleakalā, Nu'u, and Mauna Kea from the other potential sources (fig. 11). Nevertheless, the discriminant analysis based on the EDXRF estimates of the seven elemental abundances does not confidently distinguish the Lāna'i sources from the Kīlauea and Waiāhole sources.

The success of the classification yielded by the discriminant analysis of the training data can be assessed in several ways [5:108–110]. Two common assessments are the hold-out method, which holds out a random subset of the training data and then determines whether instances are correctly assigned to source targets established with the remaining training data, and the leave-out-one cross-validation method, which assesses whether each instance of the training data is correctly assigned to a source target established by the remainder of the training data. In practice, the two methods should provide similar results with a reasonably-sized training data set. The leave-out-one cross-validation

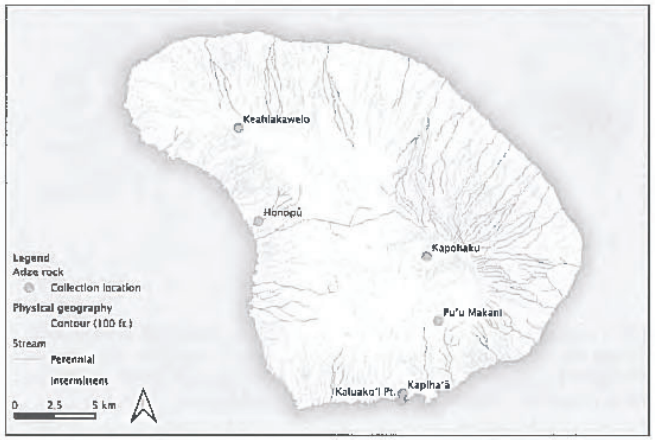


Figure 10: Potential adze rock sources on Lāna'i for which EDXRF training data are available. Note that data are also available for an outcrop in Ka'ā whose location hasn't been fixed.

method implemented by the MASS package of the R statistical software [27] correctly assigns sources to 97% of the samples in the training data set. As expected, all of the Haleakalā, Mauna Kea, and Nu'u instances were assigned to the correct source. The other potential sources fared less well: 97% of the Waiāhole instances were correctly assigned, as were 83% of the Lāna'i debitage instances and 63% of the Kīlauea instances. These results are confirmed by the hold-out method, which correctly classified 98% of a randomly selected hold-out set comprising 20% of the training data. This result indicates that the EDXRF method is sufficiently powerful to distinguish among the six sources included in the training data set. It is no guarantee that the EDXRF data would perform as well if other source locations were added to the training data set. In general, the greater the number of potential sources, the more difficult it is to distinguish among them. The same relationship holds for within-source variability. In the case of geochemical sourcing, as the known range of geochemical compositions from a source grows, the more difficult it is to distinguish that source from other sources that are geochemically similar. Thus, the success of the classification yielded by the discriminant analysis of the training data should be tempered by the understanding that it was likely aided by the formative state of the training data set, which lacks several known sources, and by the likely incomplete catalog of Lāna'i Island sources in the EDXRF database.

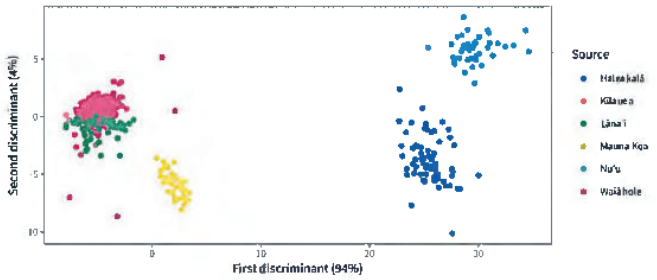


Figure 11: Graphical summary of the discriminant analysis. Note that the Haleakalā, Nu'u, and Mauna Kea sources can be distinguished with the first two discriminants, which together capture 98% of the variability in the full data set. In contrast, the Lāna'i sources are not clearly distinguished from Waiāhole and Kīlauea.

Six secondarily deposited adze rejects collected from the surface during the inventory survey (see fig. 9, p. 14) were analyzed with EDXRF in an effort to determine their source locations (appendix B). Using the training data described earlier, the discriminant analysis assigns two adze rejects to a Lāna'i source, three adze rejects to a Kīlauea source, and one adze reject to a Waiāhole source. As discussed, the discriminant analysis does not distinguish these sources confidently; the results should not be interpreted as indicating imports from Kīlauea and Waiāhole. Rather, these results indicate that there is no strong evidence that any of the adze rejects was made with imported rock. At the same time, the results do offer strong evidence that the adze rejects did not originate at Haleakalā or Nu'u on Maui, or Mauna Kea on Hawai'i Island.

4 Discussion

This section compares the ages and firewood composition of the fire-pits at Sites 50–40–98–1980 and 50–40–98–1981 with the ages and firewood composition of eight other fire-pits on Lāna'i Island. The ages and composition of the Lāna'i Island fire-pits are then compared with 33 fire-pits from coastal Waimānalo, O'ahu to distinguish tempos of vegetation change following Polynesian colonization of the islands.

Ten fire-pits on Lāna'i have been investigated with a combination of wood charcoal identification and controlled radiocarbon dating using single pieces of a short-lived taxon. The combination of wood charcoal identification and controlled radiocarbon dating yields both a roster of the woods used to fuel a fire and a precise estimate of when the firing took place. Assuming that fires were fueled with wood that was available in

the vicinity of the fire-pit, combined identification and dating analyses potentially yield a record of regional vegetation change over time. The plausibility of the assumption and the ability of the combined identification and dating analyses to yield a record of regional vegetation change over time were established at Waimānalo, O'ahu, where replacement of the native lowland forest with canoe plants brought to the islands by Polynesian settlers was underway by the mid-fifteenth century [16].

The ten fire-pits investigated in this way on Lāna'i are located on the windward and south coasts and in the central basin and plateau (fig. 12). On the windward coast, the fire-pits include one exposed on the surface at Kahalepalaoa and two other buried fire-pits identified in a backhoe excavation [11]. The two fire-pits investigated on the south coast were found during excavation of a beach sand deposit that was buried under alluvium deposited during and after ranching had destabilized the island's soils [15]. The fire-pit on the central plateau at Site 50–40–98–01984 was exposed on an eroding surface located on the outskirts of an abandoned pineapple field. In addition to the fire-pits in the central basin investigated in this report, the two fire-pits at Sites 50–40–98–01986 and –01987 were discovered beneath the plow zone of an abandoned pineapple field [13].

