

Forwarded to HMR
VIA NAVY Ser 1340
20 Feb '80

R.J.H.
Dec. 19, 1979
1 of 14
D-2

Report on Feature 109A

Introduction

This is a preliminary report on Project 109A, the collection of cultural data from Feature A of archaeological site 20-97-109, on the island of Kaho'olawe, Hawaii. This project was conducted by the State of Hawaii under contract with the U. S. Navy during the first phase of the Kaho'olawe Cultural Resources Survey, an ongoing project sponsored by the U. S. Navy, which uses the island for training purposes. The survey is being conducted to identify and evaluate the cultural resources of Kaho'olawe, nearly all of which are ancient Hawaiian archaeological sites. In sponsoring the survey, the Navy is fulfilling its responsibilities under Federal Executive Order 11593 and the National Historic Preservation Act of 1966.

Project 109A fieldwork was conducted from the 19th through the 23rd of November 1976 by a research team consisting of principal investigator Robert J. Hommon, Archaeologist of the Historic Sites Section, State Parks Division of the State Department of Land and Natural Resources; Farley Watanabe, Historic Sites Specialist of the same office; Maury Morgenstein, Geologist and President of Hawaii Marine Research, Inc. (a private research firm); and Patrick McCoy, Archaeologist on the staff of the B. P. Bishop Museum.

The purpose of Project 109A was to record and preserve the cultural information available in Feature 109A through controlled recording, collection, and analysis to provide a context within which to assess the nature and significance of the hundreds of similar features situated in the central uplands of Kaho'olawe.

Environmental Setting

Kaho'olawe is the smallest of the eight major Hawaiian Islands, being 45 sq. miles (c.116 sq. km.) in size. Its summit, Lua Makika crater, is 1477 ft. (c.450 m.) high. It is the most arid island both because its low relief limits orographic rainfall and because it is situated in the rain shadow of 10,023 ft. (c.3055 m.) Haleakala, the mountain that forms east Maui, 7 mi. (c.11.3 km.) to the north.

Estimated average annual rainfall varies from less than 10 in. (254 mm.) at Kealaikahiki Point, the west end of Kaho'olawe to slightly more than 25 in. (635 mm.) at Lua Makika. The dominant vegetation on the island includes the exotic kiawe (*Prosopis pallida*) tree and various grasses, including pili (*Heteropogon contortus*), an indigenous species of grass that was used by the ancient Hawaiians as thatching material.

About one-quarter of the surface of Kaho'olawe (c.7,750 acres or c.3135 ha.) has been subjected to severe erosion. The eroded area, which centers in the southeast quadrant of the island, with extensions to the north and west, is saprolitic hardpan, almost

totally devoid of vegetation. Most of the eroded area is gently sloping land above the 750 ft. (c.229 m.) contour that may be loosely termed the central plateau of the island.

Feature 109A

Feature 109A is situated on gently-sloping (c.7% grade) eroded land 6000 ft. (c.1.83 km.) northeast of Kamohio Bay and 2100 ft. (c.600 m.) east of Kaneloa Gulch at about 1060 ft. (c.323 m.) elevation. Though kiawe trees and grasses can be found on nearby remnant hummocks of soil and in the gulches, no vegetation grows on the feature itself.

Feature 109A, like most of the features of central Kaho'olawe is erosionally lagged. The soil that once formed the stratigraphic context of Feature 109A has been totally eroded away, leaving non-perishable items on the hardpan. Most of these items are of stone, though a few mollusc shells also remain. Missing from the archaeological inventory of Feature 109A are those perishable items that have decayed and the non-perishable items that were light enough to have been removed by slopewash and wind.

The boundaries of Feature 109A were determined by the concentration of archaeological items lying on the surface of the hardpan. These items include artifacts of basalt and basaltic glass, pieces of unworked basalt, coral, and mollusc shells; a sparse scatter of archaeological items could be found downslope (southeast) from the feature for a distance of more than 100 meters. Most of the items

probably have been transported by slopewash. The Feature itself measures approximately 22 m. (northeast-southwest) by 31 m. (northwest-southeast). The northwest-southeast dimension of the feature apparently has been elongated by movement of archaeological material by slopewash. The clearly discernible concentration of archaeological items that forms this and hundreds of similar features, as well as the differential distribution of items within the feature support the conclusion that spatial patterns within the feature have not been destroyed by the removal of their soil matrix, but rather horizontally distorted.

