A Cultural Resources Management Plan for the University of Hawaii Management Areas on Mauna Kea, Ka`ohe Ahupua`a, Hāmākua District, Hawai`i Island, State of Hawaii.

TMK: (3) 4-4-015: 09, 12

A Sub-Plan for the Mauna Kea Comprehensive Management Plan

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October 2009

EXHIBIT A-11

A Cultural Resource Management Plan
for the University of Hawai`i Management Areas on Mauna Kea
Ka`ohe Ahupua`a, Hāmākua District, Island of Hawai`i
TMK: (3) 4-4-012, 015

A Sub-Plan for the Mauna Kea Comprehensive Management Plan

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October 2009

EXECUTIVE SUMMARY

The Office of Mauna Kea Management (OMKM) was established in October 2000 to implement the management policy guidelines and recommendations presented in the Mauna Kea Science Reserve Master Plan. OMKM's primary mission is the protection, preservation, and enhancement of cultural and natural resources in the University of Hawaii (UH) management areas on Mauna Kea. This Cultural Resource Management Plan (CRMP) has been prepared to assist OMKM in fulfilling that mission. The CRMP is one of four sub plans for the Mauna Kea Comprehensive Management Plan (CMP) which was approved by the Board of Land and Natural Resources (BLNR) on April 9, 2009.

The CRMP was developed as part of OMKM's efforts to create a comprehensive management plan for the UH management areas. One objective of that effort is to ensure that UH complies with the conditions of its lease agreement with the state and all applicable state and federal laws. Another objective is to create a management plan that is acceptable to all of the major stakeholders, including the Department of Land and Natural Resources (DLNR), Native Hawaiian practitioners, conservationists, and other user groups.

The CRMP provides OMKM with the tools it needs to meet its cultural resource management responsibilities in several ways. It begins by identifying key management objectives and goals that can be used in making budget decisions, assessing staffing needs, and setting up contracts for specialized services. The major objectives, which were presented in the Mauna Kea Science Reserve Master Plan, include:

- promoting a greater understanding of the rich cultural heritage of Mauna Kea;
- preserving and managing cultural resources in a sustainable manner so that future generations will be able share in and contribute to a better understanding of the historic properties that exist in the summit region, which is of major cultural significance to Hawaiians;
- maintaining opportunities for Native Hawaiians to engage in cultural and religious practices; and
- preserving the cultural landscape for the benefit of cultural practitioners, researchers, recreationalists, and other users.

Unlike previous management plans, the CRMP includes both a Management Plan component and an Implementation and Evaluation Plan component. The Management Plan is divided into three parts: (1) general management issues; (2) specific public and commercial uses, and (3) long-term management programs, plans, strategies and other needs. Examples of general management issues include public access, on-going operations, off-road vehicle use, and enforcement. Public and commercial uses are equally varied and include such activities as cultural and religious practices, astronomy, commercial tours and events, filming, and scientific research. The long-term management programs and plans include an historic properties management plan, a burial protection and inadvertent discovery plan, development of an interpretive and educational program; data and collections management and an emergency plan.

The CRMP examines specific activities in terms of the potential threats or impacts that each may have on historic properties and presents appropriate mitigation measures to avoid or minimize impacts. In some cases there are existing policies and regulations that can be followed. For other activities new or additional actions are identified, including the need to establish new policies or guidelines. One of the issues addressed in the Management Plan is the perceived need for the Hawaiian community to consider the possible effects of on-going cultural and religious practices on historic properties. In developing the CRMP consultation was undertaken with a number of Hawaiian organizations regarding cultural issues, such as access and cultural practices. Different opinions were expressed during the consultation meetings regarding the appropriateness of some cultural practices and the unintended consequences that these may be having on the cultural landscape and spiritual values of the mountain. OMKM's cultural advisory group, the Kahu Kū Mauna Council, will take the lead in consulting with Hawaiian organizations and individuals with historical ties to Mauna Kea, cultural practitioners, and the Mauna Kea Management Board in developing procedures and protocols regarding cultural issues.

The Management Plan identifies several priority management actions: (1) completion of the archaeological inventory survey fieldwork in the Science Reserve and in a road easement between the Science Reserve and Hale Pōhaku and preparation of a draft report; (2) preparation of a Burial Treatment Plan; and (3) preparation and implementation of a final Archaeological Monitoring Plan.

The Implementation and Evaluation Plan summarizes the management actions that OMKM will implement. For each of the major management actions there is a priority ranking, relative cost estimate and schedule for completion of the major tasks. The Implementation and Evaluation Plan also discusses staffing and training; the need for on-going consultation with the major stakeholders; cooperative agreements and provisions for evaluating and amending the CRMP.

Implementation of the CRMP will have far-reaching benefits for the major stakeholders and the public at large. Approval and implementation of the CRMP will redress the frequent complaint that the cultural resources and cultural-religious values of Mauna Kea are not being properly managed. However, before the CRMP can be fully implemented, the role and authority of OMKM needs further clarification. This will entail a continuing dialogue with DLNR, as it retains the primary management and regulatory authority over many of the activities on the mountain as well as the natural and cultural resources. Ultimately, OMKM will need to adopt administrative rules to fulfill all of its management responsibilities. In the meantime there are a number of management actions that can be implemented assuming that adequate funding is available. Some actions could potentially require an environmental review to assess the possible effects on historic properties.

The following table is intended to assist the reader who is interested in knowing how the management actions in the CRMP are related to those in the CMP by providing relevant cross references to sections of each plan.

Mauna Kea CMP Management Action		CMP Section	CRMP Section
CMP Section 7.1.1: Native Hawaiian Cultural Resources			
General Management			
CR-1	Kahu Kū Mauna shall work with families with lineal and historical connections to Mauna Kea, cultural practitioners, and other Native Hawaiian groups, including the Mauna Kea Management Board's Hawaiian Culture Committee, toward the development of appropriate procedures and protocols regarding cultural issues.	2.3.3	4.2.1
CR-2	Support application for designation of the summit region of Mauna Kea as a Traditional Cultural Property, per the National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq. in consultation with the larger community.	1.2.1	2.4.2.1
CR-3	Conduct educational efforts to generate public awareness about the importance of preserving the cultural landscape.	7.1.3, 7.2.1	4.3.3
Cultural Practices			
CR-4	Establish a process for ongoing collection of information on traditional, contemporary, and customary cultural practices.	1.2.1, 1.2.2, 2.3.3, 5.1.4, 5.2	4.2.1.1
CR-5	Develop and adopt guidelines for the culturally appropriate placement and removal of offerings	1.3, 2.3.3, 5.2.3	4.2.1.3
CR-6	Develop and adopt guidelines for the visitation and use of ancient shrines.	1.3, 2.3.3, 5.2.3	4.2.1.5
CR-7	Kahu Kū Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian cultural features.	2.3.3, 5.2.3	4.2.1.6
CR-8	Develop and adopt a management policy for the UH Management Areas on the scattering of cremated human remains.	5.2.3	4.2.1.7
CR-9	A management policy for the culturally appropriateness of building ahu or "stacking of rocks" will need to be developed by Kahu Kū Mauna who may consider similar policies adopted by Hawai'i Volcanoes National Park.	2.3.3, 5.2.3	4.2.1.8
Historic Properties			
CR-10	Develop and implement a historic property monitoring program to systematically monitor the condition of the historic district and all historic properties, including cultural sites and burials.	5.4.2, 5.4.4, 6.3.1, 7.2, 7.3	4.3.1
CR-11	Complete an archaeological survey of the portions of the Summit Access Road corridor that are under UH management.		2.3.1.3; 4.3.7
CR-12	Consult with Kahu Kū Mauna about establishing buffers (preservation zones) around known historic sites in the Astronomy Precinct, to protect them from potential future development.	7.3.4	4.2.7
CR-13	Develop and implement a burial treatment plan for the UH Management Areas in consultation with Kahu Kū Mauna Council, MKMB's Hawaiian Culture Committee, the Hawai'i Island Burial Council, recognized lineal or cultural descendants, and SHPD.	5.2.3	4.3.2; 4.3.7
CR-14	Immediately report any disturbance of a shrine or burial site to the rangers, DOCARE, Kahu Kū Mauna Council, and SHPD.	5.4.2, 7.2, 7.4	4.3.1.6
CMP Section 7.1.3: Education and Outreach			

Mauna Kea CMP Management Action		CMP Section	CRMP Section
EO-1	Develop and implement education and outreach program.	6.3, 7.1.1, 7.1.2, 7.2.1, 7.2.2, 7.3.1, 7.3.2, 7.4.1	4.3.3
EO-3	Continue to develop, update, and distribute materials explaining important aspects of Mauna Kea.		4.3.3
EO-5	Develop interpretive features such as self-guided cultural walks and volunteer-maintained native plant gardens.	7.1.1, 7.1.2	4.3.3
EO-7	Continue and increase opportunities for community members to provide input to cultural and natural resources management activities on Mauna Kea, to ensure systematic input regarding planning, management, and operational decisions that affect natural resources, sacred materials or places, or other ethnographic resources with which they are associated.	2.3.1, 4	5.3
CMP Section 7.2.1: Activities and Uses			
General Management			
ACT-3	Maintain a presence of interpretive and enforcement personnel on the mountain at all times to educate users, deter violations, and encourage adherence to restrictions.	6.3.1, 7.1.1, 7.1.3, 7.2.2, 7.4.1	4.1.1
ACT-4	Develop and enforce a policy that maintains current prohibitions on off-road vehicle use in the UH Management Areas and that strengthens measures to prevent or deter vehicles from leaving established roads and designated parking areas.	6.3, 7.1.3, 7.5	4.1.2
Recreational			
ACT-5	Implement policies to reduce impacts of recreational hiking	6.1, 7.1.1, 7.1.3, 7.5	4.2.3.4
ACT-6	Define and maintain areas where snow-related activities can occur and confine activities to slopes that have a protective layer of snow.	6.1.3	4.2.3.2
ACT-7	Confine University or other sponsored tours and star-gazing activities to previously disturbed ground surfaces and established parking areas.		4.2.3.1
ACT-8	Coordinate with DLNR in the development of a policy regarding hunting in the UH Management Areas.	5.2.4, 6.1.3, 7.1.1, 7.1.2, 7.5	4.2.3.3
Scientific Research			
ACT-12	Ensure input by OMKM, MKMB, and Kahu Kū Mauna on all scientific research permits and establish system of reporting results of research to OMKM.	6.1.2	4.2.6
CMP Section 7.2.2: Permitting and Enforcement			
Laws and Regulations			
P-1	Comply with all applicable federal, state, and local laws, regulations, and permit conditions related to activities in the UH Management Areas.	3.4, 7.1.1, 7.1.2, 7.4.1, 7.5	1.1
CMP Section 7.3.1: Infrastructure and Maintenance			
Routine Maintenance			
IM-3	Conduct historic preservation review for maintenance activities that will have an adverse effect on historic properties.		4.1.3
IM-5	Develop and implement a Debris Removal, Monitoring and Prevention Plan.	6.3.6	4.1.4, 4.3.4
IM-6	Develop and implement an erosion inventory and assessment plan.	6.3.5	
IM-7	Prepare a plan, in collaboration with the Department of Defense, to remove military wreckage from a remote area of the UH Management Areas, while ensuring protection of natural and cultural resources.		4.3.4.1

Mauna Kea CMP Management Action		CMP Section	CRMP Section
CMP Section 7.3.2: Construction Guidelines			
Best Management Practices			
C-5	Require on-site monitors (e.g., archaeologist, cultural resources specialist, entomologist) during construction, as determined by the appropriate agency.	1.5.9	4.2.7
C-6	Conduct required archaeological monitoring during construction projects per SHPD approved plan.	7.1.1, 7.1.3	4.2.7
CMP Section 7.4.1: Operation and Implementation of the CMP			
OI-2	Develop training plan for staff and volunteers.	7.1.1, 7.1.3, 7.2.2, 7.3.2	5.2
OI-5	Update and implement emergency response plan.	6.2.5	4.1.6, 4.3.5
CMP Section 7.4.2: CMP Monitoring, Evaluation and Updates			
MEU-2	Conduct regular updates of the CMP that reflect outcomes of the evaluation process, and that incorporate new information about resources.	2.1.3	5.5

ACKNOWLEDGMENTS

Numerous individuals contributed to the preparation of this Cultural Resource Management Plan (CRMP), in addition to those listed in the back of the report. Stephanie Nagata, Interim Director of the Office of Mauna Kea Management (OMKM), was instrumental in setting up and overseeing all aspects of the contract with PCSI, which involved a number of meetings to discuss the scope of work. She also provided copies of planning documents and other studies that were consulted in the preparation of the plan.

The "SHPD Plan" referred to throughout this CRMP was written by Holly McEldowney, whose name does not appear, however, on the title page or elsewhere in that document. Major portions of the SHPD Plan, which was appended to the 2000 Mauna Kea Science Reserve Master Plan, have been incorporated with little or no change into this CRMP. Holly's contribution to the CRMP is reflected in just how much of her plan has been used in the preparation of the current plan. She is not responsible, however, for any of the errors, omissions or other shortcomings of the CRMP.

Keola Awong, cultural specialist at Hawaii Volcanoes National Park, kindly provided information and references to documents pertaining to the Park's cultural resource management policies. All of those who attended the community consultation meetings are thanked for their participation and input on various aspects of the CRMP. A joint meeting with the Kahu Ku Mauna Council and the Hawaiian Culture Committee early in the consultation process helped to refine the organization and content of the CRMP.

A number of people were consulted regarding routine maintenance activities in evaluating the potential effect such activities may have on historic sites. Ron Koehler kindly provided information regarding routine maintenance activities overseen by Mauna Kea Observatories Support Services (MKOSS). The directors and staff of all of the observatories are thanked for responding to questions regarding the maintenance activities for which they are responsible.

Dr. Robert McLaren, Associate Director of the Institute for Astronomy (IfA), was instrumental in seeing that the University of Hawai`i begin to fulfill its cultural resource management responsibilities on Mauna Kea. IfA provided financial assistance to the State Historic Preservation Division (SHPD) to undertake archaeological reconnaissance surveys of selected areas of the Mauna Kea Science Reserve in 1995 and 1997 and to begin preparing an historic preservation plan.

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ACRONYMS AND ABBREVIATIONS

APE	Area of Potential Effect
BLNR	Board of Land and Natural Resources
CCC	Civilian Conservation Corps
CDUA	Conservation District Use Application
CDUP	Conservation District Use Permit
CEQ	Council on Environmental Quality
CIA	Cultural Impact Assessment
CRM	Cultural Resource Management
CRMP	Cultural Resource Management Plan
EA	Environmental Assessment
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
HAR	Hawaii Administrative Rules
HCC	Hawaiian Civic Club
HIBC	Hawai`i Island Burial Council
HPP	Historic Preservation Plan
HRS	Hawaii Revised Statutes
IfA	Institute for Astronomy
DLNR	Department of Land and Natural Resources
MKOSS	Mauna Kea Observatories Support Services
MOA	Memorandum of Agreement
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Protection Act
NHPA	National Historic Preservation Act
OEQC	Office of Environmental Quality Control
OHA	Office of Hawaiian Affairs
OMKM	Office of Mauna Kea Management
PA	Programmatic Agreement
PHRI	Paul H. Rosendahl, Ph.D. Inc.
ROK	Royal Order of Kamehameha
SHPD	State Historic Preservation Division
TCP	Traditional Cultural Property
VLBA	Very Long Base Array

1.0 INTRODUCTION

The summit region of Mauna Kea, the highest and second largest of the five volcanoes that form the island of Hawai`i, is one of the premier centers for astronomy in the world. It is also by any standard of comparison one of the most culturally significant and archaeologically important places in the Hawaiian Islands. A number of Native Hawaiians regard Mauna Kea as the most sacred place on the island and some use the mountain as a place to conduct traditional and customary practices. The Mauna Kea Adze Quarry, located just below the summit, was placed on the National Register of Historic Places in 1962 as a National Historic Landmark. In 1999 the Mauna Kea Summit Region Historic District, which encompasses the adze quarry and many other significant sites in a vast cultural landscape, was determined eligible for listing on the National Register.

In addition to astronomers and Native Hawaiians, Mauna Kea is also used by the public for a variety of recreational, educational, research, and commercial purposes. With the establishment of the Mauna Kea Science Reserve (Figure 1-1), which was leased to the University of Hawai`i (UH) in 1968, came conflicts over the use of a large area of the upper mountain for primarily research and educational purposes. A number of Mauna Kea management plans have been prepared since the 1970s when concerns were first raised about the increasing number of telescopes on the mountain and the effect these were having on the natural and cultural environment.

In 1995 the Board of Land and Natural Resources (BLNR) approved the Revised Management Plan for the UH management areas on Mauna Kea. The 1995 plan, while marking an improvement on previous plans, fell short of meeting the needs and expectations of the various stakeholders, including UH, the Department of Land and Natural Resources (DLNR), Native Hawaiian practitioners, conservationists and other user groups.

A Legislative audit on the management of Mauna Kea and the Mauna Kea Science Reserve in 1998 concluded that although a comprehensive management plan had been developed it was poorly implemented. The 1998 audit recommended the preparation of a new master plan (Office of the Auditor Report 98-6). The Mauna Kea Science Reserve Master Plan was completed in 2000 (Group 70 International, Inc. 2000). Although the 2000 Master Plan contained management policy guidelines and recommendations, it had no statutory authority because it was not approved by the Board of Land and Natural Resources (BLNR). A follow-up Legislative audit in 2005 (Office of the Auditor Report 05-13) and a decision rendered by the Third Circuit Court on January 19, 2007 concluded that the 1995 Revised Management Plan did not fulfill the requirements of a comprehensive management plan for astronomy facilities constructed on Conservation Lands, as defined in Section §13-5-2 of the Hawaii Administrative Rules (HAR). The UH prepared a Comprehensive Management Plan (CMP) which was approved by the BLNR on April 9, 2009.

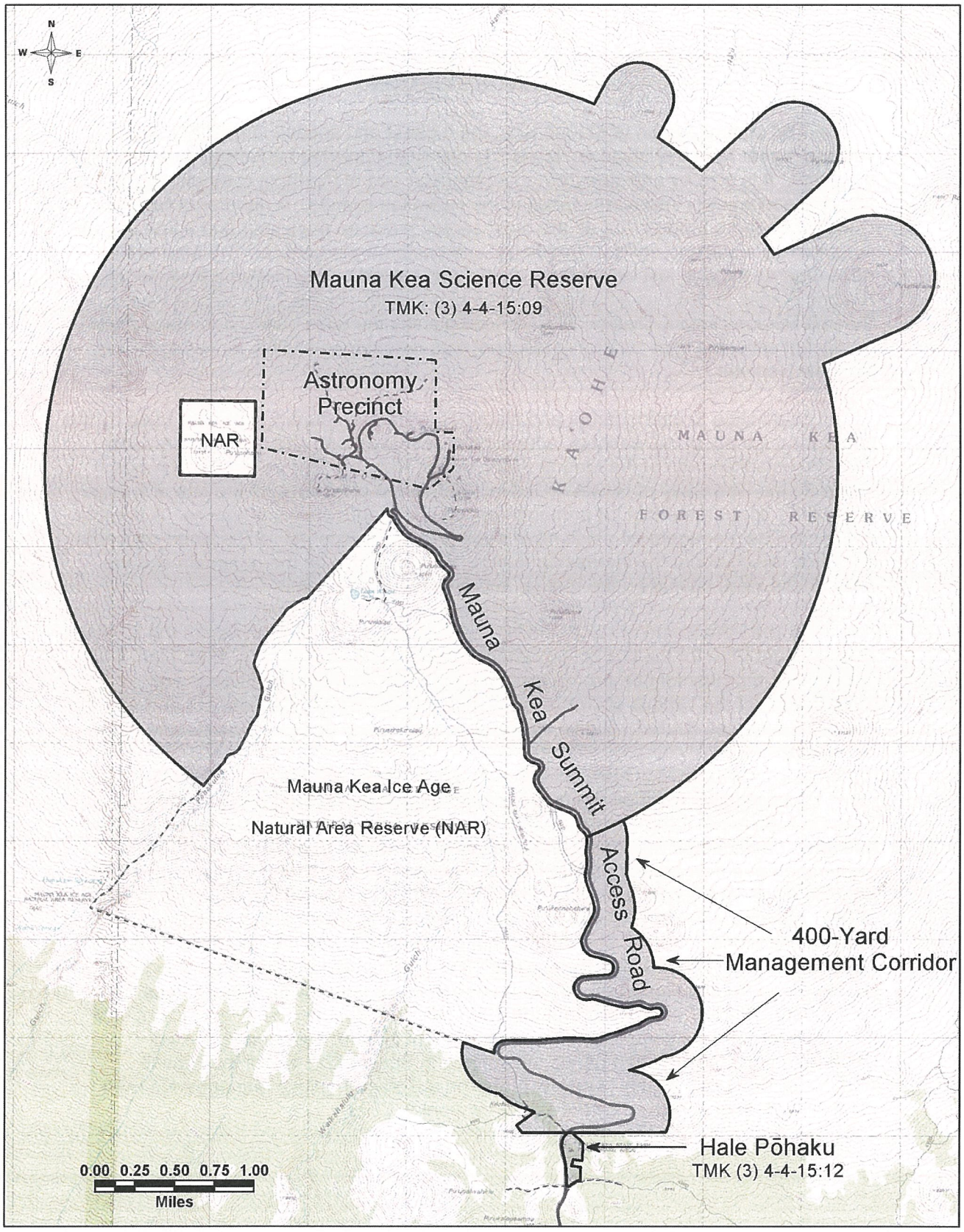


Figure 1-1. University of Hawai`i Management Areas

The CMP was approved with a number of conditions (BLNR 2009). Condition 4 stated:

> Within one year of the BLNR approval of the CMP, or the submission of a Conservation District Use Application, whichever occurs sooner, the University shall submit for review and approval the following sub plans:
>
> - A cultural resources management plan;
> - A natural resources management plan;
> - A decommissioning plan, including a financial plan; and
> - A public access plan

PCSI was contracted by OMKM to prepare a Cultural Resource Management Plan (CRMP) in May 2005, prior to the Third Circuit Court ruling and the recently approved CMP.

1.1 CULTURAL RESOURCE MANAGEMENT PLAN OBJECTIVES AND PHILOSOPHY

The primary objective of this CRMP is to ensure that UH fulfills its mandate to preserve and protect the cultural resources in the areas managed by the Office of Mauna Kea Management (OMKM). To do this UH must comply with:

1. the terms of the 1968 lease agreement
2. all applicable state and federal historic preservation laws and regulations
3. the conditions pertaining to the management of cultural resources in the 2009 Comprehensive Management Plan

Thomas F. King has noted that "The terms "cultural resource" and "cultural resource management" (CRM)--invented by archaeologists in the 1970s to equate what they did with natural resource management--is variously taken to mean a number of different things..." (King 1998:5-6). Some examples of what people regard as "cultural resources" are "archaeological resources"; "historic resources"; ""spiritual places"; "religious practices" and "historic objects" (King 1998:Figure 1). "Cultural resource" is commonly used in Hawai`i and elsewhere in the United States as a synonym for "historic property," but the two are not the same. The term "historic property" has a statutory definition, whereas "cultural resource" does not. The definition of "historic property" in the National Historic Preservation Act NHPA and Chapter 6E of the Hawaii Revised Statutes (HRS) are similar:

> ...any prehistoric or historic district, site, building, structure or object included in, or eligible for inclusion on the National Register (of Historic Places), including artifacts, records, and material items related to such a property (NHPA Sec. 301[5]).
>
> Historic property" means any building, structure, object, district, area or site, including heiau and underwater site, which is over fifty years old (Chapter 6E-2).

According to King, cultural resource management plans (CRMPs), variously called by other names, such as historic preservations plans (HPPs), are "really applicable only if you have a lot of actions going on in the same general area...so you

can prescribe standard operating procedures" (King 1998:233). The UH management areas on Mauna Kea meet this criterion because of the number of public and commercial activities and user groups.

The purpose, content and structure of this CRMP are based in large part on King's philosophy of what constitutes a good CRMP. The purpose of a CRMP, according to King, "is to give an agency or a facility a tool it can use to get on with whatever it does (its mission) in a manner consistent with the cultural resource laws and the national policy of environmental stewardship" (King 1998:234). King (1998:235) writes that a CRMP needs to:

- Respond to the mission of the agency or facility and that it has to be realistic in terms of that mission.
- Establish achievable goals in ways that can serve as a basis for budget decisions, assigning staff, establishing performance measures, and setting up contracts.
- Be integrated with other plans such as operating plans, natural resource management plans, and recreation plans.
- Address all the "cultural resources" that may be affected or managed by the entity to which the CRMP applies. If it does not, it needs to be explicit about what it does and doesn't address.
- Be based on a full understanding of the applicable laws and serve as a basis for demonstrating compliance with these laws in a cost-effective and time-effective manner.

In order to achieve its purpose, King (1998:235) is of the opinion that CRMP's should:

- Include both *proactive* and *reactive* elements.
- Include procedures-such as review procedures, or the application of standards-to minimize damage to cultural resources, and also procedures to promote their proper use. It should also establish realistic goals and targets for completing specified tasks.
- Provide ready access to pertinent information, such as survey data, pertinent standards and guidelines, and points of contact for consultation.
- If all cultural resources haven't been identified, the CRMP needs to provide for ongoing identification, coordinated with mission needs.

1.2 ORGANIZATION OF THE PLAN

The organization and content of this CRMP is built upon a partially completed draft historic preservation plan (HPP) for Mauna Kea prepared by the State Historic Preservation Division (SHPD) in 1999-2000 for the 2000 Master Plan Group 70 International Inc. 2000: Appendix F). Unlike the SHPD Plan this CRMP does not address the long-term management of historic properties located in the Mauna Kea Ice Age Natural Area Reserve (NAR) which is administered by the Natural Areas Reserve System of DLNR. The need for a comprehensive management plan for the NAR (see Figure 1-1) and the Mauna Kea Adze Quarry Complex in particular, has been recognized for some time and efforts are finally underway to develop one. While the NAR is not a part of this CRMP, sections of the SHPD Plan that included a discussion of relevant NAR administrative rules and regulations have been included since they could be easily adopted to provide more protection for the historic properties that UH is obligated to manage under the 1968 lease agreement and later agreements with DLNR.

This plan is divided into six primary sections, excluding a list of the people that were involved in the preparation of the plan, references, and appendices:

Section 1-Introduction presents a general statement of the historical and cultural significance of the Mauna Kea summit region; a brief reference to the conflicts that ensued between various user groups with the creation of the Mauna Kea Science Reserve and the management plans that followed; an overview of the objectives and philosophy of the CRMP; a description of the geographical scope of the plan or management areas; an overview of public and commercial activities and user groups; a history of Mauna Kea planning studies and the relationship of this CRMP to other Mauna Kea management plans and ancillary studies, and lastly, a brief summary of all applicable laws and regulations.

Section 2-Background provides some essential background information, including a brief description of the environment of the UH management areas; an equally brief description of the culture-historic context of the Mauna Kea summit region, and a somewhat lengthier summary of the historic property inventory for the UH management areas, including the Mauna Kea Summit Region Historic District, which extends beyond the boundaries of the Science Reserve. It also includes a section on traditional, customary and contemporary cultural beliefs and practices.

Section 3-Management Objectives and Authority summarizes previously identified management goals and objectives, including the proposal in the Master Plan for a single management authority, which was eventually realized in the creation of the Office of Mauna Kea Management (OMKM). The mission, responsibilities and early management initiatives of OMKM are briefly described as a prelude to a detailed discussion of specific management issues and needs in the following section.

Section 4 -Management Plan consists of three parts. Part one addresses general management issues while part two addresses specific public activities. The major focus in both sections is on describing potential threats or impacts that different activities may have on historic properties and how such impacts can or should be avoided or mitigated, if necessary. Existing management policies are summarized and evaluated and recommendations made for changes and/or the addition of new policies and procedures. The review and compliance procedures that are recommended are akin to what are variously called Standard Operating Procedures or Best Management Practices. The third part of the Management Plan is focused on specific long term management strategies, programs and plans, including developing and implementing an historic property monitoring program; an inadvertent discovery and burial protection plan; a conceptual interpretive and educational plan, a debris removal, monitoring and prevention plan, data and collections management and an emergency plan.

Section 5-Implementation and Evaluation Plan summarizes and presents a plan to implement the management actions presented in Section 4. Implementation is discussed in terms of the priority of major actions, the relative costs, and a schedule to complete the implementation of management actions. Staffing and training, and the value of cooperative agreements with other state agencies are also discussed. Finally, the CRMP recognizes that management plans are not static and need to contain provisions for continued consultation and periodic review and amendments to the plan.

Section 6- Agencies and Organizations Consulted in the Preparation of the CRMP summarizes consultation with Native Hawaiian organizations and other community groups and stakeholders in the preparation of this management plan.

1.3 Geographical Scope of the Plan: UH Management Areas

UH is responsible for the management of three areas on Mauna Kea (Figure 1-1), all of which are located in the Resource Subzone of the State Conservation District. Each area is identified and briefly described below.

1.3.1 Mauna Kea Science Reserve

The Mauna Kea Science Reserve (TMK: (3) 4-4-15:09), formerly a part of the Mauna Kea Forest Reserve (Figure 1-2), was established in 1968 when the Board of Land and Natural Resources (BLNR) approved a 65-year lease (Lease No. S-4191) to the University of Hawai`i (UH) for a 13,321-acre scientific complex on the top of Mauna Kea. The Science Reserve, which encompasses all of the land above the roughly 12,000 ft elevation, has an average radius of 2.5 miles from the UH 44-inch telescope located on the summit. The boundary on the northeast side of the Science Reserve extends further down the mountain to include Pu`u Mākanaka and two other large cinder cones (see Figure 1-1) which appear to have been viewed at the time as potential observatory sites. The rationale for creating such a large reserve is explained in the lease:

> The land hereby leased shall be used by the Lessee as a scientific complex, including without limitation thereof an observatory, and as a scientific reserve being more specifically a buffer zone to prevent the intrusion of activities inimical to said scientific complex.

The boundaries of the Science Reserve changed in 1981 when 2,033.2-acres of land were withdrawn from the lease for the creation of the Mauna Kea Ice Age Natural Area Reserve (NAR). The NAR (see Figure 1-1) consists of two separate parcels, a 3750.0 -acre roughly triangular-shaped parcel (TMK: (3) 4-4-15:10) that encompasses most of the Mauna Kea Adze Quarry and Lake Waiau, and a 143.5-acre parcel (TMK: (3) 4-4-15:11) surrounding Pu`u Pōhaku, where fossil ice has been found (see Figure 1-1). The Science Reserve now encompasses an area of roughly 11,288 acres.

1.3.2 Mid-Level Facilities at Hale Pōhaku

The second management area is a 19.3-acre leased parcel (Lease No. S-5529) at Hale Pōhaku (CDUP No. HA-1819, Tax Map Key 4-4-15:12). The parcel encompasses the Onizuka Center for International Astronomy (OCIA), the Visitor Information Station (VIS), and an old construction laborer camp (Figure 1-3). Some of the cabins in the old camp are now used by the OMKM rangers, VIS staff, volunteers, and researchers.

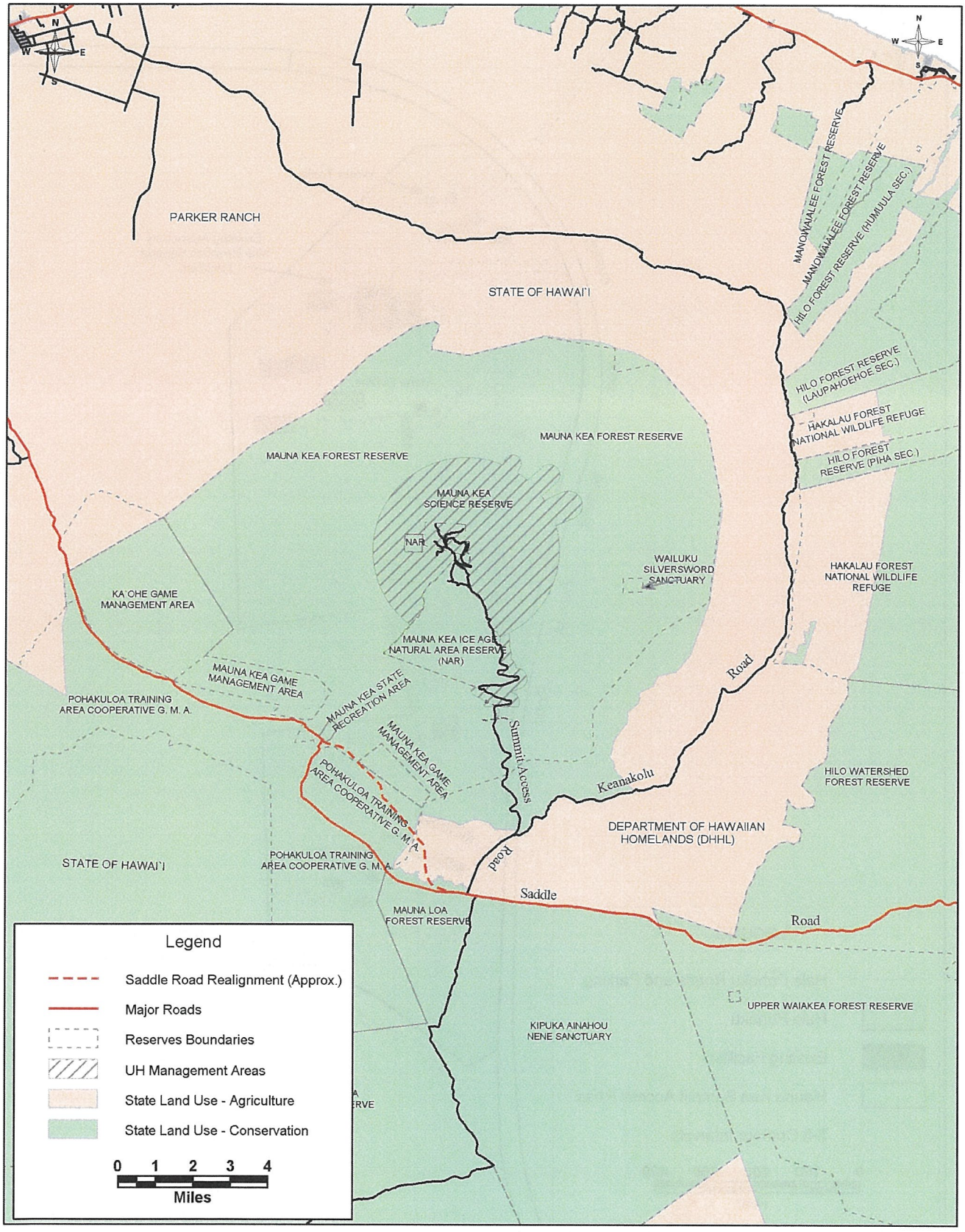


Figure 1-2. Land Use Designations Bordering the UH Management Areas

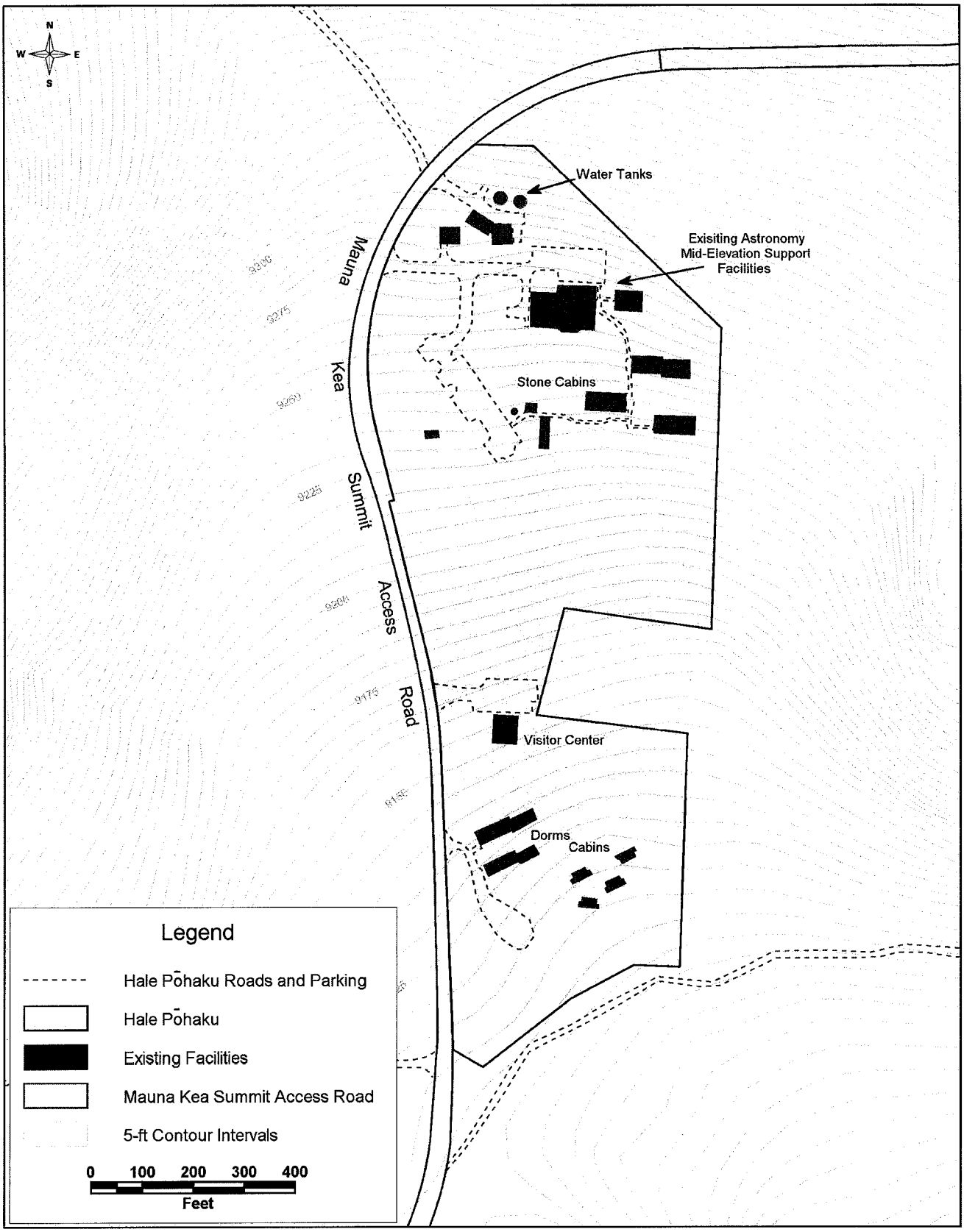


Figure 1-3. The Mid-Level Facility Parcel at Hale Pōhaku

1.3.3 Mauna Kea Access Road

The third management area is the summit access road from the OCIA at Hale Pōhaku to the Science Reserve boundary at the approximately 12,000-foot elevation. This includes a non-exclusive easement (Grant of Easement No. S-4697) approximately 400 yards wide on either side of the road, except for sections that fall within the boundaries of the Natural Area Reserve (Figure 1-4).

1.4 Overview of Public Activities, Commercial Activities, and User Groups

The state lands on the top of Mauna Kea are used for a variety of both public and commercial activities, and indeed the multiplicity of activities is the key source of the conflicts that exist between different user groups (Juvik and Juvik 1984). In addition to astronomy, Mauna Kea has become a popular destination for both local residents and tourists with an interest in astronomy and stargazing. Hiking, general sightseeing and hunting are other popular activities, as are skiing and other forms of snow play when conditions permit. A list and more detailed discussion of public and commercial activities is presented in **Section 1.5.5**.

The primary user group in terms of the number of institutions and a full-time physical presence on Mauna Kea are the astronomers. There are currently 13 observatories (Figure 1-5) that employ a large number of support staff. The observatories and their starting date of operations are presented below in Table 1-1.

Table 1-1 Mauna Kea Observatories and Starting Date of Operations.

Observatory	Starting Date of Operations
**Lunar and Planetary Station	1964
University of Hawaii (UH) 24inch	1968
University of Hawaii 88 inch	1970
Canada-France-Hawaii Telescope (CFHT)	1979
NASA Infrared Telescope Facility (IRTF)	1979
United Kingdom Infrared Telescope (UKIRT)	1979
Caltech Submillimeter Observatory (CSO)	1987
James Clark Maxwell Telescope (JCMT)	1987
Very Long Baseline Array (VLBA)	1992
W.M. Keck Observatory 1	1992
W.M. Keck Observatory 2	1996
Gemini North Telescope	1999
Subaru	1999
Smithsonian Submillimeter Array (SMA)	2002

** no longer in operation

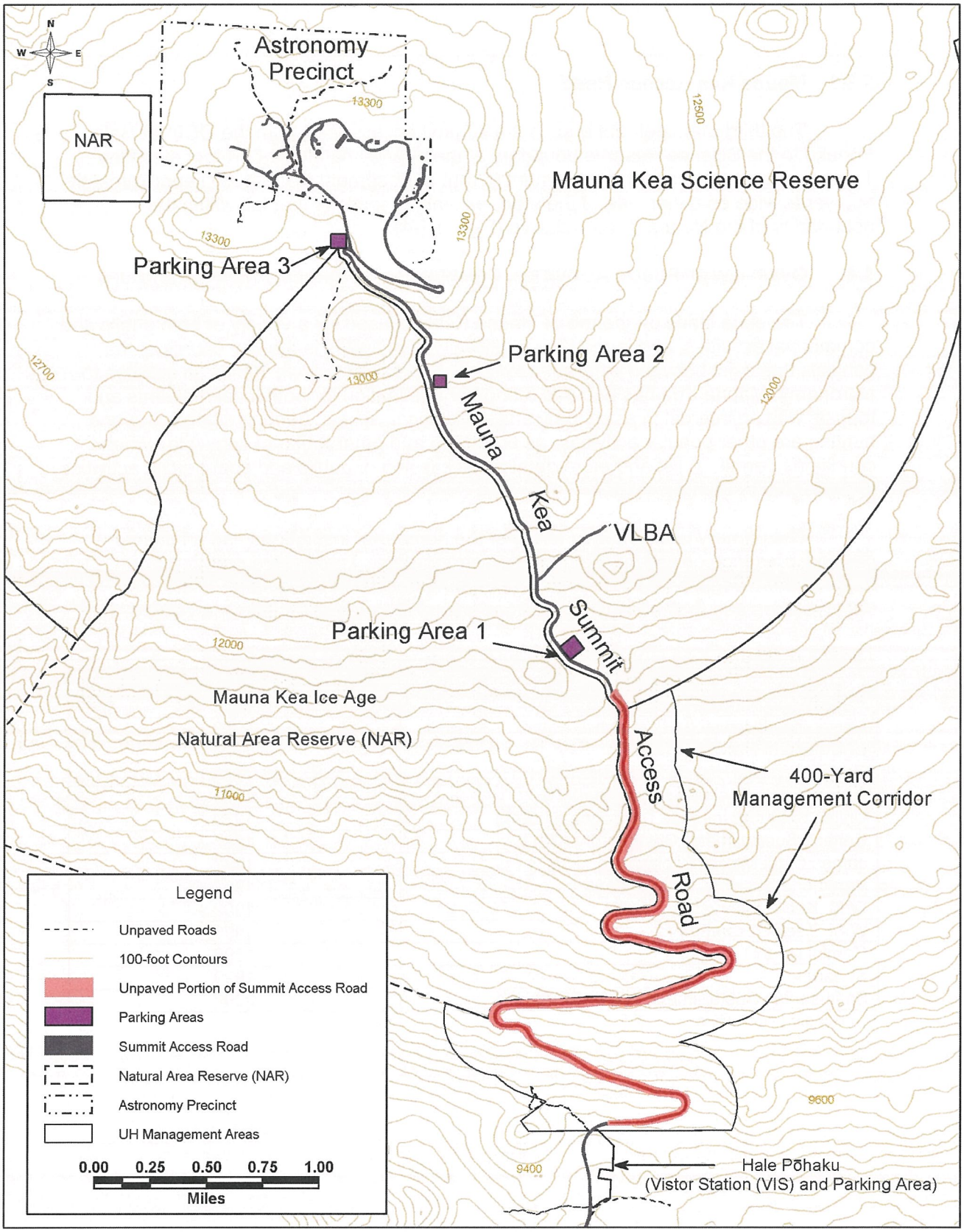


Figure 1-4. UH Management Area Roads and Parking Areas

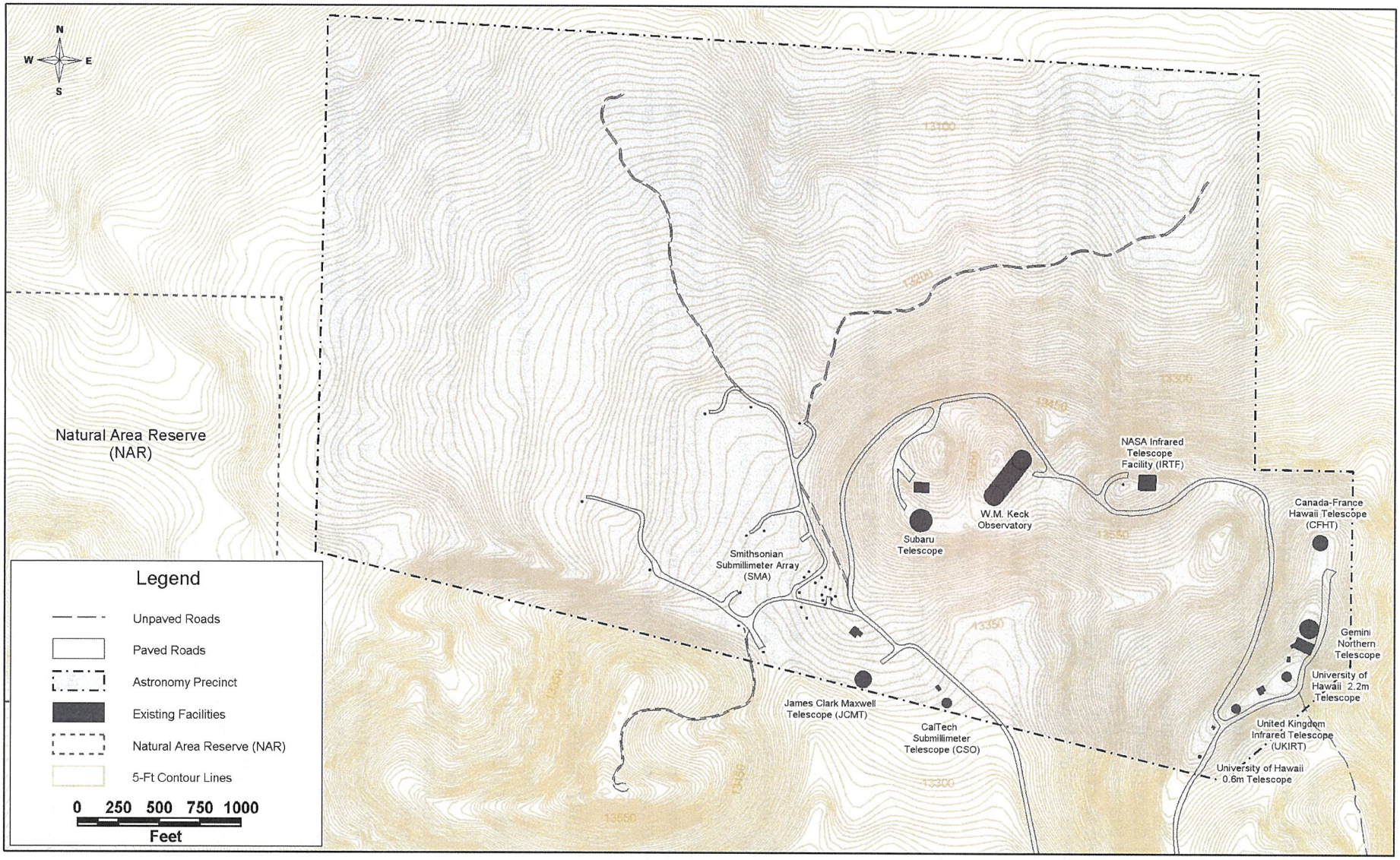


Figure 1-5. Approximate Boundary of the Astronomy Precinct and Existing Facilities

Tourists, many of whom are transported by the commercial tour companies now operating on Mauna Kea, constitute another large user group. A large number of tourists and local residents come to view the sunset at the summit and participate in star-gazing activities. The number of casual visitors, who arrive on their own, is unknown.

Another primary user group is the Native Hawaiian community. The cultural impact assessment for the Master Plan (PHRI 1999:33-40) and the Final Environmental Impact Statement (FEIS) for the Outrigger telescopes project (NASA 2005), discussed below in **Section 1.5**, both identified a number of different cultural and religious practices that are occurring today. While most of these practices, which are discussed in **Section 4.2.1**, are conducted by individuals and families who for various reasons do not wish to be identified, there are organizations such as the Royal Order of Kamehameha I and Mauna Kea Anaina Hou that have taken an active role in speaking out about the need to protect Mauna Kea's cultural and religious values and practices and, thus, are more in the public eye. A joint report has been prepared by these two organizations, "Mauna Kea—The Temple: Protecting the Sacred Resource."

1. 5 History of Mauna Kea Planning Studies and Relationship of the CRMP to Earlier Plans

A number of Mauna Kea plans have been prepared since the 1970s, including development plans, master plans and management plans. A short history of Mauna Kea planning studies and related environmental impact statements (EIS's) is presented below. The overview is focused on the plans, environmental impact assessments and ancillary studies most important to understanding the recent history of land use management on the mountain, and the management of cultural resources in particular. This section concludes with a brief discussion of the relationship of the CRMP to earlier plans.

1.5.1 1977 DLNR Mauna Kea Plan

In 1974, then Acting Governor, George Ariyoshi wrote a memorandum to the Chairman of BLNR, Sunao Kido, stating:

> I am concerned that social pressures for more intensive use of Mauna Kea for scientific, recreational and other purposes pose a threat to the priceless qualities of that mountain...
>
> To assure that full consideration is given to all aspects of permitted, controlled and prohibited uses, you are hereby directed to develop and promulgate, as expeditiously as possible, a Master Plan for all of Mauna Kea above the Saddle Road (DLNR 1977:Introduction).

A preliminary draft of what was called the Mauna Kea Planning Study was prepared and distributed for public comment in 1975. Public meetings on a subsequent draft, called A Plan for Mauna Kea, were held in Hilo in 1976. A final version, The Mauna Kea Plan, was approved by BLNR in 1977.

The Mauna Kea Plan, sometimes cited in later studies as the 1977 DLNR Plan, was developed as a policy framework for the management of all of the Conservation District land on the mountain, from the Saddle Road at the 6,000 ft elevation to the summit, which is 13,796 feet above sea level. The Plan identified five management areas:

1. *Māmane-naio* Forest Ecosystem Management Area.
2. Science Reserve Management Area.
3. Special Natural Area and Historic/Archaeological Management Area.
4. Silversword Management Area.
5. Military Management Area.

Management responsibilities were divided between UH, DLNR and the State Department of Transportation (DOT). UH was given the responsibility of managing the Science Reserve and the facilities at Hale Pōhaku. DOT was assigned responsibility for the Mauna Kea Access Road, from the Saddle Road to Hale Pōhaku, upon transfer of the road to DOT. Management of the remaining lands fell to several divisions of DLNR. The 1977 Mauna Kea Plan was amended in 1984 and 1985 "to allow for overhead power lines from the Saddle Road to Hale Pōhaku, paving of the Mauna Kea Observatory Access Road from Hale Pōhaku to the summit, and to delineate areas to be managed by UH" (MCM Planning 1985:43).

1.5.2 1980 Hale Pōhaku Complex Development Plan

The need for a more expansive and modern astronomy support facility at Hale Pōhaku had been recognized during the major boom in telescope construction in the late 1970s. This, combined with hunter concerns about the reduction in the size of a key hunting area and environmentalist concerns about the impacts of new construction on the habitat of the endangered *palila* bird (*Loxioides bailleui*), resulted in the development of the Hale Pōhaku Complex Development Plan (Group 70 1980).

The Hale Pōhaku Complex Development Plan made an attempt to minimize the impacts on the *Māmane-naio* ecosystem. Apart from the stone cabins no historic properties were known to exist at Hale Pōhaku at the time the plan was prepared. The subsequent discovery of an archaeological site complex, in 1984, resulted in an amendment to the Mauna Kea Science Reserve Complex Development Plan (see **Section 1.5.3**) through a supplemental EIS for construction camp housing. The EIS recognized that construction would have an adverse effect on the site complex and committed to mitigation through data recovery. The details regarding the initial discovery of the site and subsequent data recovery are presented in the summary of archeological investigations in the UH management areas in **Section 2.3.1.2**.

1.5.3 1983 Mauna Kea Science Reserve Complex Development Plan (amended in 1987 and 1989)

The Mauna Kea Science Reserve Complex Development Plan (SRCDP), which was prepared in 1983 and subsequently amended in 1987 and again in 1989, was developed to:

> ...guide the implementation of all proposed astronomy development with the Mauna Kea Science Reserve...to the year 2000, and to present a management plan and implementation strategy for managing and monitoring the various uses of the mountain from Hale Pohaku to the summit (Group 70 1987:4).

The SRCDP contained a management plan which was appropriately called a Conceptual Management Plan because of the lack of detailed management strategies. The rationale for its inclusion was explained in a follow-up plan as follows:

> The purpose of incorporating a management plan as an integral part of the Mauna Kea Science Reserve Complex Development Plan (SRCDP) is to protect the natural and cultural attributes of the summit area while at the same time allowing development and use of its scenic and recreation resources in a responsible, conservation oriented manner (DLNR and UH 1995:1).

The Conceptual Management Plan was organized in three sections: I (Overview); II (Management Proposals), and III (Implementation Strategies/Phasing). The plan identified five user groups—astronomy visitors, recreational visitors, hunters, scientists, and the Mauna Kea Ski Patrol and proposed a number of control measures, including monitoring.

The SRCDP defined UH's management areas as follows:

> Boundaries for the UH Management Area include: the Mauna Kea Science Reserve and the roads within, except the portions of the Mauna Kea Ice Age Natural Area Reserve that are situated within the Science Reserve boundaries; the areas at Hale Pōhaku encompassing the astronomy mid elevation facilities, the Information Station, construction camp, and proposed sub-station; and the summit access road from Hale Pōhaku to the Science Reserve Boundary at approximately 12,000 feet elevation, including a corridor approximately 400 yards wide on either side of the improved road (except for portions of this corridor which fall with boundary of the NAR, and all utility rights-of way and easements (Group 70 1987:141).

1.5.4 1985 Management Plan

UH continued to consult with DLNR, various environmental and recreational groups and the public at large following publication of the SRCDP. Concerns about the proposed control measures in the SRCDP resulted in a modified Management Plan that was approved by BLNR in 1985 (CDUA HA-1573).

1.5.5 1995 Revised Management Plan for the UH Management Areas on Mauna Kea

A significant increase in the use of the summit area by the public and commercial tour operators, following the realignment and other improvements to the jeep road above Hale Pōhaku in the mid-1970s, raised new concerns about the management of the mountain. In 1995 DLNR and IfA prepared a joint plan, called the Revised Management Plan for the UH management areas on Mauna Kea, to address the need for additional control measures (DLNR and IfA 1995). Under this plan, which was approved by BLNR (CDUP-HA-1573A), DLNR retained statutory responsibility for the treatment of historic sites and more general authority over research and education, natural resources, historical and cultural resources, recreation, and commercial uses on State land,

including the Natural Area Reserve. UH was charged with the responsibility of completing and implementing a Historic Preservation Plan. The plan was approved by BLNR with conditions (Wilson to Hall 1995), some of which relate to historic preservation management issues:

1. That until the Historic Preservation plan is completed and implemented by UHIfA, permits for commercial use shall undergo case-by-case review by the Historic Preservation Division in consultation with the Division of Land Management, Department of Land and Natural Resources;
7. The plan shall be amended to prohibit tampering with all historic, archaeological and cultural sites. The only exception would be in the case where the development of a site is proposed, and in the course of the permit for that development, alteration of the site would be prohibited;
12. When the Biological and Archaeological reports are completed, staff shall report back to the Board as to whether any modifications to the plan are warranted by things learned in the biological and archaeological surveys; and
13. There shall be signs about the protection of historic sites as well as discouraging people from making ahu's, subject to funding.

The 1995 Revised Management Plan, which replaced the 1985 Management Plan, differed from the earlier plan by incorporating permitted commercial uses. The 1995 Revised Plan stipulated that:

> Management and enforcement of pubic and commercial use of Mauna Kea is the responsibility of DLNR—except for specific rights reserved to UH.

Part II of the Revised Management Plan recognized two kinds of uses--permitted public activities and prohibited uses of which there were only two—off-road vehicles and commercial hunting tours. The permitted uses were divided into two categories: (1) public and (2) commercial (Table 1-2). The public uses were further divided into (1) recreational activities; (2) educational activities, and (3) cultural activities. The permitted commercial uses were divided into seasonal and non-seasonal activities (Table 1-2).

The permitted cultural activities were not specified (see Table 1-2). The language on cultural activities simply stated that;

> Cultural activities which are otherwise consistent with this plan and do not involve physical impacts are permitted. These activities will normally be restricted to daylight hours; special permission may be granted by UH and DLNR for night activities.

1.5.6 2000 Mauna Kea Science Reserve Master Plan

Concerns regarding the increasing number of telescopes and the management of the natural and cultural resources in the Science Reserve led to the development of the *Mauna Kea Science Reserve Master Plan* (Group 70 International, Inc. 2000), which was adopted by the University of Hawai'i Board of Regents on June 16, 2000. The Master Plan, which is essentially a planning guide, identified a set of factors and principles intended to drive the planning process through the year 2020. The Plan identified the need for:

Table 1-2. Permitted Public and Commercial Activities in the 1995 Revised Management Plan.

Public Activities			Commercial Activities	
Recreational	**Educational**	**Cultural**	**Seasonal**	**Non-Seasonal**
Skiing, Sledding & Snowplay	Mauna Kea Observatories Telescopes		Downhill Skiing Tours	Hiking Tours
Hiking	Nature Study Tours		Snowplay/Sledding Tours	Sight-seeing Tours
Sight-seeing	Visitor Information Station Programs		Cross-Country Skiing	Daytime Tours of Telescope Facilities (case by case basis)
Amateur Astronomy			Ski Meets, Ski Races and Other Snowplay Events	Nighttime Tours to Hale Pōhaku
Hunting				Film-Making

> ...special scientific and cultural studies — An extensive series of studies, technical research, related management plans and related research to establish comprehensive baselines for the formation of policies regarding the management of Mauna Kea and related resources" (*Voices and Visions of Mauna Kea: Mauna Kea Science Reserve Master Plan and Implementation Process Summary*, University of Hawai'i, 2000).

The Master Plan described several specific management objectives (see further discussion in **Section 3-Management Goals and Objectives)** and proposed policies and strategies aimed at balancing preservation and development needs. The Physical Planning Guide Section of the Master Plan included a cultural resources component that identified the following understandings and commitments (Group 70 International, Inc. 2000: ES-3):

- GIS mapping of known features.
- Designation of 10,760 acres as a Natural and Cultural Preservation Area. This designation highlights the cultural values of Mauna Kea.
- The importance of geo-physical forms such as Pu`u Poli`ahu, Pu`u Līlīnoe, other summit *pu`u* and Waiau, is recognized and protected in the Plan. All undeveloped *pu`u* are preserved.
- A view corridor to the west is preserved based on common cultural practice with a potential for future interpretation.
- Modern cultural practitioners would have unrestricted access.
- The formation of a Kahu Kupuna Council (now called Kahu Kū Mauna Council) to provide advice and facilitation in cultural matters is recommended.
- Photographic monitoring of historic sites is suggested.
- Registration procedures, signage and docent programs are recommended to educate the public on the value of cultural resources and the appropriate protocol for movement in sensitive areas.

- Special development protocols are recommended to avoid inadvertent impacts on cultural properties.
- Management practices would be coordinated with the State Historic Preservation Office.