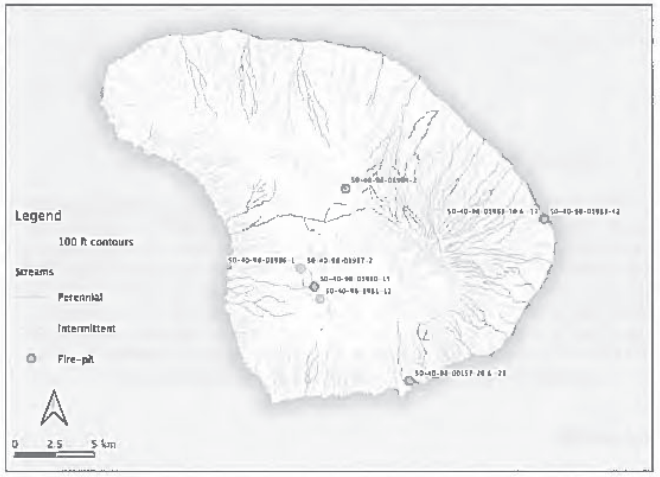


Figure 12: Location of fire-pit investigations on Lāna'i. *Sources:* Site 50–40–98–00157 [15]; Site 50–40–98–01980 and –01981 this report; Site 50–40–98–01983 [11]; Site 50–40–98–01984 [14]; Site 50–40–98–01986 and –01987 [13].

The calibrated ages of the individual fire-pits have already been reported [11; 13–15]. The reported dates can be used to investigate the tempo of fire-pit construction and use on Lāna'i by turning away from the estimated ages of individual fire-pits and asking instead when was the first occurrence of fire-pit construction and use, when was the second occurrence of fire-pit construction and use, etc. Posing the question in this way builds upon the event view of time used in the radiocarbon dating analysis to employ instead a substance view of time typically used to frame archaeological questions. The substance view of time focuses analysis on change, which is expressed on an absolute time scale. On present evidence, the occurrence of fire-pit construction and use on Lāna'i began in the late fifteenth century and continued into the historic period (fig. 13).

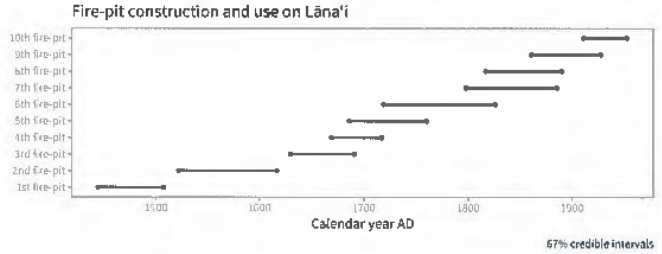


Figure 13: Occurrence of fire-pit construction and use on Lāna'i.

Identification of firewood used in the Lāna'i fire-pits indicates the prevalence into the historic period of native forest, with relatively little replacement of native species by canoe plants. This finding contrasts strongly with the documented transformation of the lowland forest at Waimānalo, where canoe plants were well established by the middle of the fifteenth century (fig. 14). At a time when most Lāna'i fire-pits were fueled exclusively with native woods, Waimānalo fire-pits regularly yield firewood assemblages dominated by canoe plants. The transformation of the lowland forest evidenced at Waimānalo started late on Lāna'i and had made relatively little progress before the island's vegetation history was radically altered during the ranching era [19].

5 Conclusion

Wood charcoal identification and dating lend support to the claim made by Hawaiian tradition that Lāna'i was settled relatively late. Current evidence from the island suggests that the first fire-pits were constructed 400–500 years after Polynesians discovered the islands. However, it is extremely unlikely that the earliest evidence for human activity on

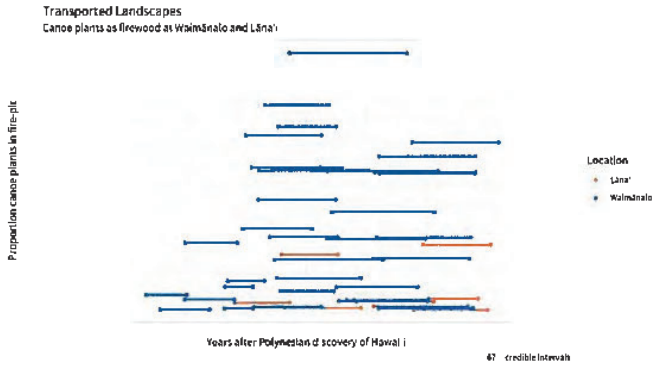


Figure 14: Canoe plants as firewood at Waimānalo and on Lāna'i.

Lāna'i has been identified. Most of the well dated fire-pits are from the island's interior and the dry southern coast, which are relatively unlikely locations for early settlement. A likely location for early settlement is the windward coast in the vicinity of Maunalei Valley. The combination of a perennial stream that could feed *lo'i kalo*, sand beaches, shallow water fishing grounds, and relatively easy access to Maui and Moloka'i Islands all point to the desirability of the island's windward coast for traditional settlement. Only a few fire-pits from the windward coast of Lāna'i have been identified and dated at Kahalepalaoa, a location that lacks the agricultural resources that would have been available at Maunalei, and would likely have been settled at a later time.

The windward Lāna'i coastline that Hawaiians knew is today deeply buried by sediment that eroded off the mountain during and after the ranching period, when large herds of grazing herbivores wreaked havoc on the native vegetation and destabilized soils over much of the island [19]. The widespread, severe erosion of upland soils that resulted likely had the effect of sealing early cultural deposits along the windward coast under a thick blanket of sediment that serves to protect them from erosion and disturbance. In the event the windward coast of Lāna'i is developed, one focus of historic preservation efforts should identify and recover evidence of this early settlement.

The canoe plants brought to the islands by Polynesian settlers had begun to replace native species in lowland forests by the middle of the fifteenth century at places like Waimānalo on O'ahu. This replacement of native forest by canoe plants favored by Polynesians is referred to by geographers as a process of landscape transport in which immigrants work to create settlements that resemble those of the homeland. The process

of landscape transport appears to have had relatively little effect on Lāna'i prior to the ranching era; fire-pits that date late in the traditional Hawaiian period and early in the historic period were fueled almost exclusively by wood from native plants that were well adapted to the island's dry conditions and were likely established in the island's primeval forests. Canoe plants are only rarely identified in fire-pits from the island–breadfruit from Kahalepalaoa, ki from Manele, and *kukui*, *'ōhi'a 'ai*, *'ulu*, and *ipu* from Kaunolū are exceptions that prove the rule of native firewood on the island. In this respect, one conclusion of an early inquiry into Lāna'i firewood at Kaunolū—that "many dryland forest taxa apparently persisted in this region until sometime after the abandonment of the Kaunolū settlement in the mid-1800's" [1]—appears to apply more widely and likely characterizes the vegetation history of the island as a whole.

Archaeological study of the island's stone tools is at an early stage. A reduction sequence in which an initial step removed a large flake from a boulder of suitable adze rock seems to have been most common. This reduction sequence based on flakes was practiced widely in Hawai'i and was particularly common during production of small adzes. The Lāna'i adze rejects sourced for the Miki Basin 200 Acre Industrial Development project were likely fashioned from local rocks, but there can be little doubt that imported adzes will be identified on the island with subsequent research. Adze rock collected from traditional Hawaiian sites in Kahikinui on Maui Island is reliably sourced to Kaunolū, so adze rock was definitely moving across the narrow channel between the islands. Additional research on Lāna'i stands a good chance of turning up evidence for the import of adze rock from islands nearby.