Method

Within the boundaries of the Feature, a 2 by 2 meter grid oriented with magnetic compass directions was established to provide horizontal control for recording and collection. Grid-lines were established by compass and tape. Each grid-square was assigned a letter and number designation indicating its direction and distance from an origin point established arbitrarily near the center of the feature. The first part of the grid-square designation indicates whether it is north(N) or south(S) of the origin point; the second indicates the distance from the origin point in 2 x 2 meter squares; the third indicates whether it is east(E) or west(W) of the origin; and the fourth indicates the distance from the origin point in 2 x 2 meter squares. Thus, grid-square N3W5 is in the third rank north of the origin point and the fifth row west of the origin point.

A total of 6913 items were recorded in 123 grid-squares during the investigation of Feature 109A. Of these, 1263 were fragments of metal, all of which evidently are remains of ordnance, deposited since 1941, when Kaho'olawe first became a target range. The remaining 5650 were archaeological items, all of which were evidently deposited during the ancient Hawaiian use of the feature. A total of 751 of these items were artifacts, that is, objects that were worked by man. The remaining 4402 items include unworked basalt stones, marine mollusc shells, and shell fragments and fragments of coral. All of the artifacts, as well as the mollusc shell and coral material and three stones that appear to be water-worn, were collected. The remaining items were counted, recorded according to provenience and left in place. (See Table 1).

Chronological Data

A total of 54 basaltic glass items collected from Feature 109A (8.63% of the total) were subjected to hydration rind analysis to obtain chronological information concerning the occupation and use of the feature. A hydration rind is a chemically altered zone of the basaltic glass that begins to form when a fresh surface is exposed to the atmosphere. The thickness of the hydration rind, which expands inward from the surface of the basaltic glass, is related in a known way to the length of time that has passed since the fresh surface was exposed. Because

fresh surfaces are almost always exposed during the flaking process used to produce basaltic glass artifacts, the approximate date of production of most artifacts, cores and waste flakes can be determined by measurement of rind thickness in thin sections. The rind of each sample is measured in a number of places, producing a range of thicknesses, which reflects a range of possible dates. For convenience, basaltic glass hydration date ranges are usually presented in the form of the median date with a plus-or-minus factor in years. Thus, for example, A.D. 1442 \pm 20 represents a range of 1442 to 1462, during which the hydration rind being measured began to form. The flake scar may have been formed in 1422, or 1462, or in any year between these two dates. (cf. Morgenstein and Riley 1974).

Hydration rinds were measured on two different flake scars on each of the two artifacts from 109A, so that a total of 56^{56 in} date-ranges appear in Table 2 and Figure 1. Five additional hydration rind measurements were attempted on basaltic glass samples from 109A. The range from one of these samples approximated 12,000 B.P. (Before Present) and may represent the original formation of the glass or an early natural fracture. No hydration rind could be detected on the other four samples analyzed. The following discussion refers to the fifty-six hydration rind ranges that provide a chronological framework for the use of Feature 109A.

The basaltic glass hydration rind dates from 109A are arranged in chronological order of medians in Table 2 and in Figure 1.

The dated basaltic glass samples are from eleven squares in the northeast-quadrant of the features. The dates range from A.D. 1406 \pm 16 to 1640 \pm 18. Twenty-one of the dated samples, including those with the earliest and latest dates, were recovered from square N1E2. The dated samples tend to cluster increasingly toward the late end of occupation at Feature 109A, as is indicated in Figure 1. For example, 43% of the sample medians date from the last 25% of the total occupation span as indicated by the sample medians; and fully 20% of the medians are found to date from the final 10% of the indicated occupation span, as compared with only 7% during the first 10% of the span. The date in hand seems to indicate that the intensity of working basaltic glass increased with time at 109A, and that this activity then ceased in the early 1600s.

Spatial Distribution of Cultural Items

Analysis of the spatial distribution of cultural items in 109A provides valuable information concerning the ancient use of this feature, as well as, the effects of the removal of these items from stratigraphic context and their subsequent movement by erosion. These factors are, of course, essential for an understanding of the nature of all of the eroded sites in the

interior upland of Kaho'olawe, and to the prehistory of Kaho'olawe as a whole. The general patterns of distribution of unworked basalt, basaltic glass artifacts, basalt artifacts, and mollusc shells are summarized in Figure 2. The indicated hatching symbol appears in each square that contains a number of items equal to or greater than the mean per square for the whole feature. Fifty squares (c.41% of the total) contain one or more symbols.