In terms of the preservation of cultural resources and opportunities for Native Hawaiians to continue cultural practices in undeveloped areas, the most important concession made in balancing conflicting uses of the summit area was the designation of 10,760 acres of the Science Reserve as a Natural and Cultural Preservation Area. This includes all of the undeveloped cinder cones (*pu`u*), some of which had been previously considered as future telescope locations. The remaining area of roughly 525 acres was designated an Astronomy Precinct. It includes the area occupied by all of the existing observatories, with the exception of the Very Long Base Array (VLBA), and several hundred acres on the north-northwestern slope of the mountain for future telescope construction (Figure 1-6).

1.5.7 Appendix F of the Master Plan: "Mauna Kea Historic Preservation Plan Management Components"

As already noted in **Section 1.2**, in 1999-2000 the State Historic Preservation Division of the Department of Land and Natural Resources began preparing a Historic Preservation Plan (HPP) for the UH management areas on Mauna Kea. A final HPP was never completed before the authors of the plan left SHPD, but parts of the HPP were included in the Mauna Kea Science Reserve Master Plan as appendices. These included "Mauna Kea Historic Preservation Plan Management Components" (Appendix F, SHPD 2000) and "Mauna Kea Science Reserve Archaeological Site Inventory: Formal, Functional, and Spatial Attributes" (Appendix K, McCoy 1999a).

The SHPD Plan identified all of the major activities and actions that could have a potential adverse effect on historic properties located in the state lands managed by UH and the means by which such effects could be mitigated to ensure the long-term protection of individual historic properties and the Mauna Kea Summit Region Historic District as a whole. It also summarized existing management policies, which included the NAR, and made a number of additional policy recommendations.

1.5.8 Appendix N of the Master Plan: "Cultural Impact Assessment Study: Native Hawaiian Cultural Practices, Features, and Beliefs Associated with the University of Hawai`i Mauna Kea Science Reserve Master Plan Project Area"

A cultural impact assessment study was undertaken by Paul H. Rosendahl, Ph.D. Inc. (PHRI) for the Environmental Impact Statement (EIS) for the Master Plan under "Chapter 343-Environmental Impact Statements" (HRS) and "Title 11, Chapter 200-Environmental Impact Statement Rules" (HAR, Department of Health). Office of Environmental Quality Control (OEQC) guidelines were employed in the study, which was focused on determining what effects implementation of the Master Plan would have on Native Hawaiian cultural practices, features and beliefs. The primary sources of information used in the assessment were oral histories and consultations undertaken by Kepa Maly, who at the time was employed by PHRI. Another of Maly's reports was included in the Master Plan as Appendix I (Maly 1999).

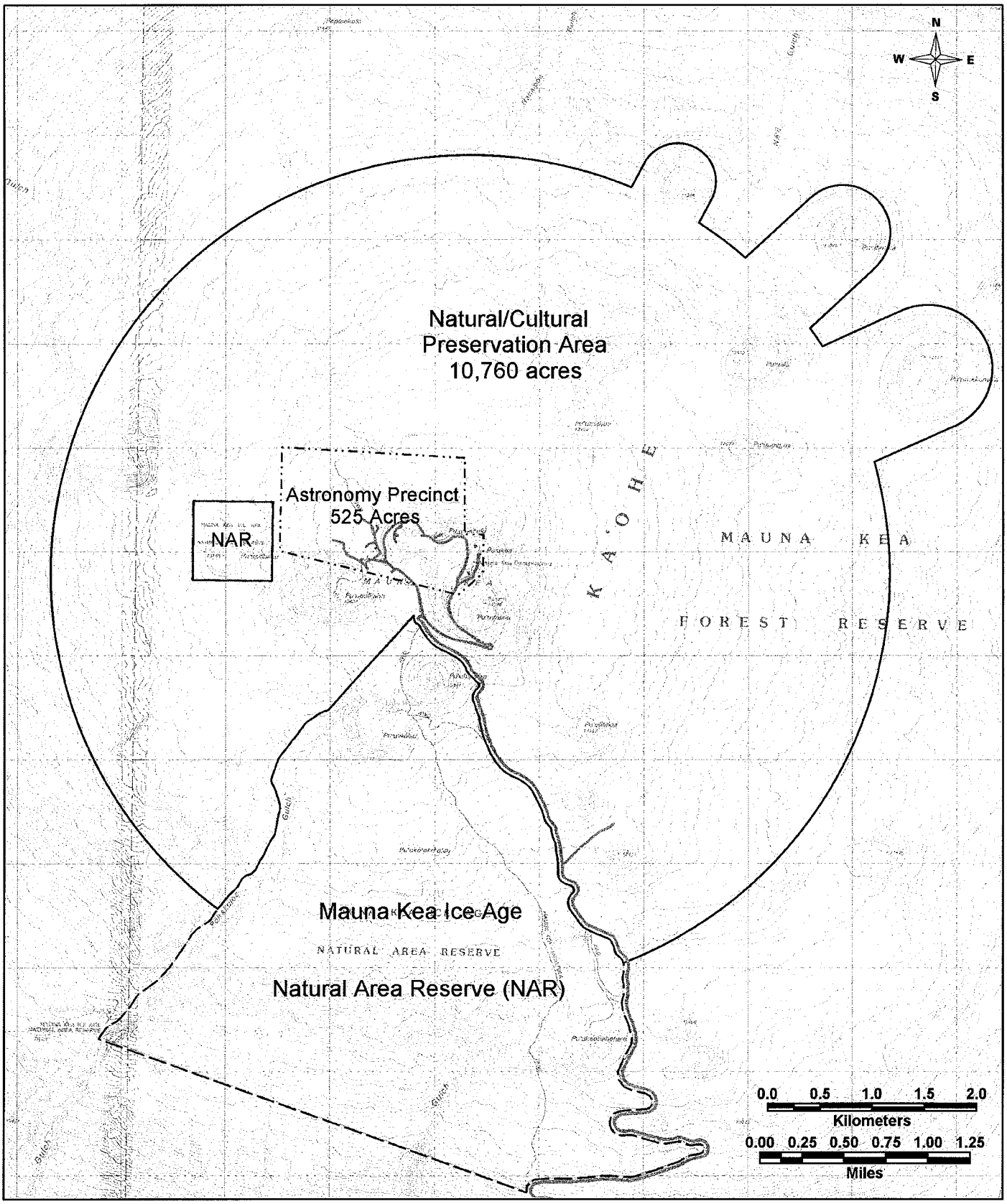


Figure 1-6. Natural/Cultural Preservation Area and Astronomy Precinct

The cultural impact assessment identified a number of traditional and customary practices, several potential traditional cultural properties and several kinds of contemporary cultural practices, some of which may represent continuity of older practices, but also including practices where "no clear specific basis in traditional culture can be clearly established or demonstrated" (PHRI 1999:Table 2, 40). The PHRI report summarized Native Hawaiian perspectives on the Master Plan, from which Maly presented six recommendations, and a concluding discussion of potential mitigation measures. The recommendations and other information presented in this Cultural Impact Assessment are examined in **Section 4.2.1-Cultural and Religious Practices.**

1.5.9 Appendix B (Section 106 National Historic Preservation Act Memorandum of Agreement) and Appendix C (Burial Treatment Plan) of the Final Environmental Impact Statement for the Outrigger Telescopes Project

In 1999 NASA proposed the addition of four and possibly as many as six outrigger telescopes to the W.M. Keck Observatory. After consultation with SHPD, NASA determined that the proposed project, which was classified as a undertaking under Section 106 of the National Historic Preservation Act (see **Section 1.6.4),** would have an adverse effect on the summit, which had been recognized as a significant historic property. The finding of adverse effect prompted the development of a Memorandum of Agreement (MOA) which acknowledged that the proposed project would have an adverse effect not only on the summit, but also on the Mauna Kea Summit Region Historic District which NASA and SHPD agreed was eligible for the National Register of Historic Places (NASA 2005: Appendix B-1). One of the stipulations in the MOA was the need to develop, prior to construction, an Inadvertent Discovery of Human Remains and Archaeological Properties Monitoring Plan.

While NASA later withdrew the funding for the Outrigger Project, following legal challenges, the MOA (Appendix B) and the Burial Treatment Plan (Appendix C) included in the Final Environmental Impact Statement (FEIS) are important documents that could be used as models in the development of future construction monitoring plans and burial treatment plans.

1.5.10 Relationship of the CRMP to Earlier Plans

The summary of the major planning studies prepared between the 1970s and 2000 shows that cultural resources management issues were addressed to some extent in all of the plans. The earliest plans identified management areas and assigned management responsibilities, but provided little or no direction apart from the need to protect the natural and cultural environment. The need to develop and implement an historic preservation plan was identified for the first time in the 1995 Revised Management Plan, the responsibility for which was assigned to IfA. SHPD, with the aid of IfA, prepared a draft HPP which was incorporated into the Master Plan. The SHPD Plan, which was written concurrent with the preparation of the Master Plan and before OMKM was established, was, of course, in some respects a conceptual plan. This CRMP draws heavily on the discussion of management issues and compliance procedures presented in the SHPD Plan. The CRMP thus continues the work begun by SHPD in preparing a comprehensive management plan for cultural resources. While the

scope of the CRMP has been expanded, the objectives are essentially the same as those outlined in the SHPD Plan.

1.6 APPLICABLE LAWS AND REGULATIONS

The discussion of CRMP objectives and philosophy in the Introduction (**Section 1.1**) noted that a CRMP should "be based on a full understanding of the applicable laws as a basis for demonstrating compliance with these laws in a cost-effective and time-effective manner" (King 1998:235). For the UH management areas this means a familiarity with both state (specifically Chapter 6E) and federal laws and regulations, since some of the telescopes (e.g., the NASA Infrared Telescope and the Smithsonian Submillimeter Array) are federally funded.

1.6.1 Chapter 6E, Hawaii Revised Statutes: Historic Preservation Hawaii Administration Rules 13-275: "Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8, HRS," Hawaii Administrative Rules 13-300: Rules of Practice and Procedure Relating to Burial Sites and Human Remains

Several sections of Chapter 6E, Hawaii Revised Statutes (HRS) – pertaining to Historic Preservation – are integral to cultural resource management issues in the three UH management areas. Provisions of §6E-7, 6E-8, 6E-10.5, 6E-11, 6E-43, and 6E-43.6 are applicable to one or more aspects of various future actions. In addition, various chapters of the Hawaii Administrative Rules (HAR) implementing Chapter 6E, HRS, will govern activities within the management areas.

In all of the statutes cited below, the phrase "historic property" refers to "...any building, structure, object, district, area, or site, including *heiau* and underwater site, which is over fifty years old." Similarly, a burial site "means any specific unmarked location where prehistoric or historic human skeletal remains and their associated burial goods are interred, and its immediate surrounding archaeological context, deemed a unique class of historic property and not otherwise included in section 6E-41" (§6E-2).

The phrase "significant historic property" refers to a historic property (including burials and traditional cultural properties) that "meets the criteria of the Hawaii register of historic places or the criteria enumerated in subsections [HAR] 13-275-6(b) or 13-284-6(b)." The criteria of the Hawaii register of historic places are given as follows in HAR §13-275-6(b):

> (b) To be significant, a historic property shall possess integrity of location, design setting, materials, workmanship, feeling, and association, and shall meet one or more of the following criterion:
> (1) Criterion "a". Be associated with events that have made an important contribution to the broad patterns of our history;
> (2) Criterion "b". Be associated with the lives of persons important in our past;
> (3) Criterion "c". Embody the distinctive characteristics of a type, period or method of construction, represent the work of a master, or possess high artistic value;

(4) Criterion "d". Have yielded, or is likely to yield, information important for research on prehistory or history;
(5) Criterion "e". 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.

To summarize, historic sites placed on the Hawaii Register of Historic Places (HRHP) are significant. Furthermore, any historic site that is evaluated through the review and compliance process described in HAR §13-275, and that meets one or more of the significance criteria cited above is also found to be significant by what is called a "consensus determination" of significance. Hawaii Administrative Rules §13-275-6(d)(3) define "consensus determinations" of significance as follows: "...Once agreement is reached [between SHPD and the government agency] on significance of the properties, the SHPD shall enter all significance assessments into the Hawaii inventory of historic places, as consensus determinations."

Since all three UH management areas are State land, Chapters 6E-7 and 6E-8, HRS (cited below) apply to nearly all future activities:

§6E-7 State title to historic property. (a) All historic property located on lands or under waters owned or controlled by the State shall be the property of the State. The control and management of the historic property shall be vested in the department.

(b) The department may dispose of the historic property subject to chapter 171 and subject further to those reservations, restrictions, covenants, or conditions which relate to the preservation of the historic property, such as rights of access, public visitation, operation, maintenance, restoration, and repair. The department shall determine the conditions for any research affecting the historic property and may issue permits for the research.

(c) The State shall hold known burial sites located on lands or under waters owned or controlled by the State in trust for preservation or proper disposition by the lineal or cultural descendants.

(d) The State shall not transfer any historic property or aviation artifact under its jurisdiction without the concurrence of the department, and shall not transfer any burial site under its jurisdiction without consulting the appropriate island burial council [L 1976, c 104, pt of §2; am L 1985, c 124, §1; am L 1990, c 306, §6; am L 1996, c 97, §6].

6E-8 Review of the effect of proposed state projects. (a) Before any agency or officer of the State or its political subdivisions commences any project which may affect historic property, aviation artifact, or a burial site, the agency or officer shall advise the department and allow the department an opportunity for review of the effect of the proposed project on historic properties, aviation artifacts, or burial sites, consistent with section 6E-43, especially those listed on the Hawaii register of historic places. The proposed project shall not be commenced, or in the event that it has already begun, continued, until the department shall have given its written concurrence. The department is to provide written concurrence or non-concurrence within ninety days after the filing of a request with the department.

According to Chapter 6E-7, historic sites upon State lands or under State waters belong to the State, and are to be managed by the Department of Land and Natural Resources (DLNR). Departmental oversight includes the issuing of any permits for research on historic sites and setting conditions for such research. The practical effects of Chapter 6E-8 review include a longer review period for the State Historic Preservation Division, and a mandatory concurrence needed from that agency for any reviewed action. Figure 1-7 illustrates the general sequence of the SHPD's review process under Chapters 6E-7 and 6E-8. It is important to note that the initial 90-day review period may be imposed upon projects that are already underway as well as those that are only planned actions. Additional review requirements and deadlines for reviews by SHPD are contained in Chapter 13-275, Hawaii Administrative Rule (HAR), "Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8, HRS."

Chapter 6E-10.5, HRS (Enforcement) and Chapter 6E-11 (Penalties) applies to any instances of outright damage or vandalism to historic and cultural sites within the three UH management areas. In addition, the provisions of both chapters also cover any failure to follow approved historic preservation compliance measures such as mitigation plans. This means, for example, if an approved archaeological monitoring plan is to be implemented for a ground-disturbing activity, a failure to ensure that the archaeological monitor is present when specified by the plan constitutes a violation of Chapter 6E-10.5. Relevant portions of these statutes follow:

> **§6E-10.5 Enforcement.** (a) If the board of land and natural resources determines that any person has violated or is violating this chapter, or any rule adopted pursuant to this chapter, the board shall serve written notice by certified mail or personal service upon the alleged violator or violators specifying the alleged violation and may include with the notice:
>
> (1) An order specifying a reasonable time during which that person shall be required to take such measures as may be necessary to correct the violation and to give periodic progress reports;
>
> (2) An order imposing penalties provided in section 6E-11.6; and
>
> (3) An order that the alleged violator or violators appear before the board for a hearing at a time and place specified in the notice or to be set later and answer the charges complained of.
>
> **§6E-11 Civil and administrative violations.** (a) It shall be a civil and administrative violation for any person to take, appropriate, excavate, injure, destroy, or alter any historic property or aviation artifact located upon the private lands of any owner thereof without the owner's written permission being first obtained. It shall be a civil and administrative violation for any person to take, appropriate, excavate, injure, destroy, or alter any historic property or aviation artifact located upon lands owned or [controlled by the State or any of its political subdivisions,] except as permitted by the department, or to knowingly violate the conditions set forth in an approved mitigation plan that includes monitoring and preservation plans.

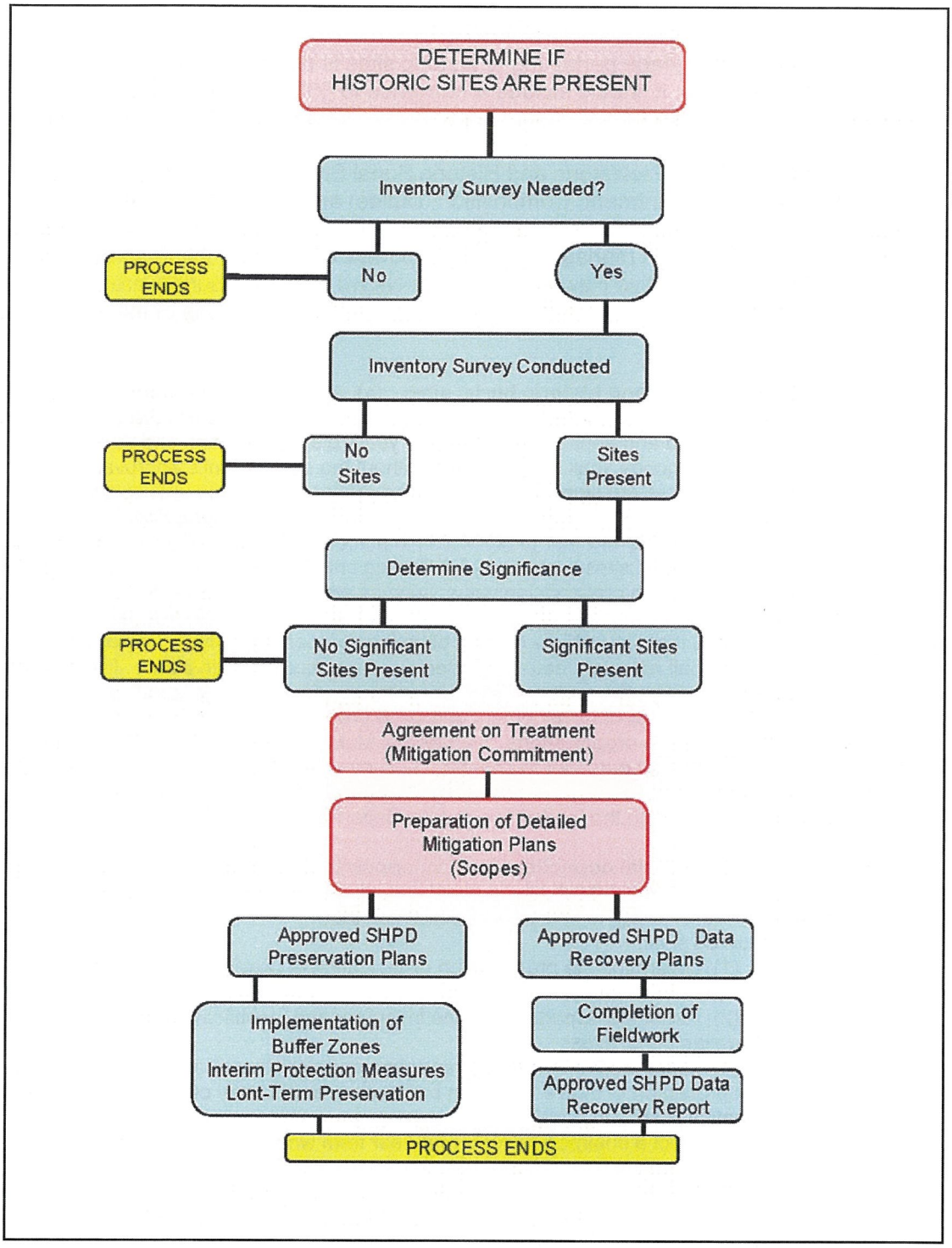


Figure 1-7. State of Hawai`i Historic Preservation Review Process.

In addition, if signage pertaining to historic sites is placed at any locale within the UH management areas, it should include a reference to §6E-11 and the language cited above in order for successful enforcement and prosecution of any violations to occur.

Chapters 6E-43 (Prehistoric and Historic Burial Sites), 6E-43.5 (Island Burial Councils; Creation; Appointment; Composition; Duties) and 6E-43.6 (Inadvertent Discovery of Burials) cover the treatment and disposition of all burials over 50 years old. In the case of the three UH management areas, burials covered by these statutes will most likely be those of Native Hawaiians; no non-Native Hawaiian burials are currently known to be present in the UH management areas. Relevant sections of these statutes follow below.

§6E-43 Prehistoric and historic burial sites. (a) At any site, other than a known, maintained, actively used cemetery where human skeletal remains are discovered or are known to be buried and appear to be over fifty years old, the remains and their associated burial goods shall not be moved without the department's approval.

(b) All burial sites are significant and shall be preserved in place until compliance with this section is met, except as provided in section 6E-43.6. The appropriate island burial council shall determine whether preservation in place or relocation of previously identified native Hawaiian burial sites is warranted, following criteria which shall include recognition that burial sites of high preservation value, such as areas with a concentration of skeletal remains, or prehistoric or historic burials associated with important individuals and events, or areas that are within a context of historic properties, or have known lineal descendants, shall receive greater consideration for preservation in place. The criteria shall be developed by the department in consultation with the councils, office of Hawaiian affairs, representatives of development and large property owner interests, and appropriate Hawaiian organizations, such as Hui Malama I Na Kupuna O Hawai`i Nei, through rules adopted pursuant to chapter 91. A council's determination shall be rendered within forty-five days of referral by the department unless otherwise extended by agreement between the landowner and the department.

§6E-43.5 Island burial councils; creation; appointment; composition; duties. (a) The department shall establish island burial councils for Hawaii, Maui/Lanai, Molokai, Oahu, and Kauai/Niihau, to implement section 6E-43. . . .

(f) The councils shall:

(1) Determine the preservation or relocation of previously identified native Hawaiian burial sites;

(2) Assist the department in the inventory and identification of native Hawaiian burial sites;

(3) Make recommendations regarding appropriate management, treatment, and protection of native Hawaiian burial sites, and on any other matters relating to native Hawaiian burial sites;

(4) Elect a chairperson for a four-year term who shall serve for not more than two consecutive terms; and

(5) Maintain a list of appropriate Hawaiian organizations, agencies, and offices to notify regarding the discovery of remains [L 1990, c 306, pt of §3; am L 2000, c 6, §1].

§6E-43.6 Inadvertent discovery of burial sites. (a) In the event human skeletal remains are inadvertently discovered, any activity in the immediate area that could damage the remains or the potential historic site shall cease until the requirements of subsections (b) to (d) have been met.

(b) The discovery shall be reported as soon as possible to the department, the appropriate medical examiner or coroner, and the appropriate police department. As soon as practicable, the department shall notify the appropriate council and the office of Hawaiian affairs.

(c) After notification of the discovery of multiple skeletons, the following shall be done within two working days, if on Oahu, and three working days, if in other council jurisdictions:

(1) A representative of the medical examiner or coroner's office and a qualified archaeologist shall examine the remains to determine jurisdiction. If the remains are the responsibility of the medical examiner or coroner, the department's involvement shall end. If the remains are historic or prehistoric burials, then the remainder of this section shall apply;

(2) The department shall gather sufficient information, including oral tradition, to document the nature of the burial context and determine appropriate treatment of the remains. Members of the appropriate council shall be allowed to oversee the on-site examination and, if warranted, removal; and

(3) If removal of the remains is warranted, based on criteria developed by the department, in consultation with the councils, office of Hawaiian affairs, representatives of development and large property owner interests, and appropriate Hawaiian organizations, such as Hui Malama I Na Kupuna O Hawai`i Nei, through rules adopted pursuant to chapter 91, the removal of the remains shall be overseen by a qualified archaeologist and a mitigation plan shall be prepared by the department or with the concurrence of the department.

(d) In cases involving the discovery of a single skeleton, the requirements of subsection (c) shall be fulfilled in one working day if on Oahu, and two working days if in other council jurisdictions.

All of the traditional Native Hawaiian burials present within the management areas can be termed "previously identified" in that they have been recorded either through previous archaeological surveys or other types of site visits, or through information provided by Native Hawaiian organizations to the SHPD or the island burial council (cf. §6E-43.5(e)(2) and HAR §13-300-24(B). Treatment and disposition of previously identified Native Hawaiian burials are determined by the island burial council. In the case of the UH management areas on Mauna Kea, the Hawai`i Island Burial Council (HIBC) would fulfill this statutory role in making a determination to preserve in place or relocate a specific burial. For all practical purposes, it is likely that all previously identified Native Hawaiian burials recorded to date will be preserved in place, if a determination is needed. Depending on the results of consultation with the Kahu Kū Mauna Council and other stakeholders, including the HIBC and any known descendants, treatment measures may also include the covering up or securing of any exposed skeletal remains.

Future activities within the UH management areas have the potential of encountering human burials during construction or other ground-disturbing work. If burials are found in such situations, they are called "inadvertent discoveries," and the determinations on their treatment and disposition fall to the DLNR and SHPD in

consultation with the HIBC, Office of Hawaiian Affairs (OHA), and any known descendants (cf. §6E-43.6, HRS, and HAR 13-300-40).

Although circumstances for each inadvertent burial find may differ, the procedures specified in §6E-43.6(a) through (c) should always be followed. These procedures should be clearly explained to any contractors as well as to all staff of OMKM, IFA, and other UH entities who participate in construction or other activities that may result in an inadvertent burial discovery.

1.6.2 Chapter 205, HRS, State Land Use Law and Hawaii Administrative Rules Chapter 13-5, Conservation District

In Hawai`i, all land use is determined through zoning set by a state-wide board, the Land Use Commission (LUC). There are four state land use districts: urban, rural, agricultural, and conservation. All of the UH management areas are within the Conservation District which the LUC defines as follows (Chapter 205-2(e), HRS):

> (e) Conservation districts shall include areas necessary for protecting watersheds and water sources; preserving scenic and historic areas; providing park lands, wilderness, and beach reserves; conserving indigenous or endemic plants, fish, and wildlife, including those which are threatened or endangered; preventing floods and soil erosion; forestry; open space areas whose existing openness, natural condition, or present state of use, if retained, would enhance the present or potential value of abutting or surrounding communities, or would maintain or enhance the conservation of natural or scenic resources; areas of value for recreational purposes; other related activities; and other permitted uses not detrimental to a multiple use conservation concept [L 1963, c 205, pt of §2; Supp, §98H-2; HRS §205-2; am L 1969, c 182, §5; am L 1975, c 193, §3; am L 1977, c 140, §1 and c 163, §1; am L 1980, c 24, §2; am L 1985, c 298, §2; am L 1987, c 82, §3; am L 1989, c 5, §2; am L 1991, c 191, §1 and c 281, §2; am L 1995, c 69, §8; am L 2005, c 205, §2; am L 2006, c 237, §3 and c 250, §1; am L 2007, c 159, §2].

Activities within the Conservation District are governed and permitted through the implementing rules promulgated by the DLNR. Hawaii Administrative Rules 13-5 further define the types of subzones to be found within the Conservation District.

All of the UH management areas are within what is called the Resource Subzone (adapted from http://www.hawaii.gov/dlnr/occl/files/Subzones/12-05/hawaii_conserv_subz2005.pdf). According to HAR 13-5-13, the Resource Subzone is defined as follows:

> §13-5-13 Resource (R) Subzone. (a) The objective of this subzone is to develop, with proper management, areas to ensure sustained use of the natural resources of those areas.
>
> (b) The (R) subzone shall encompass:
>
> (1) Lands necessary for providing future parkland and lands presently used for national, state, county, or private parks;
>
> (2) Lands suitable for growing and harvesting of commercial timber or other forest products;
>
> (3) Lands suitable for outdoor recreational uses such as hunting, fishing, hiking, camping, and picnicking;
>
> (4) Offshore islands of the State of Hawaii, unless placed in a (P) [Protective] or (L) [Limited] subzone;

(5) Lands and state marine waters seaward of the upper reaches of the wash of waves, usually evidenced by the edge of vegetation or by the debris left by the wash of waves on shore to the extent of the State's jurisdiction, unless placed in a (P) or (L) subzone.

Because the UH management areas are located within the Resource Subzone of the Conservation District, many future activities may require one or more types of approvals or permits issued by DLNR. As noted in the citation above, §13-5-24 contains the specific requirements for activities in the (R) Subzone which may range from those requiring no permit from the DLNR or the BLNR to those requiring a board permit (e.g., a Conservation District Use permit [CDUP]) and additional measures, such as a management plan. §13-5-24 (c), HAR, cited below, lists the required compliance actions:

§13-5-24 Identified land uses in the resource subzone and their required permits (if applicable), are listed below:

(c) Identified land uses in the resource subzone and their required permits (if applicable), are listed below:
(1) Identified land uses beginning with letter (A) require no permit from the department or board;
(2) Identified land uses beginning with letter (B) require a site plan approval by the department;
(3) Identified land uses beginning with letter (C) require a departmental permit; and
(4) Identified land uses beginning with letter (D) require a board permit, and where indicated, a management plan

Lacking the details of future actions, it is difficult to provide specific guidance in a planning document. In general, it is likely that many research activities that do not require ground disturbance or alteration of existing environments (e.g., simple pedestrian surveys) will not require any permit. Conversely, research activities or telescope-related projects that require significant construction with associated effects such as vehicular traffic will probably require some type of permit in order to conduct these activities in the Conservation District. Finally, as will be discussed below, the regulatory requirements for Chapters 205 and 343, HRS, may or may not be congruent from case-to-case. For example, an undertaking that requires a CDUP from the BLNR may not require that an EA or EIS be done.

1.6.3 Chapter 343 Environmental Impact Statements, Hawaii Administrative Rules Chapter 11-200, Environmental Impact Statement Rules

Any future project in the three UH management areas with the potential to have an adverse environmental impact will require the preparation of: (1) an Environmental Assessment (EA) or Environmental Impact Statement (EIS) under "Chapter 343-Environmental Impact Statements" (HRS) and "Title 11, Chapter 200-Environmental Impact Statement Rules" (HAR, Department of Health), and (2) a cultural impact assessment (CIA) study to determine what effects the proposed project would have on Native Hawaiian cultural practices, features and beliefs.

The EA and EIS are documents intended to analyze a proposed action and determine the effects, if any, it will have on the surrounding natural and cultural environments. If adverse effects are identified, the EA or EIS must also include measures designed to mitigate adverse impacts. According to §343.5, there are nine "triggers" which, when present, indicate the need for preparing an EA or EIS. The nine "triggers" include the actions listed below, as described in this excerpt from §343.5(a) that would probably apply to a number of future undertakings in the UH management areas:

> (1) … the use of state or county lands or the use of state or county funds, other than funds to be used for feasibility or planning studies for possible future programs or projects that the agency has not approved, adopted, or funded, or funds to be used for the acquisition of unimproved real property; provided that the agency shall consider environmental factors and available alternatives in its feasibility or planning studies; provided further that an environmental assessment for proposed uses under section [205-2(d)(10)] or [205-4.5(a)(13)] shall only be required pursuant to section 205-5(b);
>
> (2) … any use within any land classified as a conservation district by the state land use commission under chapter 205; …
>
> (4) … any use within any historic site as designated in the National Register or Hawaii Register, as provided for in the Historic Preservation Act of 1966, Public Law 89-665, or chapter 6E;…

In 2000, the Hawaii Legislature added the additional requirement of a CIA to the environmental review process outlined in §343-2, as seen in the following excerpt from the statute (emphasis added):

> **§343-2 Definitions.** As used in this chapter unless the context otherwise requires:…
>
> "Environmental impact statement" or "statement" means an informational document prepared in compliance with the rules adopted under section 343-6 and which discloses the environmental effects of a proposed action, effects of a proposed action on the economic welfare, social welfare, and ***cultural practices*** of the community and State, effects of the economic activities arising out of the proposed action, measures proposed to minimize adverse effects, and alternatives to the action and their environmental effects….
>
> "Significant effect" means the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State's environmental policies or long-term environmental goals as established by law, or adversely affect the economic welfare, social welfare, or ***cultural practices*** of the community and State….

In general, when an EA or EIS is required, a CIA will also be done as part of the environmental compliance process. The Environmental Council has adopted guidelines on conducting CIAs, found at this URL: http://oeqc.doh.hawaii.gov/Shared%20Documents/HOW%20TO%20PREPARE%20AN%20ENVIRONMENTAL%20ASSESSMENT/GUIDANCE%20DOCUMENTS/Guidelines%20for%20Assessing%20Cultural%20Impacts.pdf.

1.6.4 Section 106 of the National Historic Preservation Act (16 USC 470) and Implementing Regulations, Protection of Historic Properties (36 CFR Part 800)

The National Historic Preservation Act (NHPA), first passed in 1966 and subsequently amended, covers the treatment of historic properties on Federal lands, under Federal control, and/or affected by Federally funded activities, or undertakings. The NHPA governs the identification and treatment of historic properties by public and private entities in order to ensure that "...the historical and cultural foundations of the Nation should be preserved as a living part of our community life and development in order to give a sense of orientation to the American people ..." (16 USC 470, Section 1). Figure 1-8 illustrates the sequence of steps under Section 106 in which historic sites are identified and evaluated.

The cornerstone of most sections of the NHPA is the concept of historic property. While Hawaii Revised Statutes contain a definition of "historic property," the NHPA uses the following definition:

> "Historic property" or "historic resource" means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register, including artifacts, records, and material remains related to such a property or resource (§301, NHPA, 16 USCw – Definitions).

Historic properties, then, can range from buildings to landscapes, and include archaeological sites and places called "Traditional Cultural Properties." By convention, under Section 106 a property is historic in age if it is 50 years old or more. In order for a historic property be eligible for listing on the National Register of Historic Places (NRHP), it must be found significant under one or more of four criteria, as defined here:

a. that are associated with events that have made a significant contribution to the broad patterns of our history; or
b. that are associated with the lives of persons significant in our past; or
c. that embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
d. that have yielded, or may be likely to yield, information important in prehistory or history.

A historic site must also retain integrity in addition to being deemed significant under one or more criteria. Retaining Integrity simply means that the property has the ability to convey significance.

In the case of the UH management areas, most of the recorded sites are presumed to be pre-Contact in age, and the sites documented to date have been deemed significant under one or more criteria. Nearly all of these sites retain significance as well, partly due to the general isolation of their locations at the Summit of Mauna Kea. For example, a traditional shrine would probably be deemed significant under Criterion "D" (significant for the important information it has yielded or may yield as an individual site) and Criterion "A" (significant for its association with patterns of traditional Hawaiian religious practice). For reasons discussed in more detail elsewhere

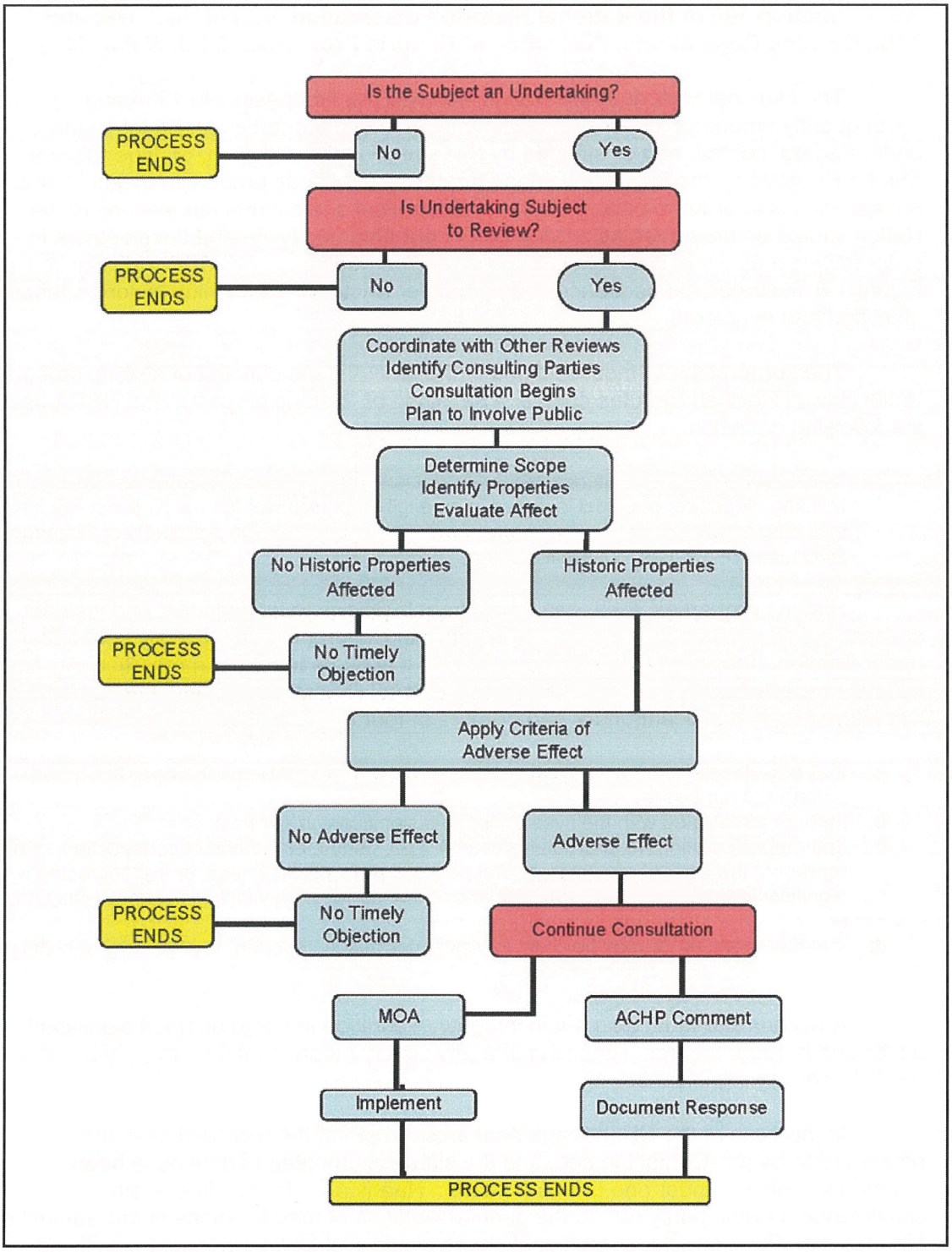


Figure 1-8. Federal Historic Preservation Review Process.

in this document (**Section 2.0**) the sites that are part of the Mauna Kea Adze Quarry National Historic Landmark are all deemed significant by virtue of being contributing properties to the landmark.

Section 106 of the NHPA governs how a Federal agency that is proposing or funding an undertaking must proceed in order to ensure the appropriate treatment of historic properties affected by the undertaking:

> 16 U.S.C. 470f
> The head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking.

Given this definition, it is clear that activities within the UH management areas that are carried out with Federal funding (e.g., from the National Science Foundation or National Aeronautics and Space Administration) are covered by Section 106, NHPA. In addition, any activities that require a federal permit, license, or approval (e.g., a permit or approval from the US Fish and Wildlife Service under the Endangered Species Act) also come under Section 106, NHPA.

While the statute (cited above at 16 USC 470f) broadly defines the requirements of Section 106, the implementing regulations (at 36 CFR Part 800) describe the process by which historic properties are identified and handled during an undertaking. Normally, these steps are carried out by or on behalf of the responsible Federal agency – often the agency that provides the funding or exercises regulatory oversight through issuing a permit.

The first series of steps in the Section 106 process, as described in §800.3 (Initiation of the section 106 Process) of the implementing regulations, establish the nature of the proposed action and who should be consulted about it, as follows:

- Determine if the action is an undertaking
- If the action is an undertaking, identify the appropriate parties to be consulted
- In addition to the State Historic Preservation Office (SHPO) and the general public parties such as local governments, Indian tribes, and Native Hawaiian organizations, and applicants for Federal assistance or permits may also need to be consulted.

The second series of steps, as described in §800.4, center on identifying the proposed undertaking (including its spatial boundaries) and historic properties in the vicinity of the undertaking, and evaluating the effects of the undertaking upon any historic property. The following actions are included:

- Determine the area of potential effect (APE) for the proposed undertaking

- Make a reasonable and good faith effort to identify historic properties in the APE. Such efforts should include background research, consultation, oral history interviews, sample field investigation, and field survey
- Compile existing information about historic properties in the APE and identify information or concerns that knowledgeable parties have about historic sites in the APE
- Determine whether any historic properties in the APE have traditional religious and cultural significance for Native Hawaiian organizations
- Determine if any of the identified historic properties are eligible for listing on the National Register of Historic Places (NRHP), or have religious and cultural significance for any Native Hawaiian organization
- Determine whether the responsible Federal agency official has made a determination of eligibility for identified historic properties in consultation with the State Historic Preservation Officer (SHPO)
- Provide the results of identification and evaluation which will include one of the following determinations:
    - A finding of "no historic properties affected" by the proposed undertaking
    - A finding of "historic properties affected" by the proposed undertaking

A finding of "no historic properties affected" is conveyed to the SHPO and any consulting parties via appropriate documentation that details the information outlined above. If this finding is made, the process ends when the SHPO and any consulting parties have accepted the documentation.

A finding of "no adverse effect" is made when, after consultation, the SHPO and other parties concur with the Federal agency that adverse effect can be resolved through following a condition that complies with the Secretary of the Interior's standards (e.g., architectural documentation of a building or archaeological monitoring during construction). A finding of "adverse effect" is made when the Federal agency, SHPO and other parties cannot agree on a resolution of adverse effect, and thus a Memorandum of Agreement (MOA) is prepared which outlines agreed-upon measures that the agency will take to avoid, minimize, or mitigate the adverse effects. In some cases, the consulting parties may agree that no such measures are possible, but that the adverse effects must be accepted in the public interest.

In the case of UH management areas, future Federal undertakings that involve no or limited ground disturbance, especially in previously developed or disturbed locations, will probably receive a finding of "no historic properties affected" through the Section 106 review process. Future Federal undertakings that require significant ground alteration, affecting the general appearance of the landscape or historic properties within the APE, will probably emerge from the Section 106 process with a finding of "adverse effect" and a MOA prepared that specifies how adverse effects will be avoided, minimized or mitigated.

1.6.5 National Environmental Policy Act of 1969 (42 USC 4321-4347) NEPA Regulations (43 CFR Part 1500 – 1506)

Promulgated in 1969, the National Environmental Policy Act (NEPA) process allows the evaluation of the environmental effects of a Federal action. Among the effects evaluated are those that may have an impact on historic properties or cultural resources in general. The NEPA process includes these general steps:

- Determine what need must be addressed
- Identify alternative ways of meeting the need
- Analyze the environmental impacts of each alternative, and
- Using with the results of the analysis, decide which alternative to pursue and how.

A NEPA analysis can have one or more of several outcomes: a determination of categorical exclusion (CatEx) where an action can be categorically excluded from further environmental analysis due to no effects on the human environment, including historic properties; the preparation of an Environmental Assessment (EA) if the action cannot be categorically excluded or is not a "major Federal action"; the EA can result in a "finding of no significant impact" (FONSI), or in the decision to conduct an Environmental Impact Statement (EIS) study because the action has been found to be a major Federal action through the NEPA analysis.

It is important to note that an action found to be a CatEx under NEPA may still be an undertaking under the NHPA, and vice versa. Any analyses done will need to focus on the potential effects to historic properties found within the APE in both procedures, not just one. Obviously, the ability to perform an adequate analysis is only enhanced by allowing sufficient time for such review. For this reason, the Advisory Council on Historic Preservation has made it possible to combine the NEPA and Section 106 processes, and the implementing regulations for Section 106 encourage this approach to project planning:

> § 800.8 Coordination With the National Environmental Policy Act.
> (a) *General principles* (1) *Early coordination.* Federal agencies are encouraged to coordinate compliance with section 106 and the procedures in this part with any steps taken to meet the requirements of the National Environmental Policy Act (NEPA). Agencies should consider their section 106 responsibilities as early as possible in the NEPA process, and plan their public participation, analysis, and review in such a way that they can meet the purposes and requirements of both statutes in a timely and efficient manner. The determination of whether an undertaking is a "major Federal action significantly affecting the quality of the human environment," and therefore requires preparation of an environmental impact statement (EIS) under NEPA, should include consideration of the undertaking's likely effects on historic properties. A finding of adverse effect on a historic property does not necessarily require an EIS under NEPA.

The implementing regulations for NEPA – found at 40 CFR Part 1500 – 1508 – provide more specific direction than does the statute for to analyze the effects of a proposed action, and consider these effects in any decision-making. Like NEPA, the Council on Environmental Quality (CEQ) regulations for implementing NEPA apply to all Federal agencies and all Federal actions.

2.0 ENVIRONMENTAL, CULTURAL, AND ARCHAEOLOGICAL BACKGROUND INFORMATION

Apart from the need for a CRMP to identify all of the types of cultural resources that exist and need to be managed, there is little or no guidance in the CRM literature on what other background information a CRMP should contain, other than the obvious need to describe the "locational context" of the management area or areas (King 1998:236). Locational context can mean different things. Here it is used to encompass the environmental setting and what is oftentimes referred to as the culture-historical context. The two are interrelated. Culture and nature are from an anthropological perspective intertwined and from a Native Hawaiian point of view inseparable.

A brief description of the environmental setting has been included in this CRMP based on the view that one cannot even begin to try and understand the meaning and significance of the cultural resources in the summit area of Mauna Kea without considering the relationship between people and the high altitude environment. Another reason for including a section on the environment is to draw attention to the constraints it poses on things such as work performance. The development and implementation of a long-term monitoring plan for historic properties, for example, has to consider high altitude and unpredictable weather in formulating a realistic schedule and time frame for the completion of field tasks.

A summary of archaeological research in the UH management areas, though probably unnecessary from a purely management perspective, has also been included as background information. One reason is to provide a readily available history of the different kinds of studies that have been conducted. The summary constitutes a record of which development projects in the management areas involved historic preservation compliance. It also documents the level of effort that has been made in the last decade in identifying all of the known and currently existing cultural resources in the Science Reserve.

2.1 ENVIRONMENTAL SETTING

As described elsewhere (McCoy 1982; 1990:87), the environment on the upper slopes of Mauna Kea evinces similarities to other high mountains, including the marked interdependency of biotic and abiotic processes that has given rise to the term geoecology in the literature on arctic and alpine environments (Billings 1979; Troll 1972; Winterhalder and Thomas 1978; Webber 1979). The UH management areas fall within two major ecosystems. The Mid-Level Facility at Hale Pōhaku, located at the 9,200 ft elevation, is at the upper margins of a subalpine forest. The area above Hale Pōhaku is a stony alpine desert.

In the alpine desert there is little or no soil development. In the absence of an organic surface layer, the ground surface has the appearance of a desert pavement (Ugolini 1974, n.d.). The climate is both dry and cold, but there are few available statistics for evaluating annual and cyclical variability. The prevailing winds are from the

east-northeast. Fog is not uncommon and appears to be generally associated with increased cloudiness at midday (Powers and Wentworth 1941).

Based on studies by Hartt and Neal (1940), Krajina (1963), and Mueller-Dombois and Krajina (1968), the vegetation in the summit region (above 11,250 ft) has been classified as a semi-arid, barren alpine desert tundra (Krajina 1963). It consists of lichens, mosses, and few species of grasses (Smith et al. 1982). Porter (1979b:178-185), in a discussion on the paleoclimatic implications of the latest ice-cap glaciation, suggests that the tree line was depressed to about the 2,000-m (6,560 ft) elevation.

Mauna Kea was for many years the only known mountain in the tropical mid-Pacific with evidence of Pleistocene glaciation (Daly 1910; Porter 1975, 1979b 1979c, 1987); however, evidence for glaciation has apparently been found recently on Haleakala (Moore et al. 1993). On Mauna Kea a succession of glacial drift sheets is exposed between the ca. 2,800 m (9,184 ft) and 4,200 m (13,776 ft) elevations (Porter 1972:1459). The presence of fossil ice [permafrost] in the summit region is further testimony to earlier glacial conditions (Woodcock et al. 1970; Woodcock 1974). The modern climate is periglacial because the summit now lies below snowline and as a result there are no glaciers.

Above the 3,353 meter (10,998 ft) elevation the slopes decrease to form a gently domed plateau (Gregory and Wentworth 1937:1724) on which is found a number of massive volcanic cones. Lake Waiau (Figure 2-1), the only permanent body of water on the plateau and one of the few lakes in Hawai`i (Maciolek 1982), is perched in a glacially scoured cinder cone named Pu`u Waiau. Two intermittent streams, Pōhakuloa Gulch and Waikahalulu Gulch, originate in the environs of the lake which contains in the bottom sediments an interesting fossil diatom flora (Massey 1978). Both gulches are narrow and shallow on the plateau. Lake Waiau, long thought to be the highest lake in the United States, together with the evidence of glaciation and the "Most majestic expression of shield volcanism in the Hawaiian Archipelago, if the not the world" were the chief reasons for adding Mauna Kea to the National Register of Natural Landmarks in 1972 (National Park Service 1972).

For humans the environment of the summit area is a particularly difficult environment in which to work and live because of the physiological effects of high altitude, low temperatures, and biotic impoverishment. It has been characterized elsewhere as a "non-subsistence" environment because of the lack of food and other essentials, such as fuel for fireplaces or hearths (McCoy 1990).

2.2 Culture-Historic Context of the Mauna Kea Summit Region

Much of what is known concerning the traditional culture history of the summit region of Mauna Kea was summarized by Holly McEldowney in a 1982 report, based on a review of early journal accounts and maps, ethnographic collections, and the Boundary Commission Book for Hawai'i (McEldowney 1982). More recent research by Kepa Maly (1998, 1999) and Charles Langlas (Langlas et al. 1997; Langlas1999), both of whom have conducted oral interviews in addition to archival research, have provided additional information on the traditions associated with Mauna Kea and its cultural and spiritual

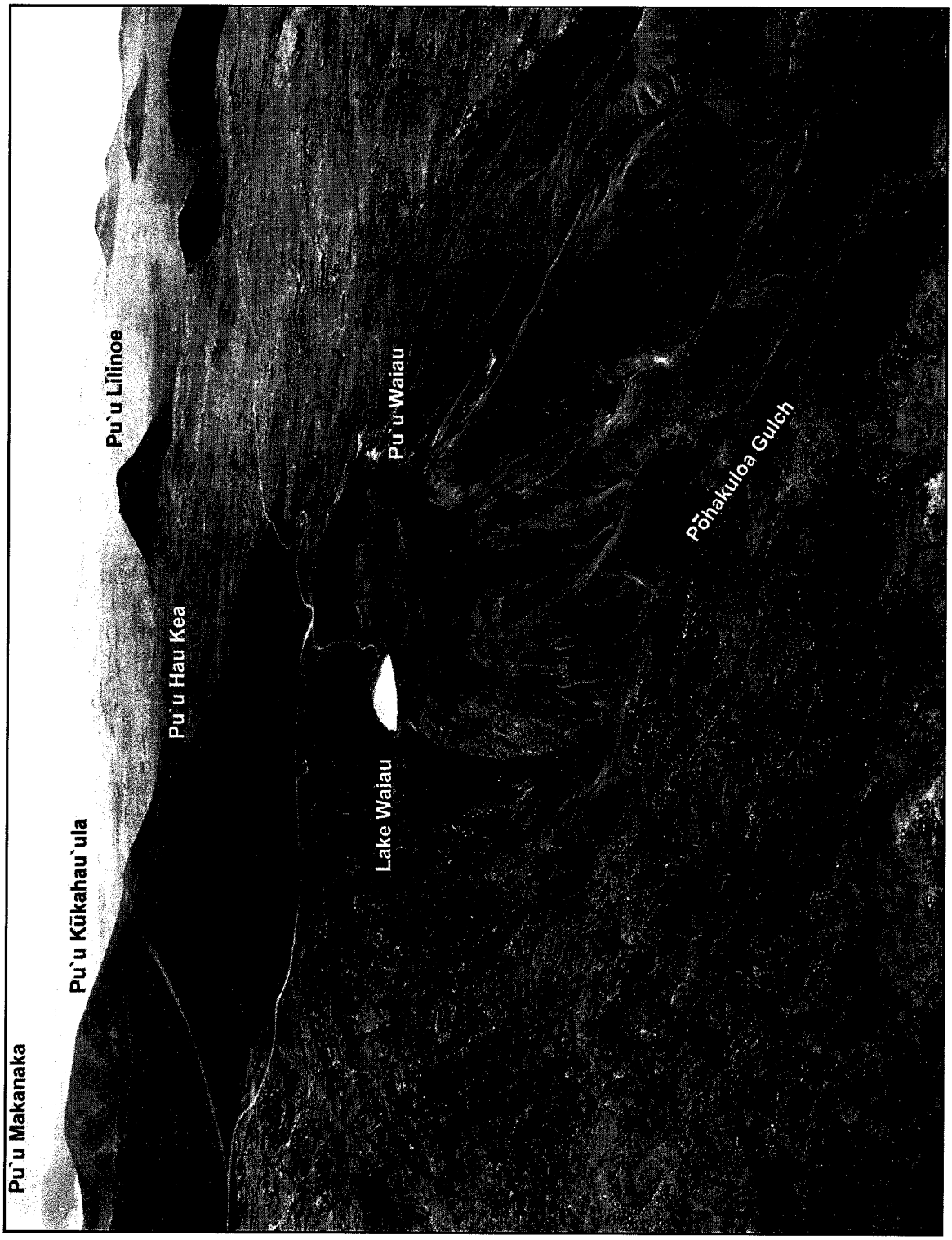


Figure 2-1 Aerial View of Lake Waiau and Surrounding Landscape.

significance for Hawaiians today. A major compilation of native traditions, historical accounts and oral history interviews on Mauna Kea and surrounding lands can be found in a study entitled "Mauna Kea—Ka Piko Kaulana o Ka `Aina (Mauna Kea—the Famous Summit of the Land) by Maly and Maly (2005) that was commissioned by the Office of Mauna Kea Management (OMKM). The overview that follows is based on these studies which should be consulted for more detailed information.

2.2.1 Socio-political Context

The summit of Mauna Kea is located in an *ahupua`a* (a territorial unit generally equated with the community) called Ka`ohe in the Hamakua District (Figure 2-2). Ka`ohe is perhaps the classic example of the unusually large *ahupua`a* found in what Lyons referred to as the "almost worthless wastes of interior Hawaii" in the following account:

> Then there are the large ahupuaas which are wider in the open country than the others, and on entering the woods expand laterally so as to cut off the smaller ones, and extend toward the mountain till they emerge into the open interior country; not however to converge to a point at the tops of the respective mountains. Only a rare few reach those elevations, sweeping past the upper ends of all the others, and by virtue of some privilege in bird-catching, or some analogous right, taking the whole mountain to themselves...The whole main body of Mauna Kea belongs to one land from Hamakua, viz., Kaohe, to whose owners belonged the sole privilege of capturing the *ua`u*, a mountain-inhabiting but sea-fishing bird.
>
> These same lands generally had the more extended sea privileges. While the smaller ahupuaas had to content themselves with the immediate shore fishery extending out not further than a man could touch bottom with his toes, the larger ones swept around outside of these, taking to themselves the main fisheries much in the same way as that in which the forests were appropriated. Concerning the latter, it should here be remarked that it was by virtue of some valuable product of said forests that the extension of territory took place. For instance, out of a dozen lands, only one possessed the right to *kalai wa`a*, hew out canoes from the koa forest. Another land embraced the *wauke* and *olona* grounds, the former for kapa, the latter for fish-line (Lyons 1875:111).

The boundaries of Ka`ohe, as shown on modern maps, are open to question. A map of the adjoining *ahupua'a* of Humu`ula made by S.C. Wiltse in 1862 (Register Map No. 668) included the adze quarry and Lake Waiau, which was labeled on the map as "Pond Poliahu." Maly and Maly note that "By the time the Commissioners of Boundaries were authorized to certify the boundaries for lands brought before them in 1874, disputes over the boundary of Humu`ula and Ka`ohe had arisen" and "by the time of settlement in 1891, the boundary of Humu`ula was taken down to around the 9,000 foot elevation, with Ka`ohe taking in the entire summit region" (Maly and Maly 2005:280). The testimony of Kahue of Humu`ula, presented in Maly and Maly (2005:287), mentions the boundary running from a gulch called Kahawai Koikapue, where mele were sung, to Waiau and then to the summit which was called Pu`uokūkahau`ula. In parentheses there is a notation that "half of the water in the gulch belonging to Ka`ohe and half to Humu`ula".

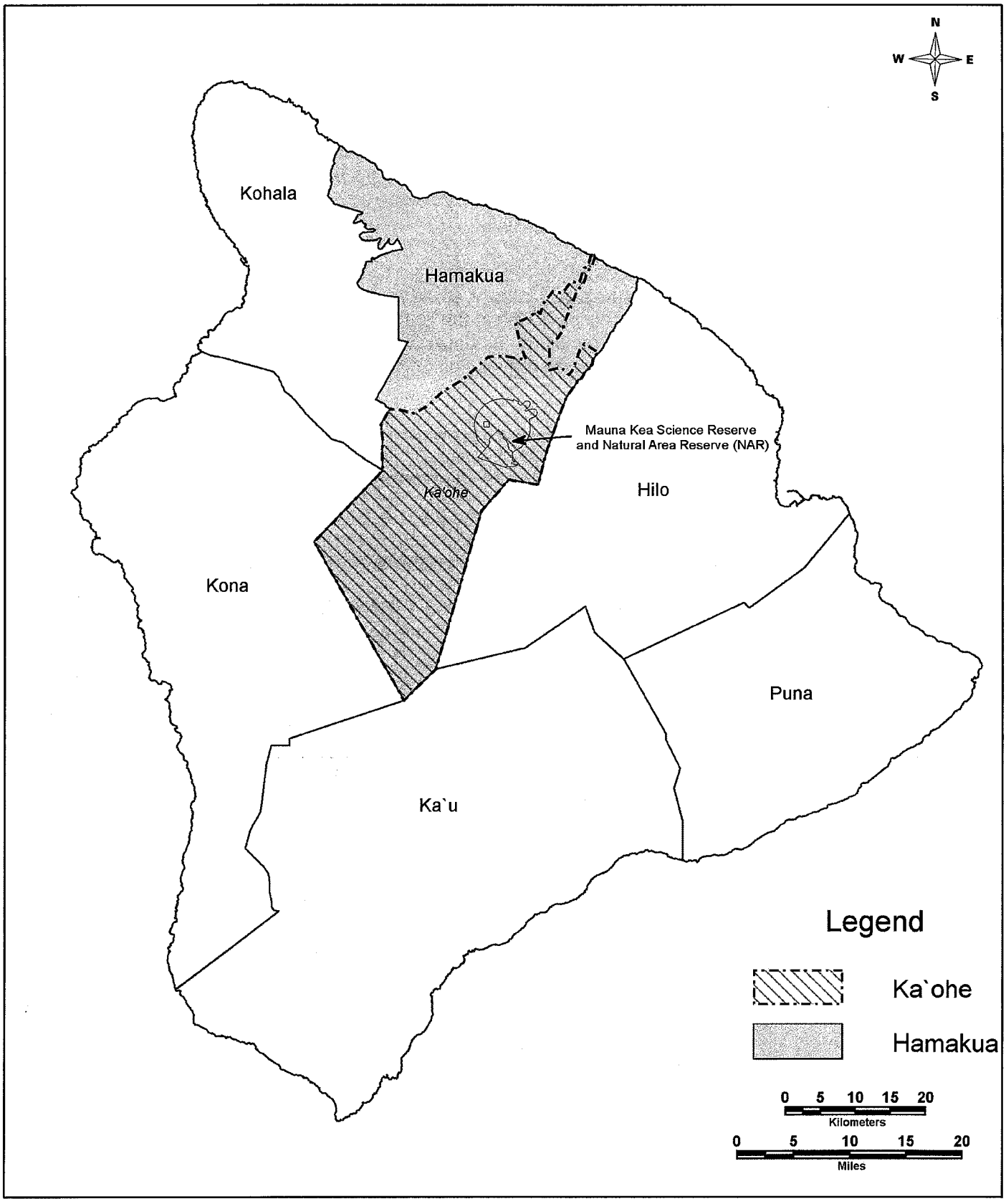


Figure 2-2. Ka`ohe Ahupua`a in the Hamakua District

The name of the gulch does not appear on any known maps, but in all probability is what is now called Pōhakuloa Gulch, since this is not only the major gulch below the lake but the only one on the south side of the mountain that is described in historic and modern times as containing running water. The reference to Waiau is presumably to the cinder cone, rather than the lake which according to the name on the 1862 Wiltse map was associated with the goddess Poli`ahu, although Waiki [or Haiki], a contemporary of Kahue, claimed the lake was called Waiau.

