SITE STABILIZATION PLAN FOR
SITE NUMBER (SIHP):50-20-97-110 FEATURE BU ON KAHOʻOLAWE, HAWAIʻI
KAHOʻOLAWE ISLAND RESERVE

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June 2013
FINAL

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INTRODUCTION

The Hawai‘i State Legislature created the Kaho‘olawe Island Reserve Commission (KIRC) to manage the Kaho‘olawe Island Reserve while it is held in trust for a future Native Hawaiian sovereign entity, has actively worked todocument and preserve sites there with the help of volunteers and its stewardship organization, The Protect Kaho‘olawe ‘Ohana (PKO). Over the past decadethe KIRC and the PKO have become integral toan intensified preservation effort.

Preservation may refer to a broad range of activities, from passive preservation, or conservation, restoration, and interpretation. The KIRC has alwaysexercised a cautious, conservation-minded approach that has enhancedthe preservation efforts of the cultural resources on Kaho‘olawe.

Feature BU of SITE 50-20-97-110 Feature BU is a previously recorded (Lee and Stasack 1993) petroglyph site located on the top surface of a large flat boulder and a smaller boulder. The previous study documented 12 petroglyph figures and four lines on the face of the large boulder (Panel 1) and a single stick anthropomorphic figure on a smaller boulder to the south (Panel 2). Not all of these petroglyphs were found during the current study. Three pecked petroglyphs of Panel 1 were located on the top surface of a large flat boulder. The boulder on which the petroglyphs are found is approximately 3.5 meters in diameter and one of a cluster of boulders. The small Panel 2 boulder was not found. While it appears that the large boulder is the only one in the cluster with petroglyphs, grass growing in the area may be obscuring others. This petroglyph feature is located at the edge of a gully, approximately 40 meters northeast of the center of Feature AP of SITE 50-20-97-110 Feature BU.

In general, the environmental conditions of the immediate area surrounding the site are in an advanced state of erosion. SITE 50-20-97-110 Feature BU is especiallyvulnerable to an earthquake and has already been eroded to an unknown extent. Inaddition to this large stone (Feature BU), features anddeposits currently around the area are at risk. Because SITE 50-20-97-110 Feature BU is nestled at the top of an eroded gulch which collects water from three different sources. Another source ofimpact is rock fall. Boulders tumbling down from Moa‘ula Nui might cause substantialdamage to sites on and near the Kāneloa Gulch. For these reasons, this plan proposes immediate stabilization methods for the Feature BU of Site 50-20-97-110[1] to satisfy the interim preservation recommendation put forward in the cultural plan.

“Preserve and stabilize Kāneloa (Site 50-20-97-110 Feature BU) in place until such time accurate placement can be calculated.” (Kanaka'ole Kanahele)

[1] SIHP Site numbers for Kaho`olawe: 50-20-97-778; 50 indicates the State of Hawai`i; 20 indicates Island of Kaho`olawe; 97 indicates a unique USGS topographic map; and 110 is a unique number assigned to an individual site.

Stabilization involves treatments such as creating some stone, wooden, and other natural structures and ensuring that the surrounding groundsurface is not eroding or otherwise subject to degradation.

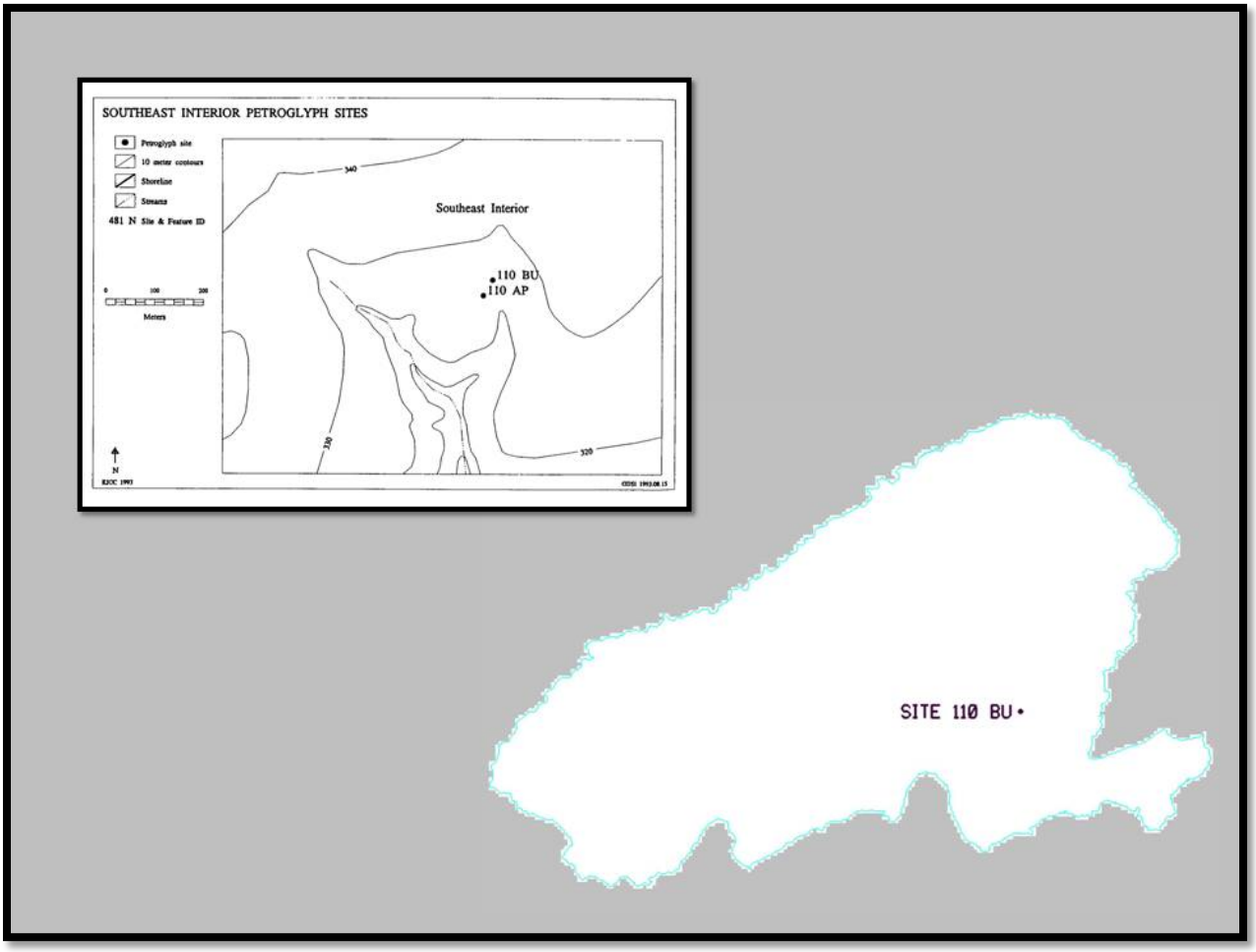

Figure 1 Site Location of 110 BU

SITE NUMBER (SIHP): 50-20-97-110
FEATURE: BU
STATUS: Previously Recorded
SETTING: Inland
PROBABLE AGE: Prehistoric
SITE TYPE: Petroglyph
SITE FUNCTION: Rock Art
MATERIAL CHARACTERISTICS: None

