

B. P. Bishop Museum, Honolulu.  
Weisler, M. and P. V. Kirch, 1982. The archaeological resources of Kawela, Molokai: their nature, significance and management. Ms. on file, Anthropology Dept., B. P. Bishop Museum, Honolulu.

## KAHO'OLAWE ARCHAEOLOGY: AN OVERVIEW

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### INTRODUCTION

Since the outbreak of war in 1941, the Island of Kaho'olawe has been under the jurisdiction of the United States Navy and has been used for target practice and troop training exercises. Between January of 1976 and May of 1980 a series of initially reconnaissance and subsequently intensive surveys were carried out (see Hommon 1980). It was not the intention of the project to conduct intensive archaeological research, but rather to fulfill the Navy's responsibility under federal laws to identify, evaluate and enhance the preservation of the island's archaeological resources. The entire island was surveyed and 549 sites, comprising over 2,000 individual features, were recorded. This is the first time that a virtually complete record of the extant archaeological resources of an entire Hawaiian island is available. Kaho'olawe is also one of the few main Hawaiian islands that has not been subjected to intensive urban and agricultural pressures, and therefore there is more complete preservation of archaeological remains. Not even the use of the island as a bombing target has seriously threatened the integrity of the archaeological record.

Kaho'olawe is the smallest of the main Hawaiian islands, with an area of approximately 116 sq. km (Figure 1). It measures about 17.7 km from east to west, 10.4 km from north to south at the east end, and 5.6 km north to south at the west end. The highest point is Lua Makika (449 m), an extinct volcanic crater on the eastern end of the island. From this point the ground slopes gradually towards the west and southwest and a bit more sharply to the north and east. About half of the east coast and most of the south coast are marked by cliffs varying between 75 and 250 m in height. This steep coastline is indented by the three large bays of Waikahalulu, Kamohio and Kanapou. The remainder of the coastline averages between 6 and 20 m above sea level, and on the north is marked by steep-sided valleys with sand beaches at their mouths.

Most of the precipitation of the tradewinds is prevented from reaching Kaho'olawe by the high land mass of Maui Island. Consequently, Kaho'olawe is the driest of the main islands, with annual precipitation

ranging between 25 cm at the west coast and 65 cm at the summit. Vegetation, which consists primarily of alagaroba (*Prosopis pallida*) trees and grasses, is densest at the coast and on the sides and bottoms of gulches. That part of the island above the 230 m contour is virtually devoid of vegetation, having been eroded to hardpan. In many places as much as 3 m of soil has been removed and heavy sedimentation has occurred on valley floors, especially at their mouths where geological sections are quite complex because of the interfingering and natural reworking of marine, alluvial, and aeolian deposits.

Erosion represents the most serious hazard to the archaeological record and many sites have undoubtedly been completely destroyed by gulying in the eastern and central portions of the island. Ironically, the hundreds of inland features would never have been discovered were it not for the extensive removal of soil cover.

The first scientific attempt to deal with the archaeological remains of Kaho'olawe was that of Bishop Museum ethnologist J. F. G. Stokes in 1913. He noted a number of sites and excavated a shrine at Kamohio Bay on the south coast. Stokes's work provided a basis for the studies of McAllister (1933) who conducted a field survey and recorded 50 sites. His emphasis, however, was on the larger and, as was thought at the time, more important archaeological sites such as temples, shrines, and large settlements.

#### KAHO'OLAWA SITES

A wide range of archaeological feature types has been recorded. Midden deposits, midden scatters, and activity areas are subjective terms that reflect different stages in the deterioration of *in situ* midden materials. Midden deposits are features in which the certain presence of sub-surface materials has been demonstrated, and midden scatters consist of midden materials and artifacts on the surface for which there is no definite evidence of the presence or absence of sub-surface materials. Midden deposits and scatters are found in virtually all geographic situations on the island. The term "activity area" is a general category, and designates those features which have been extensively eroded from their original context. These are usually marked by the presence of firecracked rock on the hardpan of the island's interior. They are often associated with remnant hummocks containing *in situ* deposits, but to

refer to the entire feature as a midden deposit would falsely imply that much of the feature is intact. The most common artifacts found, next to the firecracked rock, are flakes of basalt and volcanic glass.