Waiki, who gave testimony at the same time as Kahue (McEldowney 1982:1.7), claimed that Kaluakaakoi, "the cave where they used to get stone adzes out" was in Ka`ohe as was Poliahu, which he described as a cave where Līlīnoe used to live (Maly and Maly 2005:291).

> They told me Kaohe bounded Humuula from Pohakuhanalei down Mauna Loa, on the Kona side. I never heard my parents say that Kaalaala joined Humuula. The pond of water called Waiau is on Kaohe and not on Humuula. My parents told me Humuula went to Kaluakaakoi and Poliahu. We used to go there after adzes for the Humuula people (Maly and Maly 2005:292).

In addition to the district and ahupua`a system of land tenure, there were other traditional land classifications, including one that employed the term *wao* for a series of natural and cultural zones (Malo 1951:16-18). According to some descriptions the *wao kanaka* was a low-lying coastal area where the *maka`āinana* were free to move and inhabit. The *wao kele* was the upland forested area that the *maka`āinana* could only access for gathering purposes. The *wao akua*, which was believed to be inhabited by *akua*, was the subalpine desert region above the tree line. The *maka`āinana* were hesitant to venture into the *wao akua* and could do so only by offering prayer and displaying great respect (NASA 2005:3-18, 3-19).

The Mauna Kea summit region is commonly described today as lying within the *wao akua,* which is different, however, from Malo's description of this zone which placed it at a lower elevation in forested lands (Malo 1951:17). As noted in the footnotes to Malo's *Hawaiian Antiquities* (Malo 1951:18), *wao akua* can also be understood to mean "a remote desolate location where spirits, benevolent or malevolent, lived and people did not live. Usually these places were deep interior regions, inhospitable places such as high mountains, deserts and deep jungles. These areas were not necessarily *kapu* but were places generally avoided out of fear or respect" (PHRI 1999, 24). Indeed, when Rev. William Ellis toured the island in 1823, he noted the reluctance of native Hawaiians to venture into the summit areas of Mauna Kea.

> " ...numerous fabulous tales relative to its being the abode of the gods, and none ever approach the summit---as, they say, some who have gone there have been turned to stone. We do not know that any have been frozen to death; but neither Mr. Goodrich, nor Dr. Blatchely and his companion, could persuade the natives, whom they engaged as guides up the side of the mountain, to go near its summit." (Ellis 1979:292)

Today, the *ahupua`a* system of land and resource management, with *kapu* restrictions, is no longer in existence legally, due to the collapse of the *ali`i – maka`āinana* social and cultural system. Still, knowledge of the some traditional *kapu*

restrictions endures, although both traditional and contemporary cultural practices and belief are apparent. One cultural practitioner, Pualani Kanaka`ole Kanahele reveals traditional knowledge of *kapu* restrictions and her traditional cultural practice regarding entering *kapu* areas. She learned from her *kūpuna* that the forested regions are not the realm of humans; instead, the forest's *kupa* (citizens) are the trees. Kanahele says that "when I go *maha`oi* [intrude] in their realm, I have to ask permission to be up there" (Maly 1999:A-371). In a similar sense, Irene Loeyland Lindsey-Fergerstrom reveals, in the context of taking *piko* up to the Mauna Kea summit, that her *tūtū* (grandmother) had knowledge of the *kapu* restriction that only *ali`i* were permitted on the summit. Yet, Lindsey-Fergerstrom's *tūtū* instructed her to take her family's *piko* to the summit anyways, saying "it's not like we going be *ali`i*, but at least you can try..." (Maly 1999:A-390).

2.2.2 Land Uses

On present evidence the slopes of Mauna Kea, above the limits of agriculture and permanent settlement, were a vast montane "wilderness" probably known to only a small number of Hawaiians engaged in primarily "special purpose" activities, such as bird-catching, canoe making, stone-tool manufacture, or burial of the dead (McEldowney 1982). Ethnographic information relating to a specific locality in this and other mountainous regions in Hawai'i is either sketchy, or, as is more frequently the case, lacking altogether.

Little is known ethnographically about the uses of the alpine and sub-alpine zones on Mauna Kea except for brief accounts about adze manufacture and burials. Most of what is known regarding traditional land uses is the result of archaeological investigations undertaken since the mid-1970s.

2.2.3 Myths, Legends, and Traditional Histories

Native Hawaiian traditions state that ancestral *akua* (gods, goddesses, deities) reside within the summit area. These personages are embodied within the Mauna Kea landscape – they are believed to be physically manifested in earthly form as various *pu`u* and as the waters of Waiau. Because these *akua* are connected to the Mauna Kea landscape in Hawaiian genealogies, and because elders and *akua* are revered and looked to for spiritual guidance in Hawaiian culture, Mauna Kea is considered a sacred place.

Native Hawaiian genealogical *mele* (poems, chants) explain the centrality of Mauna Kea within Hawaiian genealogy and cultural geography. *Mele* recount that as a result of the union of Papa and Wākea, who are considered the ancestors of Native Hawaiians, the island of Hawai`i was birthed. In the *Mele a Paku`i*, a chant describing the formation of the earth, Mauna Kea is likened as the first-born of the island children of Papa and Wākea, who also gave rise to Hāloa, the first man from whom all Hawaiians are descended (Kamakau 1991:126 in Maly & Maly 2005:7-8). A *mele hānau* (birth chant) for Kamehameha III, who was born in 1814, describes the origins of Mauna Kea:

Born of Kea was the mountain,
The mountain of Kea budded forth.
Wākea was the husband, Papa
Walinu`u was the wife,
Born was Ho`ohoku, a daughter,
Born was Hāloa, a chief,
Born was the mountain, a mountain-son of Kea.
(Pukui & Korn 1973:13-28 in Maly & Maly 2005:9).

Some contemporary Native Hawaiian cultural practitioners continue to view Mauna Kea as a first-born child of Papa and Wākea, and thus, the mountain is revered as "the *hiapo*, the respected older sibling of all Native Hawaiians" (Kanahele & Kanahele 1997 in Langlas 1999:7). Cultural practitioner Kealoha Pisciotta explains that this link to Papa and Wākea "is the connection to our ancestral ties of creation" (Orr 2004:61). Pualani Kanaka`ole Kanahele states that "the very fact that it is the 'Mauna a Wākea' tells you that it is the *mauna* that is meeting Wākea" (Maly 1999:A-368).

Traditional genealogical *mele* (poems, chants) and *mo`olelo* (stories, traditions) recount associations between Mauna Kea and the following *akua* – Poli`ahu, Lilinoe, Waiau, and Kahoupakane. In a *mo`olelo* recounting the travels of Pūpū-kani-`oe, it was said that Mauna Kea was a mountain "on which dwell the women who wear the *kapa hau* (snow garments)" (Maly & Maly 2005:31). Yet another *mo`olelo*, which dates to the 1300s, explains that Ka-Miki was sent atop Mauna Kea's summit to the royal compound of Poli`ahu, Līlīnoe, and their ward, Ka-piko-o-Waiau, to fetch water for use in an *`ai-lolo* ceremony (Maly & Maly 2005:42-43).

In the post-Contact period, Native Hawaiian historian S.N. Haleole transcribed *Ka Mo`olelo o Laiekawai* in 1844, which tells that after Poli`ahu broke her engagement to Aiwohikupua, she took up residence on Mauna Kea along with her three maidens Līlīnoe, Waiaie (Waiau), and Kahoupakane (Maly & Maly 2005:20-26). As well, other 19th century researchers published on the associations between Mauna Kea and Poli`ahu, Līlīnoe, and Waiau. W.D. Westervelt claimed that Poli`ahu, Līlīnoe, and Waiau were snow goddesses "who embodied the mythical ideas of spirits carrying on eternal warfare between heat and cold, fire and frost, burning lava and stony ice" (Westervelt 1963:55-56). Westervelt also credits Poli`ahu as the rival of the fire-goddess, Pele, said that she battled Pele on numerous occasions, and credits her with having "kept the upper part of the mountain desolate under her mantle of snow and ice" (Westervelt 1963:62).

In 1931, Emma Ahu`ena Taylor, a historian of Hawaiian descent and with genealogical ties to the lands of Waimea and Mauna Kea, reported on Poli`ahu's residence at Mauna Kea, but also described the creation of Lake Wai`au. She wrote:

> Poliahu , the snow-goddess of Mauna-kea, was reared and lived like the daughter of an ancient chief of Hawaii. She was restricted to the mountain Mauna-kea by her godfather Kane. She had a nurse Lihau who never left her for a moment. Kane created a silvery swimming pool for his daughter at the top of Mauna-kea. The pool was named Wai-au. The father placed a supernatural

> guard [Mo`o-i-nanea] at that swimming pool so that Poliahu could play at leisure without danger of being seen by a man... (Maly & Maly 2005:53).

According to Taylor, on Mauna Kea, Poli`ahu's attendants – Lilinoe, Lihau, and Kipu`upu`u drove away her suitor, Kūkahau`ula (the pink-tinted snow god). But Mo`o-i-nanea allowed the snow god to embrace Poli`ahu, and to this day, Taylor reports, "Ku-kahau-ula, the pink snow god, and Poli`ahu of the snow white bosom, may be seen embracing on Mauna-kea" (Maly & Maly 2005:53)

In modern-day accounts, Poli`ahu continues to be commonly referred to as "the beautiful snow goddess of Mauna Kea" while Līlīnoe is called "a goddess of the mists and younger sister of the more famous Poliahu." (Pukui & Elbert 1971:392, 396). Langlas reports that Pualani Kanaka`ole Kanahele told him that three *pu`u*—Poli`ahu, Līlīnoe, and Wai`au, were sister goddesses who are female forms of water and that all three of the cinder cones or *pu`u* that bear their names are important religious sites (Langlas 1999). McEldowney (1982:1.3-1.4) recounts that Fornander included Līlīnoe as a person in his genealogies and legends, including a reference to her as the "wife of Nu`u, the "Noah", of the discredited Hawai`i Loa legend involving a great flood. McEldowney (1982:1.4) noted that Kamakau called Līlīnoe "the woman of the mountains" and named her as ancestress of Pae, a *kahuna* of Umi's time (Kamakau 1961:215)."

There are several myths concerning Poli'ahu and Līlīnoe. W.D. Westervelt claimed that Poli`ahu was one of four snow goddesses "who embodied the mythical ideas of spirits carrying on eternal warfare between heat and cold, fire and frost, burning lava and stony ice" and who, according to several legends, was the rival of the fire-goddess, Pele (Westervelt 1963:55). Poli`ahu, who battled Pele on numerous occasions, is credited by Westervelt as having "kept the upper part of the mountain desolate under her mantle of snow and ice... (Westervelt 1963:62). Poli`ahu continues to be commonly referred to as the "The beautiful snow goddess of Mauna Kea" (Pukui and Elbert 1971:396). Kealoha Pisciotta also retains knowledge that Mo`o Ina`ne`a was the guardian for Poli`ahu and Līlīnoe (Orr 2004:51).

Cultural practitioner Pualani Kanaka`ole Kanahele believes that because the waters of Waiau have not "had a chance to come down to the rest of us, then it is sacred water...that water, Waiau, is the most sacred because it isn't the water that has been spilled, it is still up there in the realm of Wākea" and in her estimation, "water is the source of life" (Maly 1999:A-368, A-370). Kealoha Pisciotta believes the cultural significance of Lake Waiau rests in several facts - the Kūmulipo creation chant describes a lake that resides in the heavens, the ancient trails meet at the lake, the lake is a navigational gourd, and it is a jumping off point for ancient Hawaiian souls (Orr 2004:44-45).

While there are a number of myths and legends associated with the summit area of Mauna Kea, the higher elevation areas of the mountain do not figure prominently in Hawaiian traditional histories, which McEldowney points out:

> ...revolve mainly around the lives and exploits of prominent chiefs, as passed down through genealogies, chants, and stories, and recorded primarily in works by Fornander an Kamakau (Barrere 1962:62-63. No major events from these histories occur within the summit plateau of Mauna Kea (McEldowney 1982:1.4).

2.2.4 Trails

Perhaps not surprisingly, scant information exists about ancient trails in the summit area of Mauna Kea. A *mo`olelo* associated with chief Pili-a-Ka`aiaea, and thus dating from the 1300s, recounts the journey of two brothers, Ka-Miki and Maka-iole, who traveled around the island using ancient *ala hele* (trails). Sent up to the Mauna Kea summit, Ka-Miki was guided by the following traveling *mele:*

The path goes to the uplands
The path goes to the lowlands
It is a lonely path to the mountain
A damp dreary path
A fire will be the wrap
Warming you along the sacred trail...
(Maly & Maly 2005:42)

Kamakau wrote of a battle that ensued between `Umi-a-Liloa and the chief of Hilo in the 1500s, wherein `Umi-a-Liloa and his warriors traveled from Waipi`o to Hilo via Mauna Kea. Kamakau states that "it was shorter to go by way of the mountain to the trail of Poli`ahu and Poli`ahu's spring at the top of Mauna Kea, and then down toward Hilo. It was an ancient trail used by those of Hāmākua, Kohala, and Waimea to go to Hilo." (Kamakau 1961:16 in Maly & Maly 2005:453). Maly & Maly (2005:454) contend that ancient trail systems across all the mountain lands afforded travel to burial sites and facilitated travel for the collection of resources like adze stone, canoe *koa*, and bird feathers.

The ancient trails were essentially footpaths, which, by the 1840s, proved inadequate for travel with the newly-imported horses, wagons, and wagon team animals associated with cattle ranching and bullock-hunting activities; hence, formal wagon road developments, funded by the Hawaiian Kingdom, ensued in the lowland mountain slope regions (Maly & Maly 2005:454). However, the mountain's summit region remained accessible only by trails, on foot or horseback. The difficulty of travel on the terrain by horse and on foot is well documented in historical accounts by European visitors and surveying expedition field notes. Formalized road developments continued in the lowlands into the early 20th century, with the CCC (Civilian Conservation Corps) and the U.S. Army Corps of Engineers improving existing roads, such as the Saddle Road, to accommodate vehicular traffic (Maly & Maly 2005:482).

There are two major named trails in the summit region of Mauna Kea, the Mauna Kea-Humu`ula Trail and the Mauna Kea-Umikoa Trail. The better known of the two, is the Humu`ula Trail which apparently began in the Kalaieha area where the Humu'ula

Sheep Station is located. The earliest map showing the upper part of the trail was made by W.D. Alexander's survey party in 1892 (Alexander 1892; Preston 1895). The Alexander map and the 1930 edition of the USGS Mauna Kea Quadrangle map show the trail going around the eastern flank of Pu`u Keonehehee and onward up the mountain to Lake Waiau. This alignment closely follows the modern road (Figure 2-3).

An account of the Alexander survey, published in the *Pacific Commercial Advertiser* of September 14, 1892, indicated that the Humu`ula Trail did not pass through the adze quarry and that the site marked on later maps as Keanakako`i was in fact some 100 yards west of the trail.

> The trail next turned to the east, winding around an immense sand crater called "Keonehehee," 11,500 feet in elevation, which stands on the edge of the summit plateau. Further to the southeast we were shown a pillar of stones which was raised to commemorate Queen Emma's journey over the mountain to Waimea in 1883 [1882}—Maly and Maly 2005:183).

The Alexander map of the summit plateau published in Preston (1895:602, Illustration 34) also shows the trail, which is labeled Trail to Kalaieha, cutting across the south and eastern slope of Keonehehee. This indicates that the Queen Emma memorial was southeast of the trail, contrary to Maly's interpretation (Maly and Maly 2005:Figures 8b and 8c) that it is located on the rim of Pu`u Ko`oko`olau, which is in the adze quarry and the middle, rather than edge of the summit plateau (see Figure 2-3). Preston mentions that there was more than one cairn:

> Some interesting pyramids of stones, built to commemorate Queen Emma's visit, were seen on the edge of the plateau, and at elevation of 12,000 feet was found Keanakakoi, a famous quarry opened by the natives many centuries ago for the manufacture of battle axes (Preston 1895:601).

The 1928 Walter E. Wall map of the Island of Hawaii shows both the Humu`ula and Umikoa trails, neither of which are labeled as such, however. The map shows two other unnamed trails in the summit area. One leads to Pu`u Poliahu from a junction with the old Waimea Road that passed through the area between Mauna Kea and Mauna Loa that is commonly referred to as the "Saddle." The second trail, which is joined to the Pu`u O`o Trail on the eastern side of the mountain, is a straight line path that crosses over the Umikoa Trail and ending at the summit.

The 1930 USGS Mauna Kea quadrangle map shows the Humu`ula Trail joining a second trail just below the lake. This trail, which is not named, is labeled on the later USGS maps as the Umikoa Trail. This trail is not mentioned in any early accounts, however. While it may very well have been an ancient trail, the name would appear to be modern and most likely derived from the Umikoa Ranch, where some of the horseback trips to the summit area in the early part of the 20th century and possibly earlier began. The unpublished manuscript of the 1935 Hawaiian Academy of Sciences Expedition noted that "In recent years a few people have visited the summit in small parties on horseback, with a guide from Umikoa or Humuula "(Wentworth et al. n.d.:1-2).

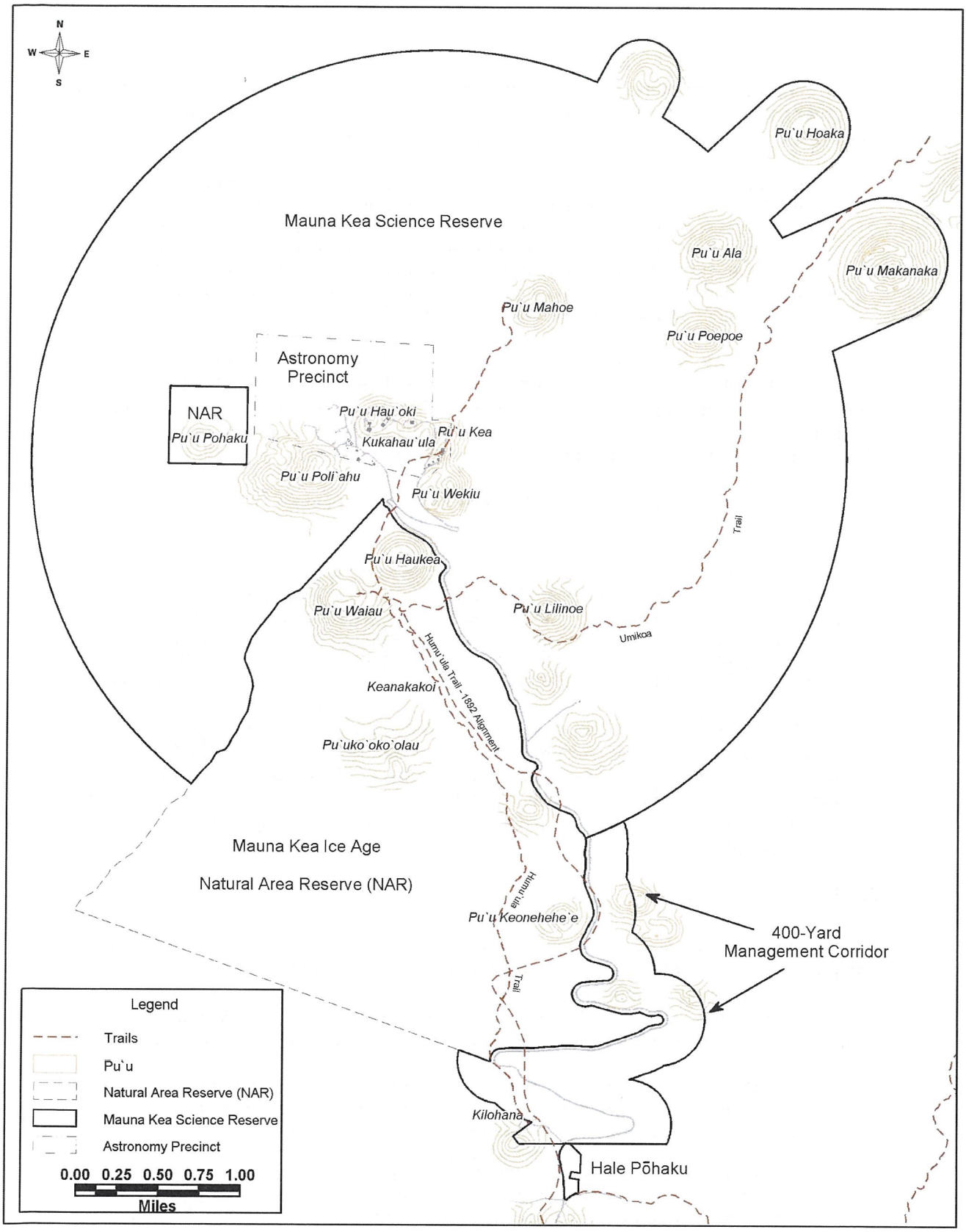


Figure 2-3. Hawaiian Place Names and Trails

A new section of the Humu`ula trail was built by the CCC in the 1930s that took a straighter course to the west of Pu`u Keonehehee (see Figure 2-3). The new trail was described by L. Bryan in a 1939 article in *Paradise of the Pacific*:

> During the past few years this lake has been visited by increasingly large numbers of visitors. Three years ago the Civilian Conservation Corp reconstructed an old trail from near the Humuula Sheep Station (Kalaieha), past Hookomo and Halepohaku to Lake Waiau and thence to the summit. This trail is well made and carefully marked on the ground with Ahus or piles of stones and the trip to the lake and on to the summit can easily be made by strangers without the assistance of a guide (Maly and Maly 2005:257).

The Umikoa Trail, which is labeled the Mauna Kea-Umikoa Trail on some maps, first appears as a named trail on the advance sheet of the Lake Waiau Quadrangle that was based on the mapping by J.O. Kilmartin in 1925-26. This trail, and the Mauna Kea-Humu`ula Trail are shown as terminating at Lake Waiau on the Kilmartin map. The absence of the Umikoa Trail on the 1892 map may be significant.

McEldowney came to the conclusion that the Humu`ula and Umikoa trails are probably recent names:

> After comparing the evidence for trails on historic maps, in descriptions of routes taken throughout the historic period, and in native boundary testimonies, it appears that the major trails or formalized routes as shown on the present U.S.G.S. Quadrangle are of recent origin, and that any specific trails or routes existing in the early historic or possibly prehistoric periods are no discernible in the literature (McEldowney 1982:1.12).

The locations of a number of lithic scatters containing adze manufacturing by-products found during the inventory survey of the Science Reserve, in 2005-2007, (McCoy and Nees in prep.) indicate a couple of routes on the eastern flank of the mountain that must have been used by adze makers on leaving the quarry. One route is found in the same general area as the Umikoa Trail, thus suggesting that the general route is an old one.

2.2.5 Place Names

The place names in the summit region (see Figure 2-3) are a mix of traditional names and modern names (see discussion in McEldowney 1982). The origin and meaning of some names is unknown. The name Mauna Kea itself is open to various interpretations. The commonly accepted, literal translation as "White Mountain" appears in this early account by the Rev. William Ellis who toured the island of Hawai'i in 1823:

> The snow on the summit of the mountain, in all probability, induced the natives to call it Mouna-Kea, (mountain white), or, as we should say, white mountain. They have numerous fabulous tales relative to its being the abode of the gods, and none ever approach the summit---as, they say, some who have gone there have been turned to stone. We do not know that any have been frozen to death; but neither Mr. Goodrich, nor Dr. Blatchely and his companion, could persuade the natives, whom they engaged as guides up the side of the mountain, to go near its summit (Ellis 1979:292).

As already noted, the reference to Mauna Kea as the abode of the gods is emphasized in some Native Hawaiian traditions in which the word "Kea" is taken to be an abbreviated form of Wakea, the male god who procreated with Papa to form the mountain. In an account of Queen Emma's trip to the lake in 1881 or 1882 and the *mele* that were written about that trip, Kihei and Mapuana de Silva present some more detail about the names of the mountain and the lake. They note, following Puakea Nogelmeier, that Emma's poets refer to the summit as Piko o Wakea and that:

> Although Maunakea is popularly translated as "white mountain," Kea is also an abbreviated form of Wakea, the sky father who, with Papa, the earth mother, stands at the apex of Hawaiian genealogy. Mauna Wakea is thus viewed traditionally as the sacred meeting point of sky and earth, father and mother, Wakea and Papa. Emma's poets were well-acquainted with the older name and its lasting significance; they refer to Waiau as "ka piko on Wakea"—as the mountain's navel/genital/umbilical/connecting-point/center (de Silva and de Silva 2007: footnote 7).

The name for the summit, which unlike many mountain summits does not consist of a single peak, is now widely accepted as Kūkahau`ula ("Kūkahau`ula of the red-hewed dew or snow") instead of the formerly used name Pu'u Wēkiu, which is still in use, however, for one of the summit cinder cones (see Figure 2-3). On present evidence the name Kūkahau`ula referred to both a legendary figure and to a character in traditional histories and genealogies. The latter includes references to Kūkahau`ula as the husband of Līlīnoe and as an *`aumakua* (family deity) of fishermen (Hibbard 1999). The place name evidence indicates that the "summit" was at the very least a legendary place or *wahi pana* (Pukui and Elbert 1971). Maly and Maly (2005:vi) give the name as Pu`u o Kūkahau`ula, which they say was "named for a form of the god Kū, where the *piko* of new-born children were taken to insure long life and safety. This practice is still participated in at the present time." According to Maly and Maly (2005:vi):

> The name Pu`u o Kūkahau`ula is the traditional name of the summit cluster of cones on Mauna Kea, appearing in native accounts and cartographic resources until c. 1932. The recent names, Pu`u Wēkiu, Pu`u Hau`oki and Pu`u Haukea, have, unfortunately, been used since the 1960s (since the development of astronomy on Mauna Kea), and have displaced the significant spiritual and cultural values and sense of place associated with the traditional name, Pu`u o Kūkahau`ula.

Other traditional place names that appear on the earliest maps and in journal accounts include Pu'u Līlīnoe and Pu'u Waiau (see Figure 2-3). Contrary to popular belief, Pu'u Poli`ahu is a modern name applied by the surveyor W.D. Alexander in 1892 (McEldowney 1982:114).

Some other place names date to the 1930s. Gregory and Wentworth made a point of noting that they assigned names to cinder cones that did not have official names at the time (Gregory and Wentworth 1937:1725 footnote 14):

> As an aid in description, names have been adopted for the following cones not recorded on official maps: Puu Mahoe (Twin Cones), Puu Poepoe (Round Cone), Puu Hoaka (Crescent Cone), Puu Ala (Trail Cone), Puu Waiau (encloses Lake Waiau), Puu Kea (White Cone), Goodrich Cone (Joseph Goodrich, Hawaiian

missionary, 1823), Macrae Cone (James Macrae, botanist of the *Blonde*, 1825), Douglas Cone (David Douglas, Hawaiian botanist, 1884), Summit Cone (highest point on Mauna Kea).

In a 1973 letter to Libert Landgraf, District Forester, L.W. Bryan wrote that he had obtained the following names from the "old Hawaiians" in the 1920s.

1. The summit cone, 13,796 is called Puu Wekei.
2. Goodrich cone is called Puu Hau Kea
3. Macrae Cone is known as Puu Hau Oki
4. Douglas Cone is called Puu Pohaku

Bryan said that he had no objection to Pu`u Mahoe, Pu`u Ala and Pu`u Poepoe, but also posed a question-- "I wonder how Lake Waiau and Pu`u Waiau secured their names? Waiau is not descriptive of the lake. Hau Oki would be more applicable" (Bryan 1973). In a memorandum dated January 16, 1974 Robert Schmitt, Chairman of the Advisory Committee on Geographic Names, presented recommended changes in some place names, particularly those named after Europeans. He suggested that Puu Wekei be changed to Puu Wekiu because he could not find the word *wekei* in the dictionary whereas *wēkiu* was included and translated as "summit." He added that the Pukui and Elbert book on Hawaiian place names wrote Pu`u Hau Oki as Pu`u Hau'oki. Pu`u Wekiu and Pu`u Hau Oki were officially adopted by the Advisory Committee on Geographic names in 1974 (Hibbard 1999).

Below Lake Waiau, on the west side of Pohakuloa Gulch, are three named springs –Hopukani, Waihu, and Liloe. None of the springs are listed in Place Names of Hawaii (Pukui et al. 1974). The names of all three springs first appeared on the 1927 U.S.G.S. Ahumoa Quadrangle (1:31,680) topographic map. On this same map there is a second locality labeled Waihu, a short distance below Liloe Spring. This may be a general place name since there is a similar name (Waiku) in the same area on the 1911 edition of the United States Coast and Geodetic Survey map of the island of Hawaii. According to the Ka-Miki legends translated by Maly the proper name of Waihu Spring is Ka-wai-hu-a Kane as noted in the following account:

> ...at that time, the guardians [Pōhakuakane and Pōhakuloa] saw the water rippling, and overflowing from the spring. As they went to investigate, they saw a shadow pass them. Because of the overflowing of the water, the spring came to be called Ka-wai-hu-a-kane (The-overlowing-waters-of-Kane), and so it remains named to this day [Figure 6]. It overflowed because Ka-Miki scooped the water, filling the *`awa* bowl of the god (Maly and Maly 2005:47).

Maly (1999: D-26) notes variations of Hopukani, including Houpo-o Kane and Ka-haupo-o-kane. Maly (1999:D-26) added, "Interestingly, at Ka-haupo-o-kane are found the waters of Pōhakuloa, Hopukani, and Waihu (also known by the name "Ka-wai-hu-a Kane."

2.2.6 Chronological Summary

For the purposes of this plan the culture history of the Mauna Kea summit region, has been arbitrarily divided into three time periods: (1) the Pre-Contact Period (pre-

1778); (2) the Post-Contact Period, which is often referred to as the historic period, and (3) the Modern Period, beginning at the turn of the 20th century.

2.2.6.1 Pre-Contact Period

While there is good reason to believe that the summit region was known to early Hawaiians because of the probable desire to investigate the snow-capped mountain, the only activity that is known with certainty to have occurred in the pre-contact period is the manufacture of stone adzes. A suite of 23 radiocarbon dates from eight sites, including three from a site complex at Hale Pōhaku, which is outside of the quarry proper (McCoy 1985; 1991), indicate that the quarry was exploited over a period of possibly as much as 700 years between ca. A.D. 1100 and 1800 (McCoy 1986:Figure 28; 1990:Figure 4). When the quarry was abandoned is unknown and may never be known with any certainty, but there is some evidence that it may have occurred as late as European contact in 1778 or shortly thereafter.

2.2.6.2 Post-Contact Period

Changes to the traditional Hawaiian lifestyle began soon after the arrival of Captain James Cook in 1778. One significant change was the rapid adoption in the major trading centers and nearby communities of Western tools, clothing and other items, initially by the chiefs and then the common people. The impact on traditional technologies is known in a general way from historic accounts, such as diaries and newspapers, but for remote centers of traditional crafts, such as the Mauna Kea Adze Quarry, there is little or no information on how long they continued to be utilized before abandonment.

The first recorded ascent of Mauna Kea by a European was made by the Rev. Joseph Goodrich in 1823 (Goodrich 1833:200). A number of visits followed shortly thereafter, including ones by such prominent figures as the renowned botanist David Douglas (see Maly and Maly 2005 for a comprehensive overview of early visits and expeditions to the top of Mauna Kea). Gregory and Wentworth wrote that:

> There have doubtless been many unrecorded visits to the summit of Mauna Kea since Goodrich's time. Indeed, it is probable that fifty or more years ago, when ranch operations were of relatively greater importance and the old Makahalau-Keanakolu trail was in general use as a route from Kawaihae and Waimea to Hilo, the upper slopes of the mountain were more generally known to the residents of Hawaii than they are today (Gregory and Wentworth 1937:1722).

Kamehameha, in the company of Kekuhaupi`o, is reported as having made an offering close to Lake Waiau (Desha 2000:94; Maly and Maly 2005:50). Of the many people that made the arduous ascent of the mountain in the 19th century, the trip made by Queen Emma in 1881 or 1882 is one of the best known (de Silva and de Silva 2007). The Queen Emma trip, which was made on horseback, started at Mana in Waimea. From there the party rode to Kalaieha [the name for the area occupied by the Humu`ula Sheep Station] where the night was spent before riding to the summit the next day.

Mary Kalani Ka`puni Phillips, a descendant of W.S. Lindsey, one of the guides that accompanied the Queen, has written that

> Queen Emma rode on the back of Waiaulima, and he swam around Waiau pond at Mauna Kea. And then he lifted Queen Emma, and carried her to a rocky place. The people were amazed to see Queen Emma's on-the-back swim, and they returned and told the mo`olelo to us (de Silva and de Silva 2007:3).

> The historical record of pilgrimages to Maunakea is not limited to Emma's mele and Phillips's mo`olelo. Steve Desha writes, that as a young man, Kamehameha Pai`ea went to Waiau to pray and leave an offering of `awa. Kamakau tells us that Ka`ahumanu made the same journey in 1828 in an unsuccessful attempt to retrieve the iwi of her ancestress Lilinoe. Kauikeaouli visited Waiau and the summit in 1830, Alexander Liloliho in 1849 and Peter Young Ka`eo in 1854 (de Silva and de Silva 2007:5).

As the summit area of Mauna Kea became better known to the public, it also began drawing the attention of scientists toward the end of the 19th century. The first major scientific study was conducted at Lake Waiau in 1892. W.D. Alexander, Surveyor General of the Kingdom and E.D. Preston, an astronomer with the U.S. Coast and Geodetic Survey, organized an expedition that is sometimes referred to as the "Pendulum Survey Party" because of Preston's objective of making pendulum and meteorological observations. A number of other individuals participated in the Pendulum Party survey which is described in detail in Maly and Maly (2005).

2.2.6.3 Modern Period

The early 20th century for all practical purposes marked the beginning of a new era in the land use history of Mauna Kea. Large numbers of wild sheep were devastating the forests below the summit in the early part of the century. The extent of the devastation was the impetus for a monumental fencing program undertaken by the Civilian Conservation Corp (CCC) in the 1930s. The CCC was also engaged at the same time in improving roads and building facilities for visitors. In 1936 the CCC made improvements to what is believed to have been a section of the old Mauna Kea-Humuula Trail, from near the Humuula Sheep Station at Kalaieha to the summit (Bryan 1939:11). According to Bryan (1939:11), the first stone cabin, from which Hale Pōhaku takes its name (Hale Pōhaku-"House of Stone'), was built by the CCC about this same time. Prior to the construction of a road above Ho`okomo, the cabin at Hale Pōhaku provided a convenient overnight rest spot for hikers and ski enthusiasts (McCoy 1984c:8).

Beginning with the Alexander survey party in 1892, Lake Waiau was used as a base camp by scientists. The geologist, Herbert Gregory, for example, camped at the lake on August 5-6, 1921 and spent some additional time there on July 23, 1926. The 1925-26 USGS mapping team also camped at the lake (Kilmartin 1974).

In 1935 the Hawaiian Academy of Science organized the first multi-disciplinary scientific expedition to Mauna Kea. The expedition included specialists in a number of different fields, including the team leader, Chester Wentworth. With the assistance of the U.S. Army, the expedition established three camps. The Humu`ula Sheep Station

was the main base camp. Above that was the Ho`okomo Ranger cabin. The uppermost camp was at Lake Waiau which was occupied between July 30 and August 21, 1935. An unpublished account of the expedition, titled *The Mauna Kea Expedition of 1935: Hawaiian Academy of Science*, by Chester Wentworth, John Coulter and Constance Hartt, is on file at Bernice P. Bishop Museum. A popular account of the expedition, *Mauna Kea Here We Come*, was published by one of the members, Ed Bryan, in 1979.

Construction of the Saddle Road, begun in 1943 for what would become the Pōhakuloa Training Area, was extended after World War II. The completed road, which linked Hilo and Waimea, provided easier access to the south side of Mauna Kea. The first road to the summit of Mauna Kea was completed in 1964. The first astronomy facility, the Lunar and Planetary Station located on the summit of Pu`u Poli`ahu (Group 70 International 2000: Figure IX-1), was opened in July of 1964. Improvements to the original jeep road in the 1970s made access to the mountain top much easier, resulting in more public and commercial activities and as a consequence, conflicts between different public user groups.

2.3 CULTURAL PRACTICES AND BELIEFS

This section of the CRMP describes traditional and customary, as well as contemporary, cultural practices and beliefs associated with Mauna Kea that have been identified in the literature and through oral history interviews. The information presented below is taken from the Final Environmental Assessment for the Mauna Kea Comprehensive Management Plan (PCSI 2009).

2.3.1 Traditional, Customary and Contemporary Cultural Practices

Distinguishing between traditional and customary cultural practices and contemporary practices is important, as the Hawai`i Constitution affords special protection to some practices. Article XII, Section 7 of the Hawai`i Constitution states:

> The State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua`a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, subject to the right of the State to regulate such rights.

The Hawai`i Supreme Court has provided guidance in determining if a cultural practice is traditional or customary:

> To establish the existence of a traditional or customary native Hawaiian practice, we hold that there must be an adequate foundation [(12)] in the record connecting the claimed right to a firmly rooted traditional or customary native Hawaiian practice (State v. Hanapi, 19746)

Although contemporary cultural practices are not afforded special protection under the Hawai`i constitution, HRS § 343-2 requires the evaluation of the environmental effects of a proposed action on cultural practices, without distinguishing between traditional and customary practices and contemporary practices. In addition, guidelines for assessing cultural impacts of proposed actions adopted by the Hawai`i

Environmental Council recommend that Cultural Impact Assessments also include the identification of cultural beliefs associated with an area, along with an assessment of the effects of the proposed action on those beliefs.

Given the constitutional protection afforded traditional and customary cultural practices, the discussion that follows sought to distinguish those practices that should be considered traditional or customary from other contemporary practices. However, in some instances, there is insufficient information in the literature to conclusively make such a determination.

Cultural practices and beliefs involving Mauna Kea have been changing since the arrival of the earliest Polynesian settlers, an evolutionary process that continues today. Absent a written language, Hawaiian practices and beliefs were originally recorded in chants and oral histories that were passed on from generation to generation for perhaps 1,000 years or more. The earliest written records of native Hawaiian beliefs and practices were created by European explorers and settlers in the late 18th century.

The arrival of European and Asian settlers also marked the beginning of wide-spread changes in cultural practices and beliefs throughout much of Hawai`i. Because of the evolutionary nature of cultures and beliefs, current cultural practices and beliefs involving Mauna Kea are diverse. Over the last 200 years, many practices have been modified or abandoned altogether as non-Hawaiian religious and cultural practices were introduced to the islands.

A variety of cultural and religious beliefs and practices pertain to and are occurring on the mountain today. Whereas some traditional and customary Hawaiian practices and beliefs have survived and have gained wider practice in recent generations, other traditional and customary cultural practices and beliefs appear not be in practice. In addition, recent archaeological and ethnographic studies of Mauna Kea show that contemporary practices and beliefs have developed based on modern beliefs or have evolved from a traditional practice or belief. The difficulty in thoroughly documenting cultural practices is increased by the reluctance of some cultural practitioners to describe their practices and beliefs to researchers.

Traditional and customary cultural practices and beliefs have been defined as "those beliefs, customs, and practices of a living community of people that have been passed down through generations, usually orally or through practice" (Parker & King 1998:1; PHRI 1999:1). Traditional and customary cultural practices and beliefs contribute to the maintenance of a community's cultural identity and demonstrate historical continuity through the present. This is demonstrated through actual practice or through historical documentation of a practice or belief, including both written and oral historical sources (Parker & King 1998:1; PHRI 1999:2). Traditional and customary cultural practices and beliefs lie within the purview of Article XII, Section 7, of the Hawai`i Constitution, and various other state laws and court rulings, particularly the Hawai`i State Supreme Court's 1995 "PASH decision" and the 1998 *State of Hawai`i vs. Alapai Hanapi* decision (PHRI 1999:2).

Contemporary cultural practices and beliefs have been defined as "those current practices and beliefs for which no clear specific basis in traditional culture can be clearly

established or demonstrated – for example, the conducting of ritual ceremonies at sites or features for which no such prior traditional use and associated beliefs can be demonstrated. In some cases, however, it may be possible to demonstrate the reasonable evolutionary development of a contemporary practice from an earlier traditional practice" (PHRI 1999:3).

2.3.2 Religious Beliefs and Practices

At the time of Contact, Hawaiian cultural and religious practices were inseparably intertwined, as were many other activities. When describing the organization, structure and lifeways of traditional societies, it is important to remember that the terms used today, such as religion, economics and politics, are modern analytical constructs. There are other issues that also need to be kept in mind, such as the manner in which some Hawaiian words and concepts are understood and used today. *Kapu* and *noa*, for example, are commonly translated as sacred and profane, but according to Bradd Shore these terms refer more precisely to the relations possible between the divine and the human, with *kapu* "being a state of contact with the divine" and *noa*, "an unbounded state of separation from the divine" (Shore 1989:164-165).

Ranging from Euro-American explorers and missionaries journal accounts to early native Hawaiian historians like David Malo, Kepelino, and S.M. Kamakau, and to later 19th and 20th century ethnologists, there is rich documentation of religious ceremonial and ritual life throughout the islands (Valeri 1985:37-44). Indeed, prior to and following significant undertakings, such as battles, dance, voyaging, the cultivation and harvesting of crops and fish, apprenticeship training, and the manufacture of tools or structures, etc., rites marked by offerings or sacrifices occurred. Propitiatory offerings were made to *`aumakua*, or family gods, and *akua* to avert disasters, like famines, volcanic eruptions and disease, or to ensure the coming of rain, success in crop fertility and fish harvest bounties, or victory in battle.

Following European contact, increasing numbers of Hawaiians converted to Christianity, while restrictions were placed upon traditional religious observances. As a result, traditional oral histories and written documentation of historic religious practices and any associated beliefs on Mauna Kea remain virtually non-existent. Because Ka`ahumanu abolished the *kapu* system in 1819 and imposed restrictions on certain traditional Hawaiian religious practices in the post-Contact period (Kamakau 1961:307, 322), in all likelihood, the voices of those practitioners were silenced, or perhaps simply muted, with traditional knowledge being passed on covertly. It is possible that close proximity to missionary settlements and Christian-converted chiefs may have, to a greater degree, influenced decline in traditional religious practice. In areas further removed from Christian centers, where new religious teachings had less appeal, traditional religious practices may have continued (Barrere et al. 1980:34).

Aside from Ka`ahumanu's restrictions, it has also been suggested that it may be culturally inappropriate for practitioners to speak aloud of their ceremonial or ritual practices and beliefs. As Jess Hannah points out when asked about the presence of *heiau* or burials upon Mauna Kea, "those days...if they know about them...they don't talk about `em. Even Alex [Bell], he knew 'em all, they had something here and there, but they would never pin 'em down. You couldn't pin point it. Something about how they

were brought up or raised, it was bad luck or hard luck to talk" (Maly & Maly 2006:A-437,438). Likewise, when Johnny Ah San was asked about burial locations on Mauna Kea, he revealed that "you take those Hawaiians, they were superstitious, and they hardly want to talk about that" (Maly 1999:A-75).

Nevertheless, modern-day oral history interviewees explain their knowledge, as well as an unfortunate lack thereof, concerning the presence of and meaning of *ahu* and burials in the summit region. And cultural practitioners also describe their knowledge of and beliefs surrounding the following contemporary religious practices - *kūahu* (family shrine) erection, the scattering of cremation remains, *piko* deposition in Wai`au, pilgrimage, offerings, and prayer.

2.3.2.1 Ahu and Kūahu

Although the archaeologically-documented presence of *ahu* and *kūahu* within the summit region of Mauna Kea indicates religious observances of various kinds in the Hawaiian past, no knowledge regarding the traditional practices and beliefs associated with these structures exists today, or if it does the information has not been shared with anthropologists and archaeologists. In the early post-Contact period, the existence of *ahu* on Mauna Kea are reported; however, information is unavailable concerning their traditional function, be it ritual, ceremonial, or otherwise. In the 1880s – 1890s, two surveyors, J.S. Emerson and E.D. Baldwin, independently noted various *ahu* on *pu`u* in the lowlands surrounding Mauna Kea and the presence of "a pile of stones on the highest point of Mauna Kea" (Maly & Maly 2005:494-502, 505).

It is of interest that the word *kūahu*, a more obscure and presumably older term for one kind of Hawaiian shrine (the *ko`a* or fisherman's shrine is another], does not appear in any of the early accounts. By the post-contact era it appears that *kūahu* was no longer in common use, as opposed to *ahu*, a word with many meanings. Morphologically, *ahu* are a pile or mound of stones, yet in the functional sense, *ahu* may have served historically as altars or shrines, or as markers signifying burial locales, *ahupua`a* boundaries, or trail routes. When Thomas Thrum visited Haleakala on Maui in the 1920s, he reports that *ahu* functioned as trail and way marks, memorials of traveling parties, land boundaries, burial markers, or tributes to deities (Thrum 1921:259). While Emerson and Baldwin certainly confirm the presence of *ahu* as they are defined morphologically, the surveyors do not specifically speak to the functions of the *ahu* on Mauna Kea.

Likewise, oral history interviewees reveal that they have heard of or have seen the presence of *ahu* on the summit plateau and on the Mauna Kea summit (Orr 2004:47; Maly 1999:A-134, -372; Maly & Maly 2006:A-183, -335, -349, -565). Yet, little information is available about the particularities of traditional religious observances practiced in association with the *ahu*. Libert Landgraf states that he had "no idea whether they were trail markers or a grave site or something else" (Orr 2004:47). Pualani Kanaka`ole Kanahele discloses that she does not know if *ahu* "represent these *ahupua`a* markers...or whether they are actually *kūahu* [altar] or *ahu* for different families that lived in that mountainous area...or if it had to do with *konohiki* [land overseers] that were in charge of a particular *ahupua`a* and so this family went there to mark the upper regions...they could also be new ones" (Maly 1999:A-372). On the other

hand, Kealoha Pisciotta offers up the following explanation of the significance of *ahu* – "some of the shrines mark the birth stars of certain *ali`i*...and also birth and death" (Orr 2004:47).

Pisciotta is the only cultural practitioner to describe a contemporary attempt to maintain a *kūahu* (family shrine) on Mauna Kea, which was undermined by repeated destruction and removal of the shrine. It is significant to note that in 1870 Kamakau wrote that "it was not right to trespass on someone else's altar" (Kamakau 1964:96). This statement is the only indication of a traditional cultural practice that regulated people's access to *kūahu* and *ahu*. Pisciotta explains that she erected the *ahu*, which consists of a stone from her family, on Mauna Kea because as an employee of one of the observatories, "I thought I would put it where I'm going all the time. And also it was very beautiful and I was always attracted to that place. I prayed at that place all the time" (Orr 2004:52). Pisciotta's contemporary cultural practice of erecting *kūahu* represents continuity of a traditional practice, except that she imported her upright stone rather than selecting a local stone.

2.3.2.2 *Piko* Beliefs and Practices

The cultural weight that Mauna Kea carries within the Hawaiian community is also evident in the phrase, "*piko kaulana o ka `āina*," which translates as "the famous summit of the land" and is used as a term of endearment (Maly 1999:A-3). However, the phrase also expresses the belief that the mountain is a *piko* (the navel, the umbilical cord) of the island and for this reason it is sacred (Maly 1999:D-20). In this context, the significance of the cultural practice of transporting and depositing a baby's *piko* on Mauna Kea may be better understood. Pualani Kanaka`ole Kanahele explains the symbolic importance of this practice, saying that:

> ...the *piko* is that part of the child that connected the child back to the past. Connected the child back to the mama. And the mama's *piko* is connected back to her mama and so on. So it takes it back, not only to the *wā kahiko* [ancient times], but all the way back to Kumu Lipo...So it's not only the *piko*, but it is the extension of the whole family that is taken and put up in a particular place, that again connects to the whole family line. And it not only gives *mana* or life to that *piko* and that child, but life again to the whole family (Maly 1999:A-376).

According to some Native Hawaiian cultural practitioners there are families who have a long history of taking *piko* to the top of Mauna Kea. In 1956, Kaleohano Kalihi revealed that his grandfather had taken a gourd container "the *piko* of Mauna Kea. The place of the *punawai* [spring]..." which had been filled with 40 *piko* from "all of the people that had been born into this family" (Maly 1999:A-1). Kahili also mentioned that until he took the *piko* to Lake Waiau, his grandfather had "taken care of" those *piko*. Another practitioner, Elizabeth 'Tita' Lindsey Kimura, describes being a *piko* caretaker for her family – "I still have some of her *piko* that she [her mother] collected. Not collected, but when she goes to my sisters that have babies and the *piko hā`ule* [a *piko* that has fallen off], she'd pick it up and bring it home. ...yes, I have it in the *`ōmole* [bottle]...And I'm waiting for somebody to go up to Mauna Kea with it" (Maly & Maly 2006:A-217). One of Kimura's relatives, Irene Loeyland Lindsey-Fergerstrom, also confirms that she took her children's *piko* and the *piko* of her one of her relatives up to Mauna Kea (Maly 1999:390).

These cultural practitioners also provide insight into the proper means of placing the *piko*. Irene Loeyland Lindsey-Fergerstrom recalls that "we put the *piko* in a little cotton and put 'em in a bottle. And sometimes it's hard to come out, so *kūkū* [grandmother] Laika said all you do is take the cover off and put it on the ground and it will just deteriorate" (Maly 1999:A-392). Also, when Lindsey-Fergerstrom took *piko* to Mauna Kea, her husband "dug a little hole and put the *piko* in...the summit" (Maly 1999:A-391). Elizabeth 'Tita' Lindsey Kimura relates that her mother "was very particular...you don't just *hana kapulu* [to act carelessly or slovenly]...you got to treat it with respect" (Maly & Maly 2006:A-217). Kimura also says that the reason for taking the *piko* up to Mauna Kea is that the mountains is "neat" and "clean," practitioners "don't want any *kapulu*...in the discarding of the *piko*" (Maly & Maly 2006:A-217). It is clear that maintaining cleanliness and purity is an important component in this cultural practice. Kealoha Pisciotta explains that in light of some practitioners belief that Lake Wai`au has become polluted, she fears that "people won't put the *piko* of the baby in there it it's polluted" (Orr 2004:45).

There were many reasons for hiding the *piko* of newborn babies. One was to ensure a long life. Another was to prevent the child from growing up as an irresponsible adult. There is a well known Hawaiian proverb concerning *piko--He piko pau `iole* which translates as "*an umbilical cord taken by a rat.*" Pukui interpreted the proverb to mean:

> A chronic thief. The umbilical cords of infants were taken to special places where the cords of other family members were kept for many generations. If a rat took a cord before it was hidden away safely, the child became a thief (Pukui 1983:96).

2.3.2.3 Mortuary Practices

There are numerous references to human burials on the high elevation northern and eastern slopes of Mauna Kea (see discussion in McEldowney 1982). The practice of burying the dead in remote, high elevation areas may have been a common practice, based on the information collected by Thomas Thrum for Haleakala on Maui:

> The use of the craters within Haleakala as burial places, far removed from places of habitation, is quite in keeping with ancient Hawaiian practice. Distances and difficulties were no bar to faithful execution in carrying out the instruction of a dying relative or friend (Thrum 1921:258).

One reason, but undoubtedly not the only one, for taking the dead to remote areas was the fear that the bones might be used to make fishhooks. A person named Nainoa gave such an explanation in testimony before the Boundary Commission:

> In old times, if anyone died, could not wail, but people come and steal shin bones for fishhooks, so used to carry body secretly and bury in mountains (quoted in McEldowney 1982:1.9).

There are a couple of early accounts of burials having been found in the general vicinity of Pu`u Līlīnoe. E.D. Preston's account of his work at Lake Waiau, in 1892, noted that "At an elevation of nearly 13,000 feet, near Līlīnoe, a burying ground was

found, where the ancient chiefs were laid to rest in the red volcanic sand" (Preston 1895:601). W.D. Alexander's surveying party saw what they interpreted as graves on the top of Pu`u Līlīnoe, also in 1892:

> The same afternoon [July 25, 1892] the surveyors occupied the summit of Lilinoe, a high rocky crater, a mile southeast of the central hills [the 'summit'] and a little over 13,000 feet in elevation. Here, as at other places on the plateau, ancient graves are to be found. In olden times, it was a common practice of the natives in the surrounding region to carry up the bones of their deceased relatives to the summit plateau for burial (Alexander 1892).

Kamakau indicated that Queen Ka`ahumanu, who like Fornander also considered Līlīnoe a person, made an unsuccessful attempt to recover her bones on Mauna Kea in 1828 (McEldowney 1982:1.4). Kamakau added that the body of Līlīnoe "was said to have lain for more than a thousand years in a well-preserved condition, not even the hair having fallen out" (Kamakau 1961:285). Kamakau's description of Līlīnoe's body is probably the source of modern stories about a mummified body having been found on Mauna Kea and removed to some unknown location.

Of the many locations with confirmed and possible burial sites, Pu`u Mākanaka is perhaps the best known. The 1925-26 USGS survey team found human remains on the summit of Pu`u Mākanaka:

> To set up Camp Four at 12,400 feet near Puu Makanaka, we had difficulty finding a small flat area for the tents. Makanaka is the largest and most perfectly formed cone in the summit area, 1,500 feet in diameter at the rim and 300 feet deep, while the base is more than 600 feet below the rim at one point. On the rim I found a partially uncovered grave, eroded by high winds, with an incomplete human skeleton. This was unknown, as far as I could discover, to anyone familiar with the area. The name Puu Makanaka means "Hill crowded with many people" and the grave must have been ancient (Kilmartin 1974:15).

Other accounts suggest the placement of upper-elevation burials ensured the safekeeping of high-ranking members of the *ali`i* class. Ed Stevens maintains that "oral history and traditions tell us that...the bones of very special personages were placed in the *pu`u* at or near the summit for safekeeping... they were the special ones" (Maly 1999:C-10, 13). Daniel Kaniho Sr. suggests that "they were all *ali`i*...they were kind of high-ranking people" (Maly 1999:A-169).

Today, numerous oral history interviewees reveal that they have knowledge of burials located at a number of *pu`u* dotting Mauna Kea's western and eastern slopes, including Ahumoa, Kemole, Papalekoki, Mākanaka, Kihe, Kanakaleonui, Kaupo, and Pu`u O`o (Maly 1999:A-22, -48, -75, -165, -250, -279, -351, -395, -397).

Some cultural practitioners explain practices that relate to ancient family burials atop the mountain. Alexander Kanani`alika Lancaster reveals that he and his family members went up to Mauna Kea "for ceremonial. They go up there bless the whole mountain for all our ancestors who's buried up there...the old folks always said, 'Our family is up there'" (Maly 1999:240). As no documentation exists on traditional cultural practices relating to ancient Mauna Kea burials, it is unknown whether blessing

ceremonies would be considered a traditional cultural practice or a contemporary cultural practice.

Other cultural practitioners reveal that they have participated in the practice of scattering the cremated remains of loved ones from atop Mauna Kea. It is noteworthy that cremation was not a common practice in traditional Hawaiian culture, and when it was done it was a punishment and meant to defile the dead person. Writing in the 1830s, native Hawaiian historian David Malo stated that "the punishment inflicted on those who violated the tabu of the chiefs was to be burned with fire until their bodies were reduced to ashes" and that cremation was practiced on "the body of anyone who had made himself an outlaw beyond the protection of the tabu" (Malo 1951:57, 20). Noted Native Hawaiian historian and ethnologist Mary Kawena Pukui explains why cremation was a defilement – "if the bones were destroyed, the spirit would never be able to join its *`aumakua*" (Pukui et al. 1972:109).

There are several cultural practitioners who have taken cremated remains to Mauna Kea, including Toshi Imoto, Tita Elizabeth Kauikeōlani Ruddle-Spielman, and Kealoha Pisciotta. Imoto explained that in 1954, he and six others ascended to Mauna Kea's summit, where *paniolo* Eben Low's ashes were scattered from an *ahu*, which is described as an old survey marker. It is also noteworthy that at the time Low's ashes were scattered, a commemorative cement plaque was placed at Lake Waiau in Low's honor (Maly 1999:25-26). Ruddle-Spielman, who happens to be the granddaughter of Eben Low, explained that in 1969, she and her family members scattered her parents' cremation ashes from the Mauna Kea summit (Maly 1999:273-274). Kealoha Pisciotta also revealed that she brought her aunties' ashes to Mauna Kea (Orr 2004:52). Finally, Theodore "Teddy" Bell says that he wants his ashes to be scattered from the mountain (Maly & Maly 2006:A-293).

Undoubtedly, the scattering of cremation ashes today is a contemporary cultural practice that has taken the place of traditional interment practices. But debate ensues over whether this practice has evolved from traditional practices and beliefs or whether it is a new practice based on modern customs and beliefs. Pualani Kanaka`ole Kanahele explains that while the scattering of cremation remains on Mauna Kea may be viewed by some as non-traditional, she counters that notion saying: "it may not be the *iwi* [bones] itself, but the ashes are the essence of what is left of the *iwi*. It doesn't matter, it's going back" (Maly 1999:A-377). On the contrary, in 1970, a woman identified solely as Kolokea C. testified before the Hawaiian Culture Committee of the Queen Liliuokalani Children's Center that when her brother died, she intended to have his body cremated. However, she was told by her 73-year old great-great-grandaunt that "cremation was *puhi i ka iwi* [bone burning]" and that cremation was an expressly prohibited by Kolokea's great-great-grandfather. This auntie recommended burial in the ground or at sea instead, as with a cremation "the body will be without peace." In the end, Kolokea C. decided to bury her brother (Pukui et al. 1972:106-107). Ms. Kanahele explains that cremation is an evolutionary development of a contemporary practice from an earlier traditional practice, whereas Kolokea C. concluded that cremation was non-traditional in learning of the traditional prohibitions of this practice.

2.3.2.4 Pilgrimage, Prayer, Offerings, and the Spiritual Resonance of Mauna Kea

In public testimony before the Mauna Kea Advisory Committee, Ed Stevens ascribed Mauna Kea's spiritual significance to the fact that it is the highest point in Polynesia. Stevens states the mountain is significant "because it was considered to be the gateway to heaven. When the ancient *kāula* [priests, prophets] made their treks to the summit, it was to be nearest to *akua* where prayers could be offered in the highest reverence" (Maly 1999:C-10)

Instances of the cultural importance of Mauna Kea are related in several pilgrimages made to the mountain by royalty to partake in ceremonial practices in the post-Contact period. During the reign of Kamehameha I, fearing dissension amongst some of his chiefs, in the company of Kekuhaupi`o, the king is reported to have traveled to Mauna Kea to make a ceremonial offering close to Lake Waiau (Desha 2000:94 in Maly & Maly 2005:50). In 1881 or 1882, Queen Emma ascended Mauna Kea and at Lake Waiau, she swam across the lake, riding on the back of Waiaulima (de Silva & de Silva 2006 in McCoy and Nees 2008; Maly & Maly 2005:158; Maly 1999:A-4, -5, -387). Queen Emma's swim across Waiau was a cleansing ceremony initiated in an effort to prove her genealogical connection to Wākea and Papa (Kanahele & Kanahele 1997:9 in Maly 1999:D-21).