The discriminant analysis framework outlined in this report indicates that the non-destructive EDXRF analysis carried out by the Hilo Geoarchaeology Laboratory is sufficiently powerful to distinguish at least two Maui Island sources and the fine-grained adze rock from Mauna Kea from Lāna'i adze rocks. Other potential imports, from Waiāhole on O'ahu, Kīlauea on Hawai'i, and likely several other locations, will be difficult to distinguish from the local rock with EDXRF, although this situation might change once the variability of Lāna'i adze rock is more completely known through characterization of a wider range of source locations. Even with this additional work on source locations, however, it seems likely that a two stage process will be required for a study that confidently distinguishes Lāna'i sources from imports. Currently, there are several techniques that might yield information that would distinguish the local Lana'i rocks from most imports, including petrographic description of thin sections and various geochemical techniques such as WDXRF and microprobe. These more powerful techniques are all destructive in the sense that a piece of the artifact must be sacrificed to complete the analysis, are relatively expensive to undertake compared to EDXRF, and typically require an experienced geologist to interpret their results.

A ^{14}C Dates

Beta-510703 140 ± 30

$\delta^{13}C = \quad 22.0‰$

Sample consists of one piece of *Sida* cf. *fallax* twig charcoal from Site 50–40–98–01981, Context 12. Submitted 2018–11–26. Context 12 is described as fire-pit in backoe trench 21. It is classified as a cultural event.

Comment: Sida cf. *fallax* twig is a short-lived material. The dated material has a highly probable association with the target event, which is fire-pit use. This short-lived material is confidently associated with use of the fire-pit feature. It provides the best estimate of when the fire-pit feature was last used. The submitted sample yielded ample carbon for dating and was processed normally in the laboratory.

Beta-510704 170 ± 30

$\delta^{13}C = \quad 10.4‰$

Sample consists of one piece of *Euphorbia* cf. *celastroides* twig charcoal from Site 50–40–98–01981, Context 15. Submitted 2018–11–26. Context 15 is described as the base of a truncated fire-pit exposed in an erosion swale. It is classified as a cultural event.

Comment: Euphorbia cf. *celastroides* twig is a short-lived material. The dated material has a highly probable association with the target event, which is fire-pit use. This short-lived material is confidently associated with use of the fire-pit feature. It provides the best estimate of when the fire-pit feature was last used. The submitted sample yielded ample carbon for dating and was processed normally in the laboratory.

B EDXRF Data

Label	Ni	Cu	Rb	Sr	Y	Zr	Nb
Context 19	143.298	138.531	16.689	342.543	37.753	155.704	10.772
Context 18	127.073	113.949	15.004	343.271	96.07	143.251	10.646
Context 18	169.568	148.242	17.341	353.212	24.126	141.784	10.387
Context 0	172.385	160.297	16.541	356.349	57.311	137.105	10.452
Context 18	123.763	115.902	14.582	370.528	114.449	141.899	9.254
Context 0	117.062	89.686	14.488	350.596	35.178	139.206	9.72

Note: All data in parts per million

Bibliography

1. Allen, M. S. and G. Murakami (1999a). Lana'i island's arid lowland vegetation in late prehistory. *Pacific Science 53*, 88–112.

2. Allen, M. S. and G. M. Murakami (1999b). Lana'i island's arid lowland vegetation in late prehistory. *Pacific Science 53*, 88–112.

3. Anderson, E. (1952). *Plants, Man and Life*. Berkeley, CA: University of California Press.

4. Ashmore, P. J. (1999). Radiocarbon dating: Avoiding errors by avoiding mixed samples. *Antiquity 73*(279), 124–130.

5. Baxter, M. (2003). *Statistics in Archaeology*. Chichester, UK: John Wiley & Sons.

6. Buck, C. E., J. A. Christen, and G. N. James (1999). Bcal: An on-line Bayesian radiocarbon calibration tool. *Internet Archaeology 7*.

7. Clarkson, C., C. Shipton, and M. Weisler (2014). Determining the reduction sequence of Hawaiian quadrangular adzes using 3D approaches: a case study from moloka'i. *Journal of Archaeological Science 49*, 361–371.

8. Clarkson, C., C. Shipton, and M. Weisler (2015). Front, back and sides: experimental replication and archaeological analysis of Hawaiian adzes and associated debitage. *Archaeology in Oceania 50*(2), 71–84.

9. Cleghorn, P. L., T. S. Dye, M. I. Weisler, and J. Sinton (1985). A preliminary petrographic study of Hawaiian stone adze quarries. *Journal of the Polynesian Society 94*, 235–251.

10. DiVito, N. J., K. Maly, and T. S. Dye (2015, July). *Archaeological Inventory Survey for the Miki Basin 200 Acre Industrial Development, Lands of Kalulu and Kaunoā, Lāhaina District, Lāna'i Island, TMK: (2) 4–9–002:001*. Prepared for Pūlama Lāna'i. Honolulu: T. S. Dye & Colleagues, Archaeologists.

11. DiVito, N. J., K. Maly, and T. S. Dye (2016, February). *Archaeological Inventory Survey for the Kahalepalaoa Renovation Project, Land of Ka'ōhai, Lāhaina District, Lāna'i Island, TMK: (2) 4–9–003:010*. Prepared for Pūlama Lāna'i. Honolulu: T. S. Dye & Colleagues, Archaeologists.

12. Dye, T. S. (2018a). *Archaeological Data Recovery Plan for Sites 50–40–98–1980 and 50–40–98–1981 Within the Miki Basin 200 Acre Industrial Development*. Prepared for Pūlama Lāna'i. Honolulu, HI: tsd.

13. Dye, T. S. (2018b). *Archaeological Monitoring Report for Growponics Greenhouses (Hydroponics Facility) Project, Land of Kamoku, Lahaina District, Lāna'i Island, TMK: (2) 4–9–002:061 por.* Prepared for Pūlama Lāna'i. Honolulu, HI: tsd.

14. Dye, T. S. and K. Maly (2016, October). *Archaeological Inventory Survey for the Proposed Lāna'i Well #7, Land of Pnoma'i, Lahaina District, Lāna'i Island, TMK: (2) 4–9–002:001 por.* Prepared for Pūlama Lāna'i. Honolulu, HI: T. S. Dye & Colleagues, Archaeologists.

15. Dye, T. S., K. Maly, C. E. Sholin, and N. J. DiVito (2013, November). *Archaeological Inventory Survey Addendum for Mānele Small Boat Harbor Modifications.* Prepared for Lanai Resorts LLC. Honolulu: T. S. Dye & Colleagues, Archaeologists.

16. Dye, T. S. and C. E. Sholin (2013). Changing patterns of firewood use on the Waimānalo Plain. *Hawaiian Archaeology 13*, 30–68.