Many types of habitation structures have been found, including terraces, platforms, shelters, and enclosures. The overwhelming majority of these are found in close proximity to marine resources. Midden remains and artifacts, most frequently basalt flakes, are generally found in association, and formal stone-lined firepits are not uncommon.

Two major categories of religious sites have been identified, primarily on the presence of quantities of coral, which had a sacred significance to the Hawaiians. Indeed, the Hawaiian word for a fishing shrine, *ko'a* is also the word for coral (Pukui and Elbert 1971:144). *Heiau* are large internally complex structures that functioned as temples. Only two structures have been identified as *heiau*, and both are located at the ceremonial center at Hakioawa Bay. Shrines most often consist of small platforms, enclosures or cairns upon which are found quantities of coral fragments. Often present are somewhat elongated waterworn basalt cobbles up to 80 cm in length, which when in an upright position functioned as representations or symbols of the deity to which offerings were made. They are found immediately adjacent to the coast as well as inland, and detailed analysis will undoubtedly lead to a refined classification into such categories as fishing shrines, agricultural shrines, men's houses, and so on.

Several sites have been identified as quarries from which lithic materials for the production of artifacts were extracted. Four adz quarries were found along an exposure of a fine-grained basalt dike trending northwest from Pu'u Moiwī, and are characterized by extensive surface scatters of adz blanks and basalt flakes. Volcanic glass quarries are situated near exposures of dikes containing this material, and are characterized by extensive scatters of volcanic glass flakes and cores. In one instance a volcanic glass quarry is situated inside a cave and might more properly be referred to as a mine.

Petroglyphs are uncommon and are found primarily at coastal settlements, but one petroglyph cluster has been found on the slope of Lua Makika west of Kanapou Bay. Caves and rockshelters are also

relatively rare.

Two major soil horizons have been identified in association with archaeological sites, the Kaho'olawe and the Ahupu. The earlier Kaho'olawe Soil is ideally a well-developed B horizon chemically derived from bedrock. The Ahupu Soil is an aeolian formation which is still being deposited. The Ahupu Soil is extensive but not completely coterminous with the Kaho'olawe Soil, the latter often being found at the surface with no evidence of the Ahupu in superposition. The contact between the two soils is frequently marked by a distinctive layer of burned grasses and ash up to two cm thick.

#### A TENTATIVE CHRONOLOGY

The following necessarily brief overview of the data concerning the diachronic prehistoric settlement pattern is intended as a model or working hypothesis for future research, rather than a definitive description of the prehistoric cultural sequence, and as with all preliminary studies is subject to limitations. Firstly, because the survey was completed only three months prior to the writing of this paper, the data have not been analysed in detail. Secondly, most of the volcanic glass dates for coastal sites were obtained from the surface and thus almost certainly do not represent the first dates of occupation. Thirdly, although dates have been obtained for a considerable number of features, the number of undated features is quite large. Finally, if two separate dates were obtained for a single feature it was assumed that the feature was continuously occupied during the period between the dates, which may not in fact have been the case. (Editor's note: for a listing of all of the volcanic glass dates utilized by Barrera, and an alternative interpretation of the Kaho'olawe sequence, see Hommon 1980.)

Tenth to Twelfth Centuries (Fig. 2) - The earliest Kaho'olawe dates are from Site 197, located at the top of the steep cliffs between Kamohio and Waikahalulu Bays. It is an occupation locality consisting of a number of areas sheltered by boulders and bedrock outcrops, plus a possible shrine and a crude paved area. The dates indicate that one feature was occupied during the late tenth century and that at least two features were occupied during the eleventh century. The next earliest dates, which span the second through the fourth quarters of the twelfth century, come from Site 241, a complex of

seven rockshelters and a cave located on Kaneloa Gulch at the top of the cliff. The apparent temporal gap between these two sites probably does not represent a hiatus in occupation of the island, as the ranges of the individual volcanic glass dates allow for an interpretation of continuous occupation.

These two sites are ideally situated for exploitation of the marine resources of the open ocean, for the bays of Waikahalulu and Kamohio are protected from most of the strong ocean swells and at the same time are deep enough to support many deep sea fish species.

The first evidence for occupation of coastal sites situated so as to allow exploitation of reef resources comes from the end of the twelfth century. Site 128 B, a midden deposit located at a small bay on the north coast, produced a date of A.D. 1170  $\pm$  28 for a surface sample, suggesting that initial occupation of the site was earlier. Site 139 C, an extensive midden deposit located in a sand dune near the ocean at the western tip of the island, produced a date of A.D. 1182  $\pm$  25 from a depth of 60 cm below the surface.