FIELD NO.: 75262730-1
GMU: 75262730
WORK AREA: Kanapou
CULTURAL MATERIAL QUANTITY: NA
CULTURAL MATERIAL DENSITY: NA
SITE DIMENSIONS: 3.1 (L) x 1.7 m (W)
SITE AREA: Approx. 5.27 sq m

SITE 50-20-97-110 FEATURE BU

The 1976-1980 survey of Kaho`olawe was the first systematic survey of an entire major Hawaiian island. Following the work, the entire island was placed on the National Register of Historic Places. In the period between 1980 and 1985, many specialized archaeological studies were completed. These include data recovery of eroded sites (Hommon 1981, Hommon 1982, and Rosendahl *et al*. 1987), studies of the Pu'umoiwi adz quarry (McCoy *et al*. 1993), studies of petroglyphs (Lee and Stasack 1993, Stasack *et al*. 1994), and a study of the Kuheia Bay ranch site (Tomonari-Tuggle and Carter 1984). Additionally, a number of historic preservation management studies were completed (Ahlo and Hommon l982, Yent 1983, Graves and Abad 1993, and Ogden Environmental and Energy Services Company Inc. , 1995).

Lee and Stasack, Petroglyph Study (1993)

In this report, SITE 50-20-97-110 Feature BU was determined a petroglyph site located on the southwestern slope of Pu'uMoa'ulanui on the road to Kanapou. At that time, the traditional name was not known, so Rubellite Johnson gifted the area the name, Loa'a, which was translated as "find, discover."[i] SITE 50-20-97-110 Feature BU includes features AP and BU. Feature 110-AP consists of a large cluster of bedrock boulders, which contains 91 petroglyphs.

Feature 110-BU is located 25 meters to the northeast of Feature 110-AP. This site was documented as a single large boulder whose flat upper surface is covered with carvings BU-1, and a smaller stone nearby that contains a single anthropomorphic feature BU-2.

"SITE 50-20-97-110 Feature BU -BU-1 was recorded as a large horizontally orientated boulder that included 12 petroglyphs, four lines, and a row of 32 cupules around its perimeter. The pōhaku rests on a natural pedestal, and Lee and Stasack noted that the boulder resonated with a bell-like peal when tapped with a stone.

SITE 50-20-97-110 Feature BU -BU-2 was first recorded by Lee and Stasack in 1993. Since then, no one else has recorded that site. According to Lee and Stasack, feature BU-2 is a smaller pōhaku located a few meters south of feature BU-1. This pōhaku has a single ki'ipōhaku which they describe as a stick figure anthropomorph with both arms raised, three fingers on each hand, a phallus, and shelf like feet." (Lee and Stasack)

In Lee and Stasack's discussion of the Loa'a site, it was noted that this area of petroglyphs might possibly be the oldest on the island. Pōkāneloa in particular is extremely unique. At the time of the study, the authors had not observed any other boulder in Hawai'i with such a large grouping of cupules. Additionally, they discussed the uniqueness of Pōkāneloa: Because of the proliferation of cupules on the Loa'a stone, the imaginative and well-designed figures, and the bell-like qualities when struck, this site stands apart from the other rock art sites on Kaho'olawe.

"The cupules by themselves represent a unique grouping in Hawai'i. We know of no other single boulder with such a large and ordered grouping of cupules.

At sunrise and sunset during the spring months, a stick held vertically at either end of the lines casts a shadow which generally follows the line. Likewise, a stick held vertically in a few of the cupules does the same. This may be fortuitous since the majority of the cupules are on the south perimeter of the boulder.

Many of the cupules could be used as containers; we were present after a shower and nearly half of them held water. The fact that many did not, may rule out their use as a reflector of sun, moon, or stars. Some could have been used as containers for a piko, a well-established practice at Pu'uloa on the Big Island. It is unlikely, however, that this was their function. [ii]

The fact remains that it took great effort to create these cupules. One is 3.5cm deep and nearly 15cm in diameter. Pecking and abrading a concavity in basalt is a very long and tedious process, and would require serious motivation. These cupules are refined to a fair degree of smoothness to the touch by some sort of abrasion; the cupule maker attached some importance to smoothing the surfaces. Another possibility is that they were created by abrasion and the smoothness is a by-product of the process. Usually pecking in combination with abrasion is the most efficient method.

Finally, there is the unlikely possibility that these cupules were the result of striking it to make the bell sound. We found that it did produce sounds of slightly different pitch when struck at different points along its perimeter". (Lee and Stasack)

SITE 50-20-97-110 Feature BU -BU, ki'ipōhaku located on Pōkāneloa, view to the west.
Throughout the report, Lee and Stasack made recommendations regarding the future management and preservation of SITE 50-20-97-110 Feature BU -BU. During the study, the authors noted that both of the pōhaku (110-BU-1, 110-BU-2) were resting on the edge of an eroded gully and were in imminent danger of collapsing into the gully. Lee and Stasack also believed that the site could have once contained additional petroglyph boulders that have already been lost.

Because of the unique nature of Pōkāneloa, Lee and Stasack recommended immediate preservation measures to protect this special cultural resource because at this time it was already located "precariously on a pedestal on the edge of a fast-eroding gulch, and in danger of falling."

They cautioned, in fact, that the pōhaku might have already shifted dangerously closer to the edge of the gulch. Lee and Stasack recommended immediate action to stabilize the site and prevent an unwanted collapse. Another recommendation included the need for additional information regarding the unique "bell-like" qualities of the pōhaku. The authors also thought it might be best not to publicize these features because of other cases of destruction done to the bell-stones on Kaua'i.