In addition, some oral history interviewees have noted seeing offerings left on Mauna Kea in recent times. Libert Landgraf recalls seeing *pu`olo* (offerings) left at Lake Waiau and on the summit of Mauna Kea, which he describes as "a gift or something wrapped in *ti* leaves. My feeling of that is it has cultural, I don't want to go out on a limb and say religious, but it has a significant cultural significance...someone is taking a gift or presentation to a particular area." (Orr 2004:51) Other interviewees, including Rally Greenwell, Hisao Kimura, Coco Vredenburg-Hind, and Daniel Kaniho Sr., testify that they either saw or had heard that *`opihi* shells were present in the Mauna Kea adze quarry (Maly & Maly 2006:A-37, -215; Maly 1999:A-118, -260). Archaeologists theorize that because these *`opihi* shells are too few to be interpreted as the remains of food consumption activities; it is more likely that they were offerings to the *akua* (McCoy 1990:108).

Other oral history interviewees demonstrate the spiritual resonances of Mauna Kea in the following statements:

> Libert Landgraf – "I looked at sites, the area, as the church. ...In this instance maybe the summit of Mauna Kea represents to us what the church is, and the individual sites or the individual platforms is the altar." (Orr 2004:49)
>
> Kealoha Pisciotta – "This is a really hard issue for Hawaiian people, because Hawaiian people have really no temples. [They're] in the state or national parks....So Mauna Kea represents one of the last kind of places where the practice can continue. ...But for Mauna Kea, it's not a temple built by man. It's built by Akua..." (Orr 2004:49)
> Pualani Kanaka`ole Kanahele – "If you want to reach *mana*, that [the summit] is where you go." (Maly 1999:A:372)

> Pualani Kanaka`ole Kanahele – " Mauna Kea was always *kūpuna* [an elder, ancestor] to use. ...And there was no wanting to go on top. You know, just to know that they were there...was just satisfying to us. And so it was kind of a hallowed place that you know it is there, and you don't need to go there. You don't need to bother it. ...And it was always reassuring because it was the foundation for our island." (Maly 1999:A:366)
>
> Florence La`i-ke-aloha-o-Kamāmalu 'Coco' Vredenburg-Hind oral history – "I don't think I could live anywhere else. I feel like it's right, I belong to the dirt, the soil....It just like they protect all of us. These mountains protect us." (Maly 1999: A-117, 120)
>
> Alexander Kanani`alika Lancaster – "My grandmother...she said, 'When you go up there, you going feel the spirit.' And you do feel the spirit." (Maly 1999:A:234)
>
> Tita Elizabeth Kauikeōlani Ruddle-Speilman – "Yes the *mana* is there. There is no question." (Maly 1999: A-286)

Clearly, these statements demonstrate that Mauna Kea continues to be viewed as a realm of great spiritual and sacred importance, a belief rooted in Hawaiian tradition.

2.3.2.5 Collection of Water for Healing

Little documentation exists that Hawaiians sought to collect water or snow in ancient times, yet Lloyd Case says that "they went there because that mountain has the power to heal and it still does...I've heard of the old ones getting water from Waiau to use for healing..." (Maly 1999:A-353). Presently, cultural practitioners engage water and snow collection for ceremonial/medicinal purposes. Regarding the waters on the mountain, Anita Leilani Kamaka`ala Lancaster and Alexander Kanani`alika Lancaster explain that their family uses the "sacred water" of Waiau for baptisms (Maly 1999:A:246). And Kealoha Pisciotta states that "its for medicine...all of these waters" (Orr 2004:45). However, concern surrounding the purity of Lake Waiau is also a factor influencing the contemporary practices of Lake Waiau water collection and snow collection on Mauna Kea. Some cultural practitioners believe that effluent from the observatories enters the aquifer and has caused the green coloration of Lake Waiau's water. Although scientific studies disprove the theory that effluent has in fact leached into the aquifer, Kealoha Pisciotta states that "we are not really trusting to take the water for the medicine anymore" (Orr 2004:45). Pisciotta states that because she is unsure about the purity of the Waiau waters, she gathers snow instead. In her words, "the snow along this ridge in here and by the lake, is what I was told is the snow to collect. It's powerful snow..." (Orr 2004:51).

2.3.3. Adze Manufacture

The manufacture of stone adzes made from discarded preforms left by ancient Hawaiian adze makers or from unmodified pieces of raw material in the Mauna Kea Adze Quarry is a practice occurring today, about which relatively little is known, however. One reason is that the collection of material from the quarry, a large part of

which is located in the NAR, is not a permitted activity under the NAR rules. The collection and use of material from the quarry thus tends to be clandestine.

Cultural practitioners also have different beliefs concerning the appropriateness of using material from the quarry for adze manufacture and whether this activity should be taking place at all. For instance, Lloyd Case does not believe adze collection should take place whatsoever. Case states:

> "I think that what ever is there should stay there. Because not only would it be a resource that people can go and see, what the old Hawaiians did and how things were. But if you take everything off of that mountain, and people keep taking things, you have nothing to show for our past." (Maly 1999:A-352)

On the other hand, Hannah Springer believes that if it can be demonstrated that the quarries lack potential for archaeological analysis, adze quarrying could be permitted. She expresses that she does not know how access could or should be regulated, but expects that if it were stipulated that practice be done in a traditional manner, not many individuals would engage in quarrying. Springer says:

> Should there be fresh mining? I don't know if there's information that can still be extracted from the fragments that remain from past work done there. If already there has been tremendous removal of material, how valid is the data that remains? What sort of picture would we get from analysis of it? I cannot answer that. If it has relatively low value maybe we would want people to continue to mine an already tapped source. Hundred and eighty degrees away from that, I can't imagine how many people would make the effort if they had to go *kālai* [carve or cut] the *pōhaku* [stone]. So that might be self regulation, right there. To identify and designate an area where people could go. And again I don't know how you determine who's authentic to go up there (Maly 1999:A-310).

Pualani Kanaka`ole Kanahele believes that adze quarrying should be permitted, but only if those quarrying can demonstrate a genealogical tradition of adze quarrying. She says:

> I have two *mana`o* [opinion, thought] for that. One is, an old site should be approached...it depends on what you are taking it for. I can only say, 'Yes, take it if I see that you bring down the *ko`i* [adze] and you use it for something.' It has to be functional for you, and not just a show piece or something that you want to use commercially. ...So I am thinking that if you would go to an old place to mine the *ko`i*, then you need to show some kind of genealogy where your *kūpuna* also had that kind of function. So if your *kūpuna* were some kind of *kālai ki`i* [carvers of images] or *kālai wa`a* [canoe makers] or had some kind of function with the *ko`i*, if you have that...Because then it would make us stronger to know that you still have that and that you still continue this in some form. ...So it's not like saying, 'Oh you cannot, first you have to show us your genealogy.' No. 'Show us what your genealogy is because that makes you stronger, that makes us stronger, that brings *mana* to the place.' That it is still being continued by the *mo`opuna kuakāhi, kualua, kuakolu* [the great; great great great; and great great great grandchildren] of this *kūpuna* (Maly 1999:A-373-374).

Modern-day adze collection and quarrying can be considered a traditional cultural practice that has been modified to include the use of contemporary methods and tools (such as steel rock hammers).

2.3.4 Navigation/Orienteering

Kepā Maly notes in his collection of archival documentation on traditional practices that no specific references to *kilo hōkū* (observing and discerning the nature of the stars) upon Mauna Kea are present (Maly & Maly 2005:95). Maly speculates it is likely that *kilo hōkū* was practiced upon the mountain, as the gods and deities associated with the mountain are also embodied in the heavens, but such accounts are absent from the historical literature (Maly & Maly 2005:95). Libert Landgraf also says that he has "no personal knowledge of it," but he suspects "that it probably was a very good observation [point]" (Orr 2004:55). Lloyd Case says that he believes a platform, which he believes to have been a "navigational *heiau*" was present on the Mauna Kea summit. He states that "before the observatories were there, they had one when all the stones were piled up, kind of similar to some of the *heiau* at Mahukona" (Maly 1999:A-349).

In contrast to Maly's statement that there is an absence of evidence of traditional Hawaiian astronomical observations, cultural practitioner Kealoha Pisciotta believes that "the lake [Wai`au] is like the navigation gourd," a concept which she learned from her auntie (Orr 2004:45). According to Pisciotta, her auntie also instructed her to go to the lake and when she did, Kealoha says "I could see clearly why she wanted to look into the lake. Because when you look into the lake, the whole heavens are reflected in it and it's just like the gourd that they carry on the canoe with the water and the *ane ane*" (Orr 2004:45).

Pisciotta states that *mo`olelo* passed down from her auntie describe solstice alignments with Mauna Kea, thus she believes that the solstices were marked from the Mauna Kea summit. Pisciotta emphasizes that she does not doubt the validity of *mo`olelo*, but she is interested in understanding how the solstice alignments work. Thus, she has concerns that the view plane from Mauna Kea has been diminished and obstructed by the leveling of *pu`u* and the erection of observatory domes (Orr 2004:54-55). Pisciotta reveals the importance of the solstice alignments by stating that "if you do not measure the solstice and the equinox, you cannot keep track of the sacred time. And if you don't know what year you're at, you don't know part of the *wā* or the epic period you're in, so you don't know where you are in the prophesy either" (Orr 2004:58-59). It is noteworthy that not only is Pisciotta interested in validating traditional Hawaiian astronomy techniques, she also holds a degree in physics and has worked as a telescope systems specialist at a Mauna Kea observatory.

On a similar note, Tita Elizabeth Kauikeōlani Ruddle-Spielman conveys the significance of the Mauna Kea view plane, but as a landscape viewed from the sea. She says:

> It was so important when we used to go fishing with uncle Francis, I used to go with him. From Keawaiki. When we started out, he'd say 'Now watch the *pu`u* on the mountain.' And we'd go out, and that was my job to watch the *pu`u* as we went along. And as soon as a cloud came down to that certain *pu`u* we'd turn around and go right home again, because he knew that the ocean would change. It was anywhere that we went, whether we were going towards Kona or coming this side towards Kohala. He said 'You watch that *pu`u* and as soon as you see the clouds hug it, or heading towards it, let me know, because we are turning

around and going home.' And he never failed. ....No, it was on the side, the slopes [not the *pu`u* near the summit, but on the slopes]. But he knew, and sure enough, by the time we got home, that wind would change, but we had gotten home safely. ...that is very important, this whole idea of line of sight, cultural landscape. So not only is it important close up on top, but as viewed from afar (Maly 1999:A-282).

2.3.5 Hunting

There is no evidence that hunting in the summit region was a traditional cultural practice. Available information indicates that it was not until the late 19th century and throughout the 20th century, following the introduction of numerous non-native ungulate species such as bullock (cattle), goats, and sheep, that hunting for subsistence and for sport began on Mauna Kea. Following the Māhele, livestock was deemed the property of the King and the government, although private parties could apply for license to own and brand livestock (Maly & Maly 2005:270). Interestingly, government correspondence dating from 1850-1856 shows that illegal hunting activity by individuals was becoming problematic (Maly & Maly 2005:270-273).

In 1861, a legal dispute over hunting rights led to the decision that no hunting activities could take place on Mauna Kea, except for individuals who acquired leasehold interests in the mountain lands or who gained special permission to hunt (Maly & Maly 2005:274-277). In the years that the forested slopes of Mauna Kea were controlled by cattle ranching operations, Jess Hannah contends that one benefit of being employed as a ranch hand lay in one's ability to practice subsistence hunting. He says, "If you go hunting that was the main benefit because guys could go hunt pig, sheep, and all that. You could always eat" (Maly & Maly 2006:A-428). Dave Woodside, a former government naturalist, concurs and explains that it was only after the World War II era that public hunting on Mauna Kea lands was permitted. This managed hunting policy was developed in part because non-native goats and sheep were adversely impacting the forests and in part because individuals interested in sport and subsistence hunting organized to gain the right to hunt (Maly & Maly 2006:A-323-326). Indeed, Lloyd Case explains the importance of subsistence hunting to many ranch families, "a lot of my brothers and the old timers like David Hogan Kauwē, when they went out hunting, it was basically a hunt where each family took home so much of the meat so that everybody had meat" (Maly 1999:A-345).

Based on all available evidence subsistence hunting within the UH management areas on Mauna Kea is a contemporary cultural practice that has evolved from non-Hawaiian traditions.

2.4 Historic Property Inventory and Significance Evaluations

The number, variety and significance of the historic properties located in the UH management areas is unusual and, indeed, unparalleled elsewhere in Hawai`i (Figure 2-4). An overview of the number and types of historic properties is presented below, together with a chronologically organized history of archaeological investigations. The

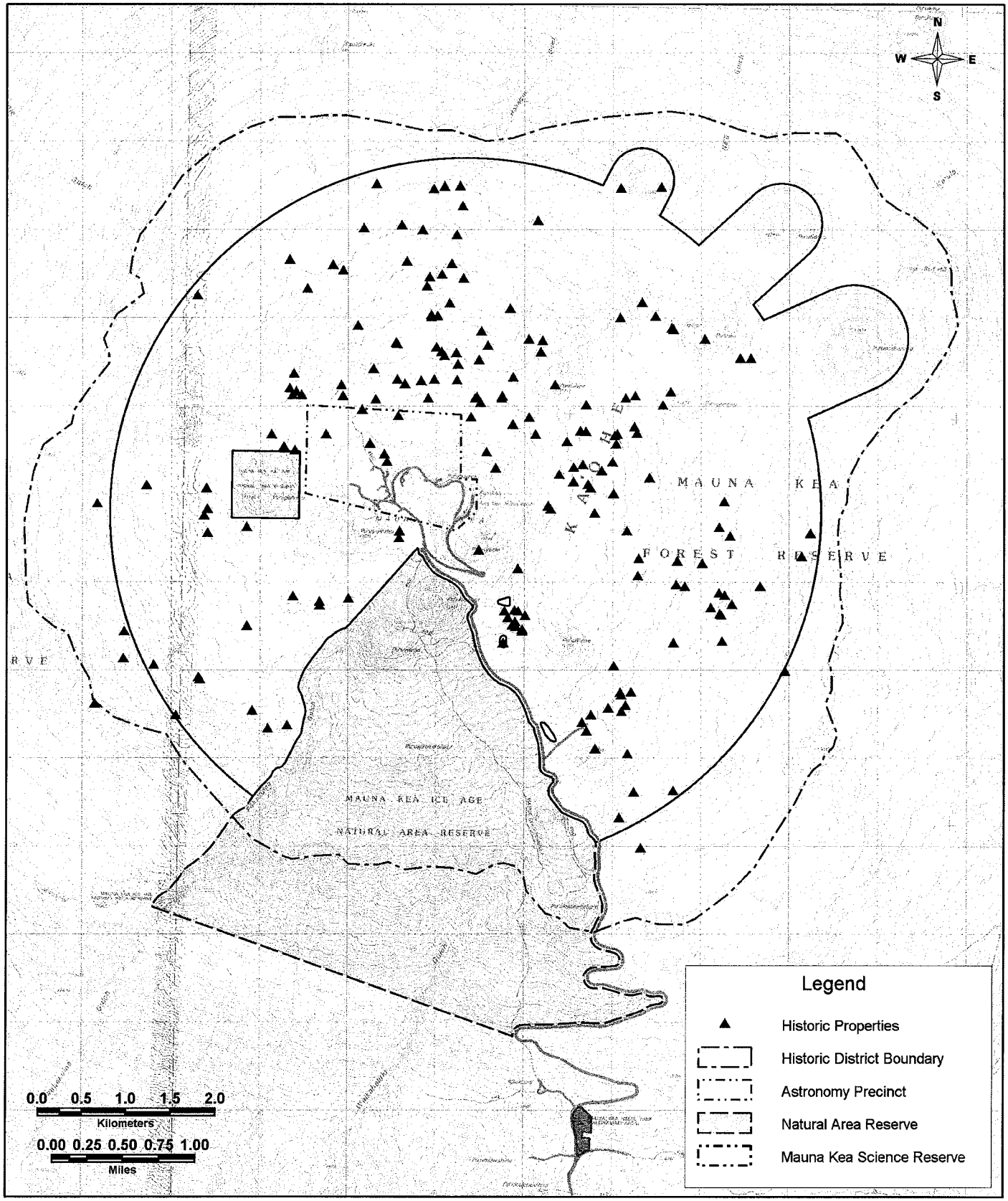


Figure 2-4. Location of Historic Properties in the Mauna Kea Science Reserve as of 2007

significance of the cultural resources on the upper mountain is discussed in the context of the Mauna Kea Summit Region Historic District.

2.4.1 Brief History of Archaeological Research in the UH Management Areas

Archaeological surveys have been conducted in all three of the UH management areas. An intensive survey of the Science Reserve, begun in 2005 is expected to be completed in the summer of 2009. A portion of the Mauna Kea Access Road has not been surveyed and the stone buildings at Hale Pōhaku have not been recorded and assigned a state site number. The only area where mitigation has taken place is in the Mid-Level Facilities parcel at Hale Pōhaku. A brief overview of the archaeological investigations undertaken in each area follows.

2.4.1.1 Mauna Kea Science Reserve

Archaeological surveys undertaken between 1975 and 1999 identified a total of 93 sites (McCoy 1977, 1982, 1984, 1990, 1999; Hammatt and Borthwick 1988; Borthwick and Hammatt 1990) in an area encompassing some 3,711 acres, which represents roughly 33% of the 11,288 acre Science Reserve (Table 2-1). With the exception of a survey undertaken as part of a research project on the Mauna Kea Adze Quarry Complex, all of these surveys were reconnaissance level studies, which by definition are limited in terms of coverage and completeness.

The first archaeological investigations in the Mauna Kea Science Reserve were carried out in 1975-76 in the context of a National Science Foundation funded research project on the Mauna Kea Adze Quarry (McCoy 1977, 1990; Cleghorn 1982; Allen 1981; Williams 1989). A reconnaissance survey undertaken in 1975 to determine the boundaries of the quarry, a National Historic Landmark, found one site just inside the Science Reserve boundaries on the eastern side of the summit road, between the ca. 12,250 and 12,300 ft elevations. The site (BPBM Site No. 50-Ha-G28-1; State Site No. 50-10-23-16204) as defined at the time, using the site definition criteria employed in the quarry project, consists of five shrines, 25 open-air enclosures (shelters) and a diffuse lithic scatter of adze manufacturing by-products (McCoy 1977, 1999b). Two other sites were found in the Science Reserve in the 1976 field season, which involved more intensive survey and site recording. One site (BPBM Site No. 50-Ha-G28-38; State Site No. 50-10-23-16163) is a shrine with a diffuse scatter of flakes located on a ridgetop at the ca. 12,880 ft elevation. The second site (BPBM Site No. 50-Ha-G28-76; State Site No. 50-10-23-16195) are the remains of two stone mounds on the rim of Pu'u Līlinoe. These would appear to be the remnants of the burial interment features noted by W.D. Alexander's survey party in 1892 (see **Section 2.2.4**).

In 1981 a one day reconnaissance survey was undertaken of five potential locations for the proposed Kitt Peak Observatory. While no historic properties were found in this cursory survey (McCoy 1981), the Kitt Peak Observatory was eventually built in Arizona. The first major survey in the Science Reserve was conducted by the Bishop Museum over 5 1/2 days between July 12 and 17, 1982 for the Hawaii Institute for Astronomy

Table 2-1 Summary of Archaeological Surveys in the Mauna Kea Science Reserve.

Year	Project	Survey Type	New Sites	Reference
1975-76	NSF Research Project on the Mauna Kea Adze Quarry	Reconnaissance and inventory	3	McCoy 1977, 1978, 1990; Allen 1981; Cleghorn 1982; Williams 1989
1981	Kitt Peak National Observatory	Reconnaissance	0	McCoy 1981
1982	Hawaii Institute for Astronomy	Reconnaissance	21	McCoy 1982a
1982	Caltech Telescope	Reconnaissance	0	McCoy 1982b
1983	Mauna Kea Observatory Power Line	Reconnaissance	0	Kam and Ota 1983
1984	NSF Grant-in-Aid Survey	Reconnaissance	21	McCoy 1984b
1987	Summit Road Improvement	Reconnaissance	0	Williams 1987; McCoy 1999b
1988	VLBA Telescope	Reconnaissance	3	Hammatt and Borthwick 1988
1990	Subaru Telescope	Reconnaissance	0	Robins and Hammatt 1990
1990	Gemini Telescope	Reconnaissance	0	Borthwick and Hammatt 1990
1991	Pu`u Makanaka	Reconnaissance	1	McCoy field notes
1992	Smithsonian Astrophysical Observatory	Relocation of two known sites	0	McCoy 1993
1995	SHPD site relocation and GPS recording	Reconnaissance	18	McCoy 1999a
1997	SHPD transect survey	Reconnaissance	29	McCoy 1999a
1999	SHPD survey of Pu'u Wekiu	Reconnaissance	1	McCoy 1999a
2005	PCSI survey of the Science Reserve	Inventory	12	McCoy et al. 2005
2006	PCSI survey of the Science Reserve	Inventory	73	McCoy and Nees 2006
2007	PCSI Survey of the Science Reserve	Inventory	40	McCoy and Nees in prep.

Note: The number of sites found in 2008 is still being evaluated and is dependent on completing work in one area of the Science Reserve in 2009.

(IfA) and encompassed roughly 1,000 acres of land on the summit and the north slope of the mountain, down to the ca. 13,000-ft elevation. Few, if any, archaeological sites were predicted to occur within the boundaries of the project area, given the high altitude location and presumed absence of exploitable resources, including adze-quality stone, which was believed to be restricted to the south slope of the mountain. Twenty-two (22) sites were recorded in this survey (McCoy 1982). For field purposes, all but one site, an open-air shelter, were classified as "shrines," earlier defined by Buck (1957:527) as "a convenient term to designate a simple altar without a prepared court." The open-air shelter, which contained modern debris, was later deleted from the historic places inventory because of the belief that it is a modern feature. The number of historic properties found in the 1982 survey has thus been changed to 21. A survey of the Caltech Telescope site was conducted at the same time as the larger survey. No sites were found within the proposed project area, but two sites were found in close proximity (McCoy 1982).

Archaeological survey of the Science Reserve was resumed in 1984 by the Bishop Museum with the support of a National Historic Preservation Grant-in-Aid. The 1984 survey, which was carried out over a period of 6 days between July 23 and 28, was aimed at completing an inventory of archaeological remains on the east-southeast flank of the mountain adjoining the proposed northern boundary of the Mauna Kea Adze Quarry (McCoy 1978). The survey strategy and methodology were the same as those

employed in the 1982 fieldwork. A total of 21 dispersed and aggregated sites was recorded in the survey (McCoy 1984b), which covered ca. 1,000 acres on the eastern slope of the mountain. Time did not permit survey of the upper slopes and summit of Pu`u Mahoe as originally planned.

In 1988 Cultural Surveys Hawaii, Inc., conducted a reconnaissance survey of two areas that were being considered as alternative sites for the National Radio Astronomy Observatory (now called the Very Long Base Array). No archaeological sites were found in the survey of the first area, an area of some 15 acres located between the 11,560 and 11,840 ft elevations near the junction of the summit road and a utility road (Hammatt and Borthwick 1988:1). Four archaeological sites were recorded in the survey of the second alternative site, an area of some 100 acres located on the east side of the summit road at the 12,100 to 12,225 ft elevations. Three sites of the sites (11076, 11077, and 11079) were interpreted as possible shrines; the fourth site (11078) is a small rockshelter (Hammatt and Borthwick 1988:21).

Two archaeological surveys were undertaken in the Science Reserve in 1990, both by Cultural Surveys Hawaii, Inc. The first involved a resurvey of a portion of Pu`u Hau Oki for the proposed Japan National Large Telescope (JNLT-- later renamed the Subaru Telescope). No sites were found in this survey, which covered an area of 5.1 acres (Robins and Hammatt 1990). The second survey was done for the proposed Galileo Telescope (later renamed the Gemini Telescope). Two alternative sites were inspected, both of them located on what the authors called the "summit ridge" (Borthwick and Hammatt 1990). No sites were found in either area.

In 1991 an unofficial one-day reconnaissance of the top of Pu'u Makanaka was undertaken by Holly McEldowney and Marc Smith (SHPD) and Patrick McCoy (Mountain Archaeology Research Corp.) to relocate previously reported burials. The survey, which was interrupted by bad weather, found a number of burials, none of which were mapped, however (McCoy 1991 field notes). A single state site number was assigned to the burials on the *pu'u* at that time.

As part of their Section 106 compliance, Mountain Archaeology Research Corp. was contracted by the Smithsonian Institution Astrophysical Observatory in December 1992 to relocate two previously recorded sites in the general vicinity of one of the pads. The two sites (50-10-23-16164 and -16165), which were found in the 1982 survey and described as shrines (see discussion of site types below) were found to be located well outside of the observatory footprint. Flagging of the two sites was recommended as a precautionary measure (McCoy 1993).

In 1995 the State Historic Preservation Division, with financial support from the Hawaii Institute for Astronomy, initiated a project designed to result in a historic preservation management plan for the Science Reserve. The first task, which was begun in 1995, involved the relocation and GPS locational mapping of the sites recorded in the 1982 and 1984 surveys. In the course of the fieldwork 18 new sites were found and recorded (McCoy 1999a).

In 1997 SHPD undertook a reconnaissance survey of five previously unsurveyed areas aimed at obtaining a better idea of site distribution patterns for both management

and research purposes. The 1997 survey area included three transects on the north, northwest and southwest slopes of the mountain from the summit area to the lower boundary of the Science Reserve at the ca. 12,000 ft elevation and two other areas—Pu`u Poepoe and a small piece of land located near the Science Reserve boundary downslope of the CalTech observatory. A total of 29 new sites were found in the 1997 project, which was conducted over a period of 6 days (McCoy 1999a).

The 1997 survey also began the process of recording what were initially referred to as "locations" but are now being termed "find spots"--a general term referring to man-made remains that are either obviously modern features (e.g., camp sites with tin cans, pieces of glass and other modern material culture items), or features that cannot be classified with any level of confidence as historic sites because of their uncertain age and function (e.g., a pile of stones on a boulder).

One of the recommendations made in the SHPD Plan was to undertake an archaeological inventory survey of the entire Science Reserve. PCSI was contracted by OMKM in 2005 to initiate such a survey. The survey, which was essentially completed in 2007, was viewed as an essential first step in:

- Addressing the frequent complaint by some Hawaiian groups and other interested parties that only a small portion of the Science Reserve has been surveyed and that culturally significant sites, such as burials and shrines, had not been found and could be damaged or destroyed, or that their integrity could be diminished in future observatory construction projects because of impacts such as obstructed view planes.
- Developing a comprehensive CRMP based on the view that the cultural landscape of the Science Reserve could not be adequately managed without data on the number, variety, location and significance of archaeological and cultural sites.

A total of 223 historic properties had been found during the archaeological inventory survey (see Appendix A) as of the end of 2007 when the first draft of the CRMP was in preparation. This includes the 93 sites that had been found in the earlier surveys (McCoy et al. 2005; McCoy and Nees 2006; McCoy and Nees in prep). Additional fieldwork was conducted in 2008 and more is planned in 2009. The total number of sites thus remains to be determined.

2.4.1.2 Mid-Level Facility Parcel at Hale Pōhaku

A number of archaeological investigations have been conducted at Hale Pōhaku (Table 2-2), beginning with a one-day reconnaissance survey by the Bishop Museum in 1979 for the Hale Pōhaku Mid-Level Complex Development Plan. No sites were found at that time (McCoy 1979). Three more surveys were conducted by the Bishop Museum between July 1984 and June 1985 as part of the preparation of a supplemental EIS for a permit to build a new construction laborer camp (see **Section 1.5.2**). Two shrines and five lithic scatters comprised of adze manufacturing by-products and octopus sinker manufacturing by-products were recorded in the surveys, which encompassed roughly 40 acres on the west and east sides of the Mauna Kea Observatory Access Road between the ca. 9,080 and 9,200 ft elevations. The lithic scatters and shrines, one of

Table 2-2. Summary of Archaeological Investigations at Hale Pōhaku.

Year	Project	Investigation	Reference
1979	Hale Pohaku Mid-Level Facilities Complex Development Plan	Reconnaissance survey	McCoy 1979
1984-85	Supplemental EIS for Construction Laborer Camp	Reconnaissance survey	McCoy 1985
1986	HELCO transmission line and substation	Reconnaissance survey	Bonk 1986
1987	HELCO transmission line and substation	Reconnaissance survey	Sinoto 1987
1987	HELCO substation and surrounding area	Data recovery	McCoy 1991
1990	Japan National Large Telescope Dormitories	Reconnaissance Survey	Robins and Hammatt 1990
1993	Japan National Large Telescope Dormitories	Data Recovery	Hammatt and Shideler 2002
2005	Septic Tank Excavations	Monitoring	McCoy 2005

which has octopus sinker manufacturing by-products on it that have been interpreted as offerings, were designated the Pu'u Kalepeamoa Site (Bishop Museum site number 50-Ha-G28-87) after the name of one of the large cinder cones at Hale Pōhaku (McCoy 1985). This cone, through which the summit access road passes, is the source of the stone (primarily dunite and gabbro) used in the manufacture of the sinkers. The two shrines and some of the lithic scatters found in the 1984-85 work are located outside of the Mid-Level facility parcel (Figure 2-5).

In early 1986 William Bonk of the University of Hawaii at Hilo conducted a reconnaissance survey of a proposed new HELCO transmission line and substation located adjacent to a jeep road on the west side of the summit access road at Hale Pōhaku. No historic sites were found in the survey (Bonk 1986).

The subsequent discovery of lithic artifacts in the vicinity of the HELCO substation led to a reconnaissance survey of the substation and surrounding area (Sinoto 1987) and a data recovery project in 1987 (McCoy 1991). The data recovery project involved a more intensive survey; surface collections at 11 different lithic scatters and limited test excavations of two of the scatters (McCoy 1991). SHPD arbitrarily assigned Statewide Inventory of Historic Places (SIHP) numbers to the two shrines and 12 lithic scatters found in the 1984-85 and 1987 projects (Cordy 1994). The Bishop Museum designations and corresponding SIHP numbers are presented in Appendix C.

A total of 2,364 artifacts and 129 faunal remains were collected in the data recovery project. In addition to the debris related to adze and octopus sinker manufacture some 20 special purpose bird cooking stones called *pohaku `eho* were found. Three radiocarbon dates from charcoal recovered in fire pits indicate that the site, which has been interpreted as a temporary camp occupied on the ascent to and descent from the Mauna Kea Adze Quarry, is of late pre-contact age (ca. AD 1600-1700).

Cultural Surveys Hawaii conducted another reconnaissance survey at Hale Pōhaku on August 9, 1990. The survey, which was done in conjunction with the proposed construction of dormitories for the Japan National Large Telescope (later renamed the Subaru Telescope), covered the entire Hale Pōhaku parcel. No new sites

Figure 2-5 Locations of Historic Properties in the Hale Pōhaku Area

or features were found in the survey. Two of the lithic scatters located in the area of the proposed dormitories that had been recorded in the 1984-85 Bishop Museum survey were relocated, mapped in more detail, and recommended data recovery investigations prior to construction of the dormitories (Robins and Hammatt 1990). The data recovery work was conducted October 19-20, 1993 by Cultural Surveys Hawaii. Two radiocarbon dates were obtained that support the idea of a late prehistoric camp site (Hammatt and Shideler 2002).

The most recent work at this site, conducted in March 2005, involved archaeological monitoring of four septic tank excavations (McCoy 2005). The monitoring report noted that while all of the known surface features in the lease area have undergone data recovery and no longer exist, there is possibility that buried cultural deposits might exist in some undisturbed areas (McCoy 2005).

There is one other historic property, stone cabins constructed by the CCC in the 1930's, in the Mid-Level Facility parcel that has not yet been recorded and evaluated (see **Section 2.2.3** and Figure 1-3).

2.4.1.3 Mauna Kea Access Road

In 1987 the Bishop Museum was contracted by the Facilities Planning and Development Office of the University of Hawaii to undertake an archaeological reconnaissance survey of the Mauna Kea Observatories Access Road above Hale Pōhaku as part of the planning process for road improvements and new parking areas (see Figure 1-1). The survey covered a 100-foot wide corridor on both sides of the road, from Hale Pōhaku to the location of an old, abandoned batch plant and stockpile area located below Pu`u Hau Kea in the NAR. A post-field letter report dated July 7, 1987 (Williams 1987) indicates that no new sites were found during the survey. New data on Site 16204 (see description below), located in close proximity to the road, was obtained during the project (McCoy 1999b).

A significant portion of the 400 yard wide roadway easement has not been surveyed. While it is unlikely that any significant historic properties are being affected in the easement at this time, if UH is going to continue to be responsible for management of the whole easement, then plans should be made to complete the archaeological survey of this management unit sometime in the future.

2.4.2 Historic Property Types

A total of 223 historic properties has been identified and recorded in the UH management areas as of 2007 (Table 2-3; Appendix A). The spatial distribution of known sites is shown in Figures 2-4 and 2-5. All but one of the properties is located in the Science Reserve (see Figures 2-4 and 2-5). The other historic property is located at Hale Pōhaku (see Figure 2-5), but the portions of the site that were found within the boundaries of the Mid-Level Facility parcel have been mitigated through data recovery and no longer exist.

Four classes of sites were recognized in the early surveys in the Science Reserve: (1) shrines; (2) adze manufacturing "workshops"; (3) burials; (4) and probable

Table 2-3. Historic Property Types in the UH Management Areas.

Site Type	Number	Percent Total
Traditional Cultural Properties	2	0.90
Shrines	147	65.91
Burials and Possible Burials	28	12.56
Stone Tool Quarry/Workshop Complexes	2	0.90
Adze Quarry Ritual Center	1	0.44
Isolated Adze Manufacturing "Workshops"	17	7.62
Isolated Artifacts	3	1.35
Stone Markers/Memorials	10	4.50
Temporary Shelters	3	1.35
Historic Campsites	1	0.44
Unknown Function	9	4.03
TOTAL	**223**	**100%**

** Note: The number of sites in the Science Reserve has not yet been determined and will not be known until the survey is completed in October 2009.

survey markers. The archaeological inventory survey conducted by PCSI between 2005 and 2007 identified several additional site types. Each class of sites is briefly described below in terms of its defining characteristics. Functional inferences are based on formal attributes, locational context, and comparative data (ethnographic and archaeological) from Hawai`i and other areas of East Polynesia. One specific site that is known to exist from historic accounts and maps, but which has not been identified on the ground, is the Umikoa Trail. While the trail is believed to date to the 19th century, there is archaeological evidence, including cairns and isolated lithic scatters that indicate Hawaiian adze makers and perhaps other people were following a route similar to the alignment of the Umikoa Trail in the pre-Contact Period.

While the majority of sites consist of just a single feature, there are a fair number of multi-feature sites. These include a number of sites located outside of the adze quarry but which contain adze manufacturing by-products (e.g., cores, flakes, hammerstones and unfinished adzes in various stages of completion) and in some cases an associated shrine and/or enclosures. How to classify and interpret such sites presents some problems, which are addressed more thoroughly in the archaeological inventory survey report (McCoy and Nees in prep). The site types listed below represent just one way of classifying and presenting the data.

2.4.2.1 Traditional Cultural Properties

A type of historic property that was formally defined for the first time in 1998 by Patricia Parker and Thomas King, in National Register Bulletin 38 (*Guidelines for Evaluating and Documenting Traditional Cultural Properties*), is what they called a traditional cultural property.

TCP's, to use the commonly used acronym, were defined by Parker and King as follows:

> A traditional cultural property, then, can be defined generally as one that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community (National Register Bulletin 38:1998:1).

In a recent book, entirely devoted to TCP's, King notes that the term he and Parker invented was just "A fancy way of saying places that *count* to ordinary people, are held dear by them, whatever significance they may have for professional scholars" (King 2003:1). Such a broad definition poses some obvious problems, especially in the case of large mountains, where some people regard the whole mountain as culturally significant while others of the same group might say that only the very top or summit is significant.

During the preparation of the Master Plan and draft HPP, in 1999-2000, SHPD determined that three areas on Mauna Kea met the criteria for designation as TCP's because of their association with legendary figures and on-going cultural practices Two of the TCPs are located in the Science Reserve. These include Pu'u Līlīnoe and the summit (Kūkahau'ula), which is comprised of a series of overlapping cinder cones including Pu`u Wekiu, Pu`u Kea, Pu`u Hau Oki and at least one other unnamed cone. The third TCP is Pu`u Waiau, which is located just outside of the Science Reserve in the Mauna Kea Ice Age Natural Area Reserve. Each area was given a state site number (see Figure 2-6) and the general boundaries marked on a map (SHPD 2000:Figure 1). The boundaries shown in Figure 2-6 are based on geological map units (Wolfe et al. 1997: Plate 2). All three TCP's are listed in the Statewide Inventory of Historic Places as sites 50-10-23-21438 (Kūkahau'ula), 50-1-23-21439 (Pu'u Līlīnoe), and 50-1-23-21440 (Pu`u Waiau) and by definition (see above) are eligible for inclusion on the National Register of Historic Places.

Studies conducted for improvements to the Hawaii Defense Access Road and Saddle Road Project in 1996 included a Traditional Cultural Property assessment for Mauna Kea by Dr. Charles Langlas of the University of Hawaii at Hilo (Langlas et al. 1997). A letter written in March 1999 that accompanied the submittal of a supplement to the main study, prepared in 1998, indicated that "the author intended to conclude that although the whole upper zone of Mauna Kea should be considered eligible as a traditional cultural property for the National Register of Historic Sites (as a historic district), he cannot recommend that the summit peak be considered eligible as a specific site, because he cannot make public the information he collected by Kupuna X" (Langlas 1999).

Tom King, in the declaration he submitted as part of the contested case hearing for the Keck Outrigger project (King 2003), stated his opinion that the landscape on the upper slopes of Mauna Kea meets the eligibility criteria for inclusion in the National Register as a TCP (King 2003:6-7). While King did not set a boundary, there are individuals who believe that all of the lands above the 6,000 ft elevation should be recognized as a TCP (NASA 2005:xv).

With regard to management action CR-2 in the CMP (Ho`akea 2009:Table 7-1), the summit, Kūkahau'ula, is already a listed TCP (Statewide Inventory of Historic Places Site 50-10-23-21439).

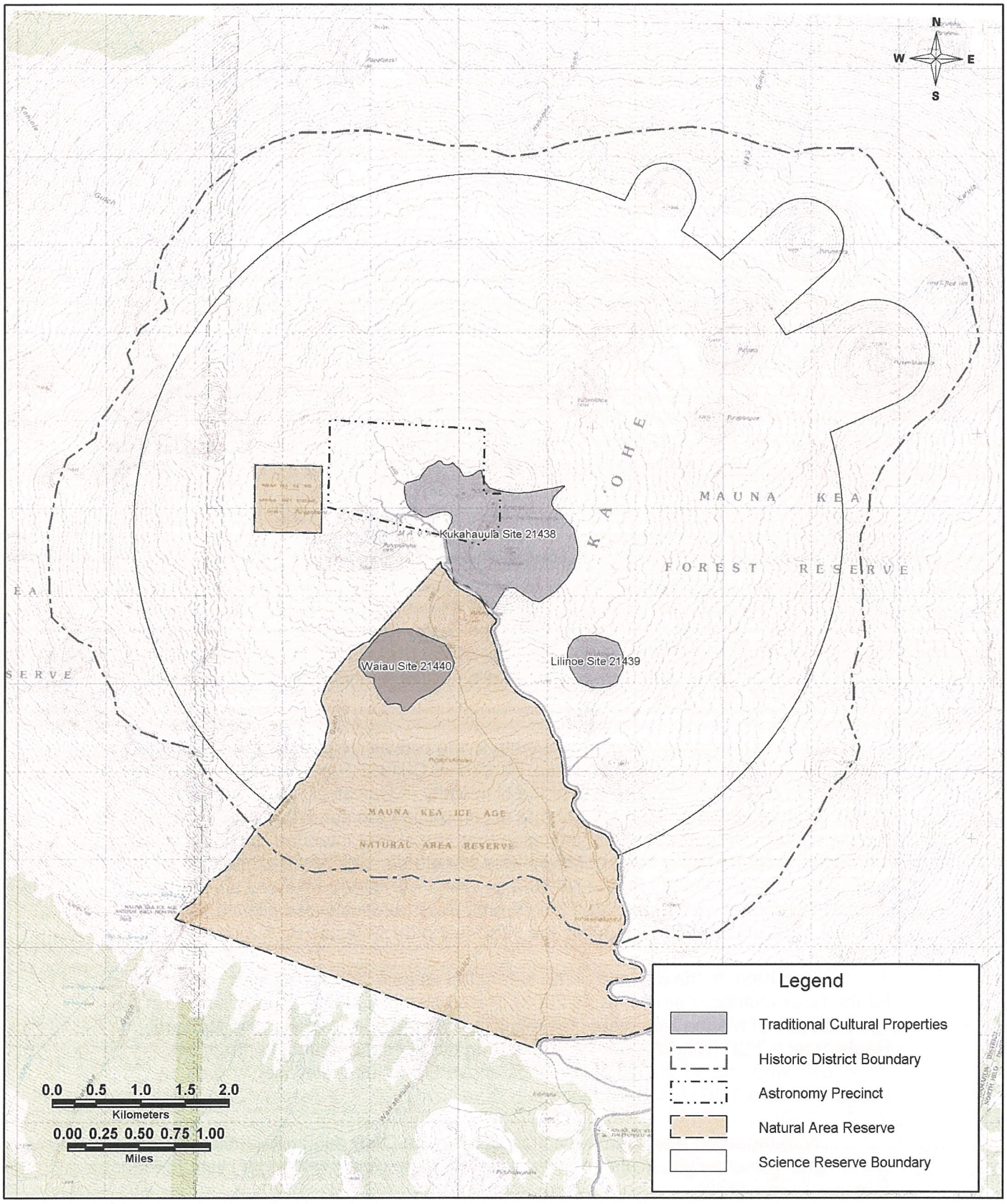


Figure 2-6. Location of SHPD-Designated Traditional Cultural Properties in the Mauna Kea Summit Region

2.4.2.2 Shrines

Shrines are by far the most common site type in the UH management areas (see Table 2-3). A total of 147 or 65.91% of the 223 historic properties identified as of 2007 are shrines. This number includes a couple of possible shrines, where some doubt exists about the presence of uprights because none were found in a standing position. As described below, shrines are also found in association with isolated lithic scatters comprised of adze manufacturing by-products transported from the adze quarry, so the total number of shrines in the Science Reserve is actually larger.

The quintessential characteristic of all the remains identified as shrines is the presence of one or more upright stones (Figure 2-7). A number of shrines consist of just a single upright, while others are characterized by multiple uprights arranged in different patterns on a variety of different kinds of foundations. Kenneth Emory, who was the first one to describe the shrines on Mauna Kea and note their East Polynesian affinities, was of the opinion that the uprights represented or symbolized separate gods. Emory made the following comments about the shrines he saw in the nearby adze quarry, during a brief reconnaissance of the main quarry area in 1937:

> The adze makers, clinging to the ancient form of shrine at which to approach their patron gods, have preserved a most important link with their ancestral home. Each upright stone at a shrine probably stood for a separate god. The Hawaiian dictionary describes *'eho* as "a collection of stone gods" and this is the term which the Tuamotuans, the neighbors of the Tahitians, used to designate the alignment of upright stones on the low and narrow platform at their maraes, or sacred places (Emory 1938:22).

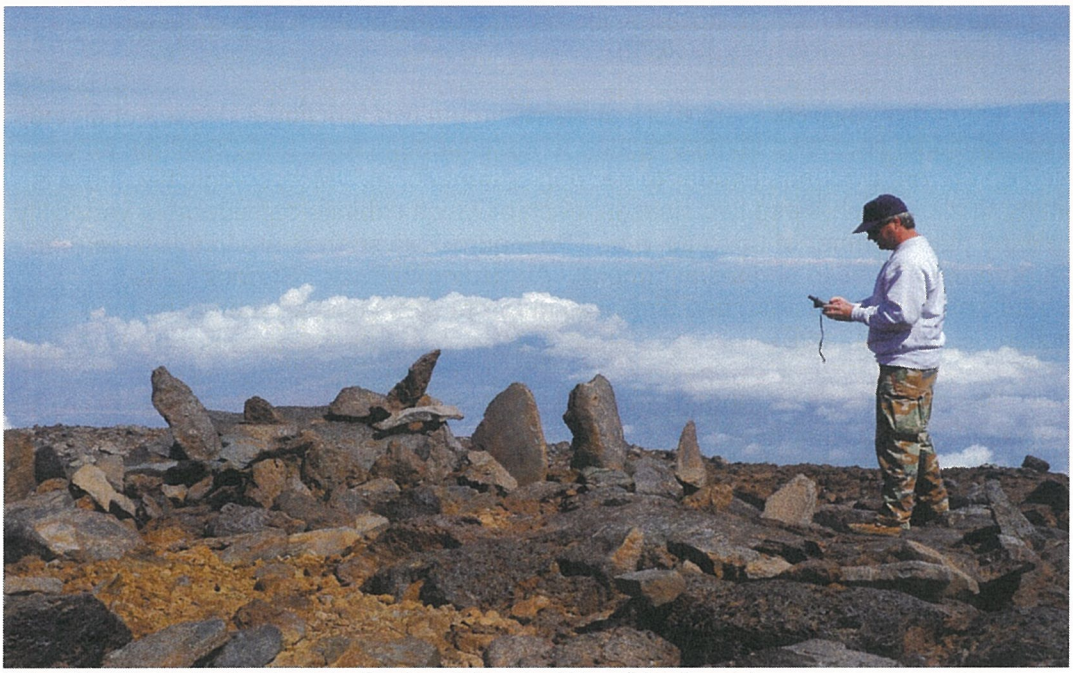
On current evidence there are at the minimum two functional classes of shrines: (1) occupational specialist shrines related to adze manufacture, and (2) all the others, which on current evidence appear to be "non-occupational." Morphologically, there is nothing to distinguish these two classes, each of which exhibits considerable variability in ground plan, number of uprights, etc. The Mauna Kea shrines are in this regard no different from Hawaiian shrines in general. According to Buck, "Shrines varied considerably in construction, and similar forms were distinguished merely by their function" (Buck 1957:528).

The only thing that distinguishes the occupational shrines from all the others are associated lithic scatters found either on the shrine itself or in close enough proximity to be considered part of a single site. The artifacts found on shrines are interpreted as offerings, while those some distance away are interpreted as some kind of specialized "workshop."

2.4.2.3 Burials and Possible Burials

Prior to the beginning of the archaeological inventory survey in 2005 the only positively identified human remains that were known to exist in the Science Reserve were located on the summit of Pu'u Mākanaka, although as noted in **Section 2.3** there are also references to human remains having been seen on Pu`u Līlīnoe in 1892 (see Figure 2-3). Jerome Kilmartin, a surveyor with the United States Geological Survey,

Site 16200, Multiple Upright Shrine with Mauna Loa in Background; View to South



Site 16168, Multiple Upright Shrine; View to West/Northwest.

Figure 2-7. Examples of Shrines (*Kūahu*) in the Mauna Kea Science Reserve.

noted the presence of human remains on Pu'u Mākanaka in 1925. In a popular account of his experiences on the mountain, written many years later, Kilmartin noted that the name Pu`u Mākanaka means "Hill crowded with many people" and the grave must have been ancient (Kilmartin 1974:15). The name is indeed accurate; a number of other human remains were found on the rim of the *pu`u* in the 2005-2007 survey.

There are currently 28 sites in the Science Reserve that have been interpreted as burials or possible burials (see Table 2-3 and Appendix A). They are the second most common site type in the UH management areas, representing 12.56% of the total. For the sites classified as possible burials there are compelling reasons, such as the topographic location and morphological characteristics of the structures, to believe that these sites are indeed burials, but because human remains were not seen at the time they were recorded they are classified as possible burials.

Burial site locations are not illustrated in Appendix A. Until the inventory survey report and Burial Treatment Plan is completed and formal decisions are made by SHPD, the Hawai`i Island Burial Council, and OMKM, in consultation with the Kahu Kū Mauna Council, this data will not be made to the public.

2.4.2.4 Stone Tool Quarry/Workshop Complexes

Two kinds of stone tool quarry/workshop complexes have been found in the UH management areas, one in the Science Reserve and one at Hale Pōhaku. The complex in the Science Reserve is a part of the Mauna Kea Adze Quarry Complex and consists of a number of quarries, workshops, shrines and at least two habitation rockshelters. As described above, the Pu`u Kalepeamoa Site at Hale Pōhaku is a multi-functional site complex, consisting of several temporary camp sites where the manufacture of adzes and octopus lure sinkers took place. Two shrines, both related to sinker manufacture, are a part of this unusual site complex, which is the only one of its kind known at the present time.

2.4.2.5 Adze Quarry Ritual Center

Site 50-10-23-16204, first recorded in 1975 during research on the Mauna Kea Adze Quarry (McCoy 1977, 1999b), is one of the most complex and significant sites in the Science Reserve. The site, which is located on a prominent whale-back ridge on the east side of the summit road between the roughly 12,250 and 12,332 ft elevations (see Appendix A), consists of 5 shrines, 26 open-air enclosures and a diffuse scatter of adze manufacturing by-products. McCoy (1999b) has interpreted the site, which is located outside of the quarry proper because there is no local source of stone-tool quality basalt, as the locus of initiation rites for apprentice adze makers.

2.4.2.6 Isolated Adze Manufacturing "Workshops"

There are currently 17 sites in the Science Reserve that have been tentatively classified as adze manufacturing "workshops" based on the presence of one or more of

the following kinds of artifacts---flakes, cores, unfinished adzes, and hammerstones (see Table 2-3). These are "workshops" of a different kind than those found in the adze quarry, however. First, there is no naturally occurring source of raw material of the same quality as that found in the adze quarry in the environs of these sites. With one or two possible exceptions, there is little question that the artifacts in these sites were transported from the quarry, even though a geochemical analysis has not yet been conducted to confirm this. Second, there appears to be a considerable amount of inter-site variability in the number or frequency of different artifact classes found on these sites, unlike the usual workshop. In some cases there seems to be a disproportionate number of unfinished adzes compared to the number of flakes, thus pointing to the high probability that some of the adzes were flaked elsewhere and/or transported to these localities at a later stage in the manufacturing process. At other sites the predominant artifact type is flakes. These characteristics, combined with the small size of most of the artifact assemblages, indicate that these were not ordinary workshops. Indeed, the evidence for *in situ* manufacture, as opposed to a place where offerings were made, is in many instances ambiguous. If manufacture did take place it would appear to have been an essentially symbolic act.

Associated with several of these workshops are one or more shrines. Unfinished adzes, flakes and occasionally other manufacturing byproducts were found on or near the shrines at several sites. These assemblages, like those found on many shrines in the quarry, are interpreted as offerings to the tutelary gods of adze making (Malo 1951; McCoy 1990, 1999b). All of these sites are highly significant for the information they convey about the quarry as a social process.

2.4.2.7 Isolated Artifacts

A number of different kinds of isolated artifacts and objects, oftentimes referred to as find spots (e.g., McCoy 1984a), as opposed to the admittedly more idiosyncratic use of the term in the Science Reserve survey, were found in various localities. Isolated artifacts found in the survey include adze preforms, adze manufacturing waste flakes, hammerstones, and a horseshoe. The site and isolated find distinction is arbitrary. The decision to give a site number to the isolated artifacts in the Science Reserve is based on the definition of historic properties in both the National Historic Preservation Act (NHPA), and Chapter 6E (Hawaii Administrative Rules), even though the Statewide Inventory of Historic Places to our knowledge does not currently contain isolated artifacts.

All of the sites and isolated artifacts in the Science Reserve are contained within the proposed boundaries of the Mauna Kea Summit Region Historic District, which has been determined eligible for the National Register of Historic Places. The isolated artifacts found in the survey clearly fit the definition of a contributing property. They possess historic integrity and have yielded information that is contributing to a more detailed understanding of the adze manufacturing process on Mauna Kea. Their locations alone provide important data on the ascent and descent routes utilized by at least some of the adze makers whose homes would have been on the Hamakua Coast.

2.4.2.8 Stone Markers/Memorials

Nine sites are classified as either survey markers or markers left by unknown visitors. These include cairns, mounds, and less formal piles of rocks on top of a boulder. Morphologically, all are quite unlike those which have been interpreted as burials. Some of the more elaborate examples are cylindrical in shape and faced.

Some things that could possibly be interpreted as markers have been built in modern times. Jerome Kilmartin, who was in charge of the topographic mapping of the Lake Waiau quadrangle [later changed to the Mauna Kea quadrangle] for the United States Geological Survey, in 1925, mentions building an *ahu* to retard the wind (Kilmartin 1974:15).

It is possible that some of the simple stacked-stone constructions that have been interpreted as modern (see **Section 2.4**), may be memorials of the kind described by Thomas Thrum in Haleakala:

> It was a recognized custom of Hawaiians to erect stone piles--pile is one meaning of the word ahu--as way marks, memorials of parties traveling or resting, division points of survey, and also guides to most accessible routes of travel. One such marks the safest of three ridges leading from the rim of the crater to the district of Nuu. That some ahu mark burial places is in accord with the present practice in certain districts of Maui and of Hawaii, and perhaps elsewhere. Most, if not all, of the ahus of three stones, one upon the other, are tributes to the deity of the locality and are designed by travelers to assure safety in their journey (Thrum 1921:259).

The number of markers could thus change with a closer analysis of the survey data.

2.4.2.9 Temporary Enclosures

Crude stone walls were found at various localities in the Science Reserve, usually in association with other features, such as lithic scatters. Three sites consist of nothing more than walls. Two to a maximum of four walls were found at these sites. Some are linear, while others are roughly C-shape in plan view. They are interpreted as temporary shelters based on their morphology and environmental setting. There is no means of dating any of these sites, which are probably either late prehistoric or historic in age.

2.4.2.10 Historic/Modern Campsite

One of the camps (Camp Site 3) occupied by the United States Geological Survey team in 1926 was found in 2007 on the north slope of the mountain near Pu'u Mahoe. Another possible USGS campsite was found near Pu'u Makanaka, just outside of the Science Reserve.

2.4.2.11 Unknown Function

There are nine sites of uncertain or unknown function, including the only known site on the summit (see Table 2-3). Three of the sites are either cairns or piles of rocks that could be markers. One site, a terrace with a possible upright, may be an unfinished shrine.

2.4.3 The Mauna Kea Summit Region Historic District

As previously noted in **Section 1.5.7**, in 1999, during the preparation of the Master Plan, SHPD proposed that the cultural landscape on the top of Mauna Kea be recognized as the Mauna Kea Summit Region Historic District. The historic district proposal was summarized in the cultural impact assessment for the Master Plan (PHRI 1999:30-32) and discussed in more depth in the early planning process for the proposed Keck Outrigger project (Hibbard 1999; NASA 2005). The IfA, NASA, and other parties agreed that the proposed district, which on current thinking would include all of the Science Reserve, the Natural Area Reserve, and additional areas at selected locations lower on the mountain, meets the eligibility criteria for inclusion on the National Register of Historic Places. The preliminary district boundaries are shown in Figures 2-4 and 2-6. The district is listed in the Statewide Inventory of Historic Places as Site 50-10-23-26869.

All of the sites in the Science Reserve are contained within the proposed boundaries of the historic district. They are what are called contributing properties in the National Register:

> A **contributing** building, site, structure or object adds to the historic architectural qualities, historic associations, or archaeological values for which a property is significant because a) it was present during the period of significance, and possesses historic integrity reflecting its character at that time or is capable of yielding important information about the period, or b) it independently meets the National Register criteria (National Register Bulletin 24:45).

SHPD has begun working on the nomination of the Mauna Kea Summit Region Historic District to the National Register of Historic Places. The process will involve consulting with several agencies, including OMKM and DLNR-DOFAW since the district includes within its boundaries all of the Mauna Kea Ice Age Natural Area Reserve and state lands outside of both the Science Reserve and NAR. The district will include within its boundaries the three TCP's listed in the Statewide Inventory of Historic Places.

2.4.4 Site Significance Evaluations

As noted in **Section 1.6**, evaluating the significance of sites or historic properties is a requirement for state projects under Section 6E-8 and its implementing regulation (Chapter §13-275-6), and Section 106 of the National Historic Preservation Act and its implementing regulation (36 CFR 800). The criteria used in evaluating site significance for state and federal projects are similar. The federal criteria of eligibility are set out in the National Park Services National Register regulations at 36CFR 60.4. There are four National Register Criteria which are also used in Hawai`i:

(a) That are associated with events that have made a significant contribution to the broad patterns of our history; or

(b) That are associated with the lives of persons significant in our past; or

(c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or possess high artistic values, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) That have yielded, or may be likely to yield, information important in prehistory or history.

One other criterion (e) has been added to the list in Hawai`i. Historic properties evaluated as significant under Criterion "e":

> Have an important value to the native Hawaiian people or other another ethnic group 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 (Chapter §13-275-6).

Historic properties that are significant under criterion "e" include burials, shrines, *heiau*, and traditional cultural properties. Historic districts, which are comprised of a number of individual historic properties, may also be evaluated as significant under criterion "e" if they include shrines, burials or other types of historic properties that are known to be associated with traditional beliefs, events or oral histories.

There are two basic ways in which historic districts and TCP's are recognized as significant under Hawaii Administrative Rules (HAR). Under Chapter 13-198, HAR, a process is established to determine historic properties significant by entering them into the Hawaii Register of Historic Places and by nominating them to the National Register of Historic Places. Historic districts are considered eligible for listing in the Hawaii Register through this process (§13-198-2, HAR). The Hawaii Historic Places Review Board determines which nominated properties meet the criteria for being entered in the Hawaii Register and for being forwarded to the National Register for consideration.

The second way of establishing that historic districts and TCP's are significant is through the historic preservation project review process set out in chapters 13-275 and 13-284, HAR. In both chapters, the significance of any historic property identified during the project review process must be evaluated by the agency or applicant. Once agreement is reached with the State Historic Preservation Division (SHPD) on the significance of an identified historic property, the property is entered in the "Hawaii inventory of historic places" as a consensus determination [HAR §13-275-6(d)(3); §13-284-6(d)(4)]. This process recognizes districts as a type of significant historic property [HAR §§13-275-2; 13-275-6(b); 13-284-2; and 13-284-6(b)]. ***It is important to note that the Hawaii Register of Historic Places and the Hawaii Inventory of Historic Places are not synonymous.***

Site significance tends to be viewed as fixed and unchanging, but in reality it is "both dynamic and relative" (Moratto and Kelly 1978:2). Bowdler (1984:2) and others have noted how archaeological significance is anything but static. Charles McGimsey and Hester Davis emphasize the importance of having a frame of reference in making significance evaluations and why they are always relative:

> The fact that archaeological sites and the information they contain are our only clues to much of human life in the past makes every site potentially significant. It is generally recognized, however, that defining significance implies some frame of reference, problem orientation, geographic, temporal or other context, against which an archaeological phenomenon is to be evaluated. A site is therefore more or less significant relative to some criterion or criteria (McGimsey and Davis 1977:31).

With the recognition of the Mauna Kea Summit Region Historic District as eligible for the National Register there is now a single frame of reference that can be used in evaluating site significance for all of the historic properties on the top of Mauna Kea. As noted in the SHPD Plan, the site significance evaluation process differs for individual sites within and outside of the Historic District. Sites located outside of the proposed boundaries of the historic District will be evaluated individually, in contrast to those located in the historic District, as explained below:

> ...Within the historic district, the significance of properties is not evaluated individually because the summit region as a whole is considered eligible for inclusion in the National Register. Instead, the required assessments consider how each newly or previously recorded property potentially affected by a project contributes to the significance of the historic district as a whole. ...Determining that a property is significant and eligible for the Hawaii and National Registers does not necessarily mean the property will be placed on the Register, only that it possesses attributes and associations which would allow it to be considered eligible. Significance evaluation should conform with SHPD administrative rules or the National Register criteria (National Register Bulletin 15) if the project is federally funded or if the historic properties are located within the historic district (SHPD 2000:17, 20).