Thirteenth Century (Fig. 3) - A significant increase in the number of sites occupied occurred during the thirteenth century. At the beginning of the century, only four features were occupied. This is followed in the second quarter by seven occupied features, six of which are strictly coastal and the last of which is located at the top of a 130 m high cliff overlooking the head of Waikahalulu Bay. Site types include habitation terraces, midden deposits, and a habitation cave. Nine features were being occupied during the third quarter of the century, and the presence of sites evenly spread along virtually the entire north coast is an indication of increasing exploitation of shallow marine resources, foreshadowing the significant increase in sites which was to occur later. During the last quarter of the century twelve features were being used. An increased demand on the resources of the south coast seems to have occurred, as evidenced by the presence of five features at the top of the cliff overlooking Kamohio Bay. Occupation is still relatively sparse and intermittent along the north coast.

Fourteenth Century (Fig. 4) - Population apparently increased significantly during the first quarter of the century with the occupation of twenty-seven separate features, including the initial

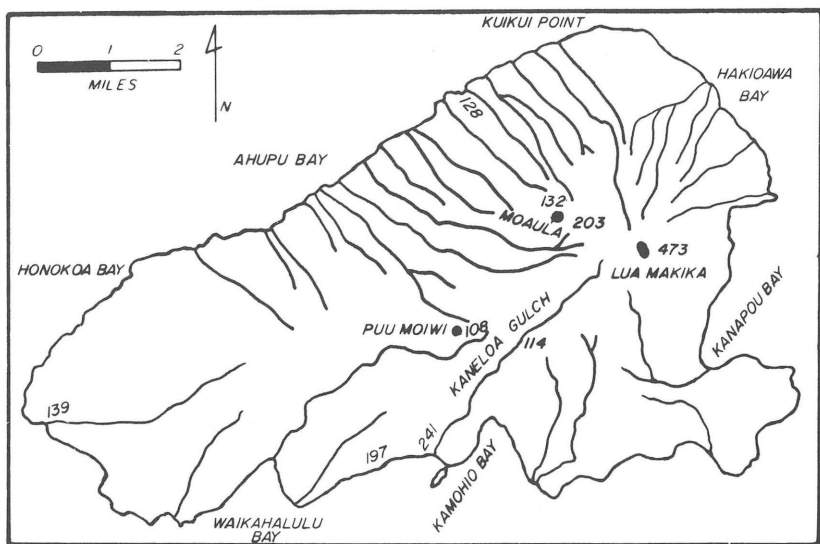


Fig. 1. MAP OF KAHO'OLAWA, SHOWING LOCATIONS OF PLACES AND SITES MENTIONED IN TEXT.

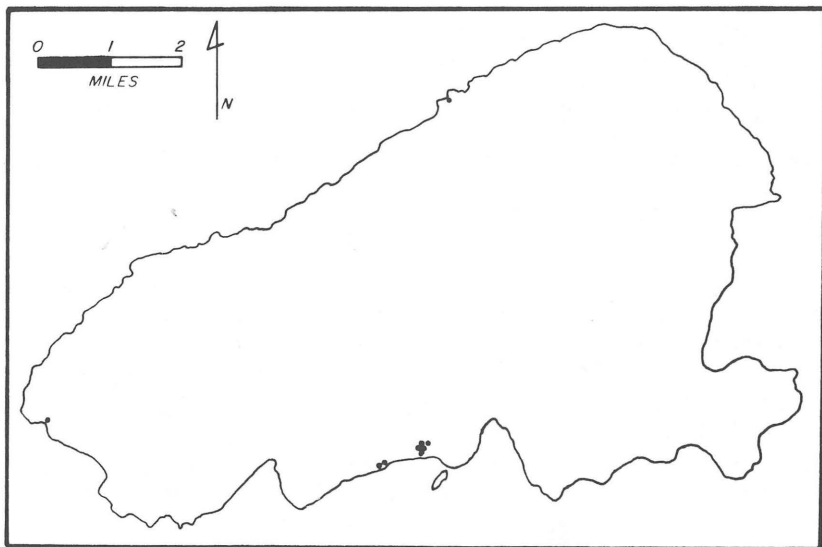


Fig. 2. LOCATIONS OF FEATURES OCCUPIED DURING THE TENTH, ELEVENTH, AND TWELFTH CENTURIES.