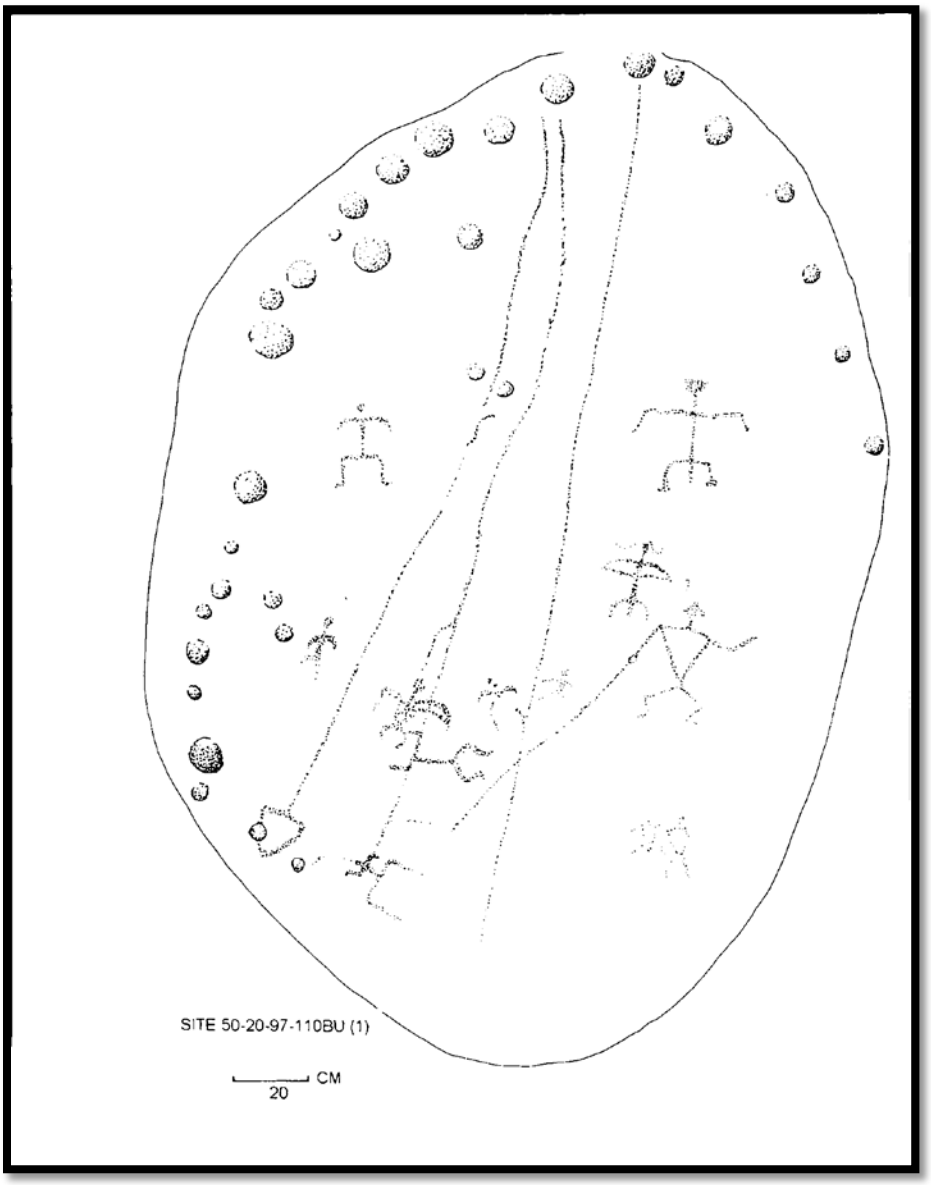

Figure 2 The Loa'a Stone and its cupules

Rubellite Kawena Johnson, Astro-Archaeology Report (1993)

Rubellite Kawena Johnson was on the faculty of the University of Hawaii, where she helped establish its Hawaiian studies program. She then became Professor Emeritus of Hawaiian Language and Literature and continued to publish. She researched the history of theKumulipo, a sacred chant of Hawaiian mythology, and early newspapers in the Hawaiian language.Johnson was named one of the Living Treasures of Hawai'i in 1983 by the HonpaHongwanji Mission of Hawai'i. She was selected as an advisory committee to the United States Commission on Civil Rights for Hawaiian sovereignty issues.

"A boulder found at the Kanapou Road Access, SITE 50-20-97-110 Feature BU Feature BU (hereafter called Loa'a, meaning "found" in Hawaiian, a name for the site agreed upon by the participating group) not previously reported or recorded may have an archaeo-astronomic function. It merits further investigation. The boulder is a large, flat slab set, it appears naturally, upon another boulder, basically horizontal but with the west end slightly elevated. It has several petroglyphs, including human figures, a turtle, a possible kite or winged figure, a number of badly eroded images, and a group of cupules. The erosion of the images here is an example of the alarming rate of deterioration of the Kahoolawe petroglyphs.

The cupules on this boulder are very interesting. There is a sequence of 20 or 21 of them irregularly spaced along the edge of this boulder. They vary in depth from one to 4 ½ cm, and extend along the perimeter from the NE to SSE. These could have a relationship to moon cycles or to retrograde planetary movements. A connection to ancient Asian sun dials is worth investigating. Further research is definitely recommended. (This investigator is not qualified to provide a conclusive statement other than that there is no other similar alignment of cupules in Hawaii. The site at Kūkaniloko on O'ahu does suggest that the Hawaiians utilized petroglyphs to mark seasons and possibly much more. Kukaniloko does not utilize cupules. However, several conformations of cupules at Puuloa, Puna, Hawaii, do suggest archaeoastronomic associations.)" – Stasack, Edward (unpublished mss.), (Johnson)

"P.S. I have said nothing in these reports about use of Kahoolawe for the teaching of navigation and astronomy, and I believe that the island itself is not the basis of learning of either discipline, but rather, is a matter of development of the human mind to understand the science of time and space. In all likelihood the island will be there long after human beings are gone, and until then it should be productively used to promote human survival and understanding. In the preparation of this report and in the field, two arts were predominantly used, so far as the detecting of celestial alignments is concerned… In our present world today we need to know and to appreciate the skills represented by both methodologies, that which was here before Captain James Cook, and that which we have learned to apply since he came. Our future would be better served if in redirecting Kahoolawe's purpose, we keep in sight the whole, rather than only a part, of our society's combined learning."(Johnson)

Hammatt et al., Historic Properties Task Order Report (2001)

SITE 50-20-97-110 Feature BU was next recorded in 2001 by Cultural Surveys Hawai‘i, as part of the UXO Clearance Project Historic Properties Task Order Report. During this survey, the site was documented, mapped, and determined significant under criteria A and D. While Hammatt et al. located feature BU-1 during fieldwork, they did not find feature BU-2, the small pōhaku with a single anthropomorph feature that Lee and Stasack recorded in 1993. Additionally, Hammett et al. could not locate all of the petroglyphs that Lee and Stasack recorded in 1993. They only documented three pecked petroglyphs located on the surface of Pōkāneloa, noting that at least two of the petroglyphs appeared to have a human form. Feature BU-1was recorded as being 3.1m long and 1.7m wide. SITE 50-20-97-110 Feature BU -BU was also determined significant for being a traditional cultural place (Criteria A) and for its information potential (Criteria D) during this survey. In terms of the historic property protection measures that were recommend for this site, Hammatt et al. suggested that monitoring take place for all proposed activities associated with the Kaho‘olawe Clearance Project because of the fragile nature of the petroglyphs and the potential for more petroglyphs in the surrounding area.