The concentrations of items shown in Figure 2 may be summarized as follows:

- 1) 4759 unworked basalt stones were distributed throughout 120 squares, and 3437 of these (72.2%) occur in the 39 appropriately marked squares.
- 2) 626 basaltic glass artifacts were distributed throughout 63 squares, and 496 (79.2%) occur in the 18 appropriately marked squares.
- 3) 125 basalt artifacts are distributed throughout 56 squares, and 72 (57.6%) of these occur in the 15 appropriately marked squares.
- 4) 131 mollusc shells and shell fragments were distributed throughout 55 squares, and 82 (63%) of them occur in the 16 appropriately marked squares.

Two general patterns of concentration are readily apparent in Figure 2. First, all four types of items tend to concentrate in the northeast quadrant of 109A. Second, unworked basalt tends to

be concentrated as well in an area that extends from the northwest quadrant into the southeast quadrant, where few other concentrations are found.

Within each of these areas is a nucleus of unworked basalt stones. Most of these stones are angular and are presumed to have been cracked by exposure to heat. They are probably the remnant of large fireplaces or imu (underground ovens). Together, they contain in only 10 squares nearly 1/3 (32%) of all the unworked basalt in the feature. Their locations and number of stones are as follows:

Northwest nucleus:

Square	N3W3:	296	stones
"	N2W4:	134	"
"	N2W3:	175	"
"	N1W3:	154	"
"	N1W2:	100	"
		859	stones (18% of the total)

Northeast nucleus:

Square	N3E2:	238	stones
"	N3E1:	100	"
"	N4E2:	117	"
"	N4E3:	113	"
"	N5E2:	100	"
		668	stones (14% of the total)

Neither square N3W3, which contains the greatest number of unworked basalt stones in the feature nor the other squares of the northwest nucleus includes items in greater than mean quantity. Square N3E2 and the other four squares of the northeast nucleus, on the other hand, contains greater than mean quantities of both basaltic glass and basalt artifacts.

Interpretation and Conclusions

On the basis of the mapping, dating, and preliminary analyses certain tentative conclusions are possible regarding the nature of Feature 109A, its archaeological context and its significance to an understanding of the archaeological pattern of the island.

On the basis of presently available information, Feature 109A evidently was occupied during a major expansion of population into and greatly increased utilization of the inland zone of Kaho'olawe. This expansion appears to have begun around A.D. 1400 and the large scale use of interior sections appears to have been curtailed by around mid 17th century (Hommon ms., Statement of Significance, pp. 22-23). As noted previously, the occupation of Feature 109A neatly brackets this time period. The most thoroughly dated square (N1E2) yielded both the earliest and latest date ranges, as well as, 19 dates distributed between them. Neither these nor other data are sufficient to suggest differential use of various sections of the feature through time.

The degree of residential permanence in habitation sites is a major question in Hawaiian archaeology. This is a vital research topic first because of the apparent discrepancy between the high socioeconomic development on the one hand and, on the other, the settlement pattern, which seems to consist largely of small, insubstantial, and apparently temporary habitation structures.

An accurate assessment of the degree of ancient residential permanence is essential to an understanding of a wide variety of variables such as economic productivity, population density, and social ranking.

The present appearance of Feature 109A, together with evidence of utilization over a span of at least 200 years provide data for consideration of residential permanence on ancient Kaho'olawe. Feature 109A, like nearly all other inland Kaho'olawe features, appears to be the remnant of a campsite or series of campsites, since it is relatively small and contains relatively little cultural material (considering the 2 century span) and includes no evidence of stone structures. If no chronological information were available, two or three relatively short term uses of the feature during a few decades would explain the distribution of archaeological contents in the feature. However, the overall span of the basaltic glass chronological data, as well as, the distribution of sample ranges throughout this overall span indicate numerous occupations of the site separated from each other by a considerable period of time. If the hypothesis of intermittent use is accurate, then it is apparent that the dated samples would represent at least six distinct occupations of the feature. This minimum figure is arrived at by determining the smallest number of year dates that would include some part of the ranges of all dated samples. These year dates and the number of samples each may be represented by are as follows (See Fig. 1):