The Mauna Kea Summit Region Historic District is significant under all four National Register criteria, and criterion "e" of the Hawaii Administrative Rules, Chapter §13-275-6. The district is significant under criterion "a" because of the presence of the Mauna Kea Adze Quarry Complex (a National Historic Landmark), which was used over a period of 500 years or more and the hundreds of shrines in and outside of the quarry. Both the quarry and the shrines are associated with broad patterns and events in Hawaiian prehistory. The district is significant under criterion "b" because of the association with several gods and goddesses who may have been deified ancestors. These include Kūkahau`ula, Līlīnoe and Waiau which are recognized as TCP's. The sites in the adze quarry and many of the shrines embody distinctive characteristics of traditional Hawaiian stone tool manufacture by craft specialists and a distinctive type of shrine construction found in only a few other places in the Hawaiian Islands. These make the district significant under criterion "c." Studies of the Mauna Kea Adze Quarry Complex and the on-going archaeological survey of the Mauna Kea Science Reserve have already made a significant contribution to our understanding of Hawaiian prehistory and history, and hold the potential to make even more contributions. The district is thus significant under criterion "d." Finally, the district is significant under criterion "e" because of the presence of numerous burials, the three TCP's and the hundreds of

shrines which have been interpreted as evidence of a previously unknown land use practice in the form of pilgrimages to the summit of Mauna Kea to worship the gods and goddesses.

2.5 OTHER CULTURAL RESOURCES

Cultural resources in the Science Reserve include a large number of remains that at present cannot be classified as sites, as normally defined in State and Federal laws, but which nevertheless need to be considered in developing appropriate management strategies since CRMPs, according to Tom King (1998:235), need to consider all cultural resources. As noted above in the summary of previous archaeological work in the Science Reserve (**Section 2.3.1.1**), in 1997 SHPD instituted a process of recording what were initially referred to as "locations" but are now being termed "find spots," although this term generally refers to isolated artifacts (cf. McCoy 1984a). "Find spots" are cultural resources that are either obviously modern features (e.g., camp sites with tin cans, pieces of glass and other modern material culture items), or features that cannot be classified with any level of confidence as historic sites because of their uncertain age and function (e.g., a pile of stones on a boulder).

A total of 21 "find spots" were recorded in 1997. The total number found in 1997 and from 2005 to 2007 is 336 (see Appendix D for descriptions). Their locations are shown in Figure 2-8.

The locations of all cultural resources identified in the UH management areas as of 2007 is shown in Figure 2-9. This includes archaeological sites, Traditional Cultural Properties, and "find spots."

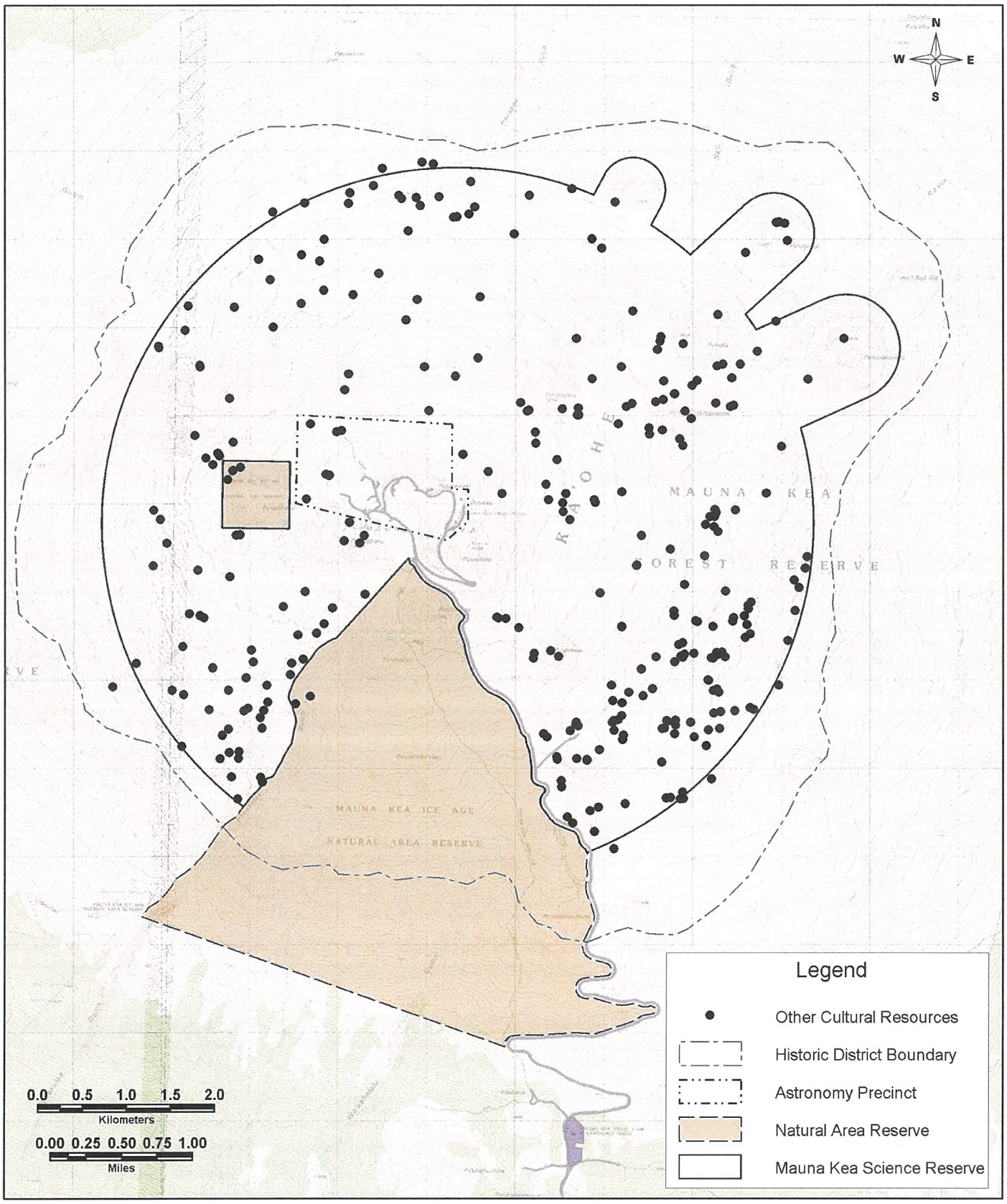


Figure 2-8. Location of Other Cultural Resources ("Find Spots") in the Mauna Kea Science Reserve as of 2007

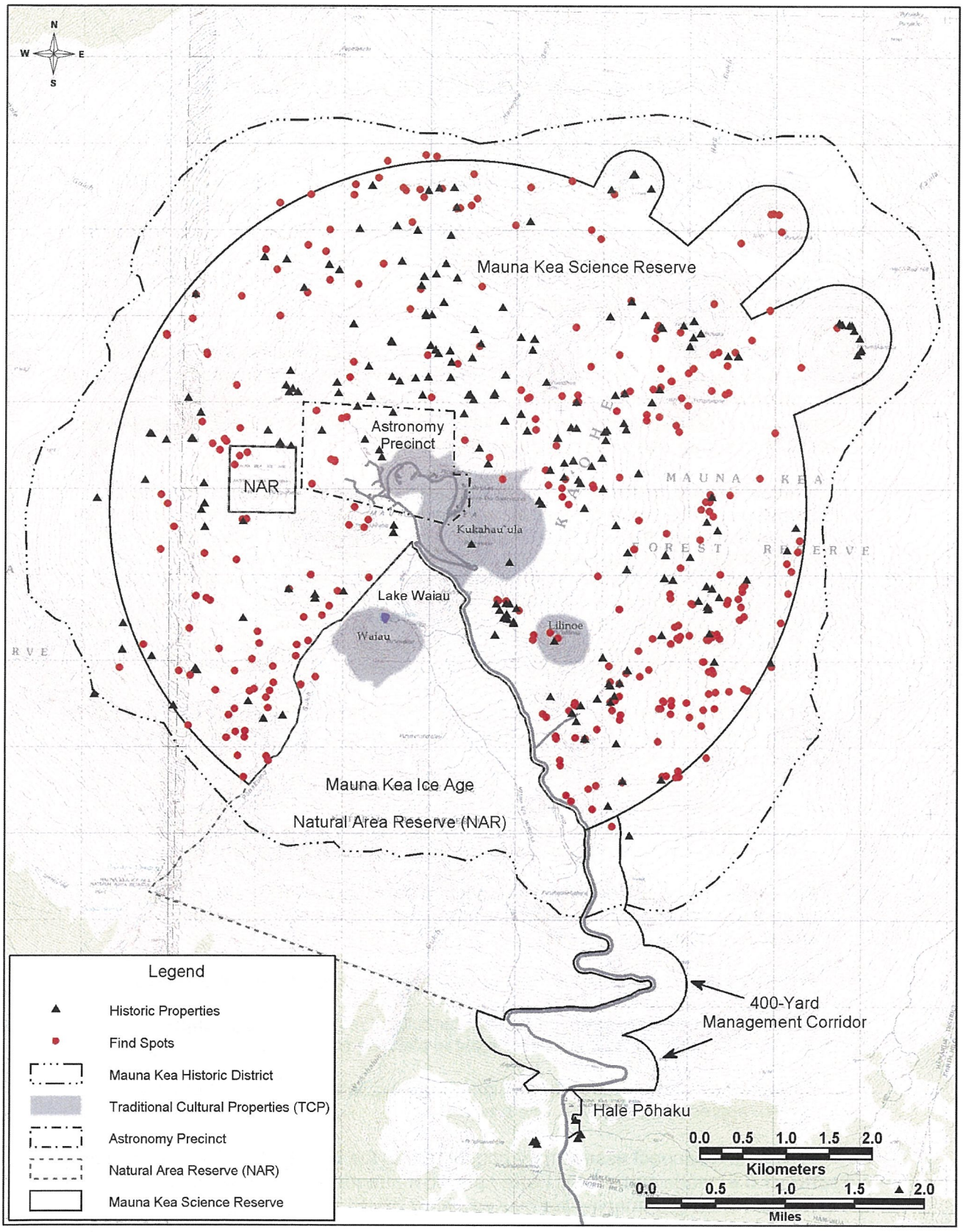


Figure 2-9. Location of Historic Properties, including Traditional Cultural Properties, and Find Spots in the Mauna Kea Science Reserve as of 2007

3.0 MANAGEMENT OBJECTIVES AND AUTHORITY

3.1 OBJECTIVES AND GOALS

Cultural resources management goals and objectives have been identified in virtually every Mauna Kea plan prepared to date, but most tend to be general and lacking specific implementation procedures. For example, the Conceptual Management Plan in the Mauna Kea Science Reserve Complex Development Plan (SRCDP) had the simply stated objective to protect the natural and cultural resources of the summit area using a conservation oriented approach.

The Master Plan, while repeating the need to protect the natural and cultural resources of Mauna Kea, went far beyond any previous plan in enumerating a number of specific objectives and describing a proposed management organization and procedures. The Management Plan section of the Master Plan (Group 70 International, Inc. 2000: X-1) summarized the objectives as follows:

> **Protect historic/cultural resources: e.g., archaeology sites, traditional cultural practices.** While actual damage to known archaeological sites has been minimal, there has evolved a greater sensitivity to cultural values and the importance of geophysical forms in the cultural landscape. The proposed management plan incorporates these values and sets up a supportive framework for current, traditional Hawaiian cultural practices. It proposes a framework for assessing the impact of current practices on historic sites, natural resources, and other uses on the mountain. If there are conflicts, the management plan would establish a procedure for resolving disputes. The plan also promotes education and further research in ethnography and related disciplines.

The Master Plan outlined the following five specific cultural objectives (Group 70 International, Inc. 2000:II-1), some of which were subsequently incorporated into OMKM's mission statement:

1. Promote a greater knowledge base and understanding of cultural resources, Hawaiian cultural practices, and significance of archaeological sites, place names, and geophysical elements (such as cinder cones, glacial deposits, etc.), through the planning process.

2. Preserve and manage cultural resources in a sustainable manner so that future generations may share in the understanding and knowledge of the mountain's archaeological and cultural sites.

3. Protect the opportunities for individuals and groups to engage in cultural practices.

4. Define areas, criteria and support facilities for cultural resources and practices, as applicable, to allow for sustainable, integrated planning and management.

5. Preserve the cultural landscape to enhance meaning, relationships, and resources for modern appreciation, research, and practice.

The cultural impact assessment conducted for the Master Plan EIS (summarized in **Section 1.5.8**) made some even more specific management recommendations based on input from Hawaiians interviewed by Kepa Maly (PHRI 1999:41):

1. In terms of management planning, the Native Hawaiian model of *ahupua`a* management, which incorporates and integrates all aspects of the physical, cultural, and spatial environment, should be utilized;

2. All users of Mauna Kea should enter into a sustainable partnership, with the Native Hawaiian and other components of the local community, that would provide for the future stewardship of Mauna Kea; and

3. Plans need to be formulated, in consultation with cultural practitioners and families having genealogical ties to Mauna Kea, for access to and use of traditional sites and resources.

The *ahupua'a* model of land use and stewardship may be workable in some places, but in the case of Mauna Kea there are several major impediments, including:

- uncertainties regarding the pre-contact boundaries of the *ahupua`a* (McEldowney 1982; Maly and Maly 2005);
- the vast size of the *ahupua'a* of Ka`ohe which extends from the Hamakua coast to the summit of Mauna Loa (see Figure 2-2) and encompasses private, state and federal lands, which would pose a major challenge in developing a cooperative agreement;
- the paucity of information about how the summit area of Mauna Kea was traditionally used; and
- the probable difficulty in identifying the descendants of the families who traditionally resided in Ka`ohe and having them accept a stewardship role.

Some of these same difficulties would probably be encountered in following through with the last recommendation regarding the use of traditional sites and resources.

The *ahupua'a* model of land management has not been incorporated into this CRMP for the reasons outlined above. Rather, the primary management objectives are those outlined in the Introduction (**Section 1.1**). Specific management objectives include those listed above from the Master Plan and others, such as the development of an educational and interpretive program, which appear in the Management Plan that follows (**Section 4**).

The objectives presented in the Master Plan are similar to the goals of ecosystem management in taking a broader, more holistic view than what is typically contained in an historic preservation plan. Like ecosystem management, the goal is managing for the long-term integrity of the cultural landscape, rather than the preservation of individual sites. This approach also recognizes the importance of cultural values in addition to scientific knowledge in resource management. In recognizing the need for conflict resolution there is an implicit acknowledgment of the need for interagency cooperation. The need to assess the impact of current activities on both cultural and natural resources is an expression of adaptive management, which recognizes that "management actions are experiments that must be designed, monitored, and used to change future management" (Lertzman et al. 1997:364-365).

3.2 MANAGEMENT AUTHORITY: OFFICE OF MAUNA KEA MANAGEMENT

The Master Plan succinctly and accurately stated what had been and unfortunately continues to be the single most difficult problem in managing the natural and cultural resources in the UH management areas on Mauna Kea:

> The joint responsibilities and layers of historical leases, plans, permits and written or verbal comments have created a complex and often confusing pattern of management responsibility (Group 70 International, Inc. 2000:VIII-1).

The Master Plan recognized "a need for a single entity to manage a comprehensive integrated plan for the Mauna Kea Science Reserve" and the need to have the management body "based on the Big Island and recognized by the general public as the point of contact for the summit region" (Group 70 International, Inc. 2000:X-3).

The OMKM and the Mauna Kea Management Board were established in July and October 2000, respectively, to implement the management policy guidelines and recommendations presented in the Master Plan. The Master Plan also recommended the creation of an advisory group to "provide advice and direction on Native Hawaiian cultural issues" (Group 70 International, Inc. 2000:ES-2). The group, which adopted the name Kahu Kū Mauna Council, has a number of specific duties, such as assisting in the development of rules and management guidelines and developing programs to educate visitors on the cultural, spiritual, historic and archaeological values of Mauna Kea.

3.2.1 OMKM Mission and Responsibilities

OMKM, aided by the Mauna Kea Management Board, Kahu Kū Mauna Council and community-based Hawaiian Culture and Environment committees, has two primary missions:

1. Protection, Preservation, and Enhancement of Cultural and Natural Resources

2. Provide a World-Class Center Dedicated to Education, Research and Astronomy

A concise statement of OMKM's mission now appears inside the front cover of each issue of OMKM's newsletter, *Ho`opono Mauna Kea*. The Mission Statement reads as follows:

> Achieve harmony, balance and trust in the sustainable management and stewardship of the Mauna Kea Science Reserve through community involvement and programs that protect, preserve and enhance the natural, cultural, and recreational resources of Mauna Kea while providing a world-class enter dedicated to education, research and astronomy.

OMKM's responsibilities have expanded beyond what was envisioned in the Master Plan to include not only the Science Reserve, but the other two lands managed by UH. As previously noted, OMKM's responsibilities are complicated by the fact that the UH management areas are governed by two over-arching management documents—the Master Plan (2000), which was not approved by the Board of Land and

Natural Resources, thus requiring UH to continue to comply with the rights and responsibilities outlined in the 1995 Revised Management Plan.

3.2.2 Early OMKM Management Initiatives

Since it was established in 2000 OMKM has undertaken a number of management initiatives, including: (1) the establishment of a permanent physical presence on Mauna Kea with the development of a ranger program; (2) the publication of a public information newsletter; (3) sponsorship of two public opinion surveys regarding access and other management issues; (4) commissioning an archaeological inventory survey of the Science Reserve; (5) commissioning the development of a Cultural Resource Management Plan; and (6) commissioning the development of a Natural Resource Management Plan.

3.2.2.1 Establishment of a Ranger Program

A major first step in the responsible management of Mauna Kea's cultural and natural resources was the establishment of a Ranger Program in 2001. Two rangers were hired at that time. There are currently five rangers, who receive first responder and first-aid training and education on the cultural and natural resources of Mauna Kea. The rangers have no enforcement powers and rely on the Division of Conservation and Resources Enforcement (DOCARE) to handle regulatory and statutory violations.

3.2.2.2 Publication of a Newsletter-*Ho`opono Mauna Kea*

In addition to conducting meetings with the Kahu Kū Mauna Council, OMKM and the Mauna Kea Management Board began the publication of a newsletter which was appropriately named *Ho`opono Mauna Kea*. The first issue appeared in the fall of 2000. In an effort to reach a broader audience more quickly an e-newsletter was started in 2006.

3.2.2.3 Commissioning of Public Opinion Surveys

OMKM has sponsored two public opinion surveys on management issues. Both were aimed at obtaining public input to assist in the development of administrative rules and regulations.

The first survey, conducted in 2002, involved the mail-out of a questionnaire on a postage paid business reply mail form to approximately local 2,050 residents. The survey consisted of a total of 12 questions that covered three primary management issues: (1) the need to protect Mauna Kea; (2) vehicular access, and (3) recreation. Respondents were asked to check an "agree" or "disagree" box for each of the 12 questions. OMKM received a total of 555 responses or 27% of the total.

The second survey was undertaken in 2003 as part of a practicum in a Social Research class at the University of Hawai`i at Hilo. The survey, which was aimed at interviewing a random sample of Hawaii Island residents of different ethnic and age groups, as well as professions, was done by phone. A total of 626 interviews were done with residents from all parts of the island. People were asked such questions as

whether they had been to the top of Mauna Kea and how often; the reasons they went; how much they knew about four topics (unique species, key geological features, cultural activities and scientific activities); the importance of different activities and possible restrictions on access. The results are summarized in a paper (Okinaka 2004).

3.2.2.4 Commissioning an Archaeological Inventory Survey of the Science Reserve

In 2005 OMKM entered into a contractual agreement with PCSI to undertake the first comprehensive archaeological survey of the entire Science Reserve. The survey, which is on-going, will result in a database of archaeological sites that is a key to the long-term management of cultural resources in the largest and most significant of the three UH management areas. Completion of fieldwork and the preparation of a final archaeological inventory survey report is one of the top priorities for OMKM.

4.0 MANAGEMENT PLAN

The Management Plan is divided into three parts: (1) general management issues; (2) specific public and commercial activities, and (3) long-term management plans, programs and strategies. The first two parts, which to some extent are overlapping, include an evaluation of the potential threats or impacts that each identified activity may have on historic properties and how such impacts can or will be avoided, or mitigated, if necessary. The management actions presented in this plan integrate: (1) existing DLNR policies; (2) the recommended management actions presented in the 2000 SHPD Plan, and (3) newly developed measures, some of which came out of the consultation meetings with Native Hawaiian organizations and individuals that are summarized in **Section 6**.

The Kahu Kū Mauna Council will take the lead in making recommendations for policies regarding cultural practices. The Council will consult with representatives of the Mauna Kea Management Board (MKMB), Hawaiian Culture Committee, the Office of Hawaiian Affairs (OHA), the Hawaii Island Burial Council, and Hawaiian Civic Clubs prior to developing final policy recommendations.

In the absence of administrative rules the Management Plan is a working plan subject to revision. Consultation with SHPD and possibly other divisions of DLNR (e.g., the Division of Forestry and Wildlife regarding hunting activities) will be undertaken prior to finalizing the Management Plan. Once the roles and responsibilities are clarified, the CRMP can be revised to reference the appropriate agency, rules, or agreements in the discussion of particular management actions.

4.1 GENERAL MANAGEMENT ISSUES

There are a number of general management issues (Table 4-1), which can be viewed and addressed in different ways. There are, for example:

(1) Public access and related public activity issues;
(2) Off-road vehicle use
(3) Routine maintenance activities
(4) Enforcement of existing rules and policies

4.1.1 Public Access

Public access to the top of Mauna Kea has been an issue ever since UH was given the lease to the Mauna Kea Science Reserve in 1968. Access continues to be a controversial and divisive subject as the results of the public opinion survey conducted by students at the University of Hawai`i at Hilo in 2003 demonstrated (see **Section 3.2.2.3**). When asked about the need to monitor and/or manage access to the top of the mountain 65.6% of the 626 people interviewed favored an entrance booth and 72.9% supported the idea of requiring visitors to stop and be informed of safety issues and the need to protect archaeological and cultural sites (Okinaka 2004).

Table 4-1. General Management Issues.

Action	Purpose	Management Action
Adopt measures that address issues affecting all major user groups on Mauna Kea and historic properties in all management areas	Minimize and mitigate the effects of debris on historic properties and the landscape Prevent or deter the use of vehicles off of established roads Minimize the impact of unrestricted public access on historic properties along the summit road and the summit region Improve enforcement of laws, regulations, and restrictions that protect historic properties and deter violations	Prepare guidelines to remove debris and reduce its initial distribution. Continue to prohibit the use of vehicles off of established roads and strengthen measures to deter off-road use. Institute measures to minimize the potential effects of unrestricted public access on historic properties and the historic district through registering visitors, distributing information on the protection of historic properties, and monitoring public uses. Institute measures to increase the effectiveness of enforcing and deterring infractions by maintaining a sufficient staff presence and compiling all laws, regulations, and policies needing enforcement. Have sufficient staff with enforcement or management authority to patrol the three management areas. Train staff to document the intentional alteration of historic properties to federal standards. Monitor the condition of historic properties to identify patterns in the alteration of historic properties. Maintain and update the catalogue of historic properties and their current condition for comparative purposes. Integrate all regulations, restrictions, and polices in a single document to aid management staff.

Existing Policy on Public Access and Historic Properties Protection Measures

Public access to all three of the UH management areas is currently unrestricted, with several exceptions that were noted in the 1995 Revised Management Plan, such as restricting access for snow clearance; for health and safety reasons during heavy visitor usage periods, and for night-time observatory use when access to the area above Hale Pohaku is restricted to one half hour before sunrise and one half hour after sunset. From the narrow perspective of preserving historic properties, the more access to the summit region is controlled and restricted, the less likely it is that historic properties will be damaged or destroyed. Preservation alone, however, is not the overriding or exclusive mandate of this CRMP which also considers Native Hawaiian access and public education as major objectives. When all three objectives are considered, options that emphasize the monitoring of access instead of restricting it are preferred. Site protection measures are presented in Table 4-2.

Table 4-2. Site Protection Measures for the Current Policy of Uncontrolled Access.

- Consider developing a policy to register visitors at Hale Pōhaku for health and safety reasons and as a means of controlling public impacts on cultural resources
- Direct visitors to historic properties suitable for visitation if self-guided tours become part of the educational and interpretive program; or inform them of guided tours if tours are incorporated into an educational and interpretive program;
- Provide users with information on historic properties and restrictions that protect historic properties and the historic district;
- Have some level of staff or ranger presence in frequently visited areas as a deterrent;
- Monitor the condition and the effects of public use on historic properties so that controls or restrictions can be revised when necessary;
- Enforce state laws or regulations when needed;
- Maintain an adequate level of staff presence to deter violations and encourage adherence to restrictions; and
- Install public safety and directional signs.

OMKM has already implemented some of the site protection measures listed in Table 4-2. Soon after OMKM became operational in 2000 a Ranger Program was developed. The rangers are currently the most effective deterrent in preventing the vandalism of historic properties, although again, they currently lack enforcement powers. In the absence of administrative rules, UH also does not currently have the legal authority to establish and enforce a visitor registration policy. However, visitors, and hikers in particular, are voluntarily asked to do so for health and safety reasons.

4.1.2 Off-Road Vehicle Use

The primary threats of off-road vehicle use to historic properties vary with the type of historic property. Historic properties and the historic district as a whole can be affected directly or indirectly by the use of vehicles off of established roads. Direct damage can be caused by vehicles running over or into historic properties. Most vulnerable to this kind of damage are relatively obscure flake scatters that are one of the byproducts of adze manufacture, and cinder cones which can be scarred by vehicle tracks. Shrines are less vulnerable to these direct impacts given their common location on stone outcrops or outcrop ridges which are often inaccessible to vehicles, or are avoided in cross-country travel. Vehicle tracks can also scar the landscape within the historic district including the cinders cones. While some scars may be obscured by natural forces through time, others could remain visible for long periods, particularly if repeated use occurs. More importantly, visible tracks tend to encourage others to follow the same route if only out of curiosity.

Off-road vehicles can also have an indirect effect on historic properties because they allow individuals to access a greater number of historic properties and more distant parts of the Science Reserve with greater ease. This increase in accessibility to otherwise relatively remote properties can, in theory, raise the probability that historic properties or parts of the historic district could be altered or damaged.

Existing Policies and Additional Management Actions

The 1995 Revised Management Plan prohibits the use of off-road vehicles by the general public and commercial operators. The types of off-road vehicles specified as being subject to this prohibition

include motorcycles, dune buggies, all terrain vehicles (ATV's), snowmobiles, and 4-wheel drive passenger vehicles, vans, and trucks. Exceptions are allowed for emergency rescue and medical reasons.

Since the inception of the Ranger Program, the 1995 Revised Management Plan policy on off-road vehicle use is being more rigorously enforced. The vehicle tracks that appeared on some of the more accessible cinder cones in the past have been obliterated. OMKM has taken a proactive approach to this issue in providing information to the public. A free brochure--*Visiting Mauna Kea Safely and Responsibly*—is available to visitors with the compliments of OMKM. The brochure contains a map showing trails, roads and parking areas. Infractions are still occurring but they appear to be fewer in number. If an infraction occurs it is noted in the daily reports prepared by the Rangers.

While the problem of off-road vehicle damage seems to be under control, there is clearly a need, however, for more specific management actions to prevent or deter off-road vehicle use and to mitigate the adverse effects of tracks and damage to historic properties. Table 4-3 lists various measures to regulate off-road vehicle use, to deter and mitigate any adverse effects, and to track infractions.

4.1.3 Daily Operations and Routine Maintenance Activities

Many of the daily operations and routine maintenance activities in the UH management areas carried out by Mauna Kea Support Services (MKSS) and the individual observatories will not affect historic properties and need not be subject to historic preservation review . Generally, all classes of activities that do not entail ground disturbance of any kind can be exempted from historic preservation review and compliance, as would those occurring in highly altered areas. In order to reach a clear understanding of which activities will be subject to historic preservation review and compliance and which activities could be exempted, PCSI consulted with MKSS and each of the observatories regarding daily operations and routine maintenance activities.

Table 4-3. Management Actions for Off-Road Vehicles.

General Measures

- Prohibit the operation of all motorized and unmotorized land vehicles except on roads or trails specifically designated for this purpose.
- Control the use of "air conveyance"; (e.g., special requirement for scattering ashes by helicopters and planes, aerial photography, and filming).
- Issue special use permits to allow otherwise prohibited activities for purposes such as research, education, and management.
- Restrict vehicles to designated parking areas such as those that are formalized and paved or those that are unpaved but marked for this purpose. The latter could include previously disturbed turning areas or stretches of road shoulders that have been previously disturbed and could accommodate parking safely.
- Retain and enforce current prohibitions.
- Adopt language used in NAR administrative rules in rules or management controls.
- Establish measures to prevent or deter vehicles from leaving established roads and designated parking areas.
- Maintain current guardrails and boulder barriers.
- Avoid or minimize visual intrusions on landscape if new guardrails or barriers are installed.
- Designate parking areas by unobtrusive signs, temporary signs when needed, or on maps distributed to public users.
- Inform public and commercial users and UH staff of these restrictions.
- Devise mitigation measures to obscure off-road tracks created by unauthorized or authorized vehicles.

Deterrence and Mitigation Actions

- Install guardrails in potentially hazardous stretches of the summit road after a road safety study assesses where they are needed.
- Install signs sparingly and ones that have been designed to certain specifications so that they do not distract from the landscape.
- Use low markers, instead of tall or reflecting signs, to delineate unpaved parking areas or stretches along the road where parking is permitted.
- Restore areas that have been marred by vehicle tracks. Experiments may be needed to determine which methods will best obscure the scars in differing slopes and substrate types. Those areas in which this has been attempted should be reexamined to see how effective these efforts were.

Management Actions for Infractions

- Develop reporting and mitigation procedures in consultation with DLNR.
- Develop a policy that includes the conditions contained in the NAR administrative rule on off-road vehicles.
- Develop a plan to assess the potential effects of off-road vehicles on the lower areas of the Science Reserve than can be accessed from below, (i.e., Kanakaleonui and Puu La`au areas.

Ron Koehler, the manager of MKSS, was consulted in 2006 regarding a range of routine maintenance activities, such as water delivery, waste removal, transportation of observatory personnel, and routine road maintenance. The activity most likely to have an adverse effect on historic properties is road maintenance, but as noted in **Section 2.3.1** no historic properties were found in a survey of a 100 ft wide corridor on both sides of the road by the Bishop Museum in 1987, except for a previously identified stone walled enclosure of questionable antiquity at Site 16204 in the Science Reserve.

While most maintenance activities and routine operations related to the support of astronomical research on Mauna Kea are conducted or overseen by OMKM and/or MKSS, there was a recognition, following a chemical spill on the summit, that some of the routine maintenance activities carried out by observatory personnel could potentially have an adverse effect on historic properties in the Science Reserve and the summit in particular. To address this issue, PCSI consulted with all 13 existing observatories in 2006. The consultation process consisted of a letter and follow-up phone call to the directors or their appointed staff (Appendix E) requesting assistance in providing information to help determine which activities should be included in the list of activities requiring historic preservation review and compliance and which activities could be excluded. The letter requested clarification or any new or additional information pertaining to activities listed below, which were subject to a detailed environmental assessment in the final EIS for the proposed Outrigger project (NASA 2005:4-83 to 4-103):

1. maintenance activities or routine operations involving the use of chemicals and other hazardous wastes in terms of how often they are delivered, how they are handled, how and where they are disposed of, and plans to mitigate accidental spills.
2. maintenance of the exterior dome surfaces and associated out-buildings (e.g., sheds), if they exist, in terms of, for example, how often they are painted and what kinds of repairs are made. The installation of safety ladders, small weather vanes and various other small instruments, such as cameras and anemometers, on a dome would be classified as "excluded activities."
3. maintenance activities that involve ground disturbance, such as the repair of underground utility lines, in terms of the equipment that is used, the extent of the area that is opened up, and how the excavations are filled.

The results of the consultation process indicated that the hazardous waste use and disposal information presented in the FEIS for the proposed Keck Outrigger project for each observatory was accurate and in no need of clarification (NASA 2005:Table 4-19).

4.1.3.1 Excluded Activities

Table 4-4 lists all the activities that can be exempted from historic preservation review, including proposed activities in disturbed areas. Previously disturbed areas were identified based on an examination of aerial photographs and ground inspections. The most disturbed areas are: (1) the Mid-Level Facility parcel; (2) the summit access road corridor from Hale Pōhaku to the summit; (3) the old batch plant and construction storage area located adjacent to the Caltech Submillimeter Observatory; (3) the immediate areas around each of the observatories, and (4) the jeep roads on the north and northwest sides of the mountain (Figure 4-1). Photographs of different kinds of disturbances related to road maintenance appear in the final EIS for the proposed Outrigger project (NASA 2005: Figures 4-2 to 4-4).

Table 4-4. Excluded Classes of Routine Maintenance Activities.

Activity Characteristics	Examples	Review and Compliance	Plan Provisions
Entails no ground disturbance Entails ground disturbances in highly altered areas with no historic properties Does not alter the visual appearance of the historic district	Daily operations: • Water delivery • Waste removal • Transporting observatory personnel • Use of observatories Periodic or routine maintenance: • Road maintenance • Grading • Snow plowing and removal • Replace road markers • Fix guard rails • Repair electrical transmission lines • Replace signs • Repairs and painting of Exterior Dome Surfaces	None	Generate and update lists of excluded activities (compiled in consultation with DLNR) Prepare and update map of previously altered areas (including degree of disturbance)

4.1.3.2 Maintenance Activities Requiring Historic Preservation Review and Potential Compliance

During the consultation process summarized above, the director of the CFHT Observatory noted the severe erosion of the road that encircles the facility and need for repairs before the guardrails are totally undermined. This is an example of an activity that would require historic preservation review (Table 4-5) because of the potential to adversely affect the summit cinder cones, which as previously noted are a TCP. The director also noted that proposed repairs to underground utility lines or the installation of new lines are currently referred to OMKM for review before a decision is made on appropriate compliance measures. This standard operating procedure will be amended to include consultation with SHPD. Other examples are listed in Table 4-5, together with review and compliance procedures and plan provisions for the long-term oversight of maintenance activities with potential adverse effects.

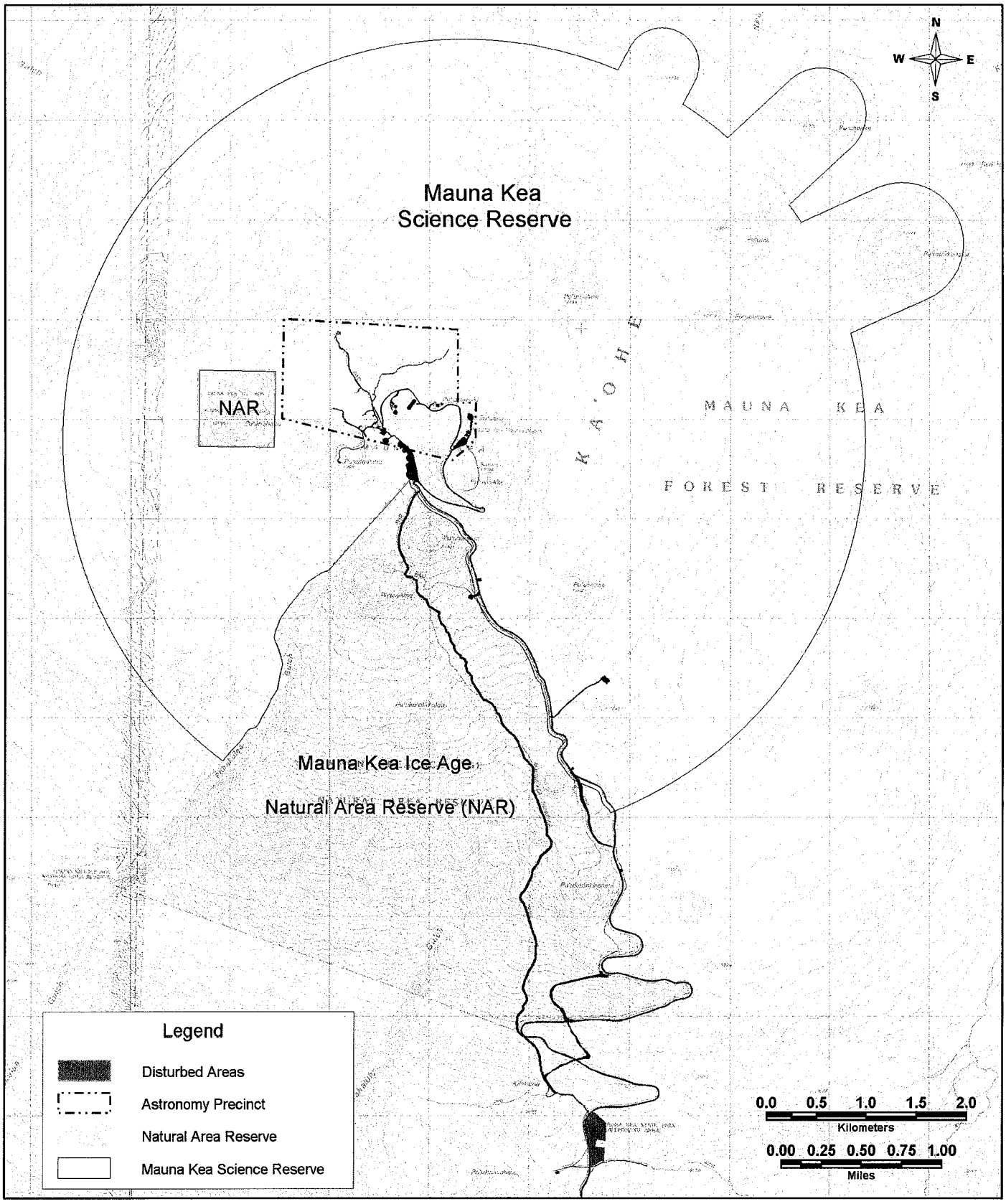


Figure 4-1. Disturbed Locales in the U.H. Management Areas

Table 4-5. Management of On-going Maintenance Activities Requiring Historic Preservation Review and Compliance.

Examples	Review and Compliance	Plan Provisions
Replacement of buried transmission lines. Improvement to drainage structures. Creation or extension of push piles from road grading. Removal of buried or partially buried structures. Installation or replacement of guardrails or barriers along road.	SHPD reviews proposed activity and asks for one or more of the following: • No survey, consultation, or monitoring needed. • Consultation with the Kahu Kū Mauna Council and other Native Hawaiian Community members • Monitoring of specified activities needed.	Generate and update lists of activities requiring review (compiled in consultation with DLNR). Prepare and update map of areas potentially affected by activities requiring review. Any excavations involved in the dismantling of observatories will be filled with natural cinder from an approved source. Seek SHPD compliance review. Develop a Programmatic Agreement for a prescribed list of activities.

4.1.4 Debris

The widespread distribution of debris over the summit region has been recognized as a problem for a long time. The archaeological survey conducted in support of this CRMP has shown that some areas within the summit region are more vulnerable to debris accumulations than others and that debris is generated by a number of activities taking place on the mountain. Construction work, routine activities by observatory personnel, and activities by the public, particularly snow-related ones, all appear to contribute to the wide-spread and sometimes concentrated distribution of debris.

HAR §13-277-6 (3) requires that historic preservation plans address the manner in which litter or debris is controlled in the discussion of long term preservation measures. Debris and the removal of accumulated litter could potentially affect some of the historic properties in the Science Reserve in at least three ways:

1. Debris could physically damage or deface individual properties such as shrines or burials.
2. Debris can affect the visual integrity of the historic district and individual landscape features within the district. This potential effect is particularly high given the open and exposed landscape of the summit region.
3. Systematic efforts to remove debris could, if not done appropriately, affect historic properties. Most vulnerable would be the shrines and the slopes of the summit cones. Individuals participating in the clean-up could inadvertently damage or alter a shrine if they were unaware of its significance or if collection points for the temporary stock-piling and removal of debris are placed too close to shrines or shrine complexes.

Table 4-6 outlines the general procedures to manage debris. A more detailed plan to deal with all aspects of debris accumulation and removal is presented in **Section 4.3.4.**

Table 4-6. Guidelines for Debris Management.

Take steps to minimize debris escaping from observatories, during maintenance work, and from construction sites.
Inform public and commercial activities of the impact of debris.
Install and maintain unobtrusive trash receptacles where users congregate.
Monitor the distribution of debris.
Conduct systematic clean-ups to remove debris without disturbing historic properties by: • Informing clean-up participants of historic properties and restrictions. • Designating debris collection and pick points which avoid historic properties.

4.1.5 Enforcement

Enforcement is key to the success of any management plan. In terms of enforcing historic preservation laws and protecting historic properties, the importance of having a full-time staff presence in the summit region cannot be over stated. The presence of rangers on the mountain since 2000 has been without a doubt a powerful deterrent to the vandalism of historic properties.

Management Actions

Though acts of vandalism may be less frequent than in the past the Rangers will nevertheless be trained in standard procedures for documenting potential violations. In particular, they will receive training in recording damage to historic properties such as that given National Park rangers who need to document damage or vandalism to standards required when enforcing the Archaeological Resources Protection Act on federal lands.

The completion of the archaeological inventory survey of the entire 11,288-acre Science Reserve will facilitate enforcement efforts since there will be a catalog of sites and site location maps that can be used in the assessment of site damage or alteration. Implementation of the long-term monitoring program presented in **Section 4.3.1** will help to focus enforcement efforts by identifying patterns of disturbance and the areas most vulnerable to human disturbance. The list of applicable laws and regulations presented in **Section 1.6** will also facilitate enforcement efforts. Adopting administrative rules specific to the Science Reserve, as recommended in the 1998 Legislative Auditor's report, could help simplify the overall enforcement effort in that all the required procedures, prohibitions, and penalties applicable to all resources and uses on the mountain would be available in one document.

4.1.6 Emergencies

A number of emergency actions, such as rescue operations, could directly and adversely affect historic properties or degrade the integrity of the historic district. Emergencies are defined here as those actions which would be difficult to predict, which require a rapid remedy or response, and which may involve health and safety issues. Examples include the collapse of a road embankment or cinder cone face, the need to create a detour road, or having to remove vehicles that have gone off the road. Another example is chemical or fuel spills which could require an extensive clean-up effort.

Management Actions

Although emergencies are a general management issue, they require, however, a specific plan. With the completion of an archeological survey of the entire Science Reserve the earlier concern about emergency actions in un-surveyed areas is no longer an issue. A draft emergency plan is presented in **Section 4.3.6**.

4.2 MANAGEMENT OF PUBLIC AND COMMERCIAL ACTIVITIES

The overview of public and commercial activities and user groups in **Section 1.4** gave some idea of the range of OMKM's management responsibilities, which includes everything from cultural and religious practices to the review and approval of filming applications. When each of the activities is considered separately and in detail the magnitude of OMKM's management responsibilities for cultural resources alone takes on a whole different perspective. Some activities have existing policies and are relatively easy to regulate in terms of ensuring compliance with historic preservation rules and regulations, but there are others, such as cultural and religious practices, that are for the most part unregulated.

4.2.1 Cultural Practices

The Master Plan and the appended SHPD Plan recognized cultural practices as a particularly important and sensitive matter. The Master Plan foresaw the need for an advisory group to assist OMKM in addressing cultural issues. The Kahu Kū Mauna Council was established to serve this function.

Access and use rights is one of the most important issues, but there are other fundamental issues that need to be addressed, such as which of the many cultural practices occurring today are acceptable to not only the Kahu Kū Mauna Council, but to the Hawaiian community in general. The only cultural practices that are currently prohibited by law (see discussion of civil and administrative violations in §6E-11 in **Section 1.6.1**) are those that tamper with ancient sites, but this has not prevented the alteration of shrines and building of new cultural features from happening as noted below. Other practices, some of which are not based on traditional Hawaiian beliefs, are taking place without any restrictions. The need to establish policies and protocols is becoming more evident as the number and types of cultural and religious practices grows. There is now a mixture of Native Hawaiian and non-Hawaiian cultural practices taking place on the mountain, on the summit (Kūkahau`ula) and at Lake Waiau, for example.

4.2.1.1 Practices, Beliefs, and Protocols

A number of different kinds of cultural practices are occurring on the mountain today. The cultural impact assessment (CIA) for the Master Plan EIS recognized two broad categories: (1) traditional and customary cultural practices and beliefs, and (2) contemporary cultural practices. Traditional and customary practices and beliefs were defined as those taking place in the summit region as a whole, as well as those occurring at specific locations within the Science Reserve boundaries. The following practices and beliefs were listed under this category (PHRI 1999:39):

1. Performance of prayer and ritual observances important for the reinforcement of an individual's Hawaiian spirituality;
2. Collection of water from Waiau for a variety of healing and other ritual uses;

3. Deposition of piko (umbilical cords) at Waiau and the summit peaks of Mauna Kea;
4. Use of the summit region as a repository for human burial remains, by means of interment, particularly on various *pu`u*, during earlier times, and more recently by means of releasing ashes from cremations;
5. Belief in the upper mountain region of Mauna Kea, from the Saddle area up to the summit, as a sacred landscape—as the personification of the spiritual and physical connection between one's ancestors, history, and the heavens; and
6. Association of unspecified traditional navigation practices and customs with [sic] the summit area.

Contemporary cultural practices were defined as those based on modern beliefs. These were described as including "prayer and ritual observances, construction of new altars and subsistence and recreational hunting" (Maly 1998; PHRI 1999:40).

The FEIS for the Outrigger telescopes project made a point of emphasizing that "In Native Hawaiian society, cultural and religious practices and observances are inseparably intertwined" (NASA 2005:3-18). The practice of carrying and concealing umbilical cords (*piko*) on the mountain was described in some detail:

> The practitioners, and many families in the community, continue to carry the umbilical cords (piko) of their newborn children to the summit for concealment. This is a deeply spiritual activity and the piko may be concealed anywhere on the summit. The location of the *piko* is known only to the families, who mark the site by the alignment of physical features, including the *pu`u* and other geographic characteristics, such as the stars (NASA 2005:3-19 to 3-20).

The FEIS also noted that families are building new shrines and visiting the adze quarry to conduct cultural and religious rituals. Beginning in 1998 there have been spiritual observances of the winter solstice on the mountain. The altar (*lele*) on the summit was constructed at the time of the first observance, in 1998 (NASA 2005:3-20 to 3-21).

Some Hawaiians and scholars will undoubtedly argue that the distinction between traditional and customary practices and associated beliefs does not exist and that practices based on modern beliefs represent nothing more than the natural process of an evolving culture. Some, but perhaps not all who hold to this view, would presumably say that all of the cultural practices occurring today are legitimate and should not be regulated in any way. There are several reasons, however, why policies for cultural practices, however they are perceived, need to be developed. Not only are new shrines being built, but some of the ancient shrines are being altered. The alterations are a violation of §6E-11, and the conditions set forth in the 1995 Revised Management Plan, which has been incorporated into the recently approved CMP, and the Master Plan, which recognized that responsibility for the protection of historic properties in the UH management areas rests with SHPD. The archaeological survey of the Science Reserve found evidence of the removal of artifacts from shrines, changes in the placement of uprights and more extensive "renovations" (McCoy et al. 2005).

As previously noted, Mauna Kea is now widely regarded by some as not only a sacred place, but the most important of all of the sacred places on the island of Hawai`i. Though widely acknowledged as such, some of the cultural practices occurring today in this sacred place are from a non-native point of view polluting the cultural landscape with debris and foreign objects and diminishing the integrity of ancient shrines through changes to architectural elements and, in some cases, the removal of offerings. As the late Mary Douglas, a preeminent British social anthropologist who wrote extensively on the concepts of pollution and taboo noted, "For us sacred places and things are to be protected from defilement "(Douglas 1966:7). She notes that this is in sharp contrast to many non-

Western societies where there seems to be no sharp distinction between sanctity and uncleanness. She writes that this could mean "that our idea of sanctity has become very specialized," in contrast to traditional cultures where the sacred may have been "a very general idea meaning little more than prohibition" (Douglas 1966:8).

From an outsider's point of view some of the cultural practices that are occurring on the mountain today are resulting in a situation analogous to what ecologists call a "sliding baseline." A "sliding baseline," according to the philosopher Kathleen Dean Moore, is one where the standards of what is considered an intact, healthy environment or ecosystem have slid down to meet the degraded landscape that people today know. The process takes place because "changes often happen slowly and losses are often hard to see," (Moore 2004:xi) and a new generation of people, unfamiliar with what existed before, are likely to believe that what they see is "the way things have always been and will always be" (Moore 2004:xi). The process she describes is one that is currently happening in the summit area, where hundreds of what are believed to be new cultural features, some with crystals and other foreign objects, have appeared on the landscape in the last decade or so. Many people, including younger practitioners, may believe that what they see was built by Native Hawaiians, has always been there and should remain.

Moore points out that there is another sliding baseline—an "ethical baseline." She notes that while "we think of ourselves as good people" we allow the destruction or alteration of ecosystems. What is lost in the process is the "richness and complexity, the wholeness of an intact ecosystem" (Moore 2004:xii). To put this in cultural terms and the Mauna Kea context specifically, along with the changes in the traditional cultural landscape in the appearance of crystals and other objects, there has been an accompanying decline in the standards of human behavior. Nowhere is this more apparent than at the summit altar (*lele*) which was erected as part of a winter solstice ceremony by the Royal Order of Kamehameha I in 1998. In the last decade the *lele* has been modified, torn down and rebuilt. In its present form it resembles the frame of a Native American tipi to which was attached an eagle feather. Native Americans were purportedly involved in its construction which has been allowed to stand. Amongst the latest offerings, observed in the summer of 2008, are rattlesnake skins. While some of the modifications to the original structure were undoubtedly well intentioned, the original purpose in erecting an altar on the summit has been lost. Another example is a site located near the *lele*, which was destroyed sometime between the 2005 and 2006 field seasons of the archaeological inventory survey by unknown persons who would also probably think of themselves as good, decent people. In the latter case the site, a stone mound of unknown function was dismantled and used in the construction of a windbreak wall.

There has been and undoubtedly will continue to be resistance to the development of protocols of any kind, even in the case of damage to ancient sites or to a modern structure like the *lele* on the summit. The Master Plan, for example, in responding to community comments regarding damage to historic sites and desecration of human remains in the past, noted that none of the claims could be verified and that in fact "The veracity of this criticism is difficult to assess since cultural protocols often prohibit knowledgeable people from disclosing this information" (Group 70 International, Inc. 2000: XII-6). The unwillingness to disclose information about even such serious matters as the desecration of burials marks a major departure from traditional beliefs and values, where people performing such acts would have been held accountable.

The time has come to begin a conversation amongst Hawaiian groups on the ethics of what is occurring in the cultural practices and religious observances on Mauna Kea. If other ethnic and cultural groups, such as Native Americans, are going to be allowed to continue to conduct cultural and religious practices then they, too, should be brought into the conversation and given an opportunity to develop a

cultural access and use policy. A policy statement would at the minimum define what culturally appropriate practices are and what disrespectful behaviors are that should either be discouraged or perhaps banned altogether.

Though a difficult issue that cannot be reduced to a simple choice between the "old" and the "new", one initial question that might be addressed is which cultural landscape is going to be preserved, protected and managed—the traditional landscape of shrines and burials associated with the families with direct ties to the mountain top, or the changing landscape comprised of old and new elements made by diverse cultural or ethnic groups with diverse beliefs and values. Discussion of this issue does not mean that new cultural practices should be automatically banned or prohibited. Each generation of cultural practitioners has a right to develop its own myths and traditions, but there needs to be some degree of accountability at both the individual and community level. Remarks such as, "who am I to question the practices of other practitioners?," which essentially translates into an unofficial policy of "anything goes," ignores or disregards not only traditional prohibitions, but restrictions of any kind. According to Kamakau, in traditional times "it was not right to trespass on someone else's altar" (Kamakau 1964:96). The "anything goes" point of view also begs the ethical question of what an individual practitioner or the modern Hawaiian community as a whole is willing to accept. For example, would the erection of Christian crosses on the *pu`u* of the summit area by Native Hawaiians be seen as a culturally acceptable practice?

The purpose in developing a general policy and protocols for specific activities is to assist OMKM in managing cultural resources and practices, and to avoid conflicts between Native Hawaiian practitioners and people who may be inadvertently altering newly built shrines or cremations, to give a couple of examples. The development of protocols as a management tool is not antithetical to how sacred places in general are conceived and used. As "places apart" sacred areas by definition have restrictions:

> To say that a specific place is a sacred place is not simply to describe a piece of land, or just locate it in a certain position in the landscape. What is known as a sacred site carries with it a whole range of rules and regulations regarding people's behaviour in relation to it, and implies a set of beliefs to do with the non-empirical world, often in relation to the spirits of the ancestors, as well as more remote or powerful gods or spirits (Carmichael et al. 1994:3).

The cultural resources section of the Outrigger Project FEIS, which summarizes much of the ethnographic work undertaken by Kepa Maly on Mauna Kea between 1996 and 1999, states that:

> The summit of Mauna Kea from about the 2,804 m (9,000 ft) level is considered *wao akua*, a sacred region, with *kapu*, or restrictions in [sic] what may be done on the land (NASA 2005:3-19).

The location of the Mauna Kea summit region in the *wao akua*—place of the gods—carries with it a similar connotation as the Maori term *wahi tapu* as a sacred place. But as Hubert (1994:10) points out, the modern translation of tapu as "sacred fails to capture its true essence, for the deep spiritual value of *wahi tapu* transcends mere sacredness" (Sole and Woods 1992:342). Hubert goes on to note that –"There are even greater complications, for even within Maori society there are said to be different definitions and classifications:"

> The hierarchy and complexity of wahi tapu classification is compounded by the people of each iwi, hapu or whanau (tribe, sub-tribe or extended family) having their own definition which is valid only to them. No iwi, hapu or whanau would be so presumptuous as to define wahi tapu for another group.

While Hawaiian culture was not organized in the same way as the Maori, it is reasonable to assume that there were variations in the way *tapu* was conceived in Hawai`i since no known culture is monolithic in terms of its traditions and beliefs.

Management Action

The use of a sacred place, such as Mauna Kea, without rules and regulations is inconceivable from a cross- cultural perspective where sacred places are universally hedged with restrictions. The Cultural Impact Assessment (CIA) study conducted for the Master Plan EIS (see **Section 1.5.4)** recommended that "Plans need to be formulated, in consultation with cultural practitioners and families having genealogical ties to Mauna Kea, for access to and use of traditional sites and resources" (PHRI 1999:41).

4.2.1.2 Access

One of the more contentious issues discussed during the preparation of the Master Plan and the public meetings that followed, was the rights of cultural practitioners, including access. The Master Plan (Group 70 International, Inc. 2000: XII-5) noted that:

> In early discussions there were suggestions that modern cultural practitioners be given designated areas to engage in cultural practices. This suggestion was rejected because it was felt that there was no reason to place such restrictions on cultural practitioners.
>
> The Master Plan does not restrict traditional cultural practices anywhere in the Science Reserve. The single exception is to activities that may impact known historic sites. The responsibility for protection of historic sites rests with the State Historic Preservation Office and they are statutorily required to protect these sites.

Existing Policies and Additional Management Actions

The State historic preservation law, Chapter 6E, Hawaii Revised Statutes, does not specifically address Native Hawaiian cultural practices or access issues. However, it protects historic properties from alteration or destruction. Destruction or alteration can only occur on State land when authorized by DLNR.

The 1995 Revised Management Plan identified cultural practices as a permitted use but stated that such activities must be otherwise consistent with the plan's provisions and must not involve physical impacts. The 1995 Plan also restricted practices to daylight hours unless permission is obtained from DLNR and UH.

The existing policies on cultural access, while useful, do not go far enough. They do not take into account, for example, specific cultural practices and in particular those that could have an adverse impact on historic properties. In an effort to develop a consistent set of policies for the whole summit region OMKM may want to consider developing and implementing a permitting process like that developed for the Mauna Kea Ice Age Natural Area Reserve.

Cultural practices and visitation are not restricted in the NAR unless they involve prohibited activities or the disturbance of historic properties. Practices that involve the gathering or extraction of resources, such as basalt for adze manufacture would require in addition to a Special Use Permit, a

Conservation District Use Permit. For traditional religious access and practices, a permit would be recommended if the activity cannot be conducted elsewhere; will be consistent with the protective and educational purposes of NARS; does not degrade the natural resources of the Reserves; and will not be used for commercial purposes.

4.2.1.3 Offerings on Shrines

There are a number of cultural practices that could potentially affect historic properties. One practice that has become a major management problem in many places in Hawai`i, including many State Parks, are those involving offerings placed on shrines. At a number of religious sites and culturally significant places in Hawai`i, accumulations of offerings have become obtrusive and distracting to the point that they can have an adverse effect on historic properties. Organic offerings become a problem as they deteriorate or are dispersed by winds, while inorganic offerings, such as stones or objects made of modern materials, remain at the site for considerable periods of time unless removed.

On Mauna Kea the prime example of this problem is the *lele* on the summit, which has gone through a series of transformations and evolved over time into what is essentially an international shrine with offerings from a number of different cultures and religions. Mauna Kea is in this regard no different from many other sacred places:

> Sacred places, in almost every case, demand offerings, and these are similar not only in terms of their functions—mainly appeasement, supplication, and thanksgiving—but also in the nature of the materials and objects that are used (Carmichael et al. 1994:1).

Management Actions

The actions listed in Table 4-7 will be implemented. The details will depend on what protocols are developed.

Table 4-7. Management Actions Pertaining to Offerings on Shrines.

- Establish protocols
- A culturally trained staff person or a specially designated individual shall be responsible for the culturally appropriate removal of offerings.
- Establish culturally appropriate means of handling the removal of non-food offerings.
- Food offerings shall be removed immediately following the ceremony.

4.2.1.4 Access to Burial Sites

The archaeological inventory survey of the Science Reserve identified several confirmed burial sites and many other probable burials (see **Section 2.3.2**). How many of the burials are visited by family members is unknown, but it is a practice that must be considered in the management of the Science Reserve.

Management Actions

Table 4-8 outlines the management actions that OMKM will adopt regarding access to burial sites.

Table 4-8. Management Actions for Burial Site Access.

- Native Hawaiians shall not be unduly restricted from visiting burial sites for cultural reasons; access to the summit area may be restricted, for example, during periods of inclement weather for health and safety reasons.
- The rangers or other management staff shall be notified of visits for security and safety reasons.
- Any disturbance of a burial site shall be reported immediately to the rangers and SHPD.
- Public tours of burial sites shall be prohibited.

Maintaining security at burial sites visited by Native Hawaiians is an issue that will be discussed by the Kahu Kū Mauna Council and other parties before adopting an official policy or guidelines.

4.2.1.5 Visitation and Use of Ancient Shrines

The visitation and use of "ancient" shrines is a cultural practice about which little is known, however, except for a few sites where obvious alterations have taken place. "Ancient" shrines usually were constructed for worship by a specific family. It is difficult, with the passage of time, to understand the full intent or meaning of a shrine's form and construction. In some instances, components such as the upright stones (god-stones) may have been intentionally set aside, hidden, or toppled after the completion of rituals.

Some of the old shrines in the summit region have been altered in the recent past. The upright slabs on some structures have been defaced with modern writing and symbols and the uprights on at least two shrines have been repositioned. There is also evidence of the removal of stone artifacts left as offerings to the gods of adze manufacture on at least one shrine. All of these alterations were done without the permission of the landowner and in violation of Chapter 6E.

The disturbance of shrines is most likely to continue, especially in areas close to roads. The expectation that more shrines will be modified in the future resulted in the detailed recording of the number, position, size and arrangement of shrine uprights during the archaeological inventory survey of the Science Reserve. The resultant data will allow land managers and archaeologists in the future to analyze changes in any of the formal attributes. For example, existing plan view maps of the shrines will enable management specialists to verify, during routine monitoring, whether new components are being added to shrines.

The consultations conducted with Native Hawaiian organizations for this CRMP indicate that there are practitioners who believe they have a right to modify the shrines of their ancestors and other practitioners who believe that old altars should be left alone (see **Section 6**). The contrasting points of view indicate the need for discussions within the Hawaiian community and the Kahu Kū Mauna Council to develop guidelines for shrine visitation and use.