PualaniKanahele et al., Cultural Plan (2009)

As the first and foremost recommendation in the Culture Plan for KanaloaKaho‘olawe,Kanahele et al. recommended that the name Loa‘abe reclassified as the nomenclature, Kāneloa. This recommendation came from research that was conducted by the Edith Kanaka‘ole Foundation (EKF) members who identified that Pōkāneloa (a contraction of PōhakuKāneloa) is a culmination of the Kāne and Kanaloa suns. Field research and observations were documented as part of a field study conducted by Kalei Nu‘uhiwa and Kaumakaiwa Kanaka‘ole on March 21, 2008, or spring equinox. This study determined that one function of Pōkāneloa is to measure the curvature of the earth as it relates to the sun. Data collection to determine this function included placing…

“a long upright stick directly west of the pōhaku and as the sun sets, record the measurement in time and distance in inches on the poho of Loa‘a as the shadow moves from one side to the other” (Kanaka'ole Kanahele)

Field studies at this site remain important because they provide a unique way to witness the ke‘eke‘e, or the movement of the sun when it reaches a certain point above the horizon and begins to swing or bend due to the curvature of the earth (Kanahele et al, 2009:5). Additional measurements at this site can also provide a fingerprint or guide to the course of the sun on any particular day. The second recommendation laid out in the Cultural Plan is to preserve and stabilize Pōkāneloa in a place until such time accurate placement can be calculated. Kanahele et al. determined that Pōkāneloa is a unique cultural resource that…

“… reveals time, space and seasons of Kāne and Kanaloa, an earthly reflection of the sky. The area has a lot of mana; it reacts to the time, the space and season when the sun of Kāne and Kanaloa meet in the sky.” (Kanaka'ole Kanahele)

Therefore, it was strongly recommended that by stabilizing the area that supports Pōkāneloa, one will be able to…

"… testify to the intelligence, training, spiritual guidance and experience that were needed to settle on the immediate location to carve the pōhaku in correlation with the sun's rotation and seasons, and finally to be in timing with the solstices and equinoxes" (Kanaka'ole Kanahele)

Uyeoka et al., Archaeological Technician Training Report (2009)

Work tasks at SITE 50-20-97-110 Feature BU -BU for the Archaeological Technician Training project included a reconnaissance survey to locate previously identified and mapped features. The reconnaissance survey located the previously identified feature, BU-1 (Pōkāneloa), but did not locate feature BU-2, that was documented by Lee and Stasack in 1993. Three new possible features were also documented. New site boundaries were determined, and all of the features and the adjacent gulch were mapped with plan view and profile sketch maps. Mapping of the site was carried out with tape, compass and GPS. Further documentation included field notes, site forms, and photographs.

Feature 110-BU was documented as a large flat boulder, with three petroglyphs, and 25 human made depressions, or poho, pecked into the top surface. Two of the three petroglyphs located on the Pōkāneloa were noted as having a human form and being pecked. The boulder measured 3.1 meters in length and 1.7 meters in width and one of a cluster of boulders located at the edge of a gulch. No cultural materials were observed in the surrounding area. In this report, discussion of the current conditions of Pōkāneloa stated that it is slipping closer towards the gulch and that a portion of the pōhaku is not secured on stable ground. Recommendations included taking immediate actions to deal with erosion control and stabilization of the Pōkāneloa as well as securing Pōkāneloa in its current location.

CONSULTATION

Consultation regarding the goals,direction, and particulars of preservation on Kahoʻolawe has taken place graduallyover many years, dominated by talk during breaks in the clearing and cleanupwork, at public commission meetings and listening sessions, around the lunch and dinner mat, and under the stars overthe beach at Hakioawa and Honokanaiʻa. Consultation has only recently been systematic or formalized, but ithas been extensive throughout the years. During this time, members of the families associated withKahoʻolawe have been invited to the island, and those who have not gonehave had the opportunity to attend informational meetings and presentations by the KIRC and are even encouraged to call or visit the office to simply talk story.

Much more attuned to the setting and the pace of old style talk storyand necessarily more rooted in the preservation needs that become obviousthrough long engagement with the sites and the local people, a consensus has emerged regarding preservation. The fact that this process has unfolded over adecade reflects a reluctance to jump into any preservation action beyond recordingthe current status of sites, but in recent years more and more of the Hawaiian communities,other island residents, and historic preservation professionals have moved toward amore active preservation stance.

Kahoʻolawe has for many years been a place visited by a controlled number of groups, as well as by local fishermen. The opinions of those involved in the preservationplanning process has been that these groups should be recognized as regular visitors, or in some cases residents,and should be educated regarding the history, cultural significance, and specialcharacter of the place. Thus, the preservation should involve both interpretation and conservation; the commitment of many volunteers overthe years to take care of the place has provided evidence of ongoing commitmentto this approach. However, this has been tempered by a deep commitment tomālamathe place for the sake of the ʻāina.

Public Listening Sessions were held on the islands of Maui, Oʻahu, and Hawaiʻi in an attempt to receive public feedback about preservation options for SITE 50-20-97-110 Feature BU. The majority of which favors the preserve in place option.

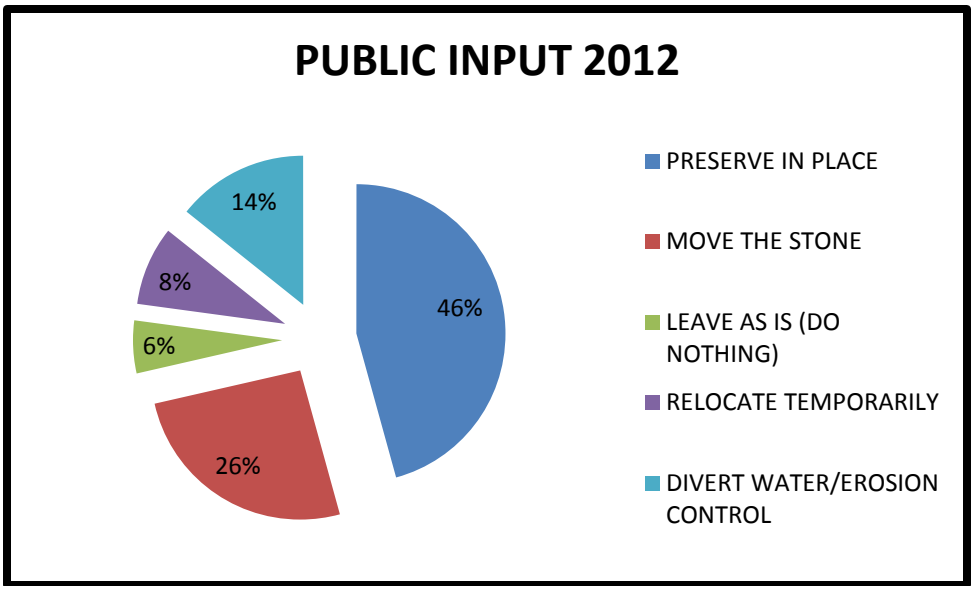

Figure 3Results of Listening Sessions

On May 3rd of 2013, The Kahoʻolawe Island Reserve Commission held a public Commission meeting to decide on a mitigation plan for the National Registry Site Number 50-20-97-110. A motion was made to create two plans that will be looked at in November of 2014.