R.J.H.
Dec. 19, 1979
12 of 14
D-2

- I. A.D. 1422: sample numbers 1-5,7 (5 or 6 samples)
- II. A.D. 1448: sample numbers 5,6-11 (6 or 7 samples)
- III. A.D. 1500: sample numbers 12-19 (7 or 8 samples)
- IV. A.D. 1539: sample numbers 19-31 (12 or 13 samples)
- V. A.D. 1591: sample numbers 32-42, 46,50 (11 or 12 or 13 samples)
- VI. A.D. 1625: sample numbers 39, 43-56 (12 or 13 or 14 samples)

It is apparent that Feature 109A was occupied by individuals or small groups of individuals at intervals ranging up to as long as 52 years. The postulated six occupations listed above are separated by an average of 40.6 years.

Today, the feature and its environment offer little evidence that would explain its repeated re-use. No evidence of stone structures, other than probable fireplaces, were found. The feature appears never to have been situated on a prominent physiographic point. It is unlikely that a source of fresh water was nearby. The slight rise in the hardpan to the north probably is the remnant of a similar rise when the postulated soil mantle was intact in the 15th and 16th centuries. This rise may have afforded some protection from the trade wind. It might be speculated that trees or brush provided more protection, yet there seems no reason why such vegetation would grow here and not in the surrounding area.

On the basis of presently available concrete evidence, it is suggested that a reason for the repeated use of Feature 109A was the presence of raw materials for the various activities that took place there. For example, unworked basalt stones, used for

lining and filling fireplaces and imu (underground ovens) occur rarely today on the hardpan except in archaeological features. It would be more convenient to re-use the stones at 109A than to carry stones from Kaneloa Gulch, the nearest source of naturally occurring stones. In a similar way, cores and flakes of basalt and basaltic glass at 109A left by earlier uses of 109A may have been worked and utilized by later inhabitants of the feature

The following activities are evidenced at Feature 109A:

- 1) the construction of fireplaces and/or imu;
- 2) the consumption of the meat of marine molluscs;
- 3) the working of basaltic glass; and
- 4) the working of basalt.

Most of the pieces of unworked basalt, both vesicular and non-vesicular, are angular, rather than rounded by erosion. Evidence from a number of Kaho'olawe features demonstrate that the angular fractures were caused by exposure to heat in fireplaces and imu. The 109A fireplaces probably served for cooking and the production of light and heat. If imu were present, they were used in baking.

Neither the basaltic glass nor the basalt samples have yet been analyzed for evidence of use, but it is probable that at least some of the flakes of both materials were used as implements at 109A. The presence of two basalt adz preforms from 109A suggest that part of the adz-manufacturing process may have taken place here. These adz preforms were probably carried from one of the

R.J.H.
Dec. 19, 1979
14 of 14
D-2

adz quarries in the vicinity of Moaula, 1.3 to 2 miles northwest of 109A.

It is of interest to note that 462 or about 74% of the basaltic glass items were identified in the field as cores rather than flakes. These data suggest that relatively few of the cores were worked at Feature 109A, or that the majority of the flakes that were produced at 109A were carried elsewhere for use. It is also possible that more flakes than cores have been transported away from the site by overland sheetwash. In this regard, it should be noted that 70% of the cores occur in the northern squares of the feature, while only 43% of the flakes occur in the same squares.

A major hypothesis of the research design of the Kaho'olawe survey is that the complex and extensive inland settlement pattern was based on the agricultural use of this area. Sweet potato is postulated as the staple crop, and land is believed to have been prepared by slash and burn techniques (Hommon ms. [1978] Statement of Significance, pp. 22-23, 31-32, ff.). While a variety of activities are demonstrated or strongly indicated by the materials from Feature 109A, no direct evidence for agricultural activities is available at 109A.

References

- Hommon, Robert J., ms. "Historic Resources of Kaho'olawe (Partial Inventory: Prehistoric Sites and Historic Properties)", National Register of Historic Places Inventory-Nomination Form, [1978].
- Morgenstein, Maurice and Thomas J. Riley, "1974 Hydration-Rind Dating of Basaltic Glass: A New Method for Archaeological Chronologies." Asian Perspectives, Vol. XVII, Number 2.