Management Actions

Table 4-9 presents the policies and other management actions on shrine visitation and use that will be implemented by OMKM.

Table 4-9. Management Actions for Ancient Shrine Visitation and Use.

- Access shall not be denied or unduly restricted for any Native Hawaiian wanting to visit the shrines within the summit region. Access to the summit region, for example, may be restricted during inclement weather for health and safety reasons. These persons will be informed of the same general precautions and prohibitions as are all public users. These would include warnings about the effects of altitude and cold, windy weather conditions as well as the prohibition of off-road vehicle use and the need to control debris.
- No restrictions shall be placed on any Hawaiian cultural observance that is deemed to be appropriate by Kahu Kū Mauna and other Native Hawaiian organizations as long as the practices do not violate Chapter 6E.
- Kahu Kū Mauna Council, in collaboration with other Native Hawaiian organizations, shall develop guidelines regarding the use of ancient shrines.
- A program to regularly monitor the condition of ancient shrines shall be established. If the effects of heavy usage become apparent and lead to the deterioration of shrines, measures should be considered to control the frequency and number of commercial or public visitors to particular areas.

The monitoring of shrines and all other historic properties in the Science Reserve is described in the Historic Property Monitoring Plan (**Section 4.3.1**).

4.2.1.6 Construction and Use of New Shrines

In addition to the modern use of ancient shrines, there are persons who are also constructing new shrines (*kūahu*) and building less formal mounds (*ahu*) of stacked or piled rocks. Though most of the *ahu*, at least those located near roads, were probably erected rather recently to commemorate or memorialize a person or family's visit to the summit region, it is also possible that some *ahu* were built based on a religious belief and might therefore be viewed as a new or different form of shrine, especially since one meaning of *ahu* is shrine or altar (Pukui and Elbert 1971:8). *Ahu* built as shrines and those built for non-religious purposes are difficult, if not impossible, to distinguish based on morphological characteristics alone. This poses a major management problem that will require further discussions amongst Native Hawaiian cultural practitioners and land managers to determine what are shrines and what are not. For the purpose of this CRMP, new shrines are defined as those that replicate the older shrines in the sense that they have one or more upright stones. The management actions for what are inferred to be modern, non-religious rock piles or *ahu* are presented in **Section 4.2.1.8.**

Existing Policies and Additional Management Actions

The 1995 Revised Management Plan for Mauna Kea states that cultural activities are permitted if they do not involve physical impacts. While the construction of small shrines (for example, a single upright stone and a few supporting stones) may not seem to constitute a physical impact, it is a "land use" as defined HAR 13-5 (Hawaii Administrative Rules for Conservation Districts) if the structure is

allowed to remain standing for more than 14 days. A "land use" in the case of shrines and other built structures means:

> The placement or erection of any solid material on land if that material remains on the land more than fourteen days, or which causes a permanent change in the land area on which it occurs (HAR 13-5-2)

Under the NARS regulations, any construction is a prohibited use and requires a Special Use permit. The management actions that OMKM is considering for the construction of new shrines are presented in Table 4-10.

Table 4-10. Management Actions for Constructing New Shrines.

- Guidance shall be sought with regards to the construction of new Hawaiian cultural features and the long-term management of these features. The Kahu Kū Mauna Council, in consultation with other Native Hawaiian organizations, will develop protocols that will consider which kinds of features and locations are appropriate or inappropriate, and whether a review process should be instituted.
- New constructions not complying with the established protocols and Chapter 6E and HAR 13-5-2 will be dismantled.
- Newly built permitted shrines will be described and their locations recorded so that they can be protected by OMKM Rangers on patrol and checked as part of the ongoing monitoring program.

4.2.1.7 Scattering and Burial of Cremated Human Remains

The scattering of cremated human remains and the burial of urns in the summit area of Mauna Kea is an on-going cultural practice, that although a private affair and thus not well known or documented, should nevertheless be regulated to prevent disturbance of historic properties and to avoid the situation of OMKM rangers having to respond to reports of disinterred human remains in the future. Mauna Kea is, of course, not the only place in Hawai`i where the scattering and burial of ashes is taking place. Another well known location is Hawaii Volcanoes National Park.

Management Actions

A management policy on the scattering of cremated human remains, like that recently instituted at Hawai'i Volcanoes National Park, will be developed and implemented for the Science Reserve. The National Park requires a copy of the death certificate before a Special Use Permit is granted. The Special Use Permit contains a number of conditions. The actions listed in Table 4-11 will be implemented to control where and how human ashes are being scattered in the Science Reserve.

Table 4-11. Management Actions for Scattering of Human Ashes.

- A death certificate will be required to obtain a Special Use Permit to scatter ashes.
- Scattering must take place in such a manner and in such a location that the ashes will not be located and identified as human remains; interment is prohibited.
- No memorials, plaques, photos, or flowers will be left.
- The permittee recognizes and is aware of the sensitivity of this activity and agrees to perform it in a discreet and private manner.
- All local, state and county rules and regulations will be followed.

4.2.1.8 Piling and Stacking Rocks

Single rocks and mounds of piled or stacked rocks on boulders and outcrops dot the landscape in the summit area of Mauna Kea. The majority of the 336 "find spots" recorded in the archaeological survey of the Science Reserve as of 2007 are piled and stacked rocks. Such features, which are widespread in Hawai`i, represent a traditional cultural practice which undoubtedly has some time depth, but whose purpose and meaning have probably changed over time. At the same time, there is reason to believe that a large number of the single rock features and small concentrations of pile or stacked rocks on Mauna Kea are modern and that many were constructed by non-Hawaiian visitors in the last decade or so. The proliferation of such features is undoubtedly a result in part of what is popularly known as the "copy-cat effect." The appearance in recent years of large numbers of rock piles at Hawaii Volcanoes National Park led the Park's committee of cultural advisors to view the construction of such features as a misguided practice resulting in the desecration of Hawaiian culture and, thus, a "cultural sacrilege" (Honolulu Advertiser Nov. 4, 2005). The increase in the number of rock piles and the implications for land managers was discussed in a draft interim monitoring plan developed by PCSI in 2006 (see **Section 4.3.1**).

Existing Policies and Additional Management Actions

Condition 13 of the 1995 Revised Management Plan (see Section **1.5.5**) stipulated that "There shall be signs about the protection of historic sites as well as discouraging people from making *ahu*, subject to funding." Table 4-12 outlines the management actions that will be considered as a means of controlling the piling and stacking of rocks.

4.2.2 Astronomy

Astronomy, which encompasses both research and education, is a specialized activity that by itself does not have an impact on cultural resources. The construction of observatories, and the maintenance activities and routine operations related to the support of astronomical research are another matter.

Table 4-12. Management Actions for Piling/Stacking Rocks.

- OMKM shall adopt a policy similar to the one developed at Hawaii Volcanoes National Park to remove modern rock piles that are deemed to reflect a misguided practice.
- Commercial tour operators shall warn their customers that piling/stacking rocks is disrespectful "because the piles don't belong there" and that such behavior is prohibited. At the same time there should be a campaign to educate the public about the importance of preserving the cultural landscape. This could be done with an informational flier and posted signs where rock piles are most common, such as the area near the VLBA.
- A culturally trained staff person shall be responsible for the culturally appropriate removal of rock piles that are made on Mauna Kea.

Construction of the observatories on the summit, which has taken place over a number of years, has clearly had a cumulative impact on Kūkahau`ula (see King 2003), which was not recognized as a culturally significant history property until 1999, however, when it was designated a TCP (Hibbard to McLaren 1999). As noted elsewhere, while no archaeological surveys were conducted prior to the construction of the summit road in the mid-1960s there is no indication that any archaeological sites on the summit were destroyed at that time, or any time thereafter in the construction of the 13 existing observatories (McCoy 1999a:31). This conclusion is a based in part on interviews conducted by Kepa Maly with people involved in the construction of the summit road. His informants did not recall any historic properties being found on the summit during the construction of the first jeep road (Maly 1999: Appendix A-123). The presence/absence of archaeological sites on the summit is of little or no consequence, however, since the significance of Kūkahau`ula is spiritual.

In his declaration in the contested case hearing (OHA vs. NASA and IfA), Tom King noted that although the existing observatories were built years ago "their effects continue today" (King 2003:12). This means that the Kūkahau`ula TCP continues to be adversely affected, not only by astronomy but by all public and commercial activities, including for example, snow play.

Management Actions

The operation of the observatories were addressed in **Section 4.1.3.1** where it was concluded on the basis of consultation with all 13 existing observatories, that daily and routine maintenance operations do not pose a threat to cultural resources. Chemical use and disposal will nevertheless be monitored, but this responsibility would best be assumed by the State Department of Health. DOH inspectors will be required to submit copies of their reports to OMKM. The removal, retrofitting or construction of new observatories is covered under future land uses (**Section 4.2.7**).

4.2.3 Recreational Activities

The upper slopes of Mauna Kea have been used for a variety of recreational purposes for some time, beginning with the early explorations to the summit and later horseback trips to Lake Waiau in the mid to late 19th century. With the construction of the stone cabins at Hale Pōhaku by the Civilian Conservation Corp in the 1930s, access to the summit area was made easier. The completion of the Mauna Kea Access Road to the summit in 1964 increased the opportunities for recreational activities on the top of the mountain.

"Extreme sports" is a relative new kind of recreational activity that was not addressed in the 1995 Revised Management Plan, but was discussed in the Master Plan, where it was defined as "recreational activities that seek dangerous and unusual thrills," and in the SHPD Plan.

Management Action

Prior to the acceptance of the Master Plan DLNR reviewed and denied a request to conduct an extreme sports event on Mauna Kea because of the potential for significant harm to the environment and insensitivity to the cultural significance of the mountain. OMKM has determined that extreme sports shall be a prohibited activity because of the liability that such activities pose.

4.2.3.1 Stargazing, Amateur Astronomy, and Non-Commercial Tours of Telescopes

Stargazing and amateur astronomy have become one, if not the most popular, activities on Mauna Kea today. It is believed that much of the stargazing that is occurring today is being done by people who have signed up with one of the commercial tour operators, which are regulated through a permitting process. How many individual amateur astronomy groups and individuals come on their own is unknown.

Existing Policies and Additional Management Actions

The 1995 Management Plan permits individuals to use the grounds of the Visitor Information Station at Hale Pōhaku for independent star-gazing and, if permission is granted by UH, they may also use areas within the summit region for this purpose. UH and the individual observatories operating on the summit are permitted to conduct tours of the astronomical facilities and to hold star-gazing, groups sessions at Hale Pōhaku. They are also permitted to convene other educational meetings at Hale Pōhaku. It is highly unlikely that the "average" sightseer or stargazer is having any effect on historic properties since most take place in previously disturbed areas on the summit and at Hale Pōhaku.

Management actions under consideration by OMKM for stargazing, amateur astronomy and non-commercial tours of telescopes are presented in Table 4-13.

Table 4-13. Management of Stargazing, Amateur Astronomy, and Non-Commercial Tours of Telescopes.

Example of Activities

Daytime public tours of the Subaru Observatory.

School field trips to Hale Pōhaku or observatories.

UH sponsored stargazing programs at Hale Pōhaku seven times a week.

Amateur astronomers independently observe from Hale Pōhaku grounds.

Potential Effects on Historic Properties and District

Low potential effects because activities are confined to previously altered areas.

Parking off of previously disturbed surfaces could alter landscape or historic properties near Hale Pōhaku when user numbers are high.

Debris escaping from users could have a visual effect on the historic district.

Increase usage of Mauna Kea by introducing public to the mountain.

Management Actions

- UH or other sponsored tours should be confined to previously disturbed ground surfaces. This includes not only the tour or star-gazing activities themselves.
- All parking for these activities should be accommodated on previously disturbed surfaces. This is particularly important when specific events (e.g., meteor showers, eclipses, etc.) can attract large numbers of participants.
- Activities taking place on the summit cones, which have been identified as a TCP, should be conducted in a manner that does not further alter the current condition and integrity of the summit cones.
- Participants should be warned to keep litter or pieces of clothing from being carried away by high winds.
- When conducting group tours and stargazing sessions, presentations should include a brief overview of visitor policies and allowed activities in the summit region for those who may return to visit the mountain independently. In many cases, these tours may be the first introduction many have to Mauna Kea and some may want to return.

4.2.3.2 Skiing and Snow Play

Snow-related activities occurring in the summit region range from the simplest form of merely experiencing snow to the more technical sports such as down-hill skiing. These activities can include snow-play, snow-boarding, sledding, and cross-country skiing. The frequency, intensity, and location of these activities will always depend on the depth of snow accumulations, how long the snow cover lasts, and how far down the mountain slope the cover extends. These conditions can draw large numbers of people for relatively short periods (i.e., one or two days, a weekend, etc.) or cause only moderate increases in the routine number of visitors to the summit region. Despite this variability, most of these activities probably take place in relatively predictable areas. For down-hill skiing, the favored runs are on Pu`u Poliahu, Pu`u Hau Kea, and the summit cones where established roads also allow a degree of vehicle access at the beginning and end of the runs. For other types of snow-related activities, factors

such as proximity to access roads, convenient parking areas, and appropriate slopes for snow-boarding and sledding will influence where these activities are most likely to occur.

Most of the snow-related activities have the potential to directly affect historic properties. Because the cluster of summit cones (i.e., Pu`u Kūkahau`ula) is considered a TCP (Figure 4-2) skiing on the summit slopes could adversely affect this significant historic property. For example, visibly scarring of the *pu`u* can occur if skiing-related actions take place on portions of the cinder cone which are not covered with a sufficient depth of snow to protect the surface of the cinder cone. If this is the case, skiers will be asked to confine their activities (i.e., walking, skiing) to slopes that are covered with a protective layer of snow. Long-term monitoring of the cinder cone slopes will identify the magnitude of these or any other affects, and the need, if any, for mitigative measures.

Management Actions

The management actions for skiing and other forms of snow play are presented in Table 4-14.

4.2.3.3 Hunting

Hunting of wild sheep and goats for both subsistence and recreational purposes has a long history on Mauna Kea (Maly and Maly 2005:270). While the ungulate populations have declined in the last few decades, hunting is an on-going activity, which now also includes a number of non-native game birds. The decline in the ungulate populations is a good thing from an historic preservation point of view because the animals, which commonly bed down in the sheltered confines of rockshelters utilized by Hawaiian adze makers, disturb the cultural deposits which results in a loss of important information.

Existing Policies and Additional Management Actions

The 1995 Revised Management Plan lists daytime hunting as a permitted use under the terms of the lease between UH and BLNR, "pursuant to the rules and regulations of the Board." The lease stipulated that hunting "must be coordinated with the activities of UH." Hunting is a regulated activity under HRS 13-5-2 which covers both game birds (Chapter 122) and game mammals (Chapter 123). A map of the DLNR hunting units indicates that the UH management areas are located in Hunting Unit A (Figure 4-3).

In several respects, the potential effects of hunting on individual historic properties are similar to those of hikers in that damage would probably be inadvertent because of the inability to recognize features as historic properties. Particular to hunting, however, is the possibility that historic properties could be damaged by ammunition that misses its mark or is deflected. Hunters may also be tempted to use off-road vehicles to reach hunting areas that are at a distance from human activity and thus more likely to have unsuspecting game.

Table 4-14. Management of Snow Play Activities.

Examples of Activities

Experiencing snow and winter conditions

Snow play

Snow-boarding and Sledding

Down-hill and Cross-country skiing

Potential Effects on Historic Properties and District

Scaring or eroding cinder cones during skiing, sledding or snow-boarding.

Inadvertent damage to shrines or flake scatters during cross-country skiing, snow-play, or snow-boarding.

Inadvertent damage to cinder cones, shrines, or flake scatters during emergency rescues.

Creating debris (clothing, beverage containers, Styrofoam board fragment, cardboard).

Need for rest room facilities.

Use of vehicles off-roads (caused by limited parking, wanting to reach snow banks or covered slopes).

Management Actions

- Confine down-hill skiing and sledding to cinder slopes with a protective layer of snow.
- Monitor long-term effects of snow-related activities on cinder cones.
- Designate areas where specific snow-related activities can occur.
- Inform users of designated areas through maps, temporary signs, or directions given by rangers.
- Inform users of rest room facilities and permanent trash receptacle locations.
- Increase ranger presence during high intensity use periods.
- Limit number of visitors or duration of visits during high intensity use periods.
- Install more temporary trash receptacles during high intensity use periods. Encourage removal of trash "what you take in you take out".
- Perform debris clean-up sweeps in high use areas at end of winter season.
- Inform users of designated parking areas (also with temporary signs if needed).
- OMKM staff reviews emergency plans when winter season begins.
- Prohibit commercial tours and tournaments involving snow play.

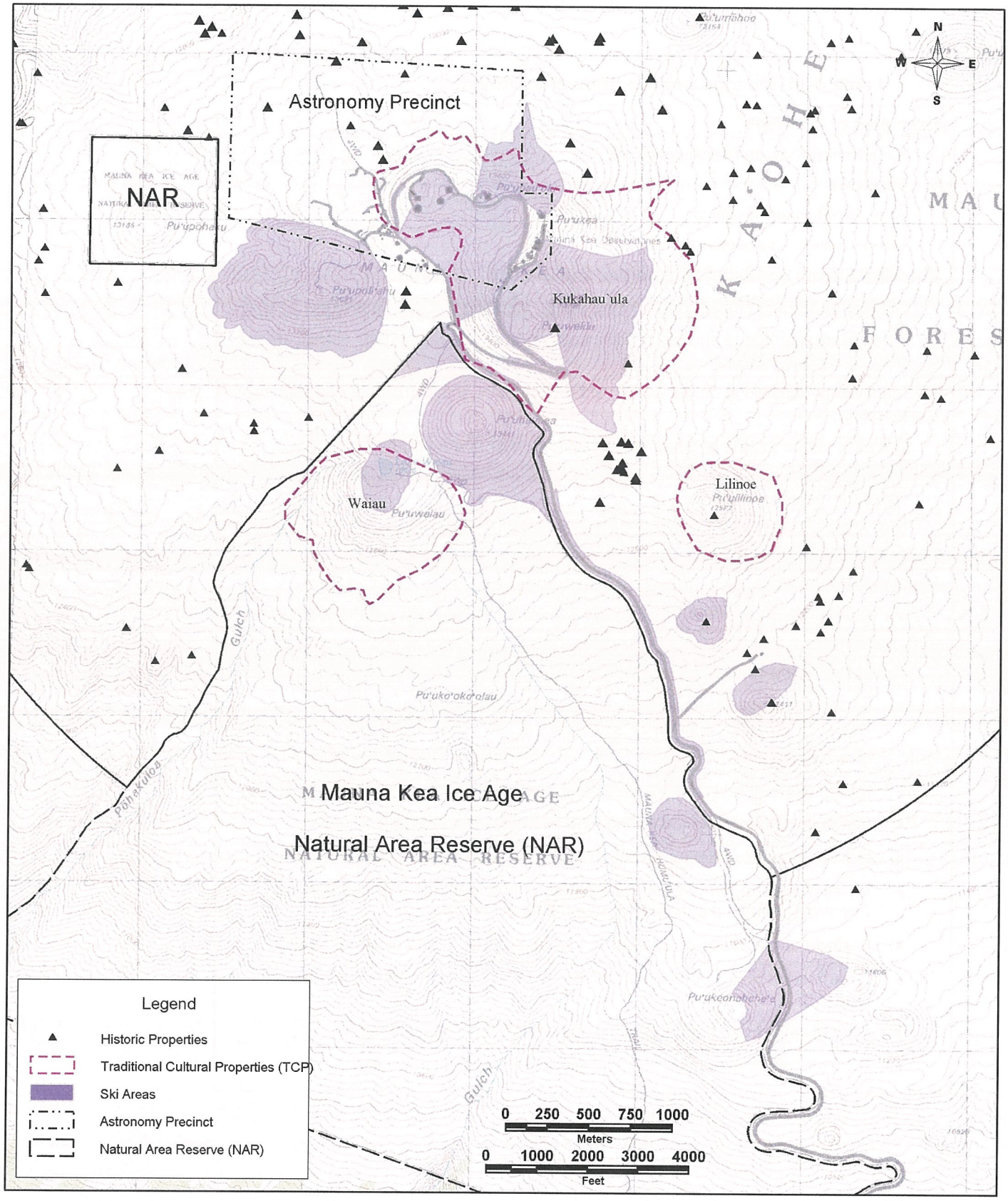


Figure 4-2. Commonly Used Ski Areas

On current evidence the most heavily hunted areas are in the Pohakuloa and Waikahalulu Gulch drainage areas. These appear to be the areas most heavily utilized by the much smaller populations of wild sheep and goats, probably because of the existence of freshwater springs and proximity to Lake Waiau. The area with historic sites most likely susceptible to threats from hunting is the upper reaches of Pohakuloa Gulch area where the Science Reserve and NAR boundaries meet.

The potential effects of hunting can probably be reduced or prevented in two ways:

(1) Those granted permission to hunt in the Science Reserve will be provided an information sheet that: (a) describes the kinds of historic properties that might be encountered in particular areas; (b) warns against disturbing these properties; (c) notes the restriction against driving off established roads; (d) designates areas in which hunters can park; and (e) requests that debris be controlled.

(2) If long-term monitoring indicates that hunters are adversely affecting historic properties in particular areas, then additional steps can be taken to prevent this damage. One solution may be to designate the areas immediately surrounding these historic properties as being off-limits to hunters. This is more likely to occur, if at all, in areas with higher concentrations of historic properties Table 4-15 presents other recommended management actions.

4.2.3.4 Non-Commercial Sightseeing, Hiking, and Educational Fieldtrips

As Mauna Kea has become increasingly popular with tourists, there seems to have been an increase in the number of hikers and sightseers. Most hikers appear to walk the Humu`ula Trail, beginning at Hale Pōhaku and ending at Lake Wai`au. This portion of the trail, which supposedly originated in earlier days near the Humu`ula Sheep Station, is located in the NAR and thus not one of OMKM's management responsibilities. Hiking is clearly taking place though in the Science Reserve. What effect, if any, it is having on historic properties is hard to judge, but some of the rock piles that dot the landscape in certain areas of the Science Reserve may be directional markers erected by hikers.

Existing Policy and Additional Management Actions

The 1995 Management Plan restricts recreational hiking to existing roads and trails, but the restriction does not seem to be well known to the public, nor does it seem to be enforced.

The most likely, direct effects sightseers or hikers could have on historic properties would be the alteration of shrines, the disturbance of burial sites, or the scarring of cinder cone slopes. Those properties closest to access routes or visible from a distance are the most likely to be visited and are thus the most vulnerable. As damage to historic properties by visitors is primarily done inadvertently or in ignorance, providing visitors with adequate information on how to recognize historic properties and on their appropriate treatment is expected to reduce the number of such incidents. The indirect effects of sight-seers and hikers are essentially the same as people engaged in snow play activities in that they can generate debris, create a need for rest room facilities, could be tempted to drive vehicles off of existing roads, and could require emergency rescues. Although less intense than snow-related activities, effects caused by hikers and sightseers could be more widespread and less predictable as some hikers could reach infrequently visited areas farther from existing roads.

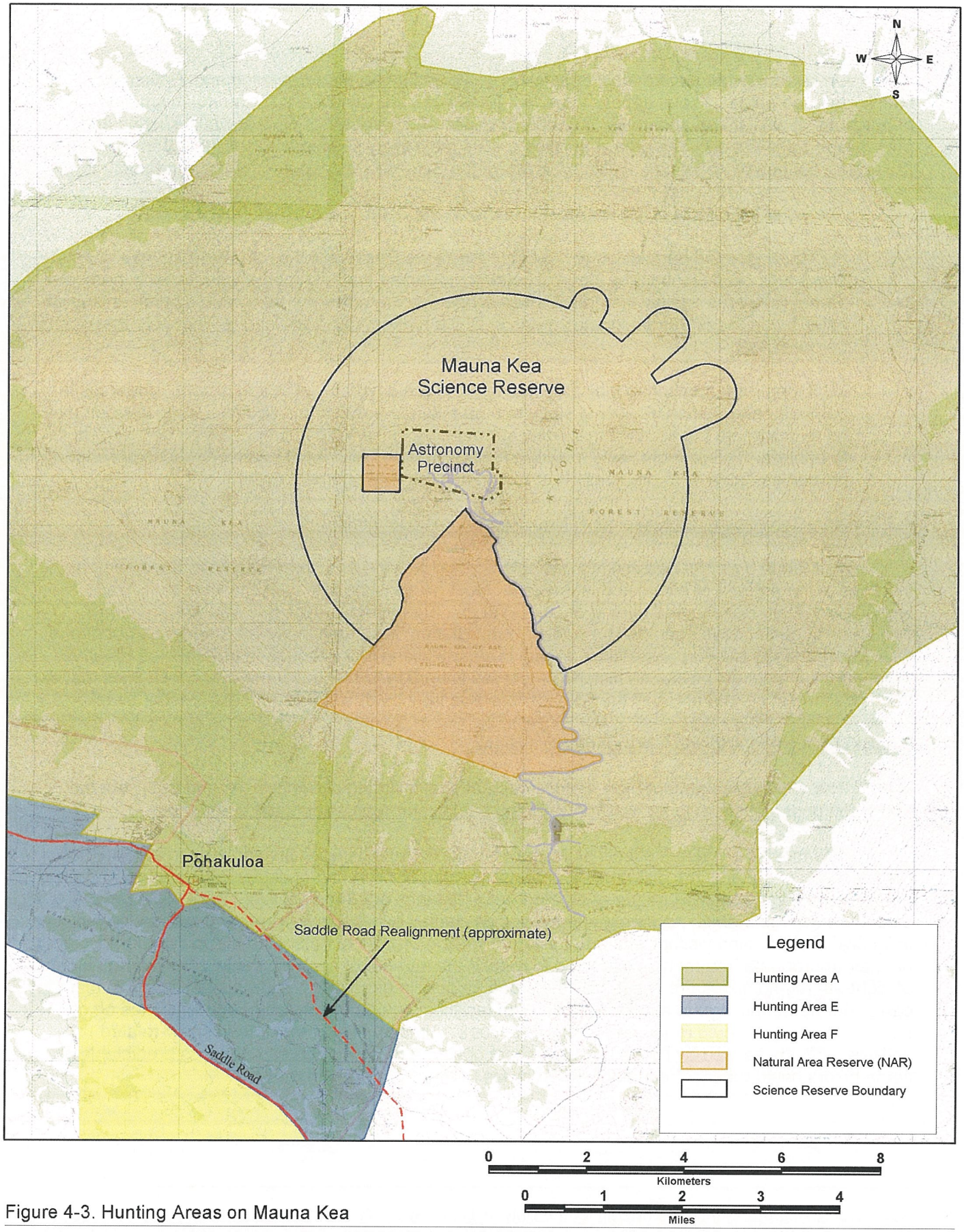


Figure 4-3. Hunting Areas on Mauna Kea

Table 4-15. Management of Hunting Activities.

Examples of Activities
Rifle hunting for game birds, pigs, goats, and mouflon sheep.
Archery hunting for goats and mouflon sheep.
Potential Effects on Historic Properties and District
Inadvertent alteration of shrines, flake scatters, or burial sites.
Ammunition striking shrines.
Off-road vehicle use to access game.
Debris left in areas hunted.
Management Actions
• Enforce HRS 13-5-2 Chapter 122 on game bird hunting and 13-5-2 Chapter 123 on game mammal hunting.
• Prepare description and map of most likely hunting areas and assess potential effects on historic properties.
• Provide hunters with information on historic properties and the need to avoid them.
• Inform hunters of designated parking areas and prohibitions against off-road vehicle use.
• Inform hunters that they are required to remove all debris created while hunting.
• Monitor long-term effects of hunting on historic properties and the district.

OMKM currently has no statutory authority or control over hiking, but the Rangers do attend to the health and safety of hikers and ask that hikers register at the Visitor Information Station (Office of the Auditor 2005:46). Table 4-16 lists the management actions that will be implemented, including the development of a permitting process similar to that used by NARS. Obtaining a permit allows conditions to be placed on group visits that are tailored to the particular areas being visited or the size of the group. This would be important for groups visiting for educational purposes because they are more likely to seek out historic properties. A similar policy has already be implemented for the NAR. The NARS 1997 management policies state that all organized educational trips require a Special Use Permit which allows specific restrictions to be placed on the group's size and what areas will be visited. Currently, groups with more than 15 members are required to obtain a permit to visit the Mauna Kea Ice Age NAR.

4.2.4 Commercial Tours and Other Commercial Events

Mauna Kea has become a major tourist destination in recent years as reflected in a dramatic increase in the number of people who sign up for one of the package deals offered by commercial tour operators. Currently, there is a maximum of nine allowable, permitted commercial tour operators on Mauna Kea. According to estimates made by the Department of Land and Natural Resources (DLNR) the number of paying visitors has increased from 24,164 in 1999 to 43,877 in 2005 (*Ho`opono Mauna Kea* 2007:4). In 2007 there were approximately 50,000 visitors (Stephanie Nagata, personal communication).

Table 4-16. Management of Non-Commercial Sightseeing, Hiking, and Educational Fieldtrips.

Examples of Activities

Non-Hawaii residents sightseeing in rented vehicles.

Sightseeing by Hawaii residents.

Day-hikers.

Excursions by school groups.

Individuals or groups interested in natural history.

Potential Effects on Historic Properties and District

Scarring or eroding cinder cones by walking or running down slopes.

Intentional vandalism of historic properties.

Defacing landscape features.

Management Actions

- Require groups greater than a specified size obtain a permit or special permission to visit off-road areas of the Science Reserve.
- Register all visitors to summit region so that information on historic properties can be distributed.
- Prepare appropriate brochures and a cultural orientation program, coupled with requirements that all entering the summit region must register. Registration provides the opportunity to distribute this information to all visitors and increases the likelihood of adherence to warnings and instructions.
- Inform visitors to avoid disturbing historic properties and of penalties in brochures or orientations.
- Inform visitors of need to control debris and personal belongings in high winds.
- Inform users of locations of trash receptacles, rest rooms, and parking areas.
- Create self-guided tours and regular guided tours to reduce the potential impacts by focusing visitation on particular properties which can accommodate visitors by having a guide present to monitor visitor actions.
- Individual hikers shall be discouraged because of the dangers of hiking at high elevations and for safety reasons.
- Creation of any new, formalized trails or substantial alteration of an existing route would be subject to review by the State Historic Preservation Division.

Existing Policies and Additional Management Actions

The permitting process for commercial tour operators has undergone several changes since it was first instituted by DLNR. Commercial tours are now one of the most regulated activities. Following the adoption of the Master Plan, UH requested a legal opinion from the Attorney General (AG) to take over the permitting process. In January 2005 the UH Board of Regents accepted the responsibility of regulating commercial activities and authorized OMKM to issue permits and collect fees (Table 4-17).

As summarized in the Spring 2007 issue of *Ho`opono Mauna Kea*,

> Starting January 1, 2007, OMKM assumed control of commercial operations and implemented new commercial permit terms and conditions, which included a significant increase in monthly fees, insurance coverage, security deposit, and penalties for non-compliance. Permitted operators would also be required to attend periodic meetings called for by OMKM.

The fees are deposited into a special fund that help defray the costs of maintaining the Visitor Information Station, the Mauna Kea Rangers program, and routine activities, such as road maintenance.

Even though the commercial tour companies are now required to comply with all applicable laws and are prohibited from touring the adze quarry, the potential still exists for damage or desecration of significant cultural resources because of the policy of unrestricted access within the Science Reserve. With the implementation of the new commercial tour permit process, the probability that cultural resources in the areas open to tourism (these are referred to as "Premises" in the Mauna Kea Commercial Tour Use Permit and include the Mauna Kea Science Reserve, Mauna Kea Access Road, and the Hale Pōhaku Mid-level facilities) will be adversely affected is minimized. Table 4-17 summarizes the management of permitted commercial activities.

4.2.5 Film Industry Activities

Prior to the formation of OMKM the review and approval of applications to film in the UH management areas was handled by the UH Institute for Astronomy (IfA). The permitting process is handled by the Hawaii Film Office, which refers all requests to film on Mauna Kea to OMKM for review and approval. As explained on their web site, *Malama Mauna Kea*, OMKM has been processing on the average of 33 requests a year.

Existing Policies

A number of factors are taken into consideration in approving filming requests, which is done on a case by case basis. The primary consideration "is to see that Mauna Kea is portrayed with reverence, dignity, and respect." The historic preservation review and compliance component of the review process is based on OMKM's currently established procedures:

Table 4-17. Management of Permitted Commercial Activities.

Examples of Activities

Commercial Operators:

Sightseeing tours to Hale Pōhaku and the summit with paid guide; Stargazing tour to Hale Pōhaku; Viewing special astronomical events at Hale Pōhaku

Potential Effects on Historic Properties and District

Scarring or eroding of cinder cones by walking, running, skiing, or snow-boarding down cinder slopes.

Altering of shrines, lithic scatters, or burial sites by hikers leaving established roads or trails.

Altering of shrines or lithic scatters by cross-country skiers or snow-boarders leaving frequented areas.

Damage to cinder cones, shrines or flake scatters during emergency rescues.

Visual impact of debris on the historic district.

Need for rest room facilities.

Landscape scared by vehicles when transporting skiers.

Management Actions

- Require all new commercial drivers and key personnel to attend a Cultural Orientation Class.
- Retain commercial permitting process which provides mechanism to:
  1. Inform operators, drivers, and clients of historic preservation restrictions and laws
  2. Enforce permit conditions, regulations or laws
  3. Revoke or suspend permits if operators or clients knowingly or unknowingly damage historic properties
  4. Restrict operators to areas and intended uses described in their applications
  5. Control the number and frequency of users
  6. Require vehicles to park in designated areas
  7. Prohibit use of vehicles off-road
  8. Require measures to reduce trash and remove all created by their activities
  9. Direct operators to provide temporary toilet facilities when needed
  10. Require emergency plans which avoid historic properties
- Control visits to historic properties by creating self-guided and guided tours to selected properties.
- Monitor and assess the effects of commercial activities and adjust controls or restrictions accordingly; no commercial tours for snow play; no commercial events such as ski contests/competition; no extreme sports.
- Ask operators to participate in service project clean-ups if appropriate and require all operators to remove all trash.
- Distribute information on the location of rest rooms and parking areas to all operators.

- Film activities require a permit from Film Branch (DBEDT), except for news coverage and filming astronomical activities.
- Require permit for all commercial film activities which include conditions to avoid or protect historic properties and the district.
- SHPD reviews all permit applications on a case-by-case basis unless all activities are restricted to previously disturbed areas.
- Include standard permit conditions addressing debris, parking, off-road vehicle use, and emergency precautions.

4.2.6 Research

Beginning with some of the earliest expeditions in the early 19th century that collected geological specimens and made observations on the natural history of the mountain, various research activities have been carried out in the summit region of Mauna Kea. Research on the natural and cultural history of the mountain continues, some of it related to the collection of baseline data for management plans, such as this CRMP and the Natural Resources Management Plan NRMP (Sustainable Resources Group Intn'l, Inc. 2009) that are being prepared as sub plans for Mauna Kea CMP. Research has been a regulated activity since the mid-1980s, but little has been done in the way of developing permitting procedures, except for the NAR.

In many instances research activities are easy to overlook or ignore from a management perspective as many do not involve activities that would alter or damage historic properties. Research activities can include those conducted to collect data, to make systematic observations, or to evaluate the status of resources within the context of research or educational objectives. These activities can range from relatively low-impact efforts, such as those in which researchers hike to specific areas to record information, to more intrusive efforts such as setting up instruments to record data over time.

Existing Policies and Additional Management Actions

The Management Plan contained in the amended 1987 Mauna Kea Science Reserve Complex Development Plan discussed non-astronomy related scientific research. The policy guidelines established at that time specified that:

> Scientific activities carried out as field work, with little or no construction involved and only short-term occupancy, will be reviewed on an ad hoc basis by the UH, with final review and approval by the Board of Land and Natural Resources (BLNR). The main policy guideline here is that the activities should not interfere with the on-going scientific work, or otherwise lead to inconsistencies with the terms of the UH lease. Permission should be received from the BLNR by the sponsor of any such activity; UH would require that the activity be financially self-supporting, including contributions where appropriate, to the cost of maintaining common service facilities such as the Information Station and the access road (Group 70 1987:145).

The 1995 Revised Management Plan does not address research except for astronomy. The Master Plan, while recognizing the need for baseline studies in biology and archaeology in developing a long-term integrated resource management plan, is primarily focused on astronomy. In one part of the Master Plan research is discussed in the context of education (Group 70 International, Inc. 2000: VI-1-11), but apart from referring to a document outlining the many different kinds of research projects that

could be undertaken on Mauna Kea other than astronomy (Juvik 1998) there is no discussion of the potential threat of non-astronomical research projects on cultural resources.

Research activities taking place in the Science Reserve or at Hale Pōhaku are currently regulated through the State Conservation District Use permitting process administered by DLNR (Table 4-18). Under the Conservation District Use regulations, data collection is a permitted use in these two areas because they are classified as Resource Subzones of the Conservation District. The level of permit required for data collection primarily depends on the degree of ground disturbing activities involved in the research (§13-5-22 and 24):

- If data collection does not involve any form of "land use," a permit is not required. As the definition of "land use" in this context includes the alteration or removal of materials or natural resources (§13-5-2), any research that involves collecting materials or resources would require a permit.

Research involving incidental ground disturbance, such as that required to install equipment, requires a departmental permit while data collection that causes more than incidental ground disturbance requires DLNR Board approval.

Despite existing regulations, some researchers are not aware that their projects could be subject to regulation. Even the best-intended researcher, particularly those in the natural or physical sciences where collecting of specimens is common, could inadvertently disturb historic properties out of ignorance. Additional management actions are presented in Table 4-18. Raising awareness of the requirements for conducting research in the UH management areas would help reduce the potential effects of these projects on historic properties because the permit application process provides a mechanism to inform researchers of historic properties that could be affected by their actions. It also provides managers with recourse if permit conditions are not followed. The probability that projects could affect historic properties is relatively high given the number of known historic properties in the summit region. Those seeking information on conducting research will be encouraged to contact SHPD or the management staff of the OMKM to discuss what measures could be taken to avoid potential effects on historic properties or the historic district before they submit their applications. This would reduce the time needed for application review and approval.

Those research projects not requiring permits would probably be those that simply involve hiking to specific locations to make and record observations. Even if no permit is required, researchers will be encouraged to meet with appropriate staff prior to conducting their research so that they can be fully informed of the kinds of historic properties in the areas where they intend to work and the need to avoid disturbing these properties. Other precautions would be similar to those given recreational users or hikers wishing to independently visit the more remote areas, such as the need to control and remove debris, to prohibit the use of off-road vehicles, and to consider emergency procedures will be emphasized. If a policy is developed in the future that requires all public users to register before going up the summit road, the registration process can inquire if individuals will be conducting research. If they are and a permit is not needed for the intended activity, then they will be briefed at that time on the nature and distribution of historic properties in their areas of interest and of all the appropriate precautions

Table 4-18. Management Actions for Research Activities.

Examples of Activities

Record distribution of flora or fauna.

Collect rock samples or artifacts.

Geological mapping.

Subsurface archaeological excavations.

Install instruments to record climatic conditions.

Potential Effects on Historic Properties and District

Low probability of effects if research involves only observations.

Higher probability of effects if research involves collecting samples or installing instruments.

Inadvertent alteration of shrines, adze quarry features, or burial sites by researchers.

Alteration of the landscape by installing permanent equipment or instruments.

Visual intrusion by installed equipment or instruments on the historic district.

Management Actions

- Prepare guidelines for which kinds of research projects require permits.
- Provide researchers information on historic properties and warn them against the alteration of historic properties whether their research requires a permit or not.
- Provide researchers with information given visitors on debris, prohibitions on off- road vehicle use, and emergency procedures.
- Prepare guidelines for appropriate and enforceable research permit conditions.
- Research conducted within the management areas requires a Special Use permit approved by the OMKM and issued by the DLNR Board.
- The uses permitted must also be consistent with Conservation District Use regulations.
- The program will allow Special Use permits to be issued for otherwise prohibited uses if these activities are conducted for the purposes of research (§13-209-4 and 5). Examples of prohibited uses may include the removal or disturbance of historical or prehistoric remains.
- SHPD must be given the opportunity to review and comment on any research involving the disturbance of historic properties, including TCP's or the removal of any archaeological materials.
- For research projects requiring permits, SHPD should continue to review applications on a case-by-case basis and projects should not begin until written concurrence has been obtained from SHPD (Chapter 6E).
- Permit conditions for projects proposing to install equipment temporarily should require removal of all equipment within a specified time period after the project's completion.
- If equipment is to be installed on a more permanent basis or over longer periods of time, then the visual impact of any equipment on the historic district should be considered and mitigated when possible. Activities needed to maintain such equipment over time should also be addressed.
- Applicants should also be made aware that research funded with federal monies, such as the National Science Foundation, or conducted by federal agencies are also subject to the Section 106 review process (NHPA).

Conditions can be placed on Special Use permits which are tailored to the proposed research. The application of these regulations to particular research activities will be clarified through guidelines prepared in consultation with the staffs of OMKM and the OCCL which administers Conservation District permits. The guidelines would help illustrate, through examples, which kinds of research activities are considered a "land use," which cause "incidental ground disturbance," and which constitute "ground disturbance" when these criteria are applied by OCCL staff. For the Science Reserve, the guidelines will include examples of research activities that will and will not require a Special Use permit given current interpretations of "prohibited activities." This will not only help expedite the application process, but will help rangers or management specialists identify which individuals should have obtained permits if they are noticed working off of established roads, or when they register to enter the summit region. When administrative rules are adopted to manage the Science Reserve, provisions will be considered to require a level of scrutiny or disclosure that is not now always applied to research projects under the Conservation District administrative rule.

4.2.7 Future Land Uses

While there is no way of knowing what kinds of new land uses may be proposed and approved in the future, these might include projects such as the installation of restroom facilities, a ranger station or kiosk, and perhaps interpretive displays in a sheltered area on the summit. The one future land use that has already been brought to the attention of the public, in the Master Plan, is the recycling and/or construction of one or more new observatories. As summarized in **Section 1.5.6**, the Master Plan protects all of the cinder cones (*pu`u)* in the summit area and prohibits development on any undeveloped *pu`u*. The discussion that follows is focused on the historic preservation review process for planned developments, such as observatories.

The approximately 525-acre Astronomy Precinct described in the Master Plan was established with a number of specific goals and objectives in mind, such as the recycling of older telescope facilities; clustering of new facilities in already developed areas, and construction of new observatories and infrastructure in or near disturbed areas to minimize the disturbance of previously unaltered areas (Table 4-19). The boundaries of the Astronomy Precinct were established to avoid or minimize adverse impacts on historic sites, only three of which were known to exist within the proposed boundaries in 2000. While the actual number of sites cannot be determined at this time because the boundaries of the Precinct have not been surveyed for metes and bounds, one additional site, found during the re-survey of the Precinct in 2005, (McCoy et al. 2005; McCoy and Nees in prep.) may be located within the Precinct on or near one of the proposed boundary lines.

The construction of three new facilities at new locations was described in the Master Plan. These will require the preparation of:

(1) An Environmental Impact Statement (EIS) under "Chapter 343-Environmental Impact Statements" (HRS) and "Title 11, Chapter 200-Environmental Impact Statement Rules" (HAR, Department of Health), and

(2) A cultural impact assessment (CIA) study to determine what effects the proposed project would have on Native Hawaiian cultural practices, features and beliefs.

4.2.7.1 Determination of Effect

The Master Plan indicated that the location of any new facility would be set back at least 200 feet from a cluster of shrines on the north slope of the mountain. While a 200 foot set back might be found acceptable, a buffer cannot be established until the Area of Potential Effect (APE) has been

Table 4-19. Historic Preservation Compliance for Future Land Uses.

Examples of Projects	Potential Effects on Historic Properties and Districts	Review and Compliance Process	Plan Provisions
Constructing a new observatory or building Constructing additions to existing observatories or enlarging buildings Reconstructing or renovating an existing observatory or building which alters its outward appearance Creating or realigning roads Rest room or support facilities for public users Constructing or formalizing parking lots Rehabilitate cinder cone slopes Constructing or formalizing hiking trails Deconstruction of an existing facility or structure which entails altering undisturbed subsurfaces	Diminishment of the integrity of the cluster of cones forming the summit Visual impacts on the historic district Increased access to larger or more remote areas	Determine the need for a Conservation District Use permit If funded or sponsored by UH or a state agency: • Requires written concurrence of SHPD prior to commencement • SHPD determines procedural steps needed to comply with state laws and regulations • Compliance actions must conform with SHPD draft program and archaeology administrative rules and the Burial Sites Program administrative rule If federal funding or federal agency involved: • Requires compliance with Section 106, National Historic Preservation Act • Federal agency in consultation with SHPO and others determines procedural steps needed to comply with federal laws and regulations	Aid decision making process by: Consulting with Kahu Kū Mauna Council Reviewing Maps of Historic Property Locations in Proposed Development Areas Expedite compliance procedures by: Preparing guidelines for historic property treatment plans suited to the three management areas (Science Reserve, Hale Pohaku, Access Road Corridor): • Monitoring plans • Inadvertent burial treatment plan In consultation with Kahu Kū Mauna Council prepare guidelines for consulting with Native Hawaiian organizations and interested members of the Hawaiian community In consultation with Kahu Kū Mauna Council create a roster of Native Hawaiians wishing to be notified of all actions in particular areas

Adapted from 2000 SHPD Plan

determined and approved by SHPD (Table 4-20). The APE, a term used in cultural resource management studies, is commonly defined as the geographic area or areas within which an action may affect historic properties, if any such properties are present or thought to exist. The APE does not equate to the "footprint" of a building or road, for example, and must therefore take into consideration a larger geographic area. The definition of the APE is not limited, moreover, to the consideration of physical effects alone, but needs to also take into consideration the potential for visual and auditory effects and indirect impacts, such as erosion, especially in the case of culturally and spiritually significant places like Mauna Kea (King 2000:46-48).

Evaluating the effects of a project on historic properties will differ for developments planned within the historic district (i.e., summit region) and those planned within the two areas outside the historic district (i.e., a portion of the road corridor and the mid-elevation facilities). Within the historic district, the effect of a project on the historic district as a whole needs to be assessed as well as the project's effect on individual historic properties located within or immediately adjacent to the project area. The effect of a project on the historic district must be addressed even if no individual historic properties are found within or immediately adjacent to the project area.

Effects on the historic district would consider the visual impact of a facility on the surrounding landscape (i.e., the various land forms creating the setting and context of the multiple historic properties encompassed by the district) and on those individual historic properties which contribute to the significance of the district. Creating a network of roads would affect the historic district because, in addition to altering the landscape, it creates easier access to more areas in the historic district and thus increases the possibility of historic properties being damaged by visitors. For projects located outside the historic district, the effect of a project would be assessed on individual historic properties identified within or adjacent to a project area. Effects on individual properties can include the complete destruction of a property or severe alteration of the terrain in which the property is located.

4.2.7.2 Inadvertent Discoveries

If any historic properties should be found in the APE as defined above they will be classified as inadvertent discoveries per HAR 13-280 once the archaeological survey of the Science Reserve, including the Astronomy Precinct, has been completed. The process that will be followed if inadvertent discoveries are made during construction projects will involve:

- Stopping all construction within the immediate vicinity of the property.
- Notifying SHPD, having the significance of the property assessed, and proposing appropriate mitigation measures.
- If the property can not be avoided due to construction or design constraints, it will be thoroughly documented before being destroyed.
- If it can be saved, appropriate measures are needed to protect the historic property during the remainder of the construction phase and when the facility is in use.
- Interested members of the Native Hawaiian community will be consulted for properties believed to be associated with Native Hawaiians (SHPD 2000:23).

Because some Native Hawaiians believe that human remains were uncovered during the construction of at least one observatory on the summit cones and because burials are known to be present on other cinder cones in the summit region, any development or construction work requiring excavation near the rims of cinder cones will be subject to archeological testing prior to ground disturbance. Exceptions would be circumstances in which it can be demonstrated that previous grading

Table 4-20. Historic Preservation Compliance Procedures for Future Land Uses.

Initial Review by SHPD	Historic Properties Identified during Survey in Project Area	Inadvertent Discovery of Historic Properties
Project description submitted to SHPD for review and comment (may be submitted concurrently with Conservation District Use application or Section 106 consultation) Initiate consultation with native Hawaiian organizations and interested individuals	Evaluate if project will have "no adverse effect" or an "adverse effect" on identified properties and the historic district If located at Hale Pohaku or in the road corridor, evaluate significance and integrity of individual property Determine treatment of adversely affected historic properties or district by: Committing to mitigation measures in preservation plans: • Interim preservation plan (protects properties during construction, sets buffer zones, may include monitoring) • Long-term preservation plan (protects properties during use of facilities, reduces visual impacts) • Burial treatment plan if burial present • Landscape rehabilitation	Historic property or burial found unexpectedly during construction or after inventory survey and acceptance of inventory survey report If burial is found: • Stop all work in immediate vicinity and secure area • Notify SHPD and police department to determine jurisdiction • Notify the Kahu Kū Mauna Council • If older than 50 years, SHPD determines disposition in consultation with Hawaii Island Burial Council • Prepare and implement burial treatment plan If historic property found: • Stop all work in immediate vicinity and secure area • Notify SHPD and the Kahu Kū Mauna Council • Document, evaluate, and determine treatment of property found • Consult with Kahu Kū Mauna Council

Adapted from 2000 SHPD Plan

or extensive excavations of the proposed construction site effectively precludes the possibility of any burials being present. When archaeological testing is required in a relatively small area, testing alone may be sufficient to establish, with a high degree of certainty, that burials are either present or absent before construction begins. If burials are discovered, or if the area is relatively large and testing is not exhaustive, then any excavation undertaken during construction will be monitored by a qualified archaeologist. OMKM will consult with Kahu Kū Mauna to assess the need for a cultural monitor.

4.2.7.3 Mitigation

Once the effects of a proposed development project are determined, treatment of the identified properties is proposed. Treatments, generally called mitigation measures, can include thoroughly documenting an historic property before it is destroyed or preparing a preservation plan to assure a property's protection during construction activities (i.e., monitoring, ample buffer zones) and during the long-term use of the constructed facilities or infrastructure. In all three areas leased by UH, strong preference will be given to avoiding and preserving all individual historic properties whenever possible.

All mitigation measures would be set out in mitigation plans such as a data recovery plan (i.e., if the historic property needs to be documented and studied before being destroyed); an interim preservation plan (i.e., if the property is at risk of damage during construction); and a long-term preservation plan (i.e., measures insuring a property's protection long-term). To help expedite the preparation of these individual plans, guidelines will be developed on preparing these different types of plans based on the historic properties known to be present in these areas.

The protection of Kūkahau`ula, arguably the most culturally significant place on the mountain, became a major issue in the planning for the Keck Outrigger project. SHPD's review of the proposed project noted that the MOA for the project needed to describe appropriate measures to prevent further degradation of the summit. Examples cited in the SHPD letter included "...appropriate measures would include those proposed to stabilize the cinder cone slopes, control the accidental dispersal of debris during and after construction, determine the disposition of excavated material which cannot be reused on site, minimize the visibility of the outrigger observatories within the summit region as well as from a distance, and reduce noise during construction and operation of the observatories" (Hibbard to McLaren 1999). As the proposed outrigger project progressed, NASA began talking about "off-site" mitigation measures, which included such things as the development of educational programs. If plans are developed in the future to construct new facilities, retrofit existing facilities or dismantle and remove an observatory within the area defined as Kūkahau`ula, a part of which falls within the boundaries of the Astronomy Precinct (see Figure 2-4), special attention will be given to minimizing adverse impacts using the guidelines established by SHPD for the Keck Outrigger project.

4.3 LONG-TERM MANAGEMENT PROGRAMS AND PLANS

The third section of the Management Plan is focused on long-term management issues and strategies to address them. A number of specific programs and plans are presented, together with discussions on other long-term needs, such as continued consultation with the Native Hawaiian community and data management. In addition to plans there is the basic issue of staffing needs to implement and enforce the policies and guidelines set forth in the CRMP.

4.3.1 Historic Property Monitoring Program

The 10,760 -acre Natural/Cultural/ Preservation Area that was established with the approval of the Master Plan (Group 70 International, Inc. 2000) will theoretically ensure the long-term preservation of all sites and the cultural landscape as a whole within that designated area. The preservation of historic sites located in the 525-acre Astronomy Precinct is more problematical, although it should be possible to preserve the few known sites in this area through avoidance and the establishment of protective buffers in the event of any future development.

4.3.1.1 Program Objectives and Background

The commitment to preservation, notwithstanding, the management of individual historic properties and preserves still requires long-term monitoring and, indeed, monitoring is a requirement for preservation plans under HAR §13-277-6 (8). For an area the size of the Science Reserve there is clearly a need to develop and implement a monitoring program. The key component of the program will be a long-term monitoring plan. A monitoring plan will be prepared to determine strategies to systematically monitor the condition of identified historic properties located within the different management areas and the historic district. The primary purpose of monitoring is to determine what uses, if any, are affecting historic properties, the degree and frequency of these effects, and ways to prevent or minimize their occurrence.

Prior to the beginning of the archaeological inventory survey in 2005 there was no perceived need for interim site protection measures. This changed as the result of observations made during a 10-day survey of roughly 1,200 acres of the Science Reserve in September-October 2005 (McCoy et al. 2005). PCSI archaeologists observed that historic sites in some areas, primarily those located near roads, were being adversely impacted by a variety of activities, including the removal of artifacts, the rearrangement and in some cases "restoration" of sites, and the creation of new features on or near historic properties. The survey conducted in 2005 and the following summers also noted an increase in "find spots". The increase in the number of these "features" appears to be directly related to the increased use of the summit region by visitors and Native Hawaiian practitioners, some of whom are either modifying existing sites or constructing new features to memorialize their visit to the top of the mountain or to perform ritual activities.

The degree to which the cultural landscape was being altered, and the likelihood that such changes would continue to occur, indicated that a monitoring plan was needed to evaluate site conditions on an immediate and on-going basis. In 2006 PCSI developed an Interim Archaeological Monitoring Plan (AMP) for selected areas of the Mauna Kea Science Reserve (TMK: (3) 4-4-015) and Lake Waiau in the Mauna Kea Ice-Age Natural Area Reserve based on the recommendation for such a plan in the report on the first phase archaeological inventory survey of the Science Reserve in 2005.

The primary purpose of the interim plan (McCoy et al. 2006) was to:

> develop and implement a set of standardized procedures for monitoring the condition of historic properties in selected areas of the Mauna Kea Science Reserve and the Mauna Kea Ice-Age Natural Area Reserve that have been adversely affected by human activity in the recent past and will likely continue to be affected in the future because of their easy accessibility.

For reasons noted below the Interim AMP was not implemented.

4.3.1.2 Management Areas and Responsibilities

Three forms of monitoring are recommended: (1) routine, (2) periodic and (3) rotational, based on a consideration of susceptibility to vandalism and cultural sensitivity or significance:

(1) Routine monitoring for the most accessible and, thus, threatened areas.

(2) Periodic monitoring for culturally sensitive sites and areas, including shrines, burials and cinder cones.

(3) Rotational monitoring of all historic properties every five years. This would include the least accessible areas where human disturbance is likely to be less common.

Monitoring of the historic district is a responsibility that will have to be shared by UH and DLNR since the proposed boundaries of the district extend outside of the Science Reserve and, thus, UH's management area. This is yet another management issue that will require meetings between UH and DLNR to develop policies and implementation procedures.

The early thinking about the monitoring of the cultural resources in the Science Reserve was to utilize the OMKM rangers, who regularly patrol the mountain between Hale Pōhaku and the summit, in addition to periodically inspecting the cultural remains at Lake Waiau. The Interim AMP included ranger training as a necessary plan component.

One day of ranger training was conducted in the field in 2006. Though only a trial effort, it was a valuable learning experience. It demonstrated that the task of monitoring the large number of archaeological sites and all of the other cultural resources (non-site areas such as cinder cones and the built features recorded as "find spots") in the Science Reserve was beyond the means of the rangers, regardless of how much training they might receive. It became apparent that the only effective way to monitor such a large and complex cultural landscape is to employ the services of qualified professional archaeologists. This became even more apparent as the archaeological survey progressed and more and more cultural resources were found. The need to contract professional archaeologists for monitoring will be a primary and long-term budget concern.

The rangers can still serve an important function in the monitoring process. Because of their full time presence they are the most effective deterrent to activities that harm and diminish the integrity of cultural resources. They can continue to monitor the most accessible and frequently visited areas, such as the summit. If a decision is made to use the rangers, they will receive training on how to relocate sites using GPS units and how to read and interpret archaeological site maps to determine whether any changes in a site have occurred since the site was first recorded or last visited.

4.3.1.3 Scope of the Monitoring Process

The Interim AMP was based on the idea that both sites and "find spots" needed to be monitored, on the assumption that the latter would remain intact and in some cases possibly undergo a major change in appearance. The plan also recognized the need to record new "find spots" for the purpose of continuing the process of documenting long-term changes in the cultural landscape. Given the large number of "find spots" found in the Science Reserve and the high probability that many of them are in fact modern, it is recommended that the monitoring process now focus on historic properties and the recording of new "find spots." Apart from the added time and expense, we now believe that little would be gained in monitoring all 336 known find spots.

The Interim AMP took the position that sites, whether they remain in passive preservation or are opened to the public in the future for educational and interpretive purposes, must be monitored, and that while the primary emphasis will be on the monitoring of the built environment (sites), the recognition of the whole landscape and region as culturally significant demands a broader perspective and approach. As already noted in **Section 4.2.1.1**, in terms of the archaeological monitoring process in general and the changing cultural landscape of the Science Reserve in particular, one important matter that OMKM and the Kahu Kū Mauna Council will carefully consider is which of the many different activities that are taking place today are considered culturally acceptable and which are not and should be curtailed. Some activities, such as the construction of small piles of stacked rocks, could have unintended consequences for future land managers if the existing piles are left in place and the practice of building such features is allowed to continue. Such features could in time become part of the archaeological record, which would then require that they be assigned State site numbers, recorded in more detail and monitored, together with all of the other cultural features and sites in the Science Reserve.

4.3.1.4 Monitoring Frequency and Scheduling

While monitoring of the whole Science Reserve every five years seems reasonable, it will nevertheless require a considerable amount of time given: (1) the large number of historic properties dispersed over a large area in a high elevation environment subject to drastic changes in weather conditions at any time of the year, and (2) the likelihood that new "find spots" will be found in the course of monitoring each management area. Establishing a fixed, rigid schedule for monitoring each of the three management areas is probably unrealistic and to some degree impossible given seasonal changes in weather conditions in the summit area. Some flexibility is obviously called for in implementing the monitoring program. At the outset it is recommended that the management area identified as needing routine monitoring be inspected once yearly and the periodic management area, every other year (Table 4-21). Some years the monitoring period might be limited to a period of perhaps four to five months because of inclement weather, while in other years it might be possible to conduct monitoring at any time warmer and drier conditions.

4.3.1.5 Monitoring Procedures and Documentation

The first step in the monitoring process, relocating previously identified sites, will be done with GPS units using the coordinates recorded during the 2005-2008 survey. Monitoring will also require the use of site descriptions, selected photographs and site maps. This is one of the reasons that sites, especially the more complex sites, need to be well mapped, described and photographed. It is also the reason for establishing photo reference points on site maps, so that whoever is doing the monitoring in the future has a series of fixed points to take a series of new photographs and compare to the old ones in the site files.

The Interim AMP included three forms that were designed for the purpose of recording the condition of sites and "find spots." The recommendation to exclude previously identified "find spots" from the monitoring process is reflected in changes to the original wording in the Interim AMP. The inspection process described in the Interim AMP using the forms that had been prepared at that time is still applicable, although some changes to the forms may be needed. The design and use of the forms was described as follows (McCoy et al. 2006:11):

> The site form contains spaces to indicate the current status or condition, the kind of changes or alterations that have occurred, if any, since the last inspection, and the probable causes of any such

Table 4-21. Long-Term Monitoring of Historic Properties and the Historic District.