"Pursuant to HRS§6k-3(a)(2), to approve the motion to 1) allow the Protect Kahoʻolawe ʻOhana to create a life-sized replica model of Pōkāneloa which can be used: (a) to evaluate a potential spot, position and process for respectfully relocating Pōkāneloa over the course of two equinoxes after the model is complete; and (b) for educational purposes; 2) leave Pōkāneloa in situ and initiate erosion control measures to stabilize the pōhaku while the relocation data is being collected; 3) evaluate the relocation data and the effectiveness of erosion control techniques and projects to stabilize the Pōkāneloa complex within 18 months, but no later than November 2014; 4) compose a detailed treatment plan including relocation of Pōkāneloa and a long term stabilization of current site (due no later than November 2014)."

This plan fulfils item 2 of the afforementioned motion.

STABILIZATION PLAN

Archaeological study of Kaho‘olawe commenced long ago, and since 1980 hasfocused on detailed recording of the surface features. From these studies,we have a detailed and nearly complete understanding of the surface, the intactfootprint versus tumble, and the general scope of work that would be required forrestoration.

For SITE 50-20-97-110 Feature BU, observation has showed that for this structure, the foundation, which consists of a basaltic pedestal slab set as a foundation for the object for which this preservation plan was created and that this one stone is the home to the majority of cupules found on the entire island. While these and other observations provide sufficient information to begin preservation,questions remain. For example, it is not clear in all cases whether stones lying nearthe area have collapsed, or could represent constructed elements such as apavement or a wall spur extending from the main feature.

Stabilization will commence after clearing, documentation, and investigation.Among the proposed staff are Native Hawaiian masons experienced in restorationof archaeological features, one of whom will serve as the restoration foreman withthe authority to direct the work flow. An experienced archaeologist will periodically be present to aid in restoration, and will have the authority to halt work whenever there is a need to evaluate an archaeological find, excavate intact sediment, orotherwise document and investigate the feature and deposit. Both the masonryforeman and the archaeologist will discuss how the original landscape looked, and howbest to achieve an authentic reconstruction. The crew will be rounded out by volunteers from various islands including *‘ōpio*(youth) who will be trained for futurerestorations.During the coming years, KIRC staff and volunteers will work to maintain SITE 50-20-97-110 Feature BU as a whole. If additional areas arerestored in the future, SHPD will be notified with a supplemental preservation plan.

Continued investigation is directed at resolving such uncertainties, and will continue to bedone to varying degrees at the site.

1. The first step will be toclear loose, tumbled stone from the gulch floor. Surface stones above the gulch will not be removed as all the stones will be brought in from the island’s rock quarry located by LZ Squid. There are no archaeological sites in the vicinity of the rock quarry located by LZ Squid.

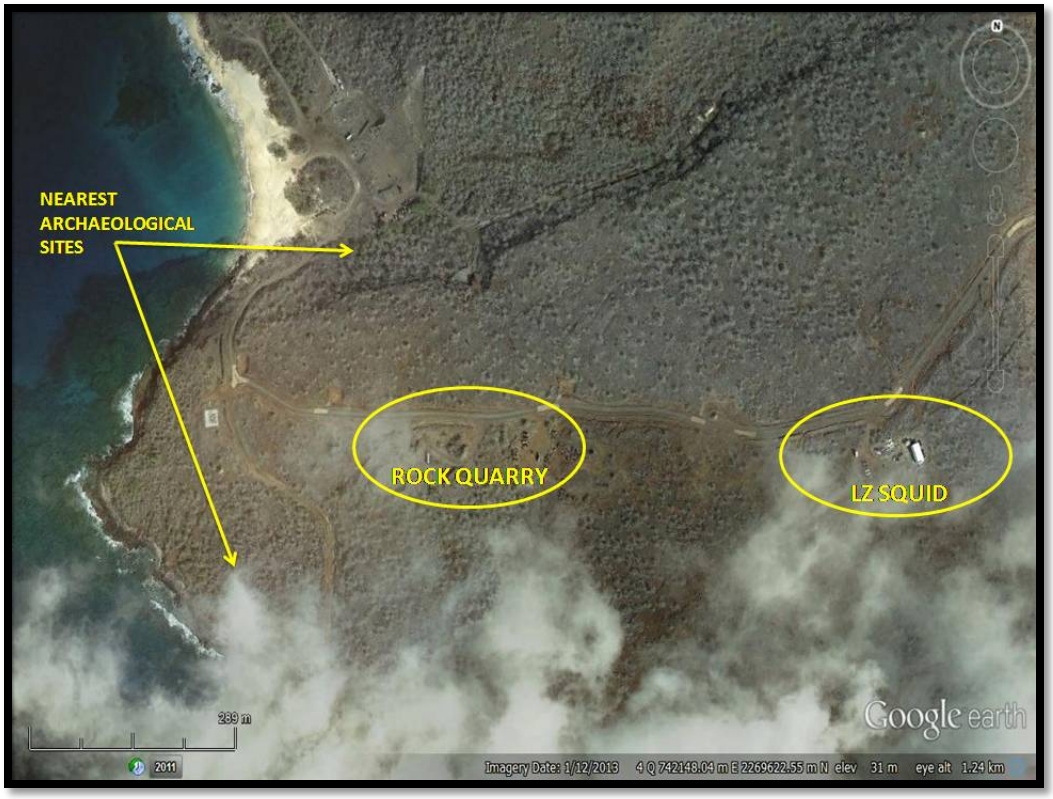

Figure 4 Rock Quarry at LZ Squid

2. Next, wall facings will be examined closely, with copies of feature maps annotatedto show the intact foundation stones.The cleared gulch floor will be photographed in large format.

3. Since the goal is to stabilize the area, only stones that have clearly tumbledfrom a feature will be moved, and there will be no attempt to clear surface sediment to identify pits.Because previous documentations indicate a complex depositional history, the usual practice of digging down to culturally sterile substrate would involve far moreinvestigation than would be appropriate to the stabilization task, and would disturb deposits withoutenhancing knowledge of the surface feature being stabilized.Remaining deposits are to be preserved, illustrated in plan view, and photographedprior to being stabilized.