17. Emory, K. P. (1968). East Polynesian relationships as revealed through adzes. In I. Yawata and Y. H. Sinoto (Eds.), *Prehistoric Culture in Oceania: A Symposium*, pp. 151–169. Honolulu: Bishop Museum Press.

18. Emory, K. P. (1969). *The Island of Lanai: A Survey of Native Culture* (Bishop Museum Press Reprint ed.). Number 12 in B. P. Bishop Museum Bulletin. Honolulu: Bishop Museum Press.

19. Hobdy, R. (1993). Lāna'i—A Case Study: The Loss of Biodiversity on a Small Hawaiian Island. *Pacific Science* 47(3), 201–210.

20. Kirch, P. V. (1982). The impact of the prehistoric Polynesians on the Hawaiian ecosystem. *Pacific Science 36*, 1–14.

21. Kirch, P. V., P. R. Mills, S. P. Lundblad, J. Sinton, and J. G. Kahn (2012). Interpolity exchange of basalt tools facilitated via elite control in Hawaiian archaic states. *Proceedings of the National Academy of Sciences 109*(4), 1056–1061.

22. Mills, P. R., S. P. Lundblad, J. G. Smith, P. C. McCoy, and S. P. Naleimaile (2008). Science and sensitivity: A geochemical characterization of the Mauna Kea adze quarry complex. *American Antiquity 73*, 743–758.

23. Nagata, K. M. (1985). Early plant introductions in Hawai'i. *Hawaiian Journal of History 19*, 35–61.

24. Sinton, J. M. and Y. H. Sinoto (1997). A geochemical database for Polynesian adze studies. In M. I. Weisler (Ed.), *Prehistoric Long-Distance Interaction in Oceania: An Interdisciplinary Approach*, Number 21 in New Zealand Archaeological Association Monograph, Chapter 11, pp. 194–204. Auckland, NZ: New Zealand Archaeological Association.

25. Tomonari-Tuggle, M. J., H. D. Tuggle, and J. S. Athens (2000, April). *Archaeology on a South Coast Landscape, Hulopo'e, Lāna'i, Hawai'i.* Prepared for Lanai Company. Honolulu: International Archaeological Research Institute.

26. Turner, M. (2005). Functional and technological explanations for the variation among early new zealand adzes. *New Zealand Journal of Archaeology 26*, 57–101.

27. Venables, W. N. and B. D. Ripley (2002). *Modern Applied Statistics with S* (Fourth ed.). New York, NY: Springer.

28. Weisler, M. (1990). A technological, petrographic, and geochemical analysis of the Kapohaku adze quarry, Lanai, Hawaiian Islands. *New Zealand Journal of Archaeology 12*, 29–50.

29. Ziegler, A. C. (2002). *Hawaiian Natural History, Ecology, and Evolution*. Honolulu: University of Hawai'i Press.

SUPPORTING DOCUMENTATION ON CULTURAL IMPACT ASSESSMENT REQUIREMENT

APPENDIX D-4

Ka Pa‘akai Analysis and Determination

4348 Wai`alae Ave #254•Honolulu Hawai`i 96816•T: (808) 392-1617•F: (888) 392-4941•E-Mail: admin@honuaconsulting.com

MEMORANDUM

To: **Keiki-Pua S. Dancil, Ph.D.**
Fr: **Trisha Kehaulani Watson, J.D., Ph.D.**
Re: ***Ka Pa'akai* Analysis and Determination**
Date: **September 17, 2021**

***Ka Pa'akai* Analysis**

Article XII, Section 7 of the Hawai'i Constitution obligates the State Land Use Commission ("LUC") to protect the reasonable exercise of customarily and traditionally exercised rights of native Hawaiians to the extent feasible when granting a petition for reclassification of district boundaries. In order to effectuate the State's obligation to protect native Hawaiian customary and traditional practices while reasonably accommodating competing private interests, the Hawai'i Supreme Court provided the following analytical framework as an outcome of *Ka Pa'akai O ka 'aina v. Land Use Commission (94 Hawai'i 31,7 P.3d 1068, September 11, 2000)*. The framework is referred to as *Ka Pa'akai Analysis* and consists of three parts:

1. Identify the scope of "valued cultural, historical and natural resources" in the petition area, including to the extent to which traditional and customary rights and practices are exercised in the affected area;
2. Determine the extent to which those resources, including traditional and customary native Hawaiian rights, will be affected or impaired by the proposed action; and
3. Identify feasible actions, if any, that should be taken by the LUC to reasonably protect Native Hawaiian rights and practices if they are found to exist.

Pūlama Lāna'i is processing an application to reclassify 200 acres from the State Land Use ("SLU") Agricultural District into the SLU Urban District for an industrial area on the island of Lāna'i. The proposed boundary amendment is on a portion of TMK (2) 4-9-002:061. The land is adjacent to other industrial parcels such as the Lāna'i Airport, Hawaiian Electric Fossil Fuel Power Plant, and Miki 20-acre industrial park (see Figure 1). The existing condition of the land is former pineapple fields that have lain fallow for over 30 years.

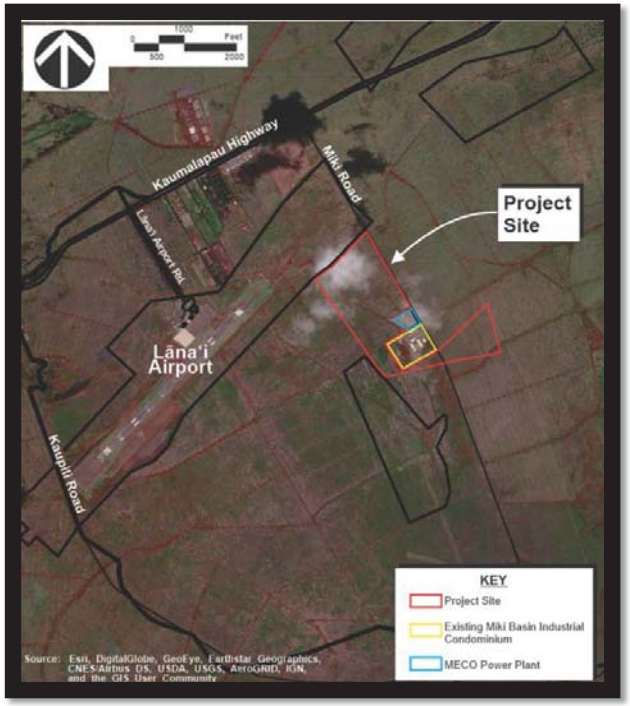


Figure 1: Miki Basin Industrial Park Project Area Map, provided by Munekiyo Hiraga.

Although Honua Consulting did not complete the Archaeological Inventory Survey ("AIS") for the Miki Basin 200 Acre Industrial Development (DiVito, Maly, and Dye 2018), we have reviewed the survey and have worked on multiple projects on Lāna'i for Pūlama Lāna'i as the archaeological consultant. In addition, Nathan DiVito is currently employed by Honua Consulting, and Thomas Dye, Ph.D. (Principal of T.S. Dye & Collegues, Archaeologist, Inc.) has provided Honua Consulting with archives of studies performed by his firm for Pūlama Lāna'i since closing his business upon retirement.