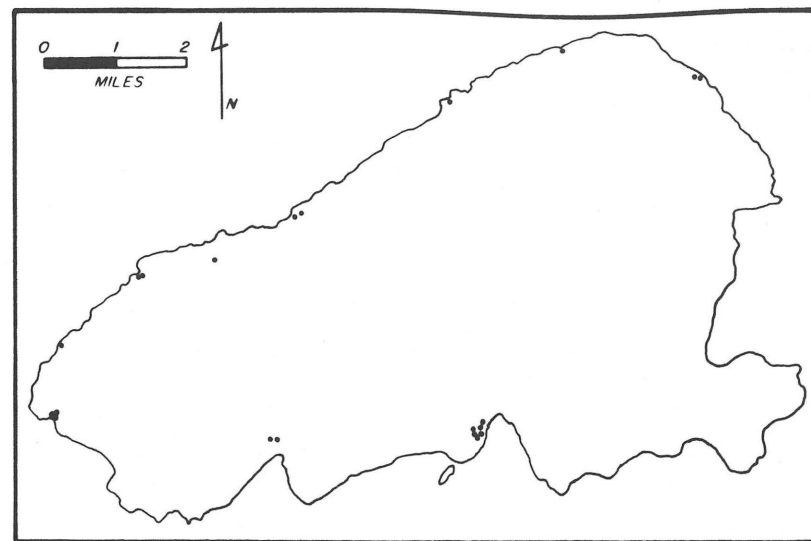


Fig. 3. LOCATIONS OF FEATURES OCCUPIED DURING THE THIRTEENTH CENTURY.

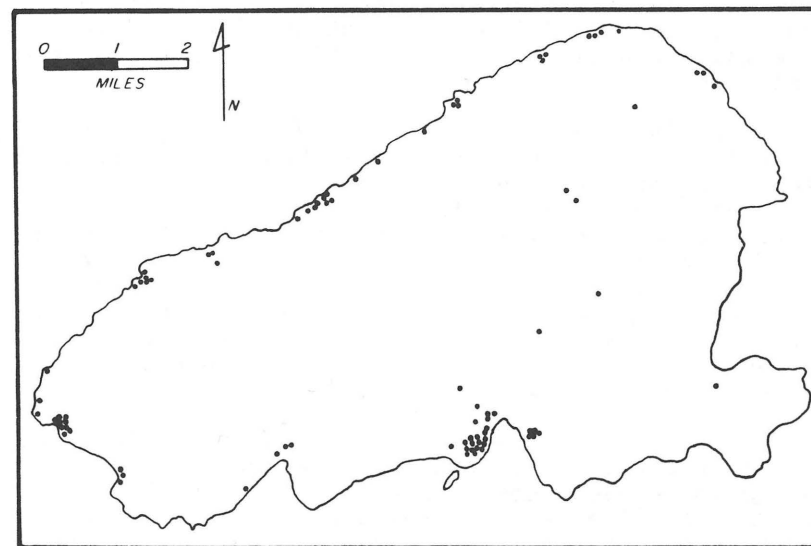


Fig. 4. LOCATIONS OF FEATURES OCCUPIED DURING THE FOURTEENTH CENTURY.

utilization of two features at a volcanic glass quarry and workshop at Honokoa Bay. Population appears to have still been fairly evenly scattered along the north, west, and east coasts, although a tendency towards higher density is apparent on the west and northwest coast and at the top of the cliff above Kamohio Bay. The first indication of the exploitation of the island's interior is evidenced by the occupation of Site 203 on the northeast slope of Moaula at an elevation of approximately 360 m. This site is a large activity area measuring 70 by 120 m and probably represents an aggregation of temporary habitation areas associated with agricultural exploitation of the immediate vicinity. During the second quarter the geographic distribution of features remains virtually unchanged, but the number increases to forty. There are major concentrations of occupied features at the west end of the island and above Kamohio Bay on the south coast. An additional inland feature (Site 114, a midden deposit on Kaneloa Gulch at an elevation of about 340 m) was being used. The third quarter continues the pattern of population concentration on the west coast and in the vicinity of Kamohio Bay. The latter group diminished considerably and was now present in two smaller concentrations, one on either side of the bay. Scattered settlements were still present along the north coast. Inland utilization continued with Site 132, an activity area, becoming occupied for the first time.