Action	Purpose	Management Areas and Monitoring Frequency	Follow-up Procedures
Systematically monitor the condition of all historic properties and the historic district Inspections note existing condition of historic properties (comparison with photographs, maps) Inspections note and document any signs of disturbance, visitation, or deterioration by natural causes Develop a mechanism for the public to report disturbances	Determine which activities are affecting historic properties Determine the degree and frequency of these effects Propose ways to prevent or minimize these effects Provide baseline information to track changes in potential effects through time Incorporate reporting system for disturbances	Routine inspection of vulnerable properties (close to roads and evidence of past disturbance) once a year Periodic inspection of selected historic properties (shrines, possible burials, cinder cones) every other year Rotational inspection of all properties over five-year period (located far from roads, no evidence of past disturbance)	Notify SHPD and the Kahu Kū Mauna Council of any disturbances to historic properties Submit field recording forms and reports to SHPD, Kahu Kū Mauna Council, and other agencies determined appropriate by OMKM

changes. Once a site is relocated, the map and description will be reviewed to determine if any changes have occurred since the last site visit, such as the addition or re-arrangement of upright stones on shrines. Any observed changes will be recorded on the existing site map and/or a sketch map, and photographed with a digital camera. The alterations should also be described in the space provided on the form.

Recordation of new "find spots" can be limited to taking a GPS reading of the location, shooting one or perhaps a couple of photographs, and writing a brief description (e.g., two rocks piled on a boulder). If the rangers are going to be a part of the monitoring program, as suggested above, then they will need to receive hands-on training on locating sites, reading site maps, and monitoring and reporting procedures, such as the filling out of field forms, recording of GPS locations, and the use of digital camera logs.

4.3.1.6 Reporting Requirements

While the completed monitoring forms will constitute a record of which sites were inspected in a given year, the results of the monitoring process also need to be incorporated into databases, since the primary objective of the monitoring program is to track the condition of all built features in the cultural landscape over time. Copies of the monitoring reports will be provided to SHPD and other agencies deemed appropriate by OMKM.

In addition to the standard reporting procedures, the discovery of any human remains or suspected human remains will be reported immediately to SHPD to comply with Chapter 6E-43 (HRS) and Chapter 13-300 of the Hawaii Administrative Rules. Any major change to a previously recorded historic site, such as the rebuilding or "restoration" of a shrine, will also be reported to SHPD (see **Section 4.3.2** below).

4.3.1.7 Plan Review

A long-term monitoring plan must contain provisions for periodic reviews of the effectiveness of the monitoring procedures and the possible need for changes and the implementation of mitigation measures, which might include the identification of areas that should be monitored on a more frequent basis.

4.3.2 Burial Protection and Inadvertent Discovery Plan

In view of the documented existence of human burials in the Science Reserve there is a need to develop a burial treatment plan (BTP) to protect all known burial sites. Given the possibility that more human remains will be found inadvertently in the Science Reserve in the future there is also a need to develop an Inadvertent Discovery Plan. Guidelines for the preparation of both plans are presented in Table 4-22 and discussed below.

4.3.2.1 Burial Treatment Plan for Known Burial Sites

A burial treatment plan (BTP) is required under HAR 13-300 for known or suspected burial sites located in areas that are not being developed or actively used. The plan will be developed in consultation with the Kahu Kū Mauna Council, the Hawaii Island Burial Council and other interested Native Hawaiians. At present, taking specific actions to protect these sites (i.e., constructed barriers, markers, and signs) could be counter-productive. Such measures tend to call attention to features that would otherwise be overlooked. There is currently no indication that known or potential burial sites are being actively disturbed or that any particular activities are causing such disturbances, but this could only be established with greater certainly through routine monitoring. An important protective measure would be ensuring that enforcement or management personnel pay particular attention to any signs that people may be visiting known or suspected burial areas.

As with other burial matters, the BTP will be reviewed by the Hawaii Island Burial Council and members of the Native Hawaiian community. Kahu Kū Mauna has already expressed its preference to bury in place any exposed human skeletal remains so the plan will emphasize the stabilization of exposed burial sites so that they can remain in place and be protected from further disturbance. ,.

4.3.2.2 Burial Plan for Inadvertent Discoveries in the Astronomy Precinct and Other Development Areas

According to the Master Plan the only place that the construction of new observatories and infrastructure would take place is in the Astronomy Precinct. On current evidence there are no known burials in the Astronomy Precinct or other potential development areas, which does not mean that no burials will be found in future development projects, however. The potential also exists for burials to be found eroding out of a cinder deposit along the Summit Access Road. Now that an archaeological inventory survey of the Science Reserve has been completed, any burials found in the future will be treated as inadvertent discoveries according to the procedures set forth in §13-300-40.

Table 4-22. Guidelines for the Preparation of Burial Protection and Inadvertent Discovery Plans.

Action

Adopt measures to protect burial sites in all management areas (within a non-development context) in consultation with Hawaii Island Burial Council.

Purpose

Protect known or possible burial sites from disturbance and degradation.

Determine appropriate treatment for inadvertently exposed human remains (non-development context).

Management Actions

- Prepare plan in consultation with Kahu Kū Mauna to protect known burial sites:
  - Maintain anonymity
  - Use barriers, markers, or warning signs only if determined necessary by SHPD in consultation with the Kahu Kū Mauna Council.
- Monitor burial sites and adjacent areas for signs of visitation or disturbance.
- Prepare plan for inadvertently exposed human remains [following procedures outlined in Table 4-21] (e.g., by natural processes):
  - Comply with State Administrative Rule on inadvertent burials
  - Provide guidance on potential burial treatment plan scenarios:
    1. Stabilize exposed human remains
    2. Relocate if stabilization is not feasible (rebury close to original burial location)
    3. Consider temporary repository in summit region until consultation or reburial is completed
  - Designate protected reburial areas if appropriate
- Document inadvertent burial sites and reburial sites for inclusion in historic property catalogue to ensure long-term protection and monitoring.
- Establish policies on confidentiality for burial site information.

If human remains are uncovered when construction work is being monitored or anytime after construction commences, the procedures set out in Chapter 6E-43.6 (HRS) and administrative rule §13-300-40 must be followed. This includes notifying SHPD and the Police Department who will determine if the remains are Native Hawaiian and if the burial site is over 50 years old. If the burial site appears to be over 50 years old, SHPD has jurisdiction over the disposition of the remains but as a standard operating procedure SHPD will most likely seek the advice of the Hawaii Island Burial Council or the appropriate council members. A burial treatment plan will be prepared specifying how the burial will be protected and any appropriate procedures needed to carry out the plan, which could involve preservation in place or relocation.

If a burial is found during data recovery excavations of a site previously identified as a possible burial and it is determined to be a Native Hawaiian burial site over 50 years old it is considered a previously identified burial site and its disposition falls under the jurisdiction of the Hawaii Island Burial Council. The council will determine if the burial should be preserved in place or relocated. Whether it

remains in place or is relocated, a burial treatment plan must be developed by either the entity undertaking the project or UH. SHPD will ask the burial councils to review the plan and will consider the council's recommendations. If the burial is to be preserved in place, the plan details measures that will ensure the stabilization and long-term protection of the burial site. If it is to be relocated, the plan will describe the proposed reburial site, reburial procedures, and measures to ensure the long-term protection of the reburial site. The burial treatment plan must conform with §13-300-33 or, if the remains are believed to be non-Hawaiian, §13-300-34.

All inadvertent burial sites and reburial sites will be recorded and their exact location plotted on a map so they can be included in the on-going monitoring program and protected. This information will be added to the catalogue of known historic properties within the lands administered by UH or DLNR and maps showing these additional locations will be updated for use by land managers or enforcement personnel. Policies on confidentiality established for all burial site records would apply to these documents. Records of human remains exposed where there are no surface indications of a burial (i.e., mounds, platforms, in-filled cracks) are particularly important because they would indicate the presence of burials in areas that were not previously known. These areas or type of areas could then be afforded greater attention in monitoring efforts. Some remains in the more remote areas may have been exposed for many years before being discovered as is indicated by surveyors' accounts which mention seeing eroding burials on cinder cones.

Guidelines will be established to address the issue of confidentiality. A balance needs to be found between restricting information on the precise location of burial sites and having this information readily available for those with management responsibilities.

For all inadvertent discoveries that need to be removed for their protection before reburial occurs, the plan may propose finding a temporary repository in the summit region so that the remains need not be removed from the mountain while waiting for reburial. The plan could also consider designating reburial areas that would be more feasible to monitor and protect over time and identifying those individuals or groups wanting to take responsibility for the care of these remains.

4.3.2.3 Burial Treatment Plan Guidelines

To help expedite the preparation of a BTP, the CRMP provides some preliminary guidance on the general outline and contents of such plans and suggest some options for consideration. Many stipulations and procedures contained in these plans are relatively standard while others consider the specific circumstances of the burial. These recommendations will be reviewed by the Hawaii Island Burial Council and other concerned members of the Native Hawaiian community. Some options might include the designation of reburial areas to help assure the long-term protection of the remains or identifying those individuals or groups wanting to take responsibility for the care of these burial sites.

As noted earlier, the Final EIS for the proposed Keck Outrigger project included a burial treatment plan. The plan was presented to the Hawai`i Island Burial Council, but was not approved by the Council. The reason is described in a footnote in the Final EIS for the Outrigger Project:

> Following an initial informational presentation of the Draft Burial Treatment to the Hawai`i Island Burial Council in April 2004, public burial notices were placed in the newspapers in early May and an amended draft plan was submitted to the Council. The plan was discussed at the Council meeting on August 19, 2004. The members of the Council expressed their general agreement with the procedures recommended in the Burial Treatment Plan for monitoring during the Outrigger Telescopes construction and for treating any human remains uncovered during construction. Because no actual burials are known

to be present, the Council took no action actually approving the plan or its procedures, concluding that this would be beyond its purview at this time (NASA 2005:xv-xvi).

Tacit approval of the draft burial treatment plan for the Keck Outrigger project suggests that that plan could be adopted with few or no changes, except for those that would pertain the circumstances of a newly found burial or burials.

4.3.3 Interpretive and Educational Program

As noted in its mission statement (see **Section 3.2.1**), in addition to protection and preservation, OMKM is also charged with the enhancement of cultural and natural resources. There are potentially several different means of enhancing the cultural resources on the mountain. The 2000 SHPD Plan presented what in effect was a conceptual interpretive and educational plan. The conceptual plan, which represents the first stage in developing an interpretive and educational program, is presented here in a slightly modified format. A few comments and recommendations have been added concerning statutory regulations and other site protection measures that will be employed in certain cases.

4.3.3.1 Conceptual Plan Goals and Components

The primary goals of interpretation and education and the management actions that need to be implemented to realize the goals are outlined in Table 4-23. The plan components are presented in Table 4-24.

4.3.3.1.1 Interpretation of Historic Properties

In considering how the historic properties in the Science Reserve could be interpreted, there are four ways this could be achieved: (1) self-guided tours; (2) guided tours; (3) independent hikers, and (4) a web page devoted to education and interpretation (see Table 4-24). The benefits include education of the public on the types of historic properties and their significance. The drawbacks, which would apply more to self-guided tours and independent hikers, are the potential for harm to individual properties and the cultural landscape as a whole. The advantages of a web is that they: (1) are relatively inexpensive to design and maintain; (2) reach a large audience and (3) are for many people today preferred over brochures. Table 4-24 summarizes management actions for public visitation, including the preparation of educational brochures and interpretive displays.

Table 4-23. Interpretive and Educational Goals and Management Actions.

Purpose

Educate the public and other users about the prehistory and history of Mauna Kea.

Encourage the preservation of historic properties on Mauna Kea and their environmental context, including Mauna Kea's cultural landscape.

Inform the public about the restrictions and precautions of visiting the summit region and other management areas.

Management Actions

- Designate historic properties suitable for public visitation and minimize impact of visitation:
  - Self guided tours
  - Guided tours
  - Independent Hikers
- Prepare brochures on Mauna Kea's past including visitor precautions:
  - Develop themes for brochure
  - Develop text, select photographs, and prepare graphics for two brochures
- Develop conceptual components of display panels, text, and illustrations for expanded or renovated Visitors Center at Hale Pōhaku to include:
  - Contents focus on five major topics (see Table 4-24):
  - Develop context for the presentation of the major topics
  - Objects or replicas in display
- Develop a web-based approach to education and interpretation
- Compile cultural, archaeological, and historical background materials to aid staff presentations or interactions with public
- Outline major themes in more detail
- Prepare a list of frequently asked questions (FAQ)

Table 4-24. Interpretive and Educational Conceptual Plan Components.

Public Visitation of Historic Properties	Brochures on Mauna Kea's Past	Conceptual Components of Display
Develop a policy on whether or not public tours should be permitted.	Develop themes for brochure: Prehistoric uses (adze manufacture, cultural practices, access routes, burial practices, bird catching, travel, resource gathering) Legends and traditions associated with Mauna Kea Chronology of historic-period events and uses of Mauna Kea (early visitors and explorers, cattle hunting, ranching, forest and wildlife management, scientific research) Penalties for disturbing historic properties General precautions to protect the historic district (control debris, prohibit off-road vehicle use) Develop text, select photographs, and prepare graphics for two brochures Simple brochure for casual visitors with moderate interest in the topics (used during visit, single sheet, black and white, easily reproduced) More elaborate brochure for visitors with long-term interest in the topics (kept for future reference or souvenir, larger format, color, higher quality paper)	Display contents focus on five major topics: • Adze manufacture at the Mauna Kea Adze Quarry • Cultural observances demonstrated by shrines • Burial practices in remote areas • Traditions and legends associated with Mauna Kea • Chronology of human uses Develop context for the presentation of the five major topics: • Historic district which integrates the types, distribution, and significance of historic properties and the cultural landscape • Environmental zones, geology and topography of Mauna Kea's upper slopes Objects or replicas in display: • Artifacts and faunal remains from the adze quarry • Artifacts from octopus manufacturing site complex at Hale Pohaku including octopus lure sinkers and adzes • Replica of a shrine found in summit region

Source 2000 SHPD Plan

4.3.3.1.2 Site Interpretation Compliance Issues and Recommendations

If a decision is made to allow one or more of the types of tours discussed above and to install appropriate signage, it will be necessary to comply with the requirements in administrative rule §13-277-7 which requires the following:

Interpretation Requirements. (a) When using interpretive text for signs, brochures, etc., the text shall be reviewed and approved by SHPD.

(b) Interpretive signs shall be:

(1) Of sufficient quality to enhance public understanding of the site;

(2) Culturally sensitive, based on consultation with appropriate organizations and individuals; and

(3) Located so as not to adversely affect the site visually.

(c) Any data recovery work to improve the interpretation of the site shall meet the standards set forth in Chapter 13-278.

As noted in **Section 1.6.1** if informational signs are placed at any locale within the UH management areas, the signs will include a reference to Chapter 6E-11 and the language pertaining to violations and penalties.

4.3.3.1.3 Brochures and Other Informational Material

Some educational materials, such as the brochure prepared by Kepa Maly of Kumu Pono Associates called *Mauna Kea "Ka Piko Kaulana o Ka `Aina" (The Famous Summit of the Land),* have already been prepared and are available at the Visitor Information Station at Hale Pōhaku, but there is clearly a need for even more educational materials. Guidelines for the preparation of additional educational materials and possible themes for a brochure are summarized in Table 4-25 and discussed below. The main themes include:

1. For the prehistoric period, a primary focus on adze manufacture, religious practices as represented by the shrines, access routes, and burial practices. The Hawaii Island Burial Council and other concerned Native Hawaiians would be asked to review the discussion on burials. The collective significance of the historic properties representing these uses, as expressed in the designation of the summit as an historic district, would be noted. Also mentioned would be known uses of the mid-elevation slopes where Hale Pōhaku is located. These include bird catching, travel from one side of the island to the other, and the use of resources needed to carry out these activities (water sources, bird distributions, wood). Some of the historic properties located near the mid-elevation facilities could illustrate activities that occurred at these elevations, such as the manufacture of octopus lure sinkers.

2. For legends and traditions, the text would discuss the major characters Poliahu, Līlinoe, and Kūkahau`ula and traditions alluding to Lake Waiau.

3. The chronology of historic periods uses would begin with the ascent of the mountain by early visitors and explorers; use of the lower slopes for cattle hunting and later sheep and cattle ranching; efforts to manage the mountain's forests and wildlife; and scientific research.

Table 4-25. Themes and Recommended Content for Brochures.

Themes (1) The major prehistoric and historic activities known to have occurred on the mountain; (2) Legends and traditions associated with the Mauna Kea; and (3) A chronology of what brought people to the mountain during the historic period (i.e., 1823 to present). **Content** • At least one photograph or drawing of a shrine, a lithic scatter, cairns, and one of the cinder cones associated with a traditional goddess should illustrate these significant historic properties. • A map of the summit region best conveying the high number and wide-spread distribution of shrines throughout the summit region without providing sufficient detail to allow visitors to walk directly to the shrines. This or another map could depict the historic district and other historic properties which contribute to the significance of the district. • The location of known and suspected burial sites would not be shown. • If the proposed historic properties have been developed for self-guided tours by the time the brochure is produced, a map should be included to guide visitors to these interpretive sites. • List health and safety issues.

One brochure could be produced quickly and cheaply in black and white and another, more expensive brochure could be printed in color, on higher quality paper, and in a larger format to accommodate more text. The cheaper brochure would be for visitors who have only a causal interest in the mountain's past and will probably throw it away once it serves its purpose as a guide. The other, more expensive brochure would be for those who are more interested in the information presented and are more inclined to keep the brochure for future reference or as a souvenir.

Portions of the brochure would warn visitors against damaging or altering historic properties and removing artifacts. The penalties for disturbing historic properties on state land will be cited (Chapter 6E-11, a $10,000 fine for each offense). The public would be cautioned about the need to control and remove any debris created during visits and reminded that use of vehicles off of established roads is prohibited. The effects of altitude and the dangers of unpredictable weather (i.e., high winds, snow, or thick mists) would be mentioned briefly as this topic is generally covered in more detail by UH in other informational materials prepared for the public.

Informational materials will also be compiled to aid those giving presentations at the Visitor Center or guided tours of the Science Reserve and/or NAR. These materials would most likely be designed to provide basic information about the history and prehistory of Mauna Kea in more detail than would be available in the brochures or in displays. Also emphasized would be answers to some of the questions most commonly asked during site visits. The format of these materials will allow guides or rangers sufficient flexibility to adapt the information to different kinds of presentations and assist them in becoming better informed in general. The themes developed in the outline would include both archaeological topics as well as historic-period uses of Mauna Kea and would essentially expand on topics raised in the brochure or display. These materials could also be used by those giving tours of

the individual observatories should they want to augment their presentation with information about past uses of the mountain

4.3.3.1.4 Displays

In addition to the need for brochures and other kinds of informational material, new interpretive displays will be installed at the Visitor Information Center if the necessary funding is secured. As noted earlier, the Master Plan proposes expanding and renovating the Visitor Center so only the conceptual components of the displays, general interpretive themes, and display options can be addressed until these expansion plans are finalized.

Most of the themes and illustrations proposed for the brochure would form the core presentation of the display. Panels and text could focus on four major themes of Mauna Kea's cultural past:

1. adze manufacturing at the Mauna Kea Adze Quarry (i.e., extraction of basalt, reduction of material, etc.);
2. religious observances as illustrated by the distribution of the shrines throughout the historic district;
3. use of inland, remote regions for burial; and
4. traditions and legends associated with Mauna Kea.

On present thinking, at least two panels will be devoted to creating a context for these activities. The first would describe the historic district as a means of integrating all the significant properties found in the summit region and would include a map showing the distribution of these properties within the context of the landscape. The second would portray and describe the different environmental and topographic zones of the mountain's upper slopes that provide a context for discussing the resources that drew Native Hawaiians to the mountain's slopes or sustained them while they were there. Some of the historic properties found in the vicinity of Hale Pōhaku could be addressed within this context. A chronology of historic-period land use and notable events could also draw on this environmental and topographic context. As with the brochure, historic-period themes would include ascents of the mountain by visitors and explorers; cattle hunting or ranching and sheep rearing, efforts to manage the mountain's forests and wildlife; and scientific research.

Although the displays will most likely be composed of text, photographs, maps, and other illustrations, some thought will be given to creating displays containing artifacts and other archaeological remains. In discussing adze manufacturing, artifacts and stone already removed from the quarry for various reasons could be displayed to illustrate the different implements and steps needed to take the fine-grained basalt extracted from the quarry and reduce it to the various forms of roughed-out adzes. A similar display could address the manufacture of octopus lure sinkers in the vicinity of Hale Pōhaku and their use in fishing. For the use of shrines, a replica of a shrine could be constructed outside the Visitor Center for those who are unable to visit a real shrine, for lack of a four-wheel drive vehicle or health concerns.

4.3.4 Debris Removal, Monitoring, and Prevention Plan

As noted in the discussion of general management issues, administrative rule §13-277-6 (3) ("Rules Governing Requirements for Archaeological Site Preservation and Development") requires that preservation plans address the manner in which litter is controlled. The SHPD Plan committed to the development of a debris removal, monitoring and prevention plan to fulfill this requirement (see **Section**

4.1.4) and provided guidance on what measures should or could be employed to reduce or minimize the accumulation of debris and its effect on historic properties.

In general, it appears that the need for large-scale clean-ups, like those carried out in the past, during or shortly following the construction of the Gemini and Subaru telescopes, has decreased significantly. At least, considerably less debris was noted in during the on-going archeological survey of the Science Reserve. A decrease in the amount of trash is undoubtedly due in part to the full-time presence of the Rangers, as well as the efforts of the commercial tour operators in educating their clientele to be respectful of the mountain by not leaving litter.

The apparent decrease in the amount litter on the upper mountain, notwithstanding, the need for a debris removal, monitoring and prevention plan still exists. Some additional thoughts on the preparation of this plan and its component parts are presented below. The further development and finalization of the plan will involve consultation with all of the major stakeholders and the public at large.

4.3.4.1 Removal Procedures

To avoid potential adverse effects on historic properties during debris clean-up efforts, all participants will be briefed sufficiently to recognize shrines and instructed to exercise caution when collecting debris near them. Preferably the locations of all collection points would be selected in advance and far enough from any shrines to avoid potential adverse effects. Efforts to remove debris from the slopes of the summit *pu`u* will be designed to avoid permanent or temporary scarring of the slopes since the summit is considered sacred by Native Hawaiians.

The procedures used in earlier debris removal projects used ground crews who collected and stock-piled rubbish at several locations. The material was then removed with a helicopter in a large net. Helicopters appear to be the most effective and preferred means of removing larger quantities of debris, accumulated over time below the summit and along the roads. The volunteers who work at the Visitor Information Station could be used to assist in periodic cleanups of smaller debris, preferably in the company of the Rangers.

In addition to the usual kinds of debris left by visitors and the debris related to construction projects, the archaeological survey of the Science Reserve found the partial remains of two military helicopters and a drone that had first been seen in the 1982 archeological survey on the north slope of the mountain. Consultation with the appropriate military authorities will be undertaken to remove the last of the wreckage at these crash sites, which clearly have no place in an historic district.

4.3.4.2 Monitoring Procedures, Personnel, and Scheduling

The monitoring of debris will be done on a regular and routine basis. The Rangers, who regularly collect and dispose of rubbish during their daily rounds between Hale Pōhaku and the summit, might also be used to determine when a major cleanup project is needed by conducting periodic checks of debris below the summit and other places where debris tends to collect because of prevailing winds.

Establishing a fixed schedule for major cleanups is probably unwarranted. Instead, routine monitoring of the kind described above would be a more effective means of determining when a major debris removal project is needed. The frequency of such projects would undoubtedly vary depending on the underlying causal factors, which might include new construction projects and annual variation in the number of winter time visitors.

4.3.4.3 Preventative Measures

One preventative measure that was described in the amended SRCDP for the Science Reserve was to construct screened areas over covered containers and to place them adjacent to parking areas (Group 70 1987:89) or in areas where visitors are most likely to congregate. Education is another obvious measure that could perhaps be improved with the development of more informational fliers and perhaps the addition of a few more well placed signs informing the public that leaving behind debris is particularly offensive to the Hawaiian community.

4.3.5 Emergency Plan

Emergencies were discussed earlier as a general management issue in **Section 4.1.6** where they were defined as actions which require a rapid remedy or response, and which may involve health and safety issues. Several examples were listed including the need to create a detour road, or having to remove vehicles that have gone off the road.

4.3.5.1 Management Actions

As previously noted in **Section 4.1.6** an emergency plan is needed to avoid or minimize impacts to historic properties. Table 4-26 lists examples of emergencies, the review and compliance procedures that will be followed and provisions of the plan, such as presenting a few emergency scenarios that could be anticipated on Mauna Kea. Table 4-27 outlines three potential scenarios and the actions that will be employed.

Table 4-26. Historic Preservation Review and Compliance Procedures for Emergencies.

Examples	Review and Compliance	Plan Provisions
Rescue injured and/or lost member of the public or employee (skiing accident, injured hiker, injured construction worker) Retrieve large objects Collapse of road embankment or cinder cone face Need to create detour road Chemical or fuel spill Fire outbreak at Hale Pōhaku	OMKM to contact SHPD for verbal consultation when feasible and appropriate OMKM to notify Kahu Kū Mauna Council	Prepare, update, and follow emergency plan that: Includes the development of a fire plan Defines anticipated emergency scenarios Proposes contingency plans for each scenario to include: • Map showing preferred routes or remedies for scenarios • Measures to avoid historic properties and defacing the landscape: • OMKM staff becomes well informed on the distribution and kinds of historic properties in areas potentially affected by emergency activities • Staff will have ready access to maps with the locations and descriptions of historic properties • Provide training regarding protocol of historic properties • Provide Hazardous Waste (HAZWOPER) training for staff • Brief members of search teams on cultural protocols

An important component of these contingency procedures is to make sure that UH personnel responsible for overseeing emergency efforts have ready access to maps showing the distribution of known historic properties and are familiar with the kinds of historic properties known to exist in the Science Reserve and at Hale Pōhaku. If time allows, SHPD will be notified verbally and given the opportunity to comment on any proposed remedy, particularly if the action deviates significantly from the anticipated scenarios.

Table 4-27. Emergency Scenarios.

Scenario	Location	Response Procedures	Follow-up Procedures
1-hiker with broken leg	Science Reserve	OMKM rangers would act as first responders to assess the situation, contact the appropriate County rescue unit, and provide information on the location of the incident	Letter from OMKM to DLNR on the incident, with a description of what effect, if any, the rescue had on historic properties
2-helicopter or plane crash	Science Reserve	OMKM rangers would act as first responders to assess the situation, contact the appropriate County rescue unit, and provide information on the location of the incident	Letter from OMKM to DLNR on the incident, with a description of what effect, if any the crash and rescue had on historic properties
3-forest fire	Mid-Elevation Facilities at Hale Pōhaku	OMKM and MKSS staff, who would most likely be the first responders, would follow the procedures in a fire management plan, and at the same time contact the County Fire Department and if possible the local SHPD office	Letter from OMKM to DLNR on the incident, with a description of what effect, if any the fire and fire suppression efforts had on the stone buildings at Hale Pōhaku and nearby features of the Pu'u Kalepeamoa Site, such as the shrine located near the Kahinahina jeep road

4.3.5.2 Examples of Possible Emergencies and Responses

Scenario 1

Perhaps one of the most common types of emergency situations that could arise, especially with the increase in the number of recreational activities on Mauna Kea in recent years, is a hiker breaking a leg or suffering some other serious mishap miles from a road. The injured person could either be removed by stretcher, or if the injuries are more serious, a helicopter. Off-road vehicles will not be employed because of the damage that such vehicles do to the land surface, especially in areas with cinder deposits. Exceptions would include situations where a helicopter is either unavailable or cannot be used because of weather conditions. If a helicopter is used care will be taken to avoid landing on a ridge top, which is the most common location of archaeological sites in the summit region and especially if the archaeological map shows sites in the immediate area. The first responders, which might be OMKM rangers, will check the existing archaeological site location map for the Science Reserve to find a suitable landing site and provide that information to the helicopter pilot.

Scenario 2

A military or private tour helicopter or plane crashes on the north slope of the mountain in an area with a dense concentration of historic sites. The people on board are either seriously injured or die from the impact. Again, off-road vehicles will not be employed to rescue or remove the persons on board unless no other options are available because of the damage that is caused by such vehicles. As with the Scenario 1 example, if a helicopter is used the pilot will try to avoid landing on a ridge top if there are known historic properties in the general area of the crash site.

Scenario 3

*A careless smoker tosses a cigarette into the bushes near the old stone building restroom at Hale Pōhaku (*see Figure 2-3*). It is a dry year and the lit cigarette starts a fire that quickly spreads and eventually jumps the Kahinahina jeep road that circles the mountain at about the 9,000 ft elevation. The fire does not damage the old restroom, which is more than 50 years old and therefore an historic property, but it begins to approach archaeological features that are part of the Pu'u Kalepeamoa Site. Mauna Kea Support Service personnel attempt to put out the fire, but the fire continues to spread and a call is made to the Department of Land and Natural resources for fire fighters and bulldozers to cut a fire line. The use of heavy mechanized equipment is deemed necessary to protect the Mid-Elevation Facilities and māmane forest, which is the habitat of the endangered palila. In order to protect the historic properties located just outside the UH leasehold property, OMKM rangers and/or Visitor Center personnel will follow the procedures in the fire management plan that will be developed (see* ***Section 4.3.7****). The first steps would be to inform all of the firefighting personnel of the locations of known historic properties in the Pu'u Kalepeamoa Site and to advise any heavy equipment operators to avoid cutting fire lines near two shrines located on the south side of the Kahinahina jeep road.*

4.3.6 Data and Collections Management

The amount of cultural resource data (e.g. site records, photographs, and maps) and artifact collections that already exist for the UH management areas and the continued collection of more in the future points to the need to develop a data and collections management system. An integrated spatial database is being created for the archaeological inventory survey of the Science Reserve. Additional data management actions are outlined in Table 4-28.

Table 4-28. Data Management Actions.

- Create a secure GIS database.
- Develop guidelines for access to and use of the GIS database.
- Contract a GIS specialist with some background in cultural resource management to maintain and up-date the database.

The archaeological inventory survey of the Science Reserve resulted in the collection of a small number of artifacts from primarily surface contexts. While the archaeological collection made during the survey is small, there is a possibility that additional material culture items may be collected in the future for educational purposes, or as the result of the need to conduct mitigative investigations of threatened historic properties.

In the absence of an official state repository and the inability of DLNR to fulfill its statutory responsibility for the curation of archaeological collections from state lands as set forth in Chapter 6E-7, OMKM is committed to assuming this responsibility for the foreseeable future. This will require finding a suitable repository and the development and adoption of curation standards and procedures to safeguard and preserve the associated records and material remains.

Ideally, the collections facility would house records, photographs, reports, portable artifacts and faunal and floral materials in one place. The guidelines presented in Table 4-29 below are based on a facility with this capability. The guidelines have been adopted from a draft document prepared by Dr. Leslie Hartzell and Dr. Susan Lebo in 2001 for the Society for Hawaiian Archaeology (SHA 2001). The document was written with the hope that some or all of the guidelines would be adopted in the Hawaii Administrative Rules for SHPD (13-300). Although the guidelines were not included in HAR 13-300, SHPD will be consulted prior to finalizing the standards and procedures and developing an administrative policy since DLNR is legally the owner of all historic properties on state land and the cultural materials they contain. OMKM may want to enter into a formal agreement with SHPD regarding their responsibilities as the curator of the data and collections derived from studies of the UH management areas on Mauna Kea.

As a general policy, the records (with the exception of sensitive and thus confidential records) and material collections will be made available to qualified researchers and interested parties, such as Native Hawaiian practitioners.

Table 4-29. Guidelines for Curation Standards and Procedures

- The facility that is chosen to house the collections must be secure and climate-controlled if the collection includes perishable items (e.g. fragments of gourds, fire ploughs, ti-leaf sandals, cordage, etc.).
- An electronic accessioning system will be developed, maintained, and up-dated as needed.
- The material culture collections must have been cleaned and catalogued before they are accessioned.
- Organize, consolidate, clean, stabilize, and repackage previously accessioned records and/or material collections as time and money allows.
- Monitor collections/premises to control insect infestation and deterioration of records and material collections.

4.3.7. Priority Management Actions

At the present time not all of the historic properties in the Science Reserve have been identified and recorded. The 400 yd.-wide road easement above Hale Pōhaku (see **Section 1.3.3**) has also not been completely surveyed. Of all the management actions outlined in the CRMP there are four that have a higher priority than the others in terms of complying with Chapter 6E and the Hawaii Administrative Rules for historic preservation:

1. Complete the archaeological inventory survey fieldwork of the Science Reserve and the 400-yd. easement on either side of the summit road between Hale Pōhaku and the bottom of the Science Reserve and prepare the draft report on the survey of both management areas.

2. Prepare a burial treatment plan (BTP) for all of the confirmed and possible burial sites in the Science Reserve and in the road easement, if any are found, using the guidelines set forth in the CRMP.

3. Prepare and implement a final archaeological monitoring plan (AMP) based on the conceptual monitoring plan contained in the CRMP and the results of the completed archaeological inventory surveys of the Science Reserve and the road easement.

4. Prepare and implement a fire management plan for the Hale Pōhaku parcel and vegetated sections of the road easement above Hale Pōhaku.

5.0 IMPLEMENTATION AND EVALUATION PLAN

This section of the CRMP summarizes and presents a plan to implement the primary management actions outlined in **Section 4** and to evaluate the CRMP on a regular basis and make amendments as required. This section also includes brief discussions of: (1) staffing needs, including training; (2) the need for on-going consultation with cultural groups, and; (3) the benefits of developing cooperative agreements to implement management actions.

While OMKM is committed to fulfilling its mandate to protect and preserve the cultural resources in the three UH management areas on Mauna Kea, its ability to implement all of the management actions that have been identified in this plan is obviously dependent on funding and other resources (e.g., staffing), and feasibility. In addition, where the implementation of a management action would require ground disturbance to the existing environment, a separate environmental assessment will be conducted in compliance with State law.

5.1 SUMMARY OF MANAGEMENT ACTIONS, PRIORITIES, COST ESTIMATES AND SCHEDULING

Table 5.1 below presents the key information for the implementation plan. The 28 management actions listed in this table are discussed in detail in Section 4.0. Column 2 of Table 5.1 provides relevant references to the CRMP sections where actions are discussed. Columns 3, 4, and 5 include a priority ranking, a relative cost, and scheduling information, respectively, for each major management action.

In Table 5.1, the management actions are listed in descending order of priority and scheduling. The priority assigned to each action (high, medium, low) correlates to its role in protecting cultural resources. The scheduling covers a five-year period for the proposed management actions; in general, actions deemed to be of a higher priority are proposed to be implemented in the first couple of years. The cost level assigned to each action is a general one ranging from a high cost ranked as "1" and a low cost ranked as "5." A cost level of "1" is associated with actions that will likely require new or additional staff positions and/or the construction of infrastructure or facilities and/or increased funding to support staff increases and/or construction. Conversely, a cost level of "5" is associated with actions that will likely require no more than existing funding, staff, resources, or facilities.

For a number of the management actions described below, additional staff positions will be needed in order to implement them. The addition of more staff may require a combination of creating new government positions and issuing limited-term contracts with non-government entities for specific services. New positions take longer to create – anywhere from one to two or more fiscal years – but contract services may be procured, and terminated, relatively quickly. Any action that requires a long-term or multi-year commitment – e.g., developing and implementing the curation plan – will probably require the creation of additional staff positions.

It is possible that some of the higher priority management actions (e.g., actions involving the preparation of policies or plans) may be accomplished without significant

Table 5.1. Summary of Management Actions.

Action No.	CRMP Section References	Action Item	Priority	Cost	Schedule
1	3.2.2.4; 4.3.7	Complete the Archaeological Inventory Survey for the three U.H. Management Areas	High	1	Year 1*
2	4.1; 4.1.1; 4.1.2; 4.2.3.2; 4.2.3.4	Develop a public access plan that incorporates protection measures for historic properties	High	3	Year 1
3	5.3	Develop a policy to assure that Kahu Kū Mauna is consulted on individual development projects	High	4	Year 1
4	4.1; 4.1.2; 4.2.6	Continue to prohibit the use of vehicles off of established roads	High	3	Year 1
5	4.3.2; 4.3.7	Prepare a Burial Treatment Plan	High	3	Year 2
6	4.3.1; 4.1; 4.1.1; 4.3.7	Develop a final archaeological monitoring plan and program	High	3	Year 2
7	4.2.1.5; 4.2.1.3	Develop guidelines regarding the use of ancient shrines and protocols for offerings	High	3	Year 2
8	5.3	Develop a list of individuals, families, or organizations who should be consulted when individual development projects are proposed or when other issues arise that may be a concern	High to Medium	4	Year 1
9	4.2.1.6; 4.2.1.8	Develop a policy for the construction of new Hawaiian cultural features and the long-term management of these features	High-Medium	3	Year 2
10	4.2.4	Retain commercial permitting process	Medium	5	Year 1
11	4.3.5; 4.1; 4.1.4; 4.2.3.2; 4.2.3.3; 4.2.3.4; 4.2.4; 4.2.6	Prepare a debris control and removal plan that incorporates protective measures for historic properties	Medium	4	Year 1
12	5.2	Develop staff training program	Medium	3	Year 1-2
13	4.3.1; 4.1; 4.1.1; 4.3.7	Implement archaeological monitoring program	Medium	1	Year 1-5
14	4.2.3.2; 4.2.3.3; 4.2.3.4	Coordinate hunting policies with DLNR to ensure that historic properties are protected	Medium	5	Year 2

Table 5.1. Summary of Management Actions.

Action No.	CRMP Section References	Action Item	Priority	Cost	Schedule
15	4.2.6	Develop research guidelines that incorporate protective measures for historic properties	Medium	4	Year 2
16	4.3.5; 4.1; 4.1.4; 4.2.3.2; 4.2.3.3; 4.2.3.4; 4.2.4;4.2.6	Implement debris control and removal plan	Medium	3	Year 2
17	5.2	Implement staff training program	Medium	2	Year 2-3
18	4.3.3; 4.2.3.2, 4.2.3.4, 4.2.4	Develop an educational and interpretive program that minimizes the impact of visitation to historic properties	Medium	2	Year 3
19	4.3.3	Implement the educational and interpretive programs	Medium	2	Year 3
20	4.1; 4.1.2	Develop a plan to mitigate the off-road vehicle tracks	Medium	4	Year 3
21	4.1.2	Implement the mitigation plan for off-road vehicle tracks	Medium	3	Year 4
22	4.3.6	Develop and maintain an integrated GIS database for cultural resources to include guidelines for access and use	Medium-Low	2	Year 3
23	4.3.6	Prepare a curation plan for archaeological collections and associated records	Medium-Low	3	Year 3
24	4.3.5	Prepare an emergency plan that includes measures to avoid and protect historic properties	Low	4	Year 3
25	4.3.6	Implement the curation plan	Medium-Low	1	Year 4
26	4.3.5	Implement emergency plan	Low	4	Year 4
27	5.5	Review CRMP periodically to ensure all historic preservations regulations, restrictions, and polices are updated and revised as appropriate, and to evaluate existing management policies and the implementation of management actions	Low	4	Year 5
28	4.2.1.7	Develop a management policy for the scattering of cremated human remains.	Medium	4	Year 4

*Note: Year 1 will commence upon approval of this sub-plan of the CMP by BLNR

cost. Once policies or plans are adopted and new positions created, however, the hiring and training of new or additional staff will be an associated cost. Initial training on various management actions – allowing staff to become familiar with policies, procedures, plans or regulations – will be extensive and may require some financial outlay to carry out. In subsequent years, training may be on-going, requiring yearly or other regular updates to information content, but will be lower in cost.

Finally, an assumption underlying the sequence of management actions in Table 5.1 is that necessary steps, such as the passage of administrative rules and the granting of enforcement authority for OMKM, will have taken place prior to carrying out some of the listed actions. In the following subsection, each management action is briefly described and a reason is given for its inclusion in Table 5.1.

5.1.1. Descriptions of Management Actions

The following list contains brief explanations of the management actions found in Table 5.1.

1. *Complete the Archaeological Inventory Survey for the three U.H. Management Areas.* Begun in 2005, the fieldwork phase for the archaeological inventory survey (AIS) of all U.H. management areas is scheduled to be completed in 2009. The resulting AIS report will contain the baseline data for cultural resources, and will present documentation of all historic sites found, and make recommendations for their treatment and preservation. This report must be completed prior to the preparation and submittal of a final Burial Treatment Plan (Action 5), and the final Archaeological Monitoring Plan (Action 6).

2. *Develop a public access plan that incorporates protection measures for historic properties.* The issue of public access to historic properties will be addressed in the Public Access Sub Plan of the CMP.

3. *Develop a policy to assure that Kahu Kū Mauna council is consulted on individual development projects.* As the primary Native Hawaiian advisory group associated with Mauna Kea, the Kahu Kū Mauna Council will be consulted on individual development projects, in a timely and appropriate manner. The consultation policy will include mechanisms for addressing any recommendations or concerns raised by the Council.

4. *Continue to prohibit the use of vehicles off of established roads.* Unauthorized off-road vehicle use has caused serious damage to the fragile alpine environment of the summit and is therefore prohibited. Direct and indirect damage to historic properties, as well as to the cultural landscape of Mauna Kea, can also occur through unauthorized off-road vehicle use. OMKM's policy will continue this ban and strengthen measures to deter off-road use.

5. *Prepare a Burial Treatment Plan.* Once the final AIS report is completed and submitted, a Burial Treatment Plan (BTP) will be prepared for all of the confirmed and possible burial sites documented for the three U.H. Management Areas

using guidelines set forth in the CRMP. The BTP will detail how the burials will be preserved and protected (including any site stabilization measures), suggest the enforcement responsibilities OMKM Rangers will have, and describe any provisions for visitation by recognized descendants.

6. *Develop an archaeological monitoring program.* Once the final AIS report is completed and submitted, the archaeological monitoring program can begin. The CRMP contains a conceptual archaeological monitoring plan (AMP) and program on which this program can be built. The program will be guided by a final Archaeological Monitoring Plan (AMP), to be prepared and submitted to OMKM and DLNR. The AMP will include guidelines for monitoring the condition of historic properties in order to identify patterns in the alteration of historic properties. In addition, the plan will include steps for maintaining and updating the catalogue of historic properties, as documented in the AIS, and record their current condition for comparative impact assessments.

7. *Develop guidelines regarding the use of ancient shrines and protocols for offerings.* The AIS fieldwork has documented alterations made to shrines and other historic sites in the U.H. Management Areas; some of the alterations appear to be related to modern cultural and religious practices. Guidelines will be developed in consultation with the Kahu Kū Mauna Council to prevent alterations that affect the integrity of historic properties, such as the removal or addition of new upright stones.

8. *Develop a list of individuals, families or organizations who will be consulted when individual development projects are proposed or when other issues arise that may be a concern.* A list of parties to be consulted will be developed and expanded from those who participated in consultations over the CRMP, Natural Resource Management Plan (NRMP), and CMP. Development of the list will include procedures for updating it, and for ensuring prompt and accurate communications between OMKM and all parties.

9. *Develop a policy for the construction of new Hawaiian cultural features and the long-term management of these features.* The AIS has documented many small stone features of presumably recent origin that may or may not be ceremonial or religious in nature. The policy will address the construction of additional new features, and include protocols (developed by the Kahu Kū Mauna in consultation with other Native Hawaiian organizations) for how, where, and when such construction may occur.

10. *Retain commercial permitting process.* Currently, the OMKM reviews and approves commercial permit applications made by such businesses as tour operators or film companies; permit approvals may include conditions on uses or activities. These procedures will continue and be supplemented by requiring cultural orientation training for all tour operators and key personnel, on-going monitoring of commercial activities, and controlling visits.

11. *Prepare a debris control and removal plan that incorporates protective measures for historic properties.* This plan will include provisions for monitoring the distribution of debris and minimizing its escape from the observatories and during maintenance and construction work. The plan will also include measures for debris collection in publicly accessed areas and safe removal practices that will not cause damage to historic properties. Public education and positive reinforcement of public behavior (e.g., strategic placement of rubbish containers) will form a part of the plan.

12. *Develop a staff training program.* A staff training program will include basic information from the AIS on site locations and descriptions, including site and artifact recognition. Primary elements of other plans or policies – prevention of off-road vehicle use, debris control and removal, public access management – will form the basis of staff training. The program will also integrate all regulations, restrictions, and polices in a single document to aid management staff.

13. *Implement archaeological monitoring program.* Once the Archaeological Monitoring Plan is approved by OMKM and DLNR, the monitoring program can be implemented. The primary purpose of the monitoring program is to determine what uses, if any, are affecting historic properties, the degree and frequency of these effects, and ways to prevent or minimize their occurrence. Implementation of the monitoring plan will require the presence of trained OMKM staff, or a qualified archaeological consultant, who will conduct site visits to all relevant locations within the U.H. Management Areas in order to monitor uses and conditions of historic properties, as well as document and describe any impacts to these properties.

14. *Coordinate hunting policies with DLNR to ensure that historic properties are protected.* The policies will include measures for advising the public of sensitive areas, the enforcement of prohibitions on off-road vehicle driving or parking, and controlling debris. Coordination with DLNR may include a Cooperative Agreement with DOFAW.

15. *Develop research guidelines that incorporate protective measures for historic properties.* Research on Mauna Kea, for example, geological, botanical, and zoological research activities, can range from relatively low-impact efforts, such as those in which researchers hike to specific areas to record information, to more intrusive efforts such as setting up instruments to record data over time or collecting samples. Research guidelines will specify which kinds of research require permits, which agency reviews are necessary, and how permit conditions will be enforced. Information on historic properties and the need to avoid any alteration of them will also be provided to research permit applicants.

16. *Implement debris control and removal plan.* Take steps to ensure that appropriate OMKM personnel, including Rangers, are aware of the plan's measures for protecting historic properties.

17. *Implement staff training program.* Take steps to ensure that the training program includes a comprehensive review of the relevant documents pertaining to the

archaeological and other cultural resources in the U.H. Management Areas as well as field trips to various site types present. Rangers will receive training in recording damage to historic properties.

18. *Develop an educational and interpretive program that minimizes the impact of visitation to historic properties.* As part of the development of this program, an educational and interpretive plan will be prepared in coordination with DLNR. The educational and interpretive plan will include educational themes, signage (if deemed appropriate), content of the sign text, guidelines for implementation of the program, and measures that will ensure protection and preservation of any historic sites involved in the program, as well as protection and preservation of Mauna Kea's cultural landscape. The program will designate historic properties suitable for public visitation through guided or self-guided tours. The program can also include development of educational brochures, displays, and materials for supporting staff presentations to the public. The development of such programs will be coordinated with OMKM, the Kahu Kū Mauna Council, and DLNR.

19. *Implement the educational and interpretive programs.* Implementation of these programs will follow steps and guidelines in the educational and interpretive plan, and will be coordinated with DLNR, and the Kahu Kū Mauna Council.

20. *Develop a plan to mitigate off-road vehicle tracks.* The plan will recommend additional barriers, provide language for signage and public information, and contain recommendations for restoring areas damaged previously by off-road vehicular activity. OMKM Rangers will be involved in the development and implementation of this plan.

21. *Implement the mitigation plan for off-road vehicle tracks.* Initially, a survey to document the location of existing off-road vehicle tracks will be conducted to ensure that mitigation efforts will not impact any historic properties.

22. *Develop and maintain an integrated GIS database for cultural resources to include guidelines for access and use.* The existing database from the AIS of the three U.H. Management Areas will be the foundation on which the integrated GIS database will be developed. Using data from the AIS and the results of periodic monitoring of the condition of historic properties, the GIS database should prove to be an effective and efficient cultural resources management tool. Guidelines regarding public access to the database and use of historic and cultural resources information will be developed.

23. *Prepare a curation plan for archaeological collections.* The curation plan will detail temporary and long-term measures for the storage of archaeological collections and associated records, in accordance with Hawaii State and Federal standards. It is anticipated that OMKM staff will need to consult with a qualified archaeological consultant or collections management specialist to develop the curation plan. The plan will specify the location(s) for curation facility, materials to be used (acid-free paper, files, and storage bags), and provisions for access and use.

24. *Prepare an emergency plan that includes measures to avoid and protect historic properties*. The plan will include anticipated situations and recommend contingency measures for each one, such as maps showing appropriate access routes and measures to avoid impact to historic sites or surrounding landscape. The plan will be prepared in coordination and consultation with OMKM Rangers and local safety officials (Fire Department, Police Department).

25. *Implement the curation plan*. Initially, steps need to be taken to locate an adequate curation facility for the archaeological collections and hard copies of the archaeological records (notes, forms, drawings and maps, etc.). Implementation of the curation plan will follow the guidelines that were developed and approved.

26. *Implement the emergency plan*. Steps need to be taken to ensure that the OMKM Rangers as well as local safety officials are aware of implementation of the emergency plan and the protective measures that need to be taken for historic properties.

27. *Review CRMP periodically to ensure all historic preservation regulations, restrictions, and policies are updated and revised as appropriate and to evaluate existing management policies and the implementation of management actions*. Periodic review will rely partly on the results of the monitoring program to be carried out as well as any changes in applicable statutes, regulations or policies. Review of the CRMP will be conducted by the OMKM, the Mauna Kea Management Board and other interested parties and stakeholders (for example, the Kahu Kū Mauna Council). Should it be decided that amendments to the CRMP are desired, the CRMP will be amended in consultation with DLNR.

28. *Develop a management policy for the scattering of cremated human remains.* A management policy on the scattering of cremated human remains could be patterned after the policy recently instituted at Hawai'i Volcanoes National Park. This type of policy will be developed and implemented for the Science Reserve.

5.2 STAFFING NEEDS AND TRAINING

In order to manage the cultural resources and associated data within the UH management areas OMKM will hire a qualified cultural resource coordinator to assist with the implementation of the CRMP, contingent on the availability of funding.

The Ranger Program

Given the number of public and commercial activities and user groups on Mauna Kea, the OMKM Rangers have numerous responsibilities. The five Rangers currently stationed at Hale Pōhaku provide a number of additional services in areas that are outside of the jurisdiction of UH, including the following (Office of the Auditor Report 05-13:46).

- Monitoring neighboring DLNR forest reserve and Natural Area Reserve (NAR) lands;
- Preventing forest fires;
- Rescuing lost and distressed hikers in DLNR forest reserve lands;
- Responding to violations occurring in the NAR.
- Looking after the health and safety of visitors, including hikers. Although lacking the statutory authority to require hikers to register at the Visitor Information Station all visitors are asked to voluntarily register.

While not all of these services are directly related to cultural resource management, the high probability that DLNR will be unable in the foreseeable future to assume these responsibilities indicates that a staff of at least five rangers will be needed in the foreseeable future. OMKM and NAR are currently working on a partnership agreement that could possibly require additional staff if, for example, the NAR was to be monitored on some regular basis.

If a decision is made to have the Rangers continue to monitor activities affecting cultural resources along the road and in the NAR, some additional training in the reporting of incidents may be required for both the Rangers and NAR staff. For example, the Rangers will receive training in recording damage to historic properties such as that given National Park rangers who need to document damage or vandalism to standards required when enforcing the Archaeological Resources Protection Act on federal lands.

A training program would also be required if a policy or protocols are developed relating to cultural practices. This assumes that the rangers would be the ones most directly involved on a day to day basis in the enforcement of a policy. Table 5-2 presents a list of management actions related to staff levels and training.

Table 5-2. Management Actions for Staffing and Training

• Assess the need for additional staff to fulfill historic preservation review compliance requirements and curation of written records, photographs, maps and material collections.
• Develop a staff training program.
• Implement staff training program.

5.3 ON-GOING CONSULTATION WITH THE KAHU KU MAUNA COUNCIL AND THE HAWAIIAN CULTURE COMMITTEE

Preservation planning recognizes the need to continue the process of consulting with the major stakeholders. A mechanism for accomplishing this goal with the astronomy community already exists in the form of regular meetings with OMKM. Periodic reviews of the CRMP would involve all of the stakeholders. In view of all of the unresolved issues pertaining to cultural practices, it is the Native Hawaiian community that needs to be consulted on a frequent basis. Some of this is presently occurring with the Kahu Kū Mauna Council and the Hawaiian Culture Committee, but it will be broadened to include more of the Hawaiian community.

Management Actions

It is recommended that OMKM continue to consult with Native Hawaiian organizations and individuals on existing policies and proposed new policies. Two specific recommendations are presented in Table 5-3.

Table 5.3. Management Actions for On-Going Consultation with Native Hawaiians.

• Develop a mechanism to assure that Kahu Kū Mauna is consulted on individual development projects. • Provide a list of individuals, families, or organizations who should be consulted when individual development projects are proposed or when other issues arise that may be a concern.

One benefit of compiling a list of organizations and persons that should be consulted is that such a list could accommodate those who are concerned about a particular place or area but do not wish to disclose its location or the nature of its significance. They could appear on the roster as wanting to be consulted about any planned activity or issue occurring in the general vicinity and then decide if they wish to act on any concerns they have.

A more general management action, which is taken from the Policy Statement on Native Hawaiian Use of Hawaii Volcanoes National Park (revised December 30, 2003), is presented for consideration:

> OMKM will continue to meet with members of the Native Hawaiian community to ensure that there will be systematic input by the community at large regarding planning, management, and operation decisions that affect sacred materials, places, or other ethnographical resources with which they are associated. As an example, such consultations have aided in developing accurate historical and cultural resource information bases for management and interpretive needs, ensuring accurate use of the Hawaiian language in exhibits and signs, and have assisted in developing policy directed at protecting Native Hawaiian sacred sites and traditional practices.

5.4 Cooperative Agreements

Cooperative agreements, such as the one currently being finalized between OMKM and NAR, can serve a number of useful functions. One particular kind of cooperative agreement, usually prepared by federal agencies that are required to comply with the National Historic Preservation Act in managing historic properties on federal lands, is the "Programmatic Agreement (PA)." Such agreements provide a mechanism by which interested parties can reach an understanding on which historic preservation review and compliance measures will be applied to particular classes of actions within a single, generally large, land holding which is being actively used and managed by an agency. These agreements are most effective when the effects of certain kinds of activities on historic properties are likely to be similar or repetitive; when

the distribution of historic properties is relatively well known in the area being managed, and when similar kinds of routine maintenance activities could have an effect on historic properties. The intent of these programmatic agreements is to reduce the need for repetitive and standard historic preservation compliance reviews. This allows more attention to be paid to those planned activities which could have significant impacts on historic properties or to management areas where little is known about historic properties located within them.

In 2006 PCSI began the preparation of a PA as partial fulfillment of the recommendation for such a cooperative agreement in the SHPD Plan. The primary objective of the PA was to identify which of the many management responsibilities assumed by OMKM and/or the observatories would require historic preservation review and stipulate how OMKM and/or the observatories would comply with the appropriate State and/or Federal rules and regulations. The PA had to be abandoned because of a number of intractable problems, such as:

- As noted in the 2005 Legislative audit there does not appear to be statutory authority for some things OMKM currently carries out, such as issuing commercial permits.
- The control of various areas of the summit by different entities has resulted in a patchwork of responsibility and oversight, including activities identified in the Master Plan as potentially subject to a PA. For example, the Natural Area Reserve technically includes Lake Waiau but the Rangers, supervised by the OMKM, extend oversight to Lake Waiau.
- Management of the summit area is governed by two over-arching management documents, the approved Master Plan (2000) and the 1995 Revised Management Plan, which affects Chapter 6E compliance.
- Due to regular funding from NASA and/or NSF, there appears to be significant, de facto Federal involvement, such that Section 106 compliance may be needed; unfortunately, it also appears to be very difficult to identify the nature & extent of Federal involvement, for the most part, due to the commingling of funds.

Once the BLNR has determined that the CMP has met all of the conditions of approval it is recommended that UH and DLNR work toward developing a Programmatic Agreement for routine maintenance activities and other actions that by agreement between both parties would have no effect on historic properties and would thus not require UH to go through the historic preservation review process.

5.5. EVALUATION AND AMENDMENTS

Provisions for periodic reviews and amendments are essential components of CRMP's as changes in some of the existing management policies and compliance procedures are to be expected in the future. In addition, some of the currently approved public uses of the Science Reserve require permits, while others do not. It is likely that some of the permit conditions may change and that some currently unregulated activities may necessitate the development of a permitting process.

A process will be established to conduct a review of the CRMP every five years or sooner, which would include the major parties affected by the plan's provisions, if

deemed necessary by the major stakeholders. The primary intent of the plan review process is to assess the effectiveness of the plan and its implementation, to identify any omissions, and to remove or revise provisions that have proved unrealistic. Another objective would be to review the status of the implementation of the management actions summarized in Table 5-1 through annual progress reports. A revised timetable may be necessary. The lack of sufficient funding, for example, could have serious effects on the implementation process and schedule.

At a minimum, the parties that will be involved in the review and amendment process would include representatives of UH and any of the individual observatories wishing to participate, interested members of the Native Hawaiian community including the Kahu Kū Mauna Council and the Office of Hawaiian Affairs, and staff of the following agencies: the Office of Mauna Kea Management; the Land Division of DLNR who oversee the issuing of Conservation District Use permits; the NARS program who are responsible for managing the Mauna Kea Ice Age Reserve; the State Historic Preservation Division who review projects or actions for their affects on historic properties, and the Division of Forestry and Wildlife of DLNR if issues of hunting or management of the *māmane* forest arise. Other interested parties, such as the commercial tour operators or recreational skiers, will be informed of the review and invited to comment if they choose.

6.0 AGENCIES, ORGANIZATIONS AND MEMBERS OF THE PUBLIC CONSULTED IN THE PREPARATION OF THE CRMP

Chapter §13-277 ("Rules Governing Requirements for Archaeological Site Preservation and Development") requires that preservation plans include a discussion of the consultation process for historic properties deemed significant. § 13-277-(4) requires that:

> The agency or person shall consult with ethnic organizations and individuals for whom the historic properties are of significance. The comments on preservation treatment expressed by these individuals or organizations shall be considered when preparing the preservation plan. The plan shall include a list of individuals and organizations consulted, and shall summarize their input.

While the state rule is focused on consultation with cultural groups and individuals, other stakeholders were consulted in the preparation of this plan in addition to the public.

6.1 CONSULTATION WITH NATIVE HAWAIIAN ORGANIZATIONS

Consultation for the CRMP has focused on Native Hawaiian organizations, including the Kahu Kū Mauna Council and the Hawaiian Culture Committee, Hawaiian Civic Clubs in Waimea, Kona, Hilo, and Pahala on Hawaii Island, the Office of Hawaiian Affairs (OHA), Historic Preservation Committee, and the Hawaii Island Burial Council (HIBC). The sections below summarize the consultation methods used and the results of consultation with the various native Hawaiian organizations.

The consultation process will continue in the near future, following the submission of the first public draft of the CRMP to SHPD. In addition, a 45-day public review period will occur when the CRMP is submitted to SHPD.

6.1.1 Methods of Community Consultation

The focus of consultation with Native Hawaiian organizations was with small groups rather than large public meetings in order to keep the focus of the consultation on protection and preservation of Mauna Kea's cultural and archaeological resources. In the beginning of the consultation period, a series of invitations were sent to key individuals representing the various organizations, specifically the Hawaiian Civic Club (HCC) organizations, asking people to attend a meeting called by PCSI and OMKM for the specific purpose of consultation regarding the cultural resources. This evolved to asking organizations if PCSI and OMKM could be placed on their agendas to consult with them regarding protection and preservation of cultural resources on Mauna Kea.

At the beginning of each meeting, people in attendance were asked for permission to record the meeting with audio tapes, and therefore each meeting was tape-recorded. With the exception of initial meetings with the Kahu Kū Mauna Council, the contents of the meetings were summarized from the tapes instead of transcribed word for word. The meetings with the Kahu Kū Mauna Council were, however,

transcribed word for word. Because meetings with the Hawaii Island Burial Council are always taped, their meeting minutes were used to summarize the content of the consultation.