Honua Consulting has reviewed the archaeological materials in the Draft Environmental Assessment ("Draft EA") for the District Boundary Amendment Application. These materials included the following:

- Archaeological Inventory Survey ("AIS") for the Miki Basin 200 Acre Industrial Development (DiVito, Maly, and Dye 2018)

- State Historic Preservation Division ("SHPD")Archaeological Inventory Survey Acceptance Letter (August 2020)
- Supporting Documentation on Cultural Impact Assessment Requirement
    - Letter from Kepā Maly to Kurt Matsumoto dated September 24, 2019
    - Letter from Kepā Maly to Kurt Matsumoto dated June 26, 2020
    - Interview with Laʻikealoha Hanog by Honua Consulting on August 21, 2021
    - Interview with Kumu Hula Pualani Kauila by Honua Consulting on August 19, 2021

***Ka Paʻakai* Analysis and Recommended Determination**

Based on the guidelines set forth in *Ka Paʻakai*, the Hawaiʻi Supreme Court provided government agencies an analytical framework to ensure the protection and preservation of traditional and customary Native Hawaiian rights while reasonably accommodating competing private development interests. This is accomplished through:

1) The identification of valued cultural, historical, or natural resources in the project area, including the extent to which traditional and customary Native Hawaiian rights are exercised in the project area.
2) The extent to which those resources—including traditional and customary Native Hawaiian rights—will be affected or impaired by the proposed action; and
3) The feasible action, if any, to be taken to reasonably protect Native Hawaiian rights if they are found to exist.

This assessment was completed throughout numerous documents, which are identified in this memo. These various documents thoroughly identified valued cultural, historical, and natural resources in the project area, including the extent to which traditional and customary Native Hawaiian rights are exercised in the project area.

The following is based on the information provided in the archaeological materials in the Draft EA, which included interviews, letters, the AIS and SHPD's acceptance letter of the AIS.

Cultural Resources and Traditional Cultural Practices

Kepā Maly recently retired from Pūlama Lānaʻi as the Cultural Advisor. He is also one of the co-authors of the SHPD accepted AIS and author of two letters attesting to the extensive outreach and research of the project area in regard to a cultural impact assessment. In his letter, he stated the following:

> *Based on the detailed ethno-historical research conducted for the ahupuaʻa in which the "Miki Basin Industrial Park" project is situated and on my personal knowledge and experience, having lived on Lānaʻi and worked with elder Hawaiian residents of Lānaʻi from the 1960s to present day, no traditional or customary practices will be impacted by the proposed Miki Basin Industrial Park.*

Honua Consulting reached out to three native Hawaiian community members (Solomon Pili Kahoʻohalahala, Laʻikealoha Hanog, and Kumu Hula Pualani Kauila) recently to conduct telephone interviews, Solomon Pili Kaho'ohalahala did not respond to the interview request.

There were references to gathering of ʻaʻalii and ʻuhaloa in the project area for adornments and laʻau lapaʻau by one of the interviewees. Therefore, per the Ka Paʻakai analysis, the first test identified cultural resources and traditional practices in the project area.

The second test considers potential impacts to these resources and practices resulting from the proposed project. Both ʻaʻalii and ʻuhaloa are common throughout the Pālāwai-Miki Region of Lānaʻi and prevalent in the surrounding areas of the project, which is also noted by Kepā in his letter dated September 24, 2019. The project is not anticipated to affect the availability of these cultural resources and the project will not affect access to these resources in the region. Therefore, the project is not anticipated to have an impact on this practice in the ahupuaʻa.

Both interviewees also mentioned deer hunting for subsistence. Although not a traditional cultural practice due to the lack of deer present in pre-contact Hawaiʻi, it should be noted that Pūlama Lānaʻi manages hunting in the area and deer is abundant in the vicinity of the project area. The project will not affect access to deer for subsistence hunting.

One of the interviewees mentioned a cave in the project area and the use as a lookout for canoes. In the AIS, the extensive research did not reveal either a cave or the use of the area as a lookout for canoes.

Due to the project's lack of impact to traditional or customary practices, feasible action to be taken to reasonably protect Native Hawaiian rights is not required.

Recommended Determination

Based on the review of the archaeological materials provided and the additional interviews conducted, the proposed 200-acre project area is not anticipated to affect the rights customarily and traditionally exercised and does not affect or impair any Hawaiʻi State Constitution, Article XII, Section 7 uses, or the feasibility of protection of those uses. We recommend that the LUC make a consistent finding of fact(s) and/or conclusion(s) of law.

Confirmation Letters for Cultural Impact Assessment and Determination

FEA REF-409

September 24, 2019

Kurt Matsumoto, COO
Pulama Lāna‘i
733 Bishop Street Suite 2000
Honolulu, HI 96813

Re: Archaeological Inventory Survey for the Miki Basin 200 Acre Industrial Development TMK (2) 4-9-002:061 (portion)
Dye, DiVito and Maly (May 9, 2018)

Mr. Matsumoto:

This letter confirms that, although not titled as such, the Archaeological Inventory Survey cited above included research compliant with guidelines for development of a cultural impact assessment study (CIA), required by the Hawai‘i Supreme Court’s holding in Ka Paakai O Ka Aina v. Land Use Commission, State of Hawai‘i, 7 P.3d 1068, 94 Hawai‘i 31 (2000).

The study includes descriptions of traditional knowledge of place, and traditional and customary practices as documented in Hawaiian language accounts from Lāna‘i. There also cited important historical accounts penned by foreign residents and visitors, documenting the changes in land use, access and residency from the 1840s to the 1950s. As a result of the rapid decline of the native Hawaiian population on Lāna‘i, and early control of nearly all the land on the island by non-native business interests, little documentation pertaining to the extent to which traditional and customary native Hawaiian rights might be exercised in the petition area survived the passing of time. No native tenant kuleana (property rights) or Royal Patent Grants were issued for lands within the petition area. By the 1870s control of the petition area lands was held under one individual, who also posted notices advising against trespass. By the 1920s, the entire area was dedicated to cultivation of pineapple (see Figure 1). Through the 1930s, the petition area included a residential field camp for Japanese employees of the plantation and their families.

Cultivation of pineapple and maintenance of support infrastructure such as road ways, water lines and stockpile sites was the only land use in the area until the close of the plantation in 1992. The Petition Area was completely cleared and cultivated in pineapple for nearly 70 years. The land was bulldozed, plowed, graded, and planted with pineapples multiple times during that period. Because of the heavy use of pesticides and growth hormones, it would have been highly unlikely that plants of medicinal or other cultural uses would have been gathered across these fields. Since the close of the pineapple plantation in 1992, a few native plant species have volunteered across the nearly 20,000 acres of former pineapple fields. Most notable are the indigenous ‘a‘ali‘i (Dodonaea viscosa), ‘ilima (Sida fallax), naio (Myoporum sandwicense), and the ‘uhaloa (Waltheria indica). While each of the plants have cultural value and uses, none are rare, and all grow throughout the Pālāwai-Miki Region of Lāna‘i.