The last quarter of the century continued the pattern of a relatively even distribution of sites along the north and west coasts. The number of features occupied along the south coast remained about the same but was more evenly distributed, with the density beginning to shift toward the head of Waikahalulu Bay. The first occupation of a cliff-top site above Kanapou Bay on the east end of the island also occurred at this time. Four occupied features in the interior of the island signal a continued interest in that area.

Fifteenth Century (Fig. 5) - A dramatic increase in the number of sites occupied, two significant shifts in the settlement pattern, the initial utilization of an adz quarry, and the first dated occurrence of the Ahupu Soil all occurred during this period.

The number of features in the interior increased sharply through the century, and the pattern on the north coast demonstrates both an increase in the

number of features occupied and a shift from a more or less dispersed population to concentrations in the vicinities of Ahupu, Honokoa, and Hakioawa Bays, and near Kuikui Point. The number of sites for marine exploitation on the south coast decreased sharply, with the major concentration now at Waikahalulu Bay.

It is significant that the first occurrence of the Ahupu Soil appeared at the same time as the first intensive utilization of the island's interior. Its presence indicates erosion of the Kaho'olawe Soil, most likely a result of intensified swidden agriculture, and presages the disastrous effects of later erosion on the entire terrestrial ecosystem. The abandonment of sites in the vicinity of Kamohio Bay at this same time can probably be attributed to the effects of this erosion, because the gulches down which eroded materials would have been carried to the south empty into the ocean on both sides of the bay. The addition of large quantities of suspended sediments to the inshore marine environment must have had a deleterious effect on the quality of fishing there.

Site 108, an adz quarry situated on Pu'u Moiwī, was first utilized during the first quarter of the century. Its utilization is probably associated with the expansion of agricultural sites and the concomitant need for forest clearing and other agricultural activities using stone adzes.

Sixteenth Century (Fig. 6) - The demographic pattern shows a steady increase in the number of occupied features in the vicinity of Hakioawa Bay, at the expense of a gradual diminution of the number of features at Honokoa and Ahupu Bays. This is probably also attributable to the effects of erosion, in this case a result of fouling of the coral reefs along the north shore by sediments from the degraded swidden areas. By the end of the century the major population concentration had shifted to the vicinity of Hakioawa, while the exploitation of the continually diminishing inland agricultural areas in the vicinity of Moaula and Lua Makika continued.

It is apparently during the early part of this century that the foundation for Hakioawa as the religious and political center for the island was laid, with the initial utilization of one of the large religious structures. Data relevant to the religious and political state of affairs at this time also came from Site 473, a shrine on the slopes of Lua Makika at which was found evidence of either an



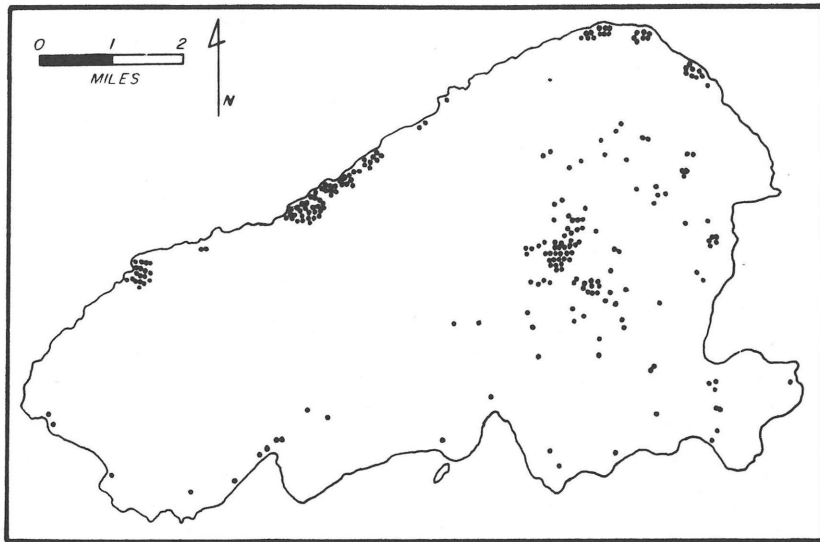


Fig. 5. LOCATIONS OF FEATURES OCCUPIED DURING THE FIFTEENTH CENTURY.