Based on the fact that it took over 12 hours to cover all the key issues addressed in the CRMP with the Kahu Kū Mauna Council, it was decided to focus the consultation on two of the more important issues: public access and cultural practices. A power point presentation was developed and shown at several of the meetings; at other meetings the slides for the power point presentation were printed and a copy was provided to people attending. These presentations covered the following:

- The purpose of the CRMP (identifies cultural resources in the UH management areas, identifies possible threats to the resources and measures to be used to protect the resources).

- Identified issues that are addressed in the CRMP, including public access, off-road vehicle use, routine maintenance, debris, enforcement, emergencies, film industry, cultural and religious practices, astronomy, recreational activities, commercial tours, commercial events, and future land use).

- More detail concerning public access (currently no rules; altering historic properties is illegal but most visitors are not aware of this).

- Summary of management actions regarding public access (visitor registration and education, ranger presence, monitor effects on historic properties, enforce preservation laws, and provide signage).

- More detail concerning cultural and religious practices (offerings, burial site access, visiting ancient sites, constructing new features, scattering ashes, and stacking rocks).

- Summary of management actions pertaining to burial site access (no restrictions for native Hawaiians, advance notification of visits, burial disturbances reported to rangers and SHPD, and no public tours to burial sites).

- Kahu Kū Mauna Council – they will review, together with the MKMB, all recommendations and decide which to adopt in the CRMP. To achieve this, they will consult with other Native Hawaiian organizations, individuals, and families.

Ms. Maria "Kaimi" Orr of Kaimipono Consulting Services, LLC (KCS) served as meeting facilitator for the consultation meetings, and Ms. Denise Russell of PCSI assisted with meeting logistics (obtaining meeting locations, providing refreshments for the meetings, and transcribing meeting minutes).

The power point presentation was followed by a discussion session and questions and answers. The discussions often focused on issues surrounding public access and cultural practices and the recommended management actions needed to protect cultural sites within the context of these issues.

The meetings held for CRMP consultation are summarized below starting with consultation with the Kahu Kū Mauna Council members. These are followed by summaries of consultation with other organizations and individuals. Appendix F presents a list of groups, agencies and individuals consulted for the CRMP.

6.1.2 Consultation with the Kahu Kū Mauna Council

The two meetings with the Kahu Kū Mauna Council took place on March 1 and March 5, 2008. Attending the March 1st meeting were Kahu Kū Mauna Council members Arthur Hoke, Larry Kimura, Leilehua Omphroy, Toni Mallow, Tiffnie Kakalia, Hannah Kihalani Springer, and Ed Stevens. Also in attendance were Stephanie Nagata of OMKM, Maria "Kaimi" Orr of KCS, and Pat McCoy, Steve Clark, and Denise Russell of PCSI.

Attending the March 5th meeting were Kahu Kū Mauna members Arthur Hoke, Larry Kimura, Sean Naleimaile, Toni Mallow, Tiffnie Kakalia, Hannah Kihalani Springer, and Ed Stevens. Also in attendance were Stephanie Nagata of OMKM, Maria "Kaimi" Orr of KCS, and Steve Clark, and Denise Russell of PCSI.

The consultation meetings with the Kahu Kū Mauna Council included extensive and intensive discussions of the issues addressed in the CRMP. The input provided by members of the Council led to significant change in the content of Section 4 of this CRMP, especially in the recommended management actions designed to protect the cultural resources identified within the UH management areas on Mauna Kea.

Some of the issues discussed in these two meetings are very complex and involve social, cultural, and political factors that transcend the ability of one organization to resolve. Instead of detailing the extensive input here from members of the Kahu Kū Mauna Council, this subsection will list issues that will require more internal discussion and consultation by the Kahu Kū Mauna Council and possibly between the Council and other Hawaiian organizations, stakeholder families, and individuals.

6.1.2.1 General Management Issues

- Some of the members of the Kahu Kū Mauna Council see a need to protect more of Mauna Kea, including cultural and natural resources, than what is included in the UH Management Areas. Some believe that Hopukani Springs should be included, some believe everything above the 9,000 foot elevation should be protected, others feel everything above the 6,000 foot elevation should be protected.

- There is a need for OMKM to hire more rangers for enforcement, although this may have to wait until OMKM has promulgated regulations.

6.1.2.2 Protection Measures for the Current Policy of Uncontrolled Access

- Recommendations for controlled access to Mauna Kea should include guided tours/shuttle from Hale Pōhaku. The concept of shuttling everyone up to the

summit from Hale Pōhaku was seriously considered and included arguments for and against. The working concept is that non-residents (visitors) would pay a fee and state residents would be shuttled for free. It is important to be mindful that before times, under the *kapu*, there were likely many rigorous restrictions to access to Mauna Kea's summit region.

6.1.2.3 Management Actions for Off-Road Vehicles

- Will air conveyance fall under this category? Should low-flying aircraft (airplanes and helicopters) be allowed to fly low over the summit for purposes such as research or scattering human ashes? There is a need to further discuss if a policy for this is required.

- DLNR needs to support OMKM's current policy of no off-road vehicles allowed in the Science Reserve because DLNR has administrative authority over lands adjacent to the Science Reserve and the Science Reserve can be accessed through these lands with off-road vehicles such as ATVs.

6.1.2.4 Management of On-going Maintenance Activities Requiring Historic Preservation Review and Compliance

- OMKM needs to develop a list of possible actions/activities that can be covered under a cooperative agreement with SHPD, eliminating the need for approval for proposed projects on a case-by-case basis. There is a need to create an agreement similar to a Federal Programmatic Agreement.

6.1.2.5 Management Actions Pertaining to Offerings

- There is a need to develop protocols for placing offerings and removal of offerings. This issue is very complex and requires further discussion among members of the Kahu Kū Mauna Council and probably between the Kahu Kū Mauna Council and other Hawaiian organizations, families, and individuals.

6.1.2.6 Management Actions for Access to Burial Sites

- There needs to be more discussion regarding the confidentiality of burial site locations and who should have access to this information. The question was raised about possible violations to the Federal Freedom of Information Act or the State Uniform Information Practices Act if burial site locations are kept confidential.

6.1.2.7 Management Actions for Shrine Visitation and Use

- There is a need to develop protocols for visitation and use of ancient shrines and leaving/removal of offerings. This issue is very complex and requires further discussion among members of the Kahu Kū Mauna Council and possibly

between the Kahu Kū Mauna Council and other Hawaiian organizations, families, and individuals.

6.1.2.8 Management Actions for Construction of New Features

- There is a need to develop protocols for constructing new features and dismantling new features. This issue is very complex and requires further discussion among members of the Kahu Kū Mauna Council and possibly between the Kahu Kū Mauna Council and other Hawaiian organizations, families, and individuals.

6.1.2.9 Management Action for On-Going Consultation

- There is a need for more discussion on the types of consultation that may be needed in the future and whether or not the consultation needs to include groups other than the Kahu Kū Mauna Council.

6.1.3 Consultation with the Waimea Hawaiian Civic Club

The presentation for the Waimea Hawaiian Civic Club began at 6:30 p.m. on April 17, 2008. Attending the presentation were the following: Sharon Medeiros, a cultural practitioner, Maile (Spencer) Napoleon, a Waimea resident, Anne Dressel, a guest, Betty and Fred Lau, with the Waimea Hawaiian Homes Board and Waimea Hawaiian Civic Club, Ku "Clarence" Ching, a farmer, Kanani Kapuniai with the Waimea Hawaiian Homesteaders Assn Inc., and Reynolds N. Kamakawiwo`ole a former Kahu Kū Mauna Council member. Also in attendance were Arnold Hiura of OMKM, Maria "Kaimi" Orr with KCS, and Pat McCoy, Steve Clark, and Denise Russell with PCSI. The meeting was held in Waimea at the offices of the Canada-France-Hawaii Observatory.

The following points summarize the input regarding issues of public access and cultural and religious practices:

6.1.3.1 Public Access

Visitor Registration

- Having visitors register is a good idea for safety reasons.

- There likely will be some resistance by contemporary cultural practitioners to register. There's a difference between people who are *ma`a* (experienced; knowing thoroughly; familiar) with Mauna Kea and those who are *malihini* (newcomer, tourist; one unfamiliar with a place or custom).

- There should be restrictions to public access that are within reason.

- Visitor registration is important but difficult to regulate and impractical. Education is the key.

- Hawaiian cultural practice is a living, dynamic thing – it is not static. Restrictions on public access should not be too inflexible and controlling.

Visitor Education

- Visitor education is the key, but how will this education process be structured?

- Who will pay for monitoring and education? There could be a terrific curriculum; if there's a curriculum for the fruit-fly, there could be one for education about Mauna Kea.

OMKM Rangers

- How do two Rangers police the entire mountain? There needs to be more money appropriated to hire more Rangers.

- It depends on what the plan says. If the plan says no restrictions, what are more Rangers going to do? If the plan says you can not do this and/or that, then we will need more eyes and ears on the Mountain; staffing needs will need to be reassessed.

- The State is the trustee so preservation laws are not the best determinant for what we do up there. These laws treat the culture as if it's static and it's not.

- Maybe we can have a little bit of both? Talking about the adze quarry, there are Hawaiians who make adzes and yet there is no allowance for them if you go by the laws. Why can't a part of the mountain be set aside for contemporary use and practice? A balance...something new.

6.1.3.2 Cultural Practices

Offerings

- Who are we to say what practitioners place and what is acceptable or not? How can we determine what is *pono* (correct)?

- The proper intent must be there; if it's not *pono*, it shouldn't be there. People need to be educated spiritually. They need to practice right.

- There should be no food on altars on Mauna Kea or the Volcano – that shouldn't happen. Somebody sees this happening and then you will have copy-cats.

- Traditional Hawaiian cultural practices do include food items, so again, where do you draw the line if you're going to be traditional?

- No opposition to removing offerings immediately after being offered. Another part of education that makes sense.

Burial Site Access

- Advance notice for burial site visitations seems to be too intrusive. The families that practice in this way may know Mauna Kea better than some of the Rangers.
- Health and safety issues are a big concern on Mauna Kea and should be included in all the plans.
- How does a Ranger know if a burial practitioner has left Mauna Kea?
- There is full agreement regarding no public tours of burial sites.

Scattering Human Ashes

- Mauna Kea is sacred and there should be no ashes.

Constructing New Features

- What makes the Kahu Kū Mauna Council the experts to say what is appropriate?
- This is tough; trying to fit Hawaiian into a Western mold; this is a complex issue.
- How do you control what is *pono* for every family? Control spirituality? How can guidelines be developed for something that's not uniform?
- The bottom-line still is should Government regulate the practice of religion?
- According to State Law and the Constitution, the cultural use of Mauna Kea is one of the paramount things on the Mountain. Many people, especially Astronomers, think the primary use of the Mountain is for Astronomy. It is not. Astronomy is below cultural uses. We need to understand that culture does not serve the observatories. The OMKM mission statement elevates the status of astronomy to the same level of cultural practices, which is incorrect.

Piling Rocks

- There is a concern that it is not okay to remove rocks in an "appropriate manner". What is culturally appropriate?

6.1.4 Consultation with the Kona Hawaiian Civic Club

The presentation for the Kona Hawaiian Civic Club began at 6:30 p.m. on April 22, 2008. Attending the presentation were the following: George K. Kahananui, Sr., Annie K. Coelho, and Aaron Kahananui (no affiliation noted) and Robert Boenig (guest). Also in attendance were Stephanie Nagata of OMKM, Maria "Kaimi" Orr with KCS, and Pat McCoy, Steve Clark, and Denise Russell with PCSI. The meeting was held in Kona at the King Kamehameha Hotel.

The following points were considered to be key comments regarding issues of public access and cultural and religious practices:

6.1.4.1 Public Access

Visitor Registration

- You have to start somewhere (with registration); to protect everybody in terms of where they're going…it depends on what their business is up there.

Provide Signs

- Signs might mean no more alteration but it's not good to plague Mauna Kea with too many signs and make it look unnatural; this has to be weighed out for cultural practices.

Visitor Education

- OMKM has to preserve the area; show/teach those who do not understand the right way. The problem is between those who do and do-not understand.

6.1.4.2 Cultural Practices

Offerings

- The *lele* (altar) should be left to fall on their own – if they don't stand, they weren't meant to stand. No one should dictate how to worship.

- [Regarding littering…] If the observatories are allowed to keep building, why can't Hawaiians build their offerings?

- [Regarding placement of Tibetan flag…] Do what you have to do to worship, and then remove it after proper respects are paid.

Burial Site Access

- Advance notification wouldn't hurt.

Scattering Human Ashes

- The stated management actions sound good.

Shrine Visitation and Use

- Establishing lineage of "native" Hawaiians is difficult; visitation is okay as long as people are respectful.

New Cultural Features

- Guidelines of a Council will provide some control.

Piling / Stacking Rocks

- This practice can get carried away.

Kahu Kū Mauna Council

- It's a good idea to have this Council in place – a positive outcome; they will generate more respect with regard to proper protocol to appease everyone.

6.1.5 Consultation with the Hawai`i Island Burial Council

The presentation to the HIBC began around 11:30 a.m. on June 19, 2008. Attending the presentation were the following HIBC members: Charles Young (Chair), Kaleo Kualii, Kimo Lee, Roy Helbush, Leningrad Elarionoff, Ronald Dela Cruz, and Cynthia Nazara. Also in attendance were Stephanie Nagata (OMKM), Ed Stevens, Arthur Hoke, Toni Mallow, and Tiffnie Kakalia of the Kahu Kū Mauna Council, and Steve Clark and Sara Collins of PCSI. SHPD staff members Morgan Davis, Theresa Donham, Wendy Machado, and Nancy McMahon were also present.

The summary presented below is derived from the published minutes of the HIBC meeting. The first half of the consultation with the HIBC consisted of an informational presentation. For the second half, the HIBC went into executive session (closed to the public) because descriptions and locations of burial sites were going to be presented.

During the information presentation, Dr. Collins explained that PCSI had almost completed the archaeological inventory survey of UH management areas on Mauna Kea, was preparing a CRMP for OMKM, and that PCSI staff members had been working closely with OMKM and the Kahu Kū Mauna Council. This council is a Native Hawaiian advisory group that works closely with OMKM on the treatment and protection of historic and cultural sites in the UH management areas.

Stephanie Nagata, the Interim Director of OMKM, indicated that this office was created in August 2000, and is responsible for managing the summit and for preserving and protecting the summit resources in order to provide a world-class center for research and education. Kahu Kū Mauna advises OMKM on cultural issues. She introduced members of the Kahu Kū Mauna who were present.

Mr. Ed Stevens of the Kahu Kū Mauna Council thanked the HIBC and said that the Council members are guardians of the mountain, and they see Mauna Kea as their *kuleana*. He explained that the members of the Council want to open up communication and work together with the HIBC to have a cooperative relationship with the concerns of Mauna Kea. He indicated that the Council has nine members dedicated to preserving

the culture, the artifacts, and all that is dear, and offered their services to the HIBC when discussions are needed.

Dr. Collins then explained that the CRMP was developed in order for UH to fulfill its mandate to preserve and protect the cultural resources in the areas managed by OMKM. UH has to comply with the terms of its 1968 lease agreement, it has to comply with all applicable State and Federal Historic Preservation laws and regulations. The CRMP is a document being prepared under State law, 6E-8, not part of a Federal action. Another requirement that the CRMP has to comply with the conditions pertaining to the management of cultural resources, in the 1995 revised Management Plan for the UH management areas.

Dr. Collins identified the three UH management areas addressed in the CRMP, and indicated that the Natural Area Reserve will not be included in the CRMP. She explained that one of the requirements of a CRMP is that it be acceptable to all the major stakeholders including DLNR, native Hawaiian practitioners, conservationists, and other groups. She indicated that PCSI has been and is currently meeting with groups on Hawaii Island for consultation. PCSI's consultation for the CRMP began with discussions with the Kahu Kū Mauna members who offered many comments and revisions that have been incorporated into the CRMP. As more comments and suggestions are received, they will be considered because the CRMP is not yet final.

During the presentation, it was explained that there were numerous burial and possible burial sites found and recorded during the inventory survey of the UH management areas and are considered previously identified. None are within the Astronomy Precinct. Any burials found in the future will be treated as an inadvertent discovery.

Mr. Elarionoff asked who would have the expertise to determine if burial remains are 50 years or older. Dr. Collins replied that SHPD staff will make the determination. Mr. Elarionoff asked for clarification on the action taken with burials being 50 years or older and burials determined to be less than 50 years old. Dr. Collins indicated that when a burial is found, the first determination made is whether or not the remains are human. The second determination made is whether or not the burial is over 50 years old. If the remains are 50 years or older, the burial can be termed "historic" and SHPD gets involved. If the remains are younger than 50 years, the burial find needs to be reported to the police.

Mr. Elarionoff asked for clarification on the words used in one of PCSI's information handouts. One line said that the Council will determine, another line said that the SHPD will consider. First it says that the Burial Council makes the decision and then it says that SHPD makes the decision. Dr. Collins said that the wording is referring to the plan not the decision making. The burial council decides to preserve in place or relocate, along with additional recommendations.

Mr. Elarionoff then asked for clarification on who will review the CRMP periodically and revise appropriately. Dr. Collins said it would be the OMKM, SHPD, and the Kahu Kū Mauna and other stakeholder groups.

Mr. Dela Cruz asked if there were any large structures by the *piko*. Dr. Collins said there is or was a *lele* right by the summit, and that modern day practitioners constructed it. Mr. Dela Cruz said that the people who built the *lele* did so with the best intentions but if our *kūpuna* felt it proper to build structures by these sacred sites, they would have done so. Nothing visual needs to be put there to enhance the sacredness of this *piko*. Mr. Ed Stevens said that he agreed with Dela Cruz and that they are working on this concern.

Mr. Kualii said that some of the concerns are that people go to Mauna Kea and practice a culture that they developed on their own. Mauna Kea is very sacred to us, and the Council extends their welcome to share *mana`o* on these issues.

Mr. Young asked about jurisdiction on Mauna Kea - how the land is being used and who is taking authority. Ms. Nagata said that the land is leased to UH who sublets the property to the observatories. The 525 acre Astronomy Precinct is the only area where future development can occur. Young asked for public comment; there was none.

6.1.6 Consultation with the Office of Hawaiian Affairs, Native Hawaiian Historic Preservation Committee

The presentation to the OHA Native Hawaiian Historic Preservation Committee (NHHPC) began at around 11:30 a.m. on June 30, 2008. Attending the presentation were the following NHHPC members: Monica Bacon, Dr. Charles Burrows, Leslie Burrows, Jeno Enocencio, Ke`eaumoku Kapu, Christopher Kauwe, Kamika Kepaa, Arthur Hoke, Kealakahi Meyers, Benjamin Noeau, Ke`ala Soares, Noelani Watanabe, Apolei Bargamento, Sweet Mathews, Keola Lindsay. Also in attendance were Stephanie Nagata and Arnold Hiura of OMKM, and Sara Collins and Steve Clark of PCSI.

There was a question and answer period after the presentation. Questions and subsequent responses included the following:

- Question: How many rangers does OMKM have on Mauna Kea and are they working 24/7?
  Response: There are five rangers working on Mauna Kea. Although there are rangers up on the mountain 24/7 - they live and work up there in shifts -, the ranger's working hours are from 7:00 a.m. to 10:30 p.m.

- Question: Do Hawaiian people travel up to Mauna Kea to visit burials?
  Response: Yes.

- Question: Why was a CRMP not developed prior to this time?
  Response: OMKM was not formed until the year 2000. Prior to preparing a CRMP, it was important to conduct an archaeological inventory survey to determine the nature and extent of archaeological and other cultural resources in the UH management areas.

- Question: How long is the CRMP good for?
  Response: The CRMP is adaptive; it can be reviewed and amended as appropriate.

- Question: Where does the current funding for this come from?
  Response: This is funded from the University of Hawaii budget. The UH President wants to make funding a line item in the next legislature.

- Question: What percentage of funds comes from site users?
  Response: The University did not have the resources to build telescope facilities for its research use. Instead of collecting monetary rent, UH has received a percentage of viewing time from each telescope.

- Question: Are you trying to collaborate with the NAR to increase the NAR holdings?
  Response: There is a Mauna Kea Ice Age Natural Area Reserve already on Mauna Kea and we are not advocating increasing or decreasing the NAR.

- Question: Is the CRMP in draft stage?
  Response: Yes, we should have a draft of this document by early fall.

- Question: What is HRS 343 and does preparing the CRMP require OMKM to comply with 343 [i.e., do you have to do an EA or EIS in order to do this plan]?
  Response: It was explained what HRS 343 is and that the CRMP is being prepared as a State action; it is not project driven and does not need an EA or EIS.

- Question: How are you defining cultural resources?
  Response: Archaeological sites, traditional cultural places and traditional practices associated with some of the archaeological sites.

- Question: Why was the term "*kahu*" selected for the name Kahu Kū Mauna?
  Response: It is based on the term "*kuleana*"...the mountain is our *kuleana* to care for.

- Question: Isn't there a conflict of interest...the State is the landlord (DLNR) and the State is also the lessee (UH). How can the State make decisions for the State? People outside the State should make the decisions.
  Response: Management of Mauna Kea prior to 2000 was from Manoa. The Office of Mauna Kea Management on Hawai`i Island was formed so control and management is now based Hawai`i Island.

- Question (from the Chair of NHHPC): How can the NHHPC help you?
  Response: We would like comments and recommendations on the CRMP from the NHHPC.

- Question: Is a draft CRMP available for us to review?
  Response: Not yet.

- Question: Do we provide comments based on these handouts? It's hard to generate comments based on the handouts. When can we get a copy of the draft CRMP?
  Response: It will be available later in the fall.

- Question: What is the protocol in place to avoid bringing in invasive plant species up to Mauna Kea?
  Response: We're working on a Memorandum of Agreement with Pohakuloa Training Area (PTA) to use their vehicle washing facility to wash down construction trucks before they go up to Mauna Kea.

In addition to the questions and answers, several comments were provided. These include the following:

- Noelani Watanabe commented about visiting a New Mexico tribal area and being impressed with rules on the reservation and how well they took care of their sacred places. The rules were good because they let people know what they could or couldn't do.

- Ke`eaumoku Kapu commented that OMKM should look into Act 212 regarding traditional management processes - *aha moku*. He recommended that we look into this and consider supporting because could be beneficial.

- The Chair of the NHHPC asked Mr. Arthur Hoke to come up and provide some insight regarding Mauna Kea. Mr. Hiura commented that there is no rule making authority to do anything at Mauna Kea! We don't have all the answers but we're trying. I believe we should have controlled access to monitor how and when people go up to make sure you're not making *kolohe*. This includes our own people too.

- Some concern was expressed about the influx of people from other nations to build telescopes. There was a suggestion is to tear down observatories that are obsolete and build new ones where the old ones are.

6.1.7 Consultation with the Hawaii Island Civic Clubs in Pahala, Hawai`i

The presentation for the Hawaiian Civic Club meeting in Pahala began at 9:30 a.m. on August 2, 2008. This meeting included HCC members from all over Hawai`i Island. Attending the presentation were the following: Mabel Tolentino (Waimea HCC), Sam Moniz (President, Waimea HCC), Lucille V. Chung (Laupahoehoe HCC), Nani Langridge (Prince David Kawananakoa HCC), Shirley Kanehailua (Laupahoehoe HCC), Les Goveia (Ka`u HCC), Anna Cariaga (Ka`u HCC), Raylene Moses (no affiliation noted), Christine Naito (President, Prince David Kawananakoa HCC), Andy Wynn (President South Kohala HCC), Kaena Peterson (Vice President South Kohala HCC), Lily K. Pa (Hilo HCC), Paulette Ke (Hilo HCC), Martha McNicoll (Hilo HCC), Ann K Nathaniel (Prince David Kawananakoa HCC), Moana DeLeon (no affiliation noted), and Ruby McDonald (Kona HCC; President [Chair] Assoc. of Hawaiian Civic Clubs, Hawaii Island).

Also in attendance were Stephanie Nagata of OMKM, and Pat McCoy, Steve Clark, and Denise Russell with PCSI. The meeting was held at the Pahala Community Center in Pahala, Hawai`i.

The following points were considered to be key comments regarding issues of public access and cultural and religious practices:

6.1.7.1 General Comments

- It would be helpful to provide an overview of the various components of these plans, including the various steps necessary for submission of the draft report, at the beginning of each presentation. Many members of the community are not familiar with the different components and find the presentation confusing.

6.1.7.2 Public Access

- We used to go up to the Mountain to play in the snow; the problems started with us when they put those "pimples" up there (referring to the observatory domes). I can understand having controls when conditions are hazardous but do you control people going up to ski?

6.1.7.3 Cultural Practices

Offerings

- There are certain protocols for certain rituals regarding food. The food had to be eaten on-site by certain people, not left there.

Scattering Human Ashes

- It is not good to have to get a permit to scatter our ashes; It takes too long to get permits; everything has to go through Honolulu. Perhaps instead the Hawai`i Island Burial Council could help with this?

- Has there been any consideration of past practices?

Piling / Stacking Rocks

- It is important to educate people about how and where to stack rocks; they should be stacked away from public view.

- It is private and personal. Anyone wanting to put an *ahu* up should find out the reason why an *ahu* is built.

- Because it's a shrine, they should put rules & regulations (signage) stating this is a sacred area and for religious reasons, visitors should not build shrines.

- One of the reasons Hawaiians piled/stacked rocks was to mark the boundary of the *`aina* (land).

Provide Signage

- Signage in different languages should be considered.

6.1.8 Consultation with the Hilo Hawaiian Civic Club

The presentation for the Hilo Hawaiian Civic Club began at 6:00 p.m. on August 11, 2008. Attending the presentation were the following: Aileen Hussey, Toni Mallow, Arthur Hoke, Kris Hoke, Paulette Ke, Jerry Konanui, Sibi Hoke, and Martha McNicoll. Also in attendance were Stephanie Nagata of OMKM, Maria "Kaimi" Orr with KCS, and Steve Clark, and Denise Russell with PCSI. The meeting was held at Hawaii Community College in Hilo.

During this meeting, there were many comments and much discussion on public access issues, as well as questions and answers. The critical comments and some of the relevant questions are presented below (with answers in parentheses).

6.1.8.1 General Comments

- With regard to recreational activities, has there been any correlation to what's taking place today and whether this is a historical activity? There seems to be a belief that there is a right to ride snow boards. It's likely that snow-play did not occur in ancient times.

- Is there any effort to incorporate what's happening in the NAR into the CRMP? A process to incorporate? (What we could think about is once we get our CRMP and once the NAR does their management plan, because of the MOU we want to develop with the NAR, maybe there is some way for us to segue something so that it's a contiguous landscape. We look at the mountain culturally as a contiguous landscape but we also have to operate within the jurisdictional boundaries. That doesn't mean we can't cooperate – the idea is to cooperate between the two agencies).

- Do the Rangers carry guns? (No they do not. They are not authorized enforcement personnel).

- Are all the sites documented to the point where there's actual visual? (Yes, plan view maps have been drawn and all the sites have been photographed).

6.1.8.2 Public Access

Visitor Registration

- There is agreement that the process at the Volcano National Park where you have guided access and then you have the educational perspective is a good one. This is so important because people won't know what they're doing if they

weren't educated and then to realize what has been mistakenly done, thinking then it was something special actually destroyed the entire meaning behind it. And they don't know about all the defacement they might be doing; it robs the original [intended] meaning of the Hawaiians. People don't realize the disrespect they are doing to our *`āina* and to our *keiki* and what they're going to be instilled with. It's confusing. This is why education is so important.

- It looks like the Kahu Kū Mauna Council members are taking care of the problem with the new construction (of sites) not meeting council guidelines, so isn't it so? For me, if you're talking about having genealogy before you go up there, as a cultural practitioner, I've never been up to Mauna Kea but I see in the future I want to do that but I also understand protocol. If you come down to Puna to my area, we have people to guide you, so to me, if you have an organization such as the Kahu Kū Mauna Council or people who have legitimacy being practitioners up there, for me as a practitioner who has never been up there, they are the people I will consult. Education is most important whether it be the tourist or the cultural practitioner going up there. We have to follow that protocol up there. I know when we look at new cultural features – a good example of this is down along Queen Ka`ahumanu Highway with all the coral graffiti, but I also would like to say that those are the people that don't know. There are some of us who are very interested in practicing our cultural traditions and we would like to expand our domain as far as our Hawaiian rights to do what is appropriate providing protocol, which is why I feel those things need to be in place very quickly.

- It's not whether my protocol is different from another person; the basic thing that happens is that's your *`āina* (referring to Kahu Kū Mauna Council) – you're up there and that's your place. If I want to come in, I don't just come in without asking! I ask for permission and I ask for the people who are the practitioners that if I can come and I can do. They should ask what I want to do and tell me if something is inappropriate. I don't challenge them and say "I have to do mine", that's disrespect for the people who *malama* that place. That is the most important thing – who is the *kahu* up there? Who has the experience? That's where I go.

- Is there a record of who the *kahu* were on Mauna Kea? Was it recorded in a chant? (It depends on what area you're talking about. If you go back far enough, the *mo'i* of the island was the one that was all power and designated certain people in the district but most likely we've lost the record of who those chiefs were. But that was one small window in time too and then when you came down to the Mahele that was still another window in time in which certain people were given different *ahupua`a* and then after the provisional government, all that went out the window).

- Our culture is ever-growing, ever-expanding and we need to go back in history – we need to know who the *ali`i* were up there and the *ahupua`a* system. It's difficult to say who's going to run it now, but if we have the history of what was done there, who did it and we have these people to assist in setting up the protocol – you'll never get it perfect – at least we'll have something that works when we want to come up – somebody to establish. So go back in history, find

all those who've been there before, find out what their protocol has been, and then come to a consensus for the modern times. We have to be flexible, like our culture is. It is difficult but not impossible. For sure we need to go back and set protocol so we can go from here to the future.

- We've been told by some cultural practitioners that they don't want to have to tell somebody else because it's their *kuleana*. That's going to be such a challenge for the Kahu Kū Mauna Council.

- If Mauna Kea is not your place of cultural practice, you need to go to the Kahu Kū Mauna and get permission to do that. You don't just go up and build an *ahu* on the summit – and that's what people are doing today.

- The adze-makers – that was their place and then other people who had burials – I think we've lost a lot of them in the ancient times; the burials could be connected to the adze makers. It seems like they were the ones who go up there first before you had the *ahupua`a* divisions, you had the adze quarry. If you have all of these different levels, as a cultural practitioner you know who you're supposed to address at each particular level as well as the one for now.

- I've done research on my family genealogy, and I've found that it is considered *kapu* too and not to be shared outside of the family. I think you would have a lot of difficulty because you have a lot of families who still hold to that tradition and will not release that information to anybody. You're going to run into that.

- Yes, what we've found lately is because a lot of the practitioners are coming out and we have many who say this is what my family practices – this is ours. It is not to say that it is not yours but they are now exposing themselves to myself and friends of mine so we can reinforce our *`ohana* traditions and then when we get into something a little different or a higher level – it's like a *hula halau*, not all knowledge comes from one – so you go and you learn and you feel what is adjusted to your *`ohana* and this is what you want to keep and take, that's where you go. I am thankful I understand and even my family does there are certain places you do not go. I have a lot of respect for that. We will overcome all our obstacles.

- Controlled access is needed so we know who's going up there; we can advise/educate them. But we need rules and regulations – without that, none of this has any impact.

- Several cultural practitioners have told me that the greatest gift of respect you can give a site or place is your *leo* (your voice); if we can pass that around as education, it would solve a lot of the problems. This gift of speaking your name has so much more *mana* than giving a rock or crystal. Maybe it would help turn this around. I was taught whenever you go to a place you don't need to bring things. Just say who you are and where you come from – this means more than putting any rock there.

- Have you considered adding a toll-gate like they have at Volcano? We've talked about a gate or a booth as a means of controlling access - the purpose of the booth would be to provide information to people, to make sure they are safe.

- What if we allow people to go up for 8 or 12 hours? If they want to go up to watch sunrise or sunset, then come down? (When I was chairman of the management board, my concern was "vicarious liability" – trusting the University to "do the right thing". It means that if you did not do everything within your power to make sure nothing bad happens to somebody, you are liable. You have to be prepared for every possible situation that could occur).

- There is a recommendation for controlled access – block it all off. No private cars past the Visitor Information Center – including astronomers. OMKM provides vehicles and everyone gets shuttled up and back down. Then you identify everybody - if you're not a local resident, you have to pay a fee. If you're a Native Hawaiian or a local resident, we take you up for free. The educational aspect is taken care of on the shuttle. It takes time to drive up there so you have a captive audience.

6.1.8.3 Cultural Practices

Offerings

- If you have a shuttle that picks up people and takes them to a site, they could be educated on during that ride. Some of those rocks are just put there because they think it's great when actually there is meaning for putting them there. And the ashes should be scattered, not the urn. These are the kind of rules that can be taught to the people when they go up there. They shouldn't put those stacked rocks any place – look at the Queen Ka`ahumanu highway, it's a mess and we don't want that mountain to become the same. The people that really mean it don't put it in plain sight, they hide it.

- The *lele* on Kūkahau`ula (the summit) was put up there in 1998 and the Kahu Kū Mauna Council has been wrestling with the issue of this *lele*. It was put up by the Royal Order of Kamehameha and has symbolic meaning to them but some *kupuna* feel it should be taken down.

- There is an understanding that the *lele* was erected on the summit to physically claim Mauna Kea. That's what it took to show that Mauna Kea belongs to the Hawaiian people because of all the other buildings up there. That was the intent and was started with the Royal Order. It went up with the right intention. But, it's served its purpose. If it's being misused then by all means it should be removed. It was not put up with the intention of how people are using it today.

- People that come here – tourists or young generations - don't understand our thinking that this is culture and that's why there is such a need to destroy all those modern things that don't belong there.

- Whether or not the *lele* needs to be taken down needs to be addressed by the Kahu Kū Mauna Council – what's the protocol? When is an appropriate time to remove these things? The Rangers are faced with what to do with things left there.

- It seems to be that a lot of people who are born and raised here are trying to do the right thing – they want to do the right thing but they really don't know. There needs to be education and establishing protocols regarding offerings.

Burial Sites Access

- There is a question regarding the "No restrictions for Native Hawaiians". There's got to be a rationale for why even Hawaiians are going there. If not, this would give others the impression that they have the right just to go.

- What about the advanced notification of visits? That would make it restricted – or controlled – visits. I'm not sure how you want to manage that; other than controlled access there's really no way of telling.

- Do you really want to mention the whole idea of burial site access? It's a given to the people who know it's there. It's their own native right to do that.

- If there are people who are going to burial sites, then there needs to be some way to determine the legality of the visits. That's what we need regulations for.

- How are you identifying Native Hawaiian's access to burial sites? I think every family who has burial sites would be offended if somebody else comes there without permission.

- Another question is how many families would visit other families' burial sites?

Scattering Human Ashes

- There is a recommendation to have designated places for scattering ashes so you don't scatter on another known burial or *ahu* or somebody's shrine. Also, when you cremate not all of the bones get turned to ash so you will have bone particles and what's going to happen if you're scattering the bones/ashes where people are walking?

- OMKM or the Rangers should be notified about scattering of human ashes because if they're patrolling and they come across bone fragments, they're going to have to figure out whether it was something done legitimately or otherwise. I think again the protocol would satisfy that – no bone remains in your ashes if you scatter.

New Cultural Features

- There is a concern about the modern sites – people/tourists that go up there and take pictures of these sites are going to think that it's Hawaiian. This isn't good - they should be taken down – they have no right putting them up there anyway. They go up there without permission, why can't we go up there and take them down without permission? We have no knowledge of these people being in a normal state of mind. First and foremost, it is offending to Hawaiian people that those structures are allowed to stay up there because it's going to change the Hawaiian culture; I don't want my grandkids growing up thinking that's part of their culture. To me, they ought to be able to show their genealogy and maybe that might justify them being able to come up to Mauna Kea.

- Set protocols. Who will dismantle? The council can approve/disapprove.

Piling / Stacking Rocks

- If you're referring to repairing old, we do reconstruction on our *heiau*. This should be changed to "new" piling/stacking of rocks. So we don't get confused; this does not involve reconstruction.

- So what do we do with the hundreds of new find spots PCSI found in their surveys? Do we just leave them? What would be an appropriate thing to do? Would it make sense to say if you don't claim them by such and such date, they will be removed? In the first place, they were put up without permission but we're expecting whoever put those up there to remove it.

- I wouldn't want to be involved in dismantling anybody's shrine. If I don't know, I don't touch it. You need to get a handle on what's already there, but if it's already there, I don't know. Who's to say what's new? It is very important to have gated access; we cannot go back to know who exactly put that there but I personally will not touch those *pohaku*. I say what is there put a stop now. Now we can regulate.

- What I'm trying to say is, I don't want to be the one to determine because it was done 12 years ago that it's not the living culture of our *`ohana* because we don't know. Just because its 50 years old doesn't make it *maika`i*. Who set the 50-year guideline? What about the guy who buried his *`ohana* up there the year after and set his stone? Who are we to say that he doesn't have the right to do that? We don't know. We have to think.

6.1.9 Consultation with the Royal Order of Kamehameha

Ali`i Nui Clifford Hashimoto of the Royal Order of Kamehameha (ROK) was contacted regarding consultation for the CRMP. His response to PCSI and KCS was that the council of chiefs did not want to meet with personally at this time, but PCSI could send them information to them regarding CRMP and they would provide a written response. As of June 30, 2009, PCSI has not yet received a response from the ROK.

6.1.10 Summary of CRMP Consultation with Native Hawaiian Organizations

Consultation with the community, and specifically with native Hawaiian agencies, organizations and individuals, focused on meetings with smaller groups of individuals. Consultation was conducted with the Kahu Kū Mauna Council and the Hawaiian Culture Committee, the Royal Order of Kamehameha, Hawaiian Civic Clubs in Waimea, Kona, Hilo, and Pahala on Hawaii Island, the Office of Hawaiian Affairs (OHA), Historic Preservation Committee, and the Hawaii Island Burial Council (HIBC).

In these meetings it was explained that the CRMP identified many issues of concern, including public access, off-road vehicle use, routine maintenance, debris, enforcement, emergencies, film industry, cultural and religious practices, astronomy, recreational activities, commercial tours, commercial events, and future land use. Because of time constraints, the meetings themselves were focused on discussions of two key concerns – public access and cultural practices.

While PCSI had prepared a draft CRMP prior to consultation, it was made clear to community residents that the draft was a work in progress and needed to ultimately reflect expressed concerns from the community. Community concerns expressed regarding the currently policy of unrestricted access to Mauna Kea varied, and included the need:

1. To educate the public regarding the significance of Mauna Kea in ancient as well as contemporary Hawaiian culture
2. To establish rules regarding access
3. To establish protocols for access to sensitive archaeological and cultural sites
4. To establish a visitor registration program
5. To establish protocols for shrine and burial visitation

Community concerns expressed regarding cultural practices on Mauna Kea today are varied, and included the need:

1. To educate the visitors and local residents regarding cultural practices associated with Mauna Kea
2. To establish protocols for constructing and dismantling new rock structures
3. To establish protocols for scattering human ashes

6.2 Consultation with Other Stakeholders

As discussed in Section 4 of this CRMP, PCSI consulted with Ron Koehler, the Manager of Mauna Kea Observatories Support Services (MKSS), in 2006, regarding routine maintenance activities. No activities other than those listed in Table 4-4 were identified.

PCSI also consulted with all 13 existing observatories in 2006. The consultation process consisted of a letter and follow-up phone call to the directors or their appointed staff (see Appendix E). The questions asked focused on maintenance activities of the observatories, including disposal of chemicals (see **Section 4.1.3.1**).

6.3 OPEN HOUSE CONSULTATION FOR THE CULTURAL AND NATURAL RESOURCE MANAGEMENT SUB-PLANS OF THE CMP

OMKM sponsored three open houses on the island of Hawaii, September 1-3, 2009, for the Cultural Resource and Natural Resource Management Sub-Plans for the Comprehensive Management Plan (CMP) for Mauna Kea. The CMP was approved by the Board of Land and Natural Resources (BLNR) on April 9, 2009 with a number of conditions (BLNR 2009). Condition 4 stated:

> Within one year of the BLNR approval of the CMP, or the submission of a Conservation District Use Application, whichever occurs sooner, the University shall submit for review and approval the following sub plans:
>
> - A cultural resources management plan;
> - A natural resources management plan;
> - A decommissioning plan, including a financial plan; and
> - A public access plan

The open houses were held in Waimea (September 1, 2009); Kailua-Kona (September 2, 2009), and Hilo (September 3, 2009). The purpose of the open houses was to obtain public input prior to finalizing each management plan. The open houses were specifically designed to provide the public with an opportunity to: (1) become familiar with the cultural and natural resources located within the three UH management areas on Mauna Kea; existing and potential new threats to those resources, and proposed management actions to avoid or minimize impacts; (2) discuss management concerns and issues with OMKM staff and OMKM's cultural and natural resource consultants, and (3) provide written and oral comments on existing and proposed management actions. PCSI was represented by Patrick McCoy, one of the authors of the Cultural Resource Management Sub-Plan, and Denise Russell, who was present to tape record any comments that persons might wish to make.

Each open house opened at 4:30 pm and ended at 7:30 pm. The three-hour time period was thought to be an adequate amount of time for the public to attend at least one of the meetings. There were no formal presentations. Rather, the open houses were designed as informal venues for OMKM staff and its consultants to interact with the public during or after the public viewing of a series of exhibits on the natural and cultural resources of Mauna Kea and hard copies of the draft management plans. The two plans were posted on OMKM's and DLNR's web sites prior to the open houses, and electronic copies were distributed to public libraries. The main exhibits consisted of a series of poster boards with photographs, maps and text and additional posters set up on easels around each room.

There were 12-13 people who turned out at each of the meetings at Waimea and Kailua-Kona. A total of 43 individuals showed up for the open house in Hilo. Most of the questions and verbal comments pertaining to cultural resources that were received at all three meetings were general in nature. As an example, at the Waimea and Kailua-Kona open houses there were some discussions regarding the spatial distribution of historic properties and find spots. In addition, some interesting information was shared by one individual at the same two open houses regarding the function of *ahu* on forest trails.

There were no specific questions or comments regarding threats to cultural resources or the proposed management actions and no persons wishing to make a recorded statement at any of the three meetings. At the Kailua-Kona meeting two individuals made comments regarding the absence of any mention of interpretation or interpretive programs on the posters. An individual submitted a written comment on this omission, which was immediately recognized as an oversight in the planning of the posters. McCoy pointed out the section of the draft CRMP that discusses proposed interpretive measures as part of a broader educational program.

7.0 LIST OF PREPARERS AND CONTRIBUTORS

Holly McEldowney, Ph.D.: As noted in the Acknowledgments, a major contributor to the CRMP was Holly McEldowney, whose ideas on the management of cultural resources on Mauna Kea is reflected throughout the plan.

Patrick C. McCoy, Ph.D.: The primary author of the current plan, which represents a continuation of the earlier effort by SHPD to develop a comprehensive cultural resource management plan, is Patrick McCoy. Pat, who was also involved in the earlier effort by SHPD to produce an historic preservation plan for the UH lease areas on Mauna Kea, is the Principal Investigator of the Mauna Kea Science Reserve archaeological inventory survey. He also participated in some of the community consultation meetings.

Sara Collins, Ph.D.: The section on applicable laws and regulations, as well as much of the Section 5 Implementation and Evaluation Plan, was prepared by Sara Collins. Sara also participated in the archeological inventory survey of the Science Reserve, in 2006-2009 and in some of the community consultation meetings.

Stephan D. Clark, B.S.: Steve, the Cultural Resource Manager at PCSI, participated in all of the community consultation meetings and prepared the summary of the consultation process in Section 6.

Valerie Park, M.A.: The section on cultural beliefs and practices is based in large part on a report prepared by Valerie, a PCSI archaeologist, for the Final Environmental Assessment for the Mauna Kea Comprehensive Management Plan.

Maria "Kaimi" Orr, M.A.: Maria, the Principal of Kaimi Pono Consulting Services, LLC, was the facilitator for the community consultation meetings. She also assumed the lead role in the beginning of the consultation process in selecting groups and mailing out invitations.

Denise Russell: Denise transcribed the taped recordings of the community consultation meetings. She also helped in organizing the meeting venues and obtaining refreshments for the meetings.

Mr. Richard Nees, B.A.: The tables in Appendices A and D were prepared by Rich Nees, who also edited, formatted and produced the CRMP. Rich participated in all phases of the archaeological inventory survey of the Science Reserve and was the Project Director in 2006-2009.

Mr. Andrew Tomlinson, M.A.: The maps and other figures were prepared by Andrew Tomlinson.

8.0 REFERENCES CITED

Alexander, W.D.

1892 The Ascent of Mauna Kea, Hawaii. *The Hawaiian Gazette* 27(38):7.

Alexander, W.D.

1892 The Ascent of Mauna Kea, Hawaii. *The Hawaiian Gazette* 27(38):7.

Allen, Melinda Sue

1981 *An Analysis of the Mauna Kea Adze Quarry Archaeobotanical Assemblage.* Master's thesis, University of Hawai`i.

Barrere, Dorothy B.

1962 *Hawaii Aboriginal Culture, A.D. 750-A.D. 1778.* The National Survey of Historic Sites and Buildings, Theme XVI, Indigenous Peoples and Cultures. U.S. Dept. of the Interior, National Park Service.

Barrere, Dorothy B., Mary Kawena Pukui, & Marion Kelly

1980 *Hula: Historical Perspectives.* Pacific Anthropological Records No. 30, Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Billings, Dwight W.

1979 High Mountain Ecosystems: Evolution, Structure, Operation, and Maintenance. In Patrick J. Webber, ed., *High Altitude Geoecology*, pp. 97-125. Washington D.C.: Westview Press for American Association for the Advancement of Science.

Bonk, William J.

1986 An Archaeological Survey at the Middle Level, Southern Flank of Mauna Kea, Hawaii. *Papers in Ethnic & Cultural Studies* 86-2.

Borthwick, Douglas F., and Hallett H. Hammatt

1990 Archaeological Reconnaissance Survey of the Proposed Galileo Telescope Sites C and D, Summit of Mauna Kea, Hawaii Island, Hawaii (TMK 4-4-015:09). Prepared for MCM Planning.

Bowdler, Sandra

1977 Archaeological Significance as a Mutable Quality. *In Site Surveys and Significance Assessment in Australian Archaeology*, edited by Sharon Sullivan and Sandra Bowdler, pp. 1-9. [Proceedings of the 1981 Springwood Conference on Australian Prehistory]. Department of Research, Research School of Pacific Studies, The Australian National University, Canberra.

Bryan, E.H., Jr. (Ed.)

1979 *Mauna Kea Here We Come: The Inside Story of a Scientific Expedition.* Privately published. Honolulu.

Bryan, L.W.

1939 Lake Waiau of Hawaii. *Paradise of the Pacific* 51(2):10-11.

1973 Letter to Libert Landgraf dated December 31, 1973.

Buck, Sir Peter

1957 *Arts and Crafts of Hawaii*. Bernice P. Bishop Museum Special Publication 45. Honolulu.

Carmichael, David, Jane Hubert, and Brian Reeves

1994 Introduction. In *Sacred Sites, Sacred Places*, pp. 1-8. Routledge, London.

Cleghorn, Paul Lodge

1982 *The Mauna Kea Adze Quarry: Technological Analyses and Experimental Tests.* Unpublished Doctoral Dissertation, University of Hawaii.

Cordy, Ross

1994 *A Regional Synthesis of Hamakua District Island of Hawai'i*. Department of Land and Natural Resources, Historic Preservation Division.

Daly, R.A.

1910 Pleistocene Glaciation and the Coral Reef Problem. *American Journal of Science* 208:297-308.

Desha, Steven L.

2000 *Kamehameha and His Warrior Kekūhaupi`o.* Kamehameha Schools Press. Honolulu.

de Silva, Kihei, and Mapuana

2006 *E Ho` ka Nani I Mana.* Ka`iwakiloumoku-Hawaiian Cultural Center, University of Hawaii at Manoa. 8/2/2007. http://hccp.ksbe.edu/kaleinamanu/8-ehoikanani. php.

DLNR (Department of Land and Natural Resources)

1977 *The Mauna Kea Plan*. Honolulu.

DLNR (Department of Land and Natural Resources) and UH Institute for Astronomy

1995 *Revised Management Plan for the UH Management Areas on Mauna Kea*. Honolulu.

Douglas, Mary

1966 Purity and Danger: An Analysis of the Concepts of Pollution and Taboo. Routledge. London.

Ellis, William
1979 *Journal of William Ellis: Narrative of a Tour of Hawaii, or Owhyee; with Remarks on the History, Traditions Manners, Customs, and Language of the Inhabitants of the Sandwich Islands*. Charles E. Tuttle Company, Inc. Rutland, Vermont.

Emory, Kenneth P.
1938 The Adz Makers of Mauna Kea. *Paradise of the Pacific* 50 (4):21-22.

Goodrich, Joseph
1833 In "Letters to the Editor." *American Journal of Science 25*:199-201.

Gregory, Herbert E., and Chester K. Wentworth
1937 General Features and Glacial Geology of Mauna Kea, Hawaii. *Bulletin of the Geological Society of America* 48:1719-42.

Group 70 International, Inc.
1987 Mauna Kea Science Reserve Complex Development Plan. Prepared for the Research Corporation of the University of Hawaii.

2000 *Mauna Kea Science Reserve Master Plan*. Prepared for the University of Hawaii.

Hammatt, Hallett, and Douglas Borthwick
1988 Archaeological Reconnaissance of Two Proposed Antenna Sites for the National Radio Astronomy Observatory, Mauna Kea, Hawaii.

Hammatt, Hallett H., and David W. Shideler
2002 Data Recovery Report for Two Archaeological Lithic Scatters, Sites 50-10-23-10,310 and 50-10-23-10,311 at The Pu`u Kalepeamoa Complex, Hale Pohaku, Ka`ohe Ahupua`a, Mauna Kea, Hawaii Island (TMK 4-4-15:12). Prepared for The Institute of Astronomy, University of Hawaii.

Hartt, Constance E., and Murie C. Neal
1940 The Plant Ecology of Mauna Kea, Hawaii. *Ecology* 21:237-66.

Hawaii Volcanoes National Park
2003 Scattering of Ashes. www.nps.gov/archive/havo/manage/remains.htm.

2007 News Release. E Malama I keia `Aina, Care for this Land. Park Embarks on Leave No Trace Campaign.

Hibbard, Don
1999 Letter of May 3, 1999 to Dr. Robert McLaren (IfA) Regarding Historic Preservation Review of the Proposed W.M. Keck Outrigger Telescopes Project.

Ho`akea, LLC dba Ku`iwalu
2009 Mauna Kea Comprehensive Management Plan UH Management Areas. Prepared for the University of Hawai`i.

Honolulu Advertiser
2005 Stacking Kilauea Rocks Called Cultural Sacrilege by Kevin Dayton. November 4, 2005.

Ho`opono Mauna Kea
2007 *Ho`opono* Mauna Kea Newsletter. Office of Mauna Kea Management. Issue No. 15, Spring of 2007. University of Hawai`i at Hilo. Office of Mauna Kea Management 200 W. Kāwili Street Hilo, Hawai`i.

Hubert, Jane
1994 Sacred beliefs and beliefs of sacredness. In *Sacred Sites, Sacred Places*, pp. 9-19. Routledge, London.

Juvik, James O.
1998 Proposal: Institute for Tropical Alpine Research and Management, University of Hawai`i Hilo.

Juvik, J.O., and S.P. Juvik
1984 Mauna Kea and the Myth of Multiple Use: Endangered Species and Mountain Management in Hawaii. *Mountain Research and Development* 4:191-202.

Kam, Wendell, and Jason Ota
1983 Archaeological Reconnaissance Survey of Mauna Kea Observatory Powerline: Upper Portions, Mauna Kea, Hamakua, Hawaii. State Historic Preservation Division Office. Prepared for University of Hawaii. On file at State Historic Preservation Office.

Kamakau, Samuel M.
1961 *Ruling Chiefs of Hawaii*. Kamehameha Schools Press. Honolulu.

1964 *Ka Po` Kahiko (The People of Old)*. Bernice P. Bishop Museum Special Publication 51. Honolulu.

1991 Tales and Traditions of the People of Old, Nā Mo`olelo a ka Po`e Kahiko. Bishop Museum Press, Honolulu.

Kanahele, Pualani K. & Edward .L.H. Kanahele
1997 A Hawaiian Cultural Assessment of the Proposed Saddle Road Alignments. Project A-AD-6(1). Hilo, HI.

Kilmartin, Jerome
1974 Na Mea o Mauna Kea (Things About Mauna Kea). *Explorers Journal* 52(1): 12-16.

King, Thomas F.
1998 *Cultural Resource Laws and Practice: An Introductory Guide*. Altamira Press. Walnut Creek.

2000 *Federal Planning and Historic Places: The Section 106 Process*. Altamira Press, Walnut Creek.

2003 Declaration of Thomas F King, Ph.D. Exhibits A-B in Office of Hawaiian Affairs vs. NASA and University of Hawaii Institute for Astronomy. *Places that Count: Traditional Cultural Properties in Cultural Resource Management.* Altamira Press, Walnut Creek.

Krajina, V. J.
1963 Biogeoclimatic Zones of the Hawaiian Islands. *Newsletter of the Hawaiian Botanical Society* 2:93-98.

Langlas, Charles
1999 Supplement to Archaeological, Historical and Traditional Cultural Property Assessment for the Hawai'i Defense Access Road A-AD-6(1) and Saddle Road (SR200) Project.

Langlas, Charles, Thomas R. Wolforth, James Head, and Peter Jensen
1997 Archaeological Inventory Survey and Historical and Traditional Cultural Property Assessment for the Hawai'i Defense Access Road A-AD-6(1) and Saddle Road (SR200) Project, Districts of South Kohala, Hamakua, North Hilo and South Hilo, Island of Hawai'i. Paul H. Rosendahl Ph.D., Inc., Hilo. Prepared for RUST Environmental and Infrastructure Inc., Phoenix, Arizona.

Lertzman, Ken, Tom Spies, and Fred Swanson
1997 From Ecoystem Dynamics to Ecosystem Management. In *The Rain Forests of Home: Profile of a North American Bioregion*. Edited by Peter K. Schoonmaker, Bettina Von Hagen and Edward C. Wolf, pp. 361-382. Island Press, Washington.

Lyons, C.
1875 Land Matters in Hawaii. *The Islander* 1[1-33].

Maciolek, J.A.
1982 Lakes and Lake-like Waters of the Hawaiian Archipelago. Bishop Museum *Occasional Papers* (25(1):1-14. Honolulu.

Malo, David
1951 *Hawaiian Antiquities*. Bernice P. Bishop Museum Special Publication 2, Second Edition. Bishop Museum Press, Honolulu.

Maly, Kepa

1998 "Mauna Kea—Kuahiwi Ku Ha'o Malie." A Report on Archival and Historical Documentary Research, Ahupua'a of Humu'ula and Ka'ohe, Districts of Hilo and Hamakua, Island of Hawai'i. Kumu Pono Associates. Hilo.

1999 "Mauna Kea Science Reserve and Hale Pohaku Complex Development Plan Update: Oral History and Consultation Study, and Archival Literature Research. Ahupua'a of Ka'ohe (Hamakua District) and Humu'ula (Hilo District), Island of Hawai'i. In Mauna Kea Science Reserve Master Plan (Appendix I), Group 70 International, Inc. Honolulu.

Maly, Kepa, and Onaona Maly

2005 Mauna Kea—Ka Piko Kaulana o Ka `Aina (Mauna Kea—The Famous Summit of the Land: A Collection of Native Traditions, Historical Accounts, and Oral History Interviews for: Mauna Kea, the Lands of Ka`ohe, Humu'ula and the `Aina Mauna on the Island of Hawai'i. Prepared for the Office of Mauna Kea Management. Kumu Pono Associates LLC. Hilo.

2006 Appendix A: Mauna Kea—Ka Piko Kaulana o Ka `Aina (Mauna Kea—The Famous Summit of the Land: A Collection of Oral History Interviews Documenting Historical Accounts and Recollections of Mauna Kea and the Mountain Lands of Hāmākua, Hilo, and South Kohala, on the Island of Hawai`i. Prepared for the Office of Mauna Kea Management. Kumu Pono Associates LLC. Hilo.

Massey, J.E.

1978 Morphological Characteristics of the Diatom Flora of Lake Waiau: Variation and Speciation. *Pacific Science* 32(2)215-217.

MCM Planning

1985 Amendment to the Mauna Kea Science Reserve Complex Development Plan, Draft Supplemental Impact Statement for Construction Camp Housing at Hale Pohaku, Hamakua, Hawaii. Prepared for University of Hawaii.

McCoy, Patrick C.

1977 The Mauna Kea Adz Quarry Project: A Summary of the 1975 Field Investigations. *Journal of the Polynesian Society* 86(2):233-244.

1979 Letter Report Dated August 22, 1979 to Mr. Francis Oda on Archaeological Reconnaissance Survey for the Preparation of the Mauna Kea Mid-Elevation Facilities Master Plan. Department of Anthropology Bernice P. Bishop Museum.

1981 Letter Report Dated June 9, 1981 to J. Jeffries on archaeological survey for the proposed Kitt Peak National Observatory. Department of Anthropology, Bishop Museum.

1982a Archaeological Reconnaissance Survey, In Patrick C. McCoy and Holly McEldowney, Cultural Resources Reconnaissance of the Mauna Kea Summit Region. Department of Anthropology, Bishop Museum.

1982b Archaeological Survey of the Proposed Site of the Caltech 10-Meter Telescope on Mauna Kea, Hawaii. Prepared for Group 70, Inc. Department of Anthropology, Bishop Museum.

1984a Archaeological Reconnaissance of Hopukani, Waihu, and Liloe Springs, Mauna Kea, Hawaii. Prepared for the U.S. Army Corps of Engineers. Department of Anthropology, Bishop Museum.

1984b Mauna Kea Summit Region Survey: A Summary of the 1984 Fieldwork. Ms. on file at the Department of Anthropology, Bishop Museum.

1985 Preliminary Archaeological Survey of the Pu`u Kalepeamoa Site, Mauna Kea, Hawai`i. Prepared for MCM Planning for Draft Supplemental Impact Statement for Construction Camp Housing at Hale Pohaku, Hamakua, Hawaii. Ms. on file at the Department of Anthropology, Bishop Museum.

1986 Archaeological Investigations in the Hopukani and Liloe Springs Area of the Mauna Kea Adze Quarry, Hawai`i. Ms. on file at the Department of Anthropology, Bishop Museum.

1990 Subsistence in a "Non-Subsistence" Environment: Factors of Production in a Hawaiian Alpine Desert Adze Quarry. In *Pacific Production Systems: Approaches to Economic Prehistory*, edited by D.E. Yen and J.M.J. Mummery, pp. 85-119. Occasional Papers in Prehistory, No. 18, Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra.

1991 Survey and Test Excavations of the Pu`u Kalepeamoa Site, Mauna Kea, Hawai`i. Prepared for Facilities Planning and Management Office, University of Hawaii. Ms. on file in the Department of Anthropology, Bernice P. Bishop Museum. Honolulu.

1993 Letter Report on the Inspection of Two Sites Located in the Vicinity of the Smithsonian Submillimeter Array. Submitted to the Smithsonian Institution Astrophysical Observatory.

1999a Mauna Kea Science Reserve Archaeological Site Inventory: Formal, Functional, and Spatial Attributes. In *Mauna Kea Science Reserve Master Plan* (Appendix K), Group 70 International, Inc. Honolulu.

1999b Neither Here Nor There: A Rites of Passage Site on the Eastern Fringes of the Mauna Kea Adze Quarry, Hawai'i. *Hawaiian Archaeology