Figure 1. Pineapple Field Harvest in Miki Basin Fields – Miki Camp in Background (left). HAPCo Photo No. 525, August 31, 1928 (Lāna‘i Culture & Heritage Center Collection).

There was no evidence of any protected cultural practices occurring on the site. Therefore, the project will not have any significant negative impact on traditional and customary practices.

Should you have any further questions, please let me know.

‘O wau no me ka ha‘aha‘a,

Kepā Maly
P.O. Box 631500
Lāna‘i City, Hawai‘i 96720

June 26, 2020

Kurt Matsumoto, COO
Pūlama Lāna'i
733 Bishop Street Suite 1500
Honolulu, HI 96813

Re: Cultural Impact Assessment for the Miki Basin 200 Acre Industrial Development TMK (2) 4-9-002:061 (portion) Dye, DiVito and Maly (May 9, 2018)

Mr. Matsumoto:

This letter confirms that a cultural impact assessment study (CIA) was prepared for the Miki Basin Industrial project consistent with the requirements by the Hawai'i Supreme Court's holding in Ka Paakai O Ka Aina v. Land Use Commission, State of Hawai'i, 7 P.3d 1068, 94 Hawai'i 31 (2000)

Based on the detailed ethno-historical research conducted for the ahupua'a in which the "Miki Basin Industrial Park" project is situated and on my personal knowledge and experience, having lived on Lāna'i and worked with elder Hawaiian residents of Lāna'i from the 1960's to present day, no traditional or customary practices will be impacted by the proposed Miki Basin Industrial Park.

In fact, over the last twenty plus years, native Hawaiian and non-Hawaiian residents of Lāna'i have provided testimony and support for development of the industrial area project as a means of promoting community sustainability and entrepreneurial opportunities.[1]

Over the last 50 years I have been involved in many consultation interviews with elder kama'āina from Lāna'i who have broad knowledge of the history and issues on the island. In addition, I have interviewed several elder residents of Miki Camp, which was in the immediate vicinity.

I have interviewed people, with both traditional and historical knowledge of Kalulu and Kaunolū ahupua'a where the proposed Miki Basin Industrial Park is situated.

I have reviewed earlier cultural resource management studies of the area and included native resident testimonies from records of the Māhele 'Āina, Royal Patent Grants and Boundary Commission proceedings (1848-1876), as cited in the Miki Basin report.

In the late 1980s, the community engaged in planning discussions on a wide range of topics. They sought to address concerns about protection of Lāna'i City, land use, zoning, adaptive new uses, including shifting the industrial use of the former Machine Shop Fleet and Labor Yard, from the heart of town. The vision was to relocate heavy and light industrial uses to the area of Miki Basin, and adaptively reuse the town site as a community heritage and educational center, and also enhance small business initiatives.

[1] Maui County General Plan 2030 Lāna'i Community Plan. Process on plan update can be found in various versions of the process at this website http://mauicounty.us/lanaicommunityplan/

DocuSign Envelope ID: B5E4A525-47E6-41A8-BE66-2570DAF7F414

The Lāna'i Community Plan, which provides "...strategic planning goals, policies, and actions, to guide decision-making and implementation through 2030"[2] includes, "[T]he Airport Area conceptual plan's goals are to improve the experience of flying into Lāna'i by improving transportation facilities, and to consolidate industrial uses."[3] The plan outlines:

> "The existing industrial uses on Miki Road will be expanded in a proposed industrial area of approximately 200 acres, divided into approximately 100 acres each of light and heavy industrial. Light industrial uses in Lāna`i City will also be moved and consolidated in this area. It will also serve as a staging area for shipments from the harbor to be distributed closer to town."[4]

"To update the Lāna`i Community Plan, the Department of Planning's Long Range Planning Division worked with the Lāna`i community, stakeholders, agencies, the Lāna`i CPAC, the Lāna`i Planning Commission, and the County Council between 2010 and 2015."[5]

The Community Plan Advisory Committee members included native Hawaiian residents and a cross-section of community members including: Christine Costales, Deborah de la Cruz, Joseph Felipe, Reynold "Butch" Gima (Chair), Ernest Magaoay, Matt Mano, Ron McOmber, Stanley Ruidas (Vice Chair), Alberta DeJetley, Charles Kaukeano, Jarrod Barfield, Jeofrey Baltero, and Caron Green.[6]

There were twenty three CPAC (Community Plan Advisory Committee) meetings held from January – September 2013, where the community could attend and provide testimony to shape the Community Plan.[7] Furthermore, there were two Public Workshops[8] held on April 4 and April 6 2013 where the community could express their opinions and hear from their neighbors regarding Island-wide, and Lanai City specific issues and ideas. There were sixty two community members in attendance.[9]

No one stated any concerns about the use of the Miki Basin site for industrial use and on one stated that there were any traditional or customary practices in this area. There was support for the industrial use in this area.

On October 22, 2018, Pūlama Lāna'i held a Community Meeting to discuss the Miki Basin Light & Heavy Industrial Project. There were thirty seven community members in attendance.

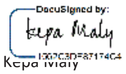
[2] Ordinance 4343 Bill No. 67 (2016) Draft 1 "A Bill for an Ordinance Amending Section 2.80B.070, Maui County Code, to adopt the updated Lanai Community Plan, page 13 of 198 in pdf, downloaded from this website link: https://www.mauicounty.gov/DocumentCenter/View/105983/2016-Lanai-Community-Plan-?bidId=
[3] Ordinance 4343 Bill No. 67 (2016) Draft 1 "A Bill for an Ordinance Amending Section 2.80B.070, Maui County Code, to adopt the updated Lanai Community Plan, page 110 of 198 in pdf, downloaded from this website link: https://www.mauicounty.gov/DocumentCenter/View/105983/2016-Lanai-Community-Plan-?bidId=
[4] Ordinance 4343 Bill No. 67 (2016) Draft 1 "A Bill for an Ordinance Amending Section 2.80B.070, Maui County Code, to adopt the updated Lanai Community Plan, page 110 of 198 in pdf, downloaded from this website link: https://www.mauicounty.gov/DocumentCenter/View/105983/2016-Lanai-Community-Plan-?bidId=
[5] Ibid at page 17 of 198.
[6] Document can be downloaded here: http://mauicounty.us/wp-content/uploads/2015/01/011abill01-Exhibit-1-May-28.pdf , See section 1.1 page 12, section 1.2 page 97, and section 1.3 page 16.
[7] https://www.mauicounty.gov/DocumentCenter/View/83364/CPAC-2013-Meeting-Schedule?bidId=
[8] https://www.mauicounty.gov/ArchiveCenter/ViewFile/Item/17757
[9] https://www.mauicounty.gov/ArchiveCenter/ViewFile/Item/17962

Community members were encouraged to provide input, concerns, anticipated impacts at and following this meeting and no one stated any concerns or knowledge of any traditional and customary practices in this area. There was support for industrial use in this area.