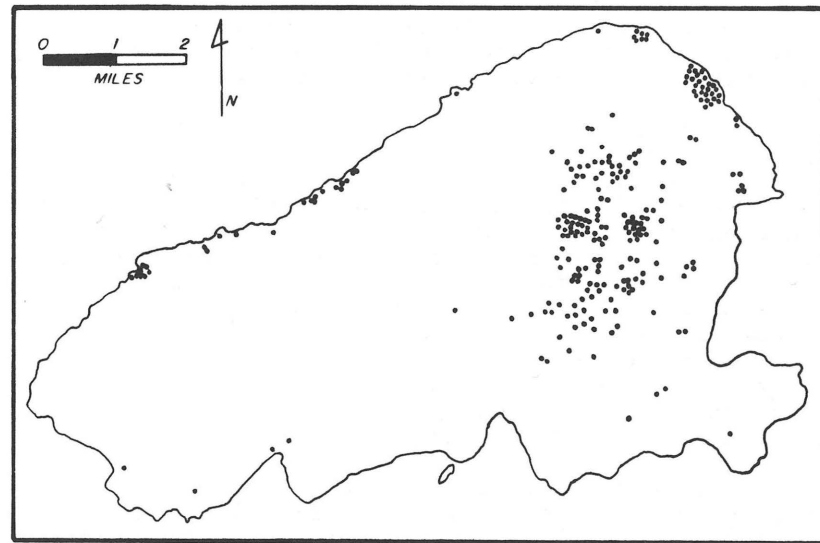


Fig. 6. LOCATIONS OF FEATURES OCCUPIED DURING THE SIXTEENTH CENTURY.

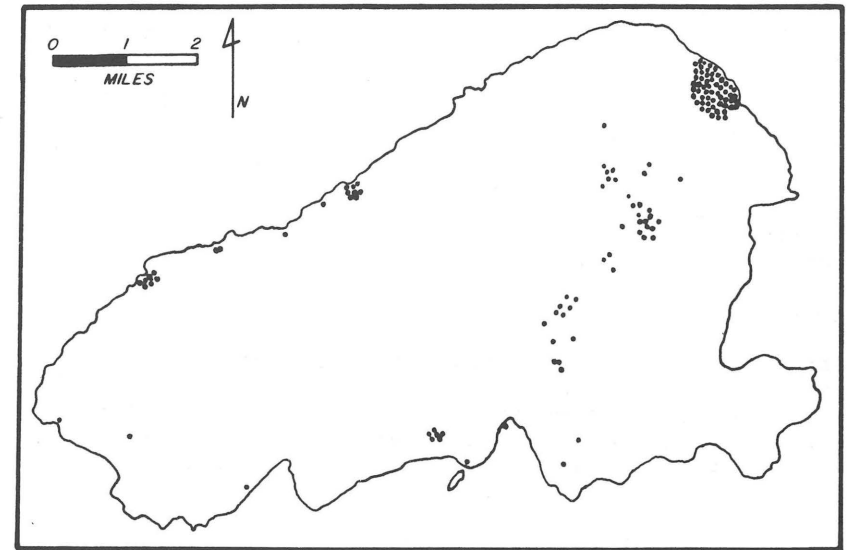


Fig. 7. LOCATIONS OF FEATURES OCCUPIED DURING THE SEVENTEENTH CENTURY.