4. A Retaining wall will be constructed. The wall structure will measure approximately 7m in length by 2m in width and 6m high. The battered appearance will give the rock face surface measurement of 8m from the foundation to the cap stones. The project foreman may decide to terrace the wall structurerather than the battered appearance depending on his initial assessment. The existing boulders will be incorporated into the dry-stacked rock wall which will be backfilled with loose rock and soil from a quarried area at LZ Squid (Figure 4). The wall face will consist of various sized basalt rocks to insure its stability. The resulting surface created by the backfill will be level with the

existing ground to serve as a platform for cultural practitioners to fully encompass the surrounding area of feature BU.

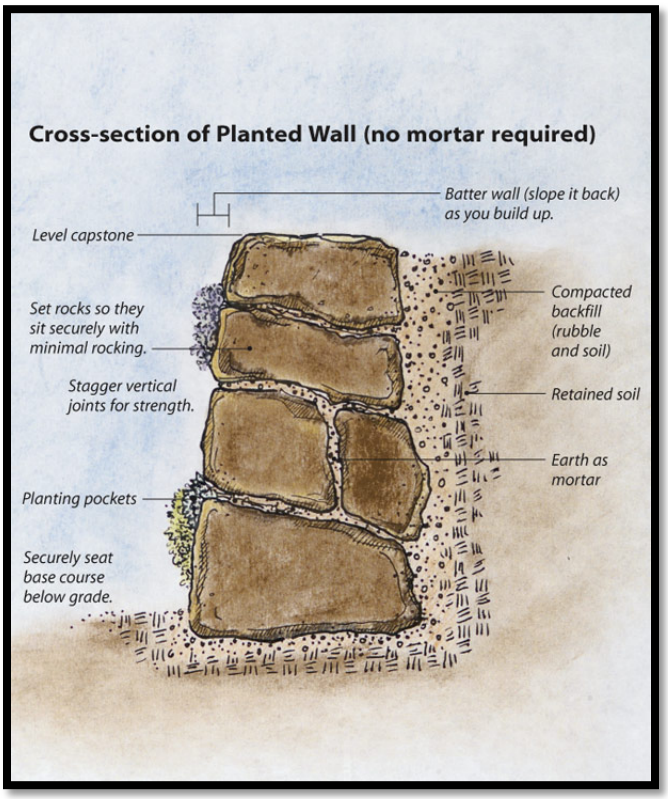

Figure 5: Cross-Section of the dry-stack method the will be used

The approach to stabilizing feature BU of SITE 50-20-97-110 Feature BU is to create a stable surface immediately east of this site by constructing a retaining wall across the mouth of the developing rill whose eroding headwall threatens the stability of this feature and backfilling this rill with offsite materials from the quarry at LZ Squid.

Figure 5 is a cross section of the method that will be used to construct the retaining wall below feature BU. Planting pockets will be incorporated into the structure to strengthen the integrity of the wall and to minimize erosion on the wall face.

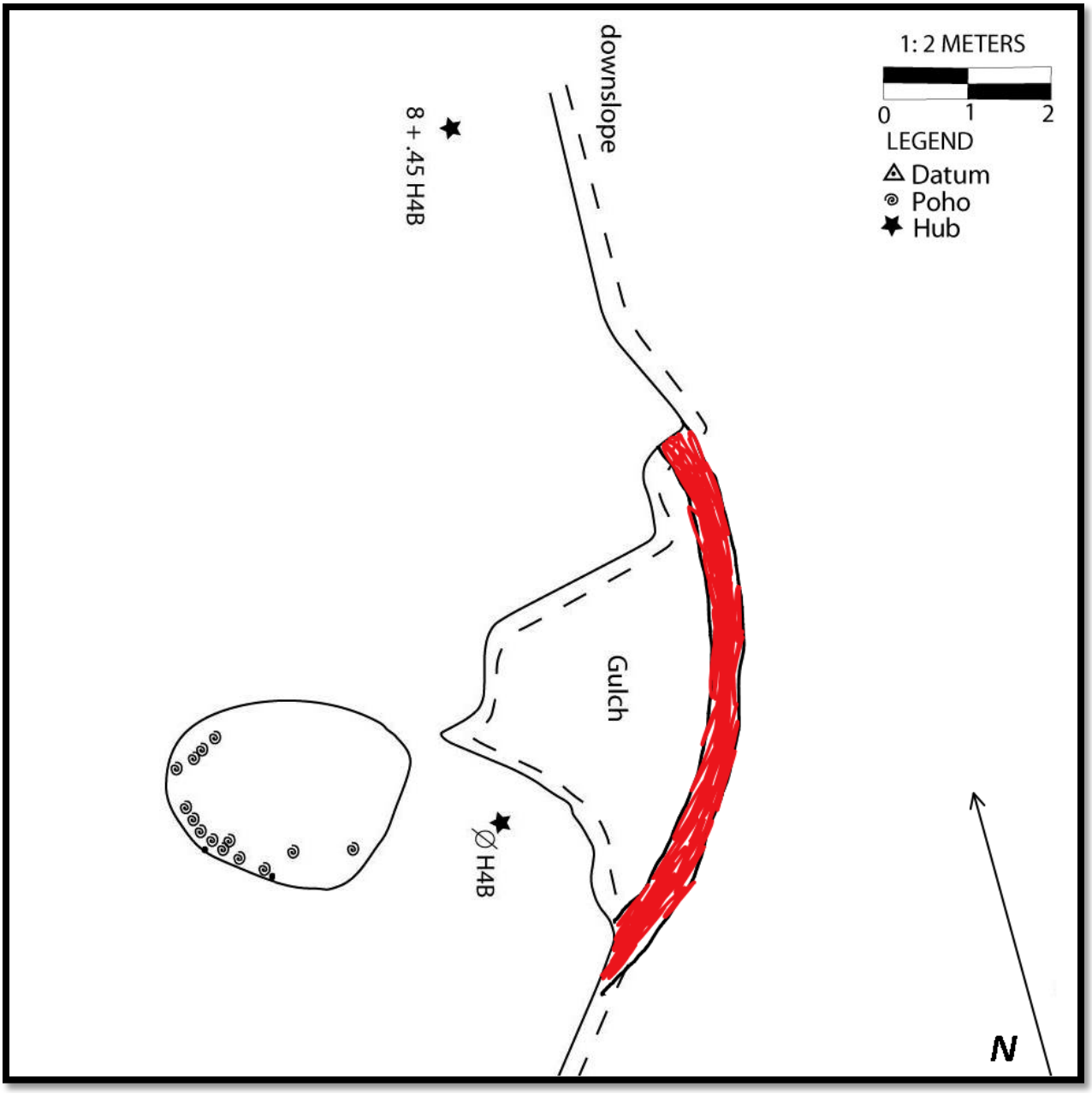

Figure 6 Proposed Stabilization of the area of SITE 50-20-97-110 Feature BU BU.

Figure 6 presents the plan view of the proposed retaining wall in relation to the developing rill and feature BU.