No evidence of any protected cultural sites or practices was found in these various forms of ethno-historical documentation. Therefore, the project will not have any significant negative impact on traditional and customary practices.

Should you have any further questions, please let me know.

ʻO wau no me ka haʻahaʻa,



Kepa Maly
P.O. Box 631500
Lānaʻi City, Hawaiʻi 96720

FEA REF-412

The table below provides additional detail about the meetings described above, including specific comments from the attendees describing their support of a consolidated industrial area in the Miki area.

Please note that the County's minutes reflected some incorrect spelling of names, Pūlama Lāna'i has made the correction (highlighted) for record keeping. For your reference, we have also underlined individuals with Hawaiian ancestry. Only Matt Mano and Stacie Koanui Nefelar and Kaulana Kaho'ohalahala are representative of multi-generational Hawaiian families of Lāna'i.

Meeting Name	Date	Attendees	Notes	Link
Lāna`i CPAC Mtg. 1	1/9/2013	**Community Plan Advisory Committee** Chris Costales, Deborah Yooko de la Cruz, Joe Felipe, Butch Gima, Ernest Magaoay, Matt Mano, Ron McOmber, Stan Ruidas, Alberta DeJetley, Charles Kaukeano, Jarrod Barfield, Caron Green **County of Maui - Planning Department** Will Spence, Director, Kathleen Kern, Long-Range Planning, Mary Jorgensen, Long-Range Planning, David Yamashita, Long-Range Planning **County of Maui - Corp Counsel** Mike Hopper **Consultants** Jen Maydan, Chris Hart & Partners **Public** Carolyn and Walter Triber, John Ornellas, Christie Costales, Robin Kaye, Kurt Matsumoto, Sally Kaye, Chet Zoll, Joseph Felipe, Donovan Kealoha, Stacie Koanui Nefalar, Chris Lovvorn, Pat Drennan, Ed Jensen, Andrea de la Cruz, Bradford Oshiro, Pat Reilly	"Kathleen Kern asked each member to identify the top issues/problems facing Lāna`i." (Page 5 of 8) "Alberta: • Lack of light industrial space, including storage space for small businesses" (Page 6 of 8)	https://www.mauicounty.gov/ArchiveCenter/ViewFile/Item/17640

Lāna`i CPAC Mtg. 3	1/23/2013	**Community Plan Advisory Committee** Chris Costales, Deborah Yooko de la Cruz, Joe Felipe, Butch Gima, Caron Green, Matt Mano, Ron McOmber, Stan Ruidas, Alberta DeJetley, Charles Kaukeano. **County of Maui - Planning Department** David Yamashita, Long-Range Planning, Kathleen Kern, Long-Range Planning Mary Jorgensen, Long-Range Planning **Consultants** Jen Maydan, Chris Hart & Partners **Public** Lisa Kaniho, David Green, David Tanoue, Kurt Matsumoto, Pat Reilly, Carolyn & Walter Triber, Steven Luliti, David Embrey, Pam Alconcel, Nancy Rajaei, Michelle Fujie, Jason Gill, David Gardner, Sue Murray, Henry Clay Richardson, Sally & Jim Clemens, Kathy & Stu Marlow, Ron Gingerich, John Stubbart, Doug Williams, Natasha Inaba, Don Jackson, Judith Stilgenbauer, Mark Sacco, Chris Andrus, Jessica Smith, Anthony Pacheco, Sherri Williams, Simon Seisho Tajiri	"Joe supports the idea of moving the industrial are to Miki Basin and creating a museum at the labor/base yard." (Page 7 of 9)	https://www.mauicounty.gov/ArchiveCenter/ViewFile/Item/17642

Lāna`i CPAC Mtg. 4	6-Feb-13	**Community Plan Advisory Committee** Chris Costales, Deborah de la Cruz, Ernest Magaoay, Butch Gima, Caron Green, Matt Mano, Ron McOmber, Stan Ruidas, Alberta DeJetley, Charles Kaukeano **County of Maui - Planning Department** David Yamashita, Long-Range Planning Kathleen Kern, Long-Range Planning Mary Jorgensen, Long-Range Planning Doug Miller, Long-Range Planning **Consultants** Jen Maydan, Chris Hart & Partners **Public** Pat Reilly, Sue Murray, Wallace Stalker, Diane Preza, Roselani Kaho'ohalahala, Kaulana Kaho'ohalahala, Simon Tajiri, Charlotte Menze, Michael Hurte, Nicholas E. Palumbo II, Mark Sacco, Henry Clay Richarson, Elaine Londreur, Robin Kaye, Keoki Kerr, Chester Koga	"He noted that if the community is going to have opportunities to have businesses then they will need land. All the community got is hotels and they didn't get the light industrial land." (Page 4 or 8)	https://www.mauicounty.gov/ArchiveCenter/ViewFile/Item/17660
Lāna`i Community Plan Update Public Workshops	April 4 & 6, 2013	62 People (see notes for Lanai CPAC Mtg. 10)		https://www.mauicounty.gov/DocumentCenter/View/84254/040413-Public-Workshops-Flyer?bidId=

Lāna`i CPAC Mtg. 10	24-Apr-13	**Community Plan Advisory Committee Attendees** Chris Costales, Deborah de la Cruz, Butch Gima, Caron Green, Ron McOmber, Alberta DeJetley, Stan Ruidas **County of Maui - Planning Department Attendees** Kathleen Kern, Long-Range Planning Mary Jorgensen, Long-Range Planning Doug Miller, Long-Range Planning **Public Attendees** Winnie Basques, Dave Green, Kepa Maly, Lynn McCrory, Meilani Aki, Howard MacNair, Donna MacNair, Alan Chun, Tom Hoen, Chester Koga, David Tanoe, John Stubbart, Charlie Palumbo, Ron Gingerich, Judi Riley, Bridgette Beatty, Linda Morgan, Natasha Inaba, Joelle Aoke, Kanish Tulbera, Bryan Jacalne, Sadie Schilling, Alicia Ebding, Michelle Fujiie	"Mary presented a brief summary of the April 4th Island-wide Public Workshop that was attended by 62 people. A summary table for housing types and density per acre showed the highest preference was for 2-4 unit buildings such as single family with ohana, duplex, multi-generational (more than one kitchen), or four-plex. A summary table for recreational references by location showed high scores for forest restoration, historical site visits and restoration. Finally Mary reviewed three maps from the April 4th Public Workshop that the public drew locations for, and commented on, preferred future development alternatives. Ron asked when the CPAC will see a complete summary of the workshop results. Mary replied that a summary will be posted on the website once it is completed." (Page 2 of 4) "Mary encouraged the CPAC members to draw on the base map the locations of new growth areas and note what type of development they would like to see in these areas." (Page 3 of 4) "Alberta said that the State does not want to see any farms within a one mile radius around the airport." (Page 3 of 4)	https://www.mauicounty.gov/ArchiveCenter/ViewFile/Item/17962