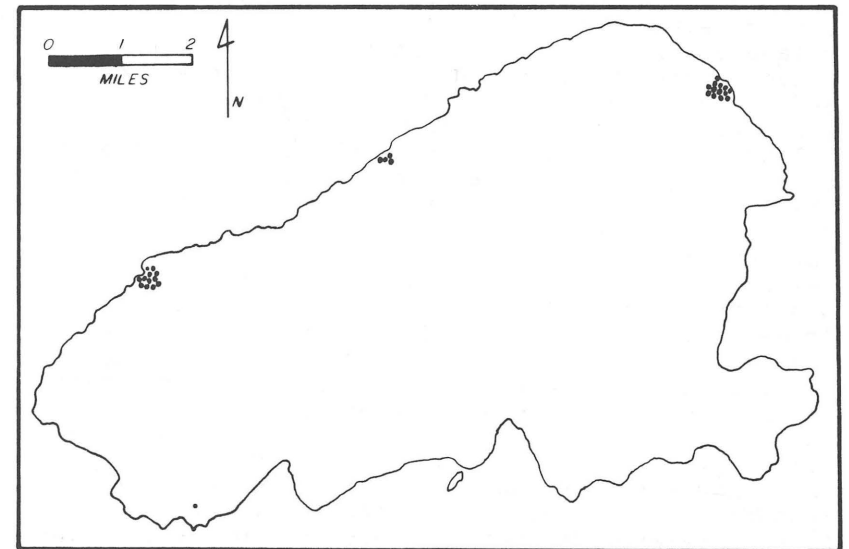


Fig. 8. LOCATIONS OF FEATURES OCCUPIED DURING THE EIGHTEENTH CENTURY.

execution or a human sacrifice (Barrera and Batista n.d.).

Seventeenth and Eighteenth Centuries (Fig. 7, 8) - The trend toward concentration of population at Hakioawa continued through the seventeenth century, while occupation along the remainder of the coastline was sparse and continued to diminish. A dramatic shift in the inland demographic pattern also occurred, with fewer interior sites being used. The first quarter of the eighteenth century witnessed the apparent abandonment of the island's interior, and the continuation of concentrations of population at Honokoa and Hakioawa Bays. The formerly extensive exploitation of the marine resources along the north coast had contracted to such an extent that 65% of the sites on the island were at Hakioawa and 25% were at Honokoa. Population at Hakioawa dropped drastically by the second quarter of the eighteenth century, with only one feature still being occupied. Continued coastal utilization is evident at Honokoa Bay and near Ahupu Bay throughout the remainder of the prehistoric period.

#### CONCLUSION

The major concern of research on Kaho'olawe should be the relationships between palaeo-environment, human interference with that palaeo-environment through agricultural practices, and the degradation of both the marine and terrestrial ecosystems. When first inhabited the island was doubtless covered with extensive forests, on which man's activities had little effect because the primary subsistence strategy involved a concentration on marine resources. With the introduction and subsequent intensification of swiddening practices, grasses increasingly became the dominant vegetation in the higher elevations. Occasional fires, intentionally set or otherwise, removed this vegetation cover and exposed large areas to erosion, leading to the formation and deposition of the Ahupu Soil above the Kaho'olawe Soil, with the burned grass layer in between. This erosion had an almost immediate effect on the ability of the inhabitants to exploit both marine and terrestrial resources, the reaction to which was two-fold. First, an adaptive strategy developed which involved the continual shifting of subsistence activities to previously unaffected areas, the net result of which was an intensification of the erosion of the remaining resource base. Secondly, the presence of the large Hakioawa religious site and the human

sacrifice/execution at Site 473 during the early sixteenth century are hypothesized to be indications of a spiritual reaction to the degradation of the island ecosystem. It is suggested that the dates for these features indicate the point at which the inhabitants first recognized the seriousness of the destruction of the island's resource base, and turned to divine (and, not incidentally, political) intervention in the face of a problem that was beyond the means of their technology to control.

There is no evidence that individual ahupua'a, land units stretching from the ocean to the mountains on which an extended family had the rights to a wide range of natural resources, ever developed on Kaho'olawe. Indeed, the evidence supports the conclusion that the residents of the island behaved opportunistically when exploiting the island's interior, rather than having been under the influence of any concept of land tenure. Thus the entire island appears to have been treated as an ahupua'a, probably as a result of its small size: by the time the concept developed on the other islands, there were very few resources to divide up. At the time of the arrival of Capt. James Cook, which marks the end of the prehistoric period in Hawaii, the island was described thusly:

It has no wood on it, seems a sandy poor soil, and is altogether a poor Island... (Beaglehole 1967:609).

#### REFERENCES CITED

- Barrera, W. M. Jr., and C. Batista, n.d. Excavation of a human burial at site 473, Kaho'olawe Island. (in preparation).
- Beaglehole, J. C., ed., 1967. The journals of Captain James Cook on his voyages of discovery. Hakluyt Society. Glasgow.
- Hommon, R. J., 1980. Multiple resources nomination form, Kaho'olawe Island. National Register of Historic Places, Washington, D.C.
- McAllister, J. G., 1933. Archaeology of Kaho'olawe. B. P. Bishop Museum Bulletin 115, Honolulu.
- Pukui, M. K. and S. H. Elbert, 1971. Hawaiian dictionary. University Press of Hawaii, Honolulu.