COMPLETION REPORT

Preservation does not end with a stacked wall. Perpetuating the surface featureandthe greater cultural landscape requires sustained attention, lest the feature slips toward ruin. The most immediate long term measure related to stabilizationis the completion of a StabilizationReport. Additional measures that will help dothis include establishment of preservation-oriented maintenance procedures, re-vegetation, condition monitoring, interpretation, and contingency response plans.

Throughout the process of stabilization, a photographer will document the process ofstabilizationin multiple media (concentrating on slides and digital images that canbe used in the report and public presentations). After fieldwork is complete, project archaeologists will produce a report forSHPD describing the findings of archaeological investigation and detailing thestabilizationmeasures. Key elements of this report will be photographs and mapsdepicting the structure before and after restoration, description of any excavation orground disturbance (including location on the map), an inventory of culturalmaterials discovered during excavation and reconstruction, analysis of exposedstratigraphy and foundations, and discussion of the feature's age and function.

Asecond report, concentrating on the process of stabilization, the partnership betweenNative Hawaiian masons and archaeologists, and lessons gained from this pilotproject, will be produced for community groups, contractors, and others interestedin doing site stabilization.

Maintenance Procedures

Typical maintenance involves a yearly cycle beginning with an early spring trip in which the crew stabilizes any fallen structures and identifies any impacts that may have occurredduring winter, additional work and special projects during the summer and a finalcleanup in early September. This cycle should continue, having served the island well over the past decade. Though many of the current staff and volunteers have become familiar with the constraints archaeologists and cultural practitioners ask for.

Most clearing now consists of using hand sickles and string trimmers to cut grassand other herbaceous species, as well as chainsaws to remove non-native trees andtrim others.Care needs to be exercised in two ways with the string trimmers.First,avoid striking the ground with the string, as this can result in small excavations that, if repeated over time, could reach and disturb intact cultural deposits. Second, avoidstriking walls or other structures, since this can leave marks on the sites and withsome of the sandstone even cut into the surface. Metal blades should be avoidedexcept where new areas are being cleared, and even then should proceed withcaution lest rocks be hit. When using chainsaws, crews should first assess thepotential for falling limbs or trees to hit and damage features, and then plan thework so as to avoid any such impacts.

Debris from clearing should be removed with the least surface disturbance.Gardenrakes or other rigid tools should not be used and even bamboo or metaltined leafrakes should be used only when necessary, and even then very gently, so that onlyleaves and stems are moved, not sediment. Larger material should be hauled byhand, although tarps may be used where the intervening ground has sufficientvegetation to prevent the load from disturbing the ground surface. Locations foradditional vegetation dumps should be chosen as they have been in the past, toserve multiple purposes. First, avoid placing them where there are features, orwhere future work is expected.Second, some brush piles have been used asbarriers, such as long logs placed to define trail edges and brush piles a little furtherout to prevent aimless wandering and trail blazing; in a few cases, logs have alsobeen placed neatly to discourage entry into sensitive areas. Finally, the piles alsorepresent a resource in terms of eventual re-vegetation, and their placement inproposed planting areas can provide a rich humus layer helpful in establishing newplants.

Clearing may lead to succession of species that is advantageous, and thereby aid maintenance. For example, repeated trimming favors lowgrowing grasses andground cover species, which typically help stabilize sediments. Beyond the trailand interpretive areas, trimming should also continue to be used as a means offavoring cultural and native plants. Cutting exotic herbaceous species on the properschedule or with sufficient frequency interrupts seed production and will eventuallyweaken the population. Cutting larger plants repeatedly can hasten their demise, orat least take away their edge where they are in competition with more desirablespecies.

Regular maintenance is also an opportunity to evaluate the landscape and sites for signs of trouble. The first crew in has the greatest likelihood of noticing newimpacts from rockfall, but work crews throughout the season should beaware of things like erosion or changing soil levels, plants causing disturbance, orhuman impacts such as camping or looting. While archaeological monitoring willbe part of the solution, maintenance crews spend more hours looking at the siteseach year than anyone, and should be aware of what to look for.

In the case of a toppled stone or small collapse, simplyrestacking the damage immediately is often the best solution. Repairing thedamage when it is noticed results in stabilization and in some cases avoids risks tosafety. This level of response is suitable to impacts limited to small areas, such as acourse or two of stone over less than a meter of wall. Large collapses would require agreater degree of planning and expertise.

In addition to toppled stone, another setting for immediate repair is the soil itself.Normal trail use can create divots, soil deflation, or exposure of rocks and roots that present safety hazards. In these cases, immediate repair should consist of fillingthe hole or covering the rock or root with sand gathered from low on the beachwhere cultural deposits do not occur.It is important that instances of immediate repair be recorded, by marking theirlocations on archaeological maps, photographing the damaged area before andafter repair, writing a brief description of the repair work completed, andforwarding this information to the KIRC. Should comparison with

maps orphotographs of the feature in its original intact condition show that the repair hasresulted in a new configuration or different appearance, then it should bedismantled and restacked correctly.

Repairs should be performed by individuals familiar with traditional masonrytechniques, so that the restacked portion appears both stable and authentic. If notsuch person is available on the service trip when damage is noted, then thedamage should be stabilized as best possible, and repair delayed until the next trip.

In conjunction with recording, the intent of this requirement is to avoid theexpansion of "immediate repair" into restoration and alteration of features whosestability and integrity is not at risk.

Re-vegetation

The work for the past decade has been dominated byvegetation clearing. As restoration becomes the focus, so does changing thecharacter of the floral communities around sites. Archaeological investigationshave shown what plants may have been growing in the area during Hawaiian occupations; botanical inventories offer more contemporary checklists of local flora, and a number of species advisable forre-vegetation has been managed by the KIRC's restoration program. The desire to have culturallymeaningful native and Polynesianintroduced plants, however, cannot be translatedinto action without solving two major problems: lack of soil and water.

New plantings, especially in wet years, are prime grazing for rodents, and nothingsurvives without dependable watering in the first year, augmented the following summer or two for larger plants unless the rains cooperate.In terms of water, perhaps the best approach is to make sure those re-vegetation efforts focus on species that are adapted to periodic dry spells, and thatthose in the near shore area are salt tolerant as well. This does not remove therequirement for water as plants are getting established however. Although rainfallcomes more frequently during the winter, this does not happen with suchconsistency that it can be counted upon, and access during winter presents bothlogistical and safety challenges, so there is no escaping the need for irrigation fornew plantings.