Lāna`i CPAC Mtg. 12	22-May-13		"The CPAC also requested to see the proposed footprint of the 200 acres of light and heavy industrial lands." (Page 2 of 2) "Motion: Support the concept of adding 100 acres of light industrial and 100 acres of heavy industrial land in the Miki Basin. Passed -All were in favor." (Page 2 of 2)	https://www.mauicounty.gov/ArchiveCenter/ViewFile/Item/18022

Interview with La‘ikealoha Hanog

4348 Wai`alae Ave #254•Honolulu Hawai`i 96816•T: (808) 392-1617•F: (888) 392-4941•E-Mail: admin@honuaconsulting.com

Interview with La‘ikealoha Hanog

Interviewer: Matthew Sproat
Interviewee: La‘ikealoha Hanog
Date: August 21, 2021
Location: via phone

Biography
Ms. Hanog works in food and beverage service for Hale o Manele (Trilogy Wedding and Event) on the island of Lāna‘i. She was born on the island of Maui and raised on Lāna‘i, where she still lives.

Overview
As a seventh-generation family of Lāna‘i, Ms. Hanog possesses a robust knowledge base of the project area’s environment and relevance to traditions and customs. She recounted the various plants and animals known to the project area as well as associated traditions and customs. Ms. Hanog expressed her concerns regarding the myriad impacts to access and habitat that the project would create.

General Discussion
Ms. Hanog is associated with the project area through collecting and harvesting. She uses some of the plants that are known to be in the project area’s region. Most recently, she and other practitioners go to the area to collect native Hawaiian plants. The plants are used for medicinal purposes, adornments, and gifts.

When asked about freshwater aquifers in the project area, Ms. Hanog explained that there are aquifers at various places across the island, but that the wells are located further mauka of the project area.

Ms. Hanog could not recount any cultural stories associated with the project area. However, in her personal narrative, she recounted that she and her family would use the area for traditional gathering.

Cultural Resources
Ms. Hanog explained the various flora that are in the project area and their uses. ‘A‘ali‘i is used for adornments. ‘Uhaloa is found here and used for medicinal purposes. There is also ilima and lantana. Regarding fauna, Ms. Hanog mentioned she had seen pueo recently, and noted that it has been a long time since she had seen them. She also noted that there are deer, pheasants, and quail in the area. She mentioned that during her grandparents’ time, pheasants were abundant. Unfortunately, now they are more scarce.

Traditions and Customs
Ms. Hanog uses the project area to gather plants for traditional medicine and adornments. She made special mention that she uses the area to gather plants primarily because of access. It is easier to gather plants in this area as opposed to the eastern shoreline or Manele bay. Ms. Hanog also noted that her husband is a hunter, and harvests deer in the area to feed her family and other members of the community. Due to the remote geography of Lāna‘i, gathering and hunting are inextricably tied to livelihood and subsistence.

Impacts
First, Ms. Hanog explained that the project could impact access to the area to collect cuturally important plants. The buildings and footprint of the project may impact plant life, as well as the associated traffic the project would create. The project could also affect the deer population in the area, which her husband harvests via archery. Ms. Hanog also noted that the project would disrupt the habitat and nesting grounds of birds such as pueo and pheasant.

Second, Ms. Hanog noted that more broadly, there are concerns about projects which are designed to bring more people to Lāna‘i. With no free-flowing surface water on Lāna‘i, there are real concerns of how further development will affect water resources and the environment more broadly.

Ms. Hanog is not aware of any iwi in the area, however she did mention that there are burials (including her ‘ohana) mauka of the project area.

Mitigation Meaures & Recommendations
Ms. Hanog said that she would prefer the project not go through. If the project does proceed, she hopes that there is something in writing to ensure protection and health of native plants. Regarding the native fauna, she hopes the project would be mindful of their habitat (including deer). The deer are already stressed due to the dry weather.

Ms. Hanog recommended that resources of Lāna‘i be made a priority, and to focus on the projects and developments that are already underway and causing impacts. She noted that the population of Lāna‘i has increased and raised concerns that the resources cannot sustain a growing population.

Interview with Kumu Hula Pualani Kauila

Interview with Kumu Hula Pualani Kauila

Interviewer: Matthew Sproat
Interviewee: Pua Kauila
Date: August 19, 2021
Location: via phone

Biography
Ms. Kauila is a retired educator of Hawaiian Studies at the University of Hawai‘i, Mānoa. She was born and raised on the island of Lāna‘i, at Kō‘ele Ranch. When she was born, her grandfather was the head wrangler for Kō‘ele Ranch. Her father and uncles were also workers on the ranch. At the age of 6, she left Lāna‘i and moved to Maui, but spent her summers working on Lāna‘i. She currently lives in Honolulu. She is a Kumu Hula and cultural practitioner.

Overview
Ms. Kauila is associated with the project area through her personal narrative. She possesses a robust knowledge about Lāna‘i, its history, and its people. Overarchingly, she is concerned that the project will further develop Lāna‘i at the expense of its long-time residents who have called Lāna‘i home for generations.

General Discussion
Ms. Kauila explained the modern history of Lāna‘i, which was used as cattle ranchland for the people of Maui, Moloka‘i, and Lāna‘i, before the pineapple industry purchased 90% of the island. During ranch times, the project area near the airport was known as the “piggery”.

Ms. Kauila noted that Hawaiians lived on ocean land, which is why those areas today are not developed; these lands were passed down through inheritence or were old kuleana lands. She also explained that because the island is so small, and given its history, the people of Lāna‘i are very closed to new things happening.

Cultural Resources
Ms. Kauila explained that, according to the oral traditions of when Lāna‘i was inhabited by ghosts, there was a cave in the project area (facing the ocean side). This was where Kaulula‘au stayed. In this cave, which opens and closes to certain people, are remnants of cultural artifacts including canoes, ipu, and capes.

Regarding flora and fauna, Ms. Kauila noted that pueo are very well known in the area. She sees them often when she returns home. She could not identify any native plants in the area but noted that she would have to refer the interviewer to another individual.

Traditions and Customs
Ms. Kauila explained that hunters use the area to hunt axis deer for their own subsistence. Historically, she noted that the area was used as a look-out to see when other canoes were approaching the island.

Impacts

Ms. Kauila explained that the people of Lāna‘i will be opposed to any industrial or commercial areas built on the land. She noted the negative impact of visitors on the island. Because the island is so small, any further development will negatively impact the island itself. She raised questions such as: would the development deface the island? Would it impact the people coming in to hunt? She firmly believes an industrial area will limit what that side of the island can access, whether for hunting or agricultural purposes.

Mitigation Meaures & Recommendations
Ms. Kauila said that there must be community engagement. Everyone must be able to voice their opinions. Her recommendation is to have the local community drive the process.