The initial problem for watering plants is the source. History suggests that Kahoʻolawe has a spring that a few people have drank from; although through these same records suggest that the well was more brackish and that fresh food and water has always come from Maui. The rain catchmentlocated at Moaʻulaoffers only a minor improvement on a reliable water supply. Once thesource(s) of water has been identified, conservation becomes paramount. For someplantings, keeping koahaoleor other canopy species in place can help protectyoung plants until they are established, at which time the nurse trees may beremoved. Mulch, utilizing the cleared vegetation, will also be necessary. Use of drip irrigation bags (sold under trade names such as "Treegator")allows individual trees or shrubs to receive up to 20 gallons of water over

half aday, and use of artificial absorbent materials (such as Potassium polyacrylimide)developed for forestry plantings can also aid in new plant establishment. Even withthese aids, however, the inescapable requirement for new plantings is that they will need regular attention—at least weekly—for their first summer, and supplemental watering may prove necessary until root systems are wellestablished.

Once these problems have been addressed, plantings would be desirable forseveral reasons. Most basically, ground cover and plants with fibrous root systemsprotect the ground surface from wind, rain, and waves, helping consolidatesediments and hamper erosion. On Kahoʻolawe, an additional goal is to have plantsthat would have been used or enjoyed by the Hawaiian residents, restoring theenvironment around the sites, and also enriching the potential for interpretationand cultural education. Quite a few species could contribute sustainable harvestsof products that could be used in cultural activities:niu, ʻuala (kūpala), ʻākulikuli, hinahina, kou, milo, hau and more. Finally, with majority of theisland exposed to the sun and subject to variable winds, shade and wind breaks are desirable.

For the instance of SITE 50-20-97-110 Feature BU, low native grounds cover such as ʻaki'aki will be the primary vegetation to be planted after the dry-stacked rock wall is constructed.

Periodic Monitoring and Stabilization Measure

Preservation in the long run depends on continued awareness of the conditions inand around sites on Kahoʻolawe. In large, preparation of detailed maps of sitesthere has been to provide baseline depictions of site conditions. In the future, theseshould be used in annual visits by qualified archaeologists to identify any impactsthat have occurred (such as wall collapse), as well as conditions that could beprecursors to impacts (such as invasive roots or eroding surfaces). While the mostintensive focus are be on the hardpan area, the eroding stream beds, and the burials, should continue to be regularly monitored. Besides the immediate goal of identifying damage or risks to sites, conditionmonitoring should be used as a means to evaluate longer trajectories.For example, a single year's monitoring report may include a minorcollapse at a trailside feature, to which the response may be a simple repair.

Because maintenance activities may not involve the same people from year to year,repeated instances of damage at the same location may not be noticed except by a5 or 10year evaluation, which could lead to a more permanent solution, such asre-routing a trail or installing a protective barrier. Likewise, incremental changessuch as invasion by a new weed or slow erosion may not be clear on a oneyearperiod, but may become obvious over a larger observation window.

Archaeological monitoring is necessary and maintenancecrews at the beginning and end of each year should be attuned to impacts thatoccurred over the winter or during the summer visits by volunteer groups.

Relocation

The PKO requested in the 3, May 2013 Commission meeting to be allowed to create two life-sized replicas of SITE 50-20-97-110 Feature BU BU in order to use the replicas to find a new home for the surface feature to reside. If the area, of which the feature currently resides, is not able to be stabilized, then the KIRC Commissioners may decide to relocate the stone the new location based on the results of studies that will be done by the PKO with the stone replicas. If relocation is the decision, a supplemental plan will be approved by the KIRC Commissioners and submitted to SHPD to include the results of the sun observations done by the PKO; the proposed area of relocation; and a new preservation plan for both old and new sites.

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[i] In 2012, Rubellite Kawena Johnson explained her reason for naming site 110BU as "Loaʻa.:
"… at this time my memory of the occasion when we went to Kaho'olawe to study the sites mentioned in my report fails to recover where I found the name Loa'a...which, may not be the "loa'a", meaning "to receive, get, obtain", but rather and perhaps from another form using "LO" meaning to align to, as in to "prop' meaning whatever was then used to align, and there are other words such as "Lu", having the connection to Lu, the ancestor (as in the name for this island, O'ahu-a-Lu-a-nu'u, meaning Ahu-son-of-Lu-son-of Nu'u, as the place where Lu stood below the zenith) who in Polynesia is like Maui, who "lifts up the sky", probably also related to another word we find connected to placement, as

Le, of which I am not sure at this time but which does turn up in the same way that Lu and Lo are used. Then A'a, in Lo-A'a, is Sirius in the southeast, the star which marks the parallel of latitude which at the place where navigators would aim their canoe, as from Hawai'i to Tahiti, which marks therefore the point overhead when the sailor is beneath Sirius, and which is also used when sailing east/west to mark the azimuth, or point of rising when seen, both in the morning before sunrise (east) or after sunset (west) to target that point, which astronomers also call "right ascension" (= longitude)." - **Rubelitte Kawena Johnson 2012**

[ii]"All the petroglyph sites in the Stasack and Lee report 1993 were identified by their place name. The idea was to be able to refer to the stone in the report using a word instead of a number, and perhaps without enough thought the entire site was named Loa'a. It is not unusual for a rock art site to be given a name, but in hindsight, this name was problematical. It happens. The Loa'a stone was far enough away from the main site that the distance suggested the likelihood that the petroglyphs had a specialized function that was different than those at the main site. Indeed, that was the fact, the Loa'a Stone was unique in that it contained the only *poho*(usually called cupules in the rock art jargon) at this site, and, in fact, the only presently known *poho* on the island.

In current Hawaiian rock art and archaeology terminology, *poho* is the term now generally accepted for the hollow or pit in stone or lava that functioned as a receptacle for the navel stump, *piko*, of a newborn. We standardized this term for these pits in our recordings **after** the Kahoolawe petroglyphs were recorded. We have presented papers at the SHA conferences, and talks at HAVO, KAHO, PUHO, and also at OHA, and other public talks, founded on documentation from Dr. Samwell's log describing the *Piko*ritual (in Cook's journal), and Beckwith's writings on the *piko*ritual at Pu'uloa, and several excerpts from Pukui (Nana I Ke Kumu) that support the practice of placing the child's *piko*in a *poho*at carefully chosen, often sacred places accompanied by prayers for the welfare of the child. The term chosen for describing the ritual is, Pule PohoPiko Pule. Auntie Rubellite, and other *kupuna*and Hawaiian scholars support the existence of this practice since ancient times; we know personally a number of families that still practice this ritual at places we have visited and recorded.

Note: we can testify that the depth and diameter of the *poho* on the Loa'a stone are perfectly consistent for containing the *piko*, as are thousands of others we have recorded throughout Hawaii Island. However, *poho*have other functions which are apparently appropriate to practices at other places. For example, in Desha's "Kamehameha and his Warrior Kekuhaupio," it is written that one of Kamehameha's kahuna used the *poho*constituting a *papamu*at Kaupulehu (a rectangular composition of vertical and horizontal rows of *poho*creating a checker-like board for the game of *konane*) to interpret the omens of the heavens for predictions about the forthcoming battle." - **Edward Stasack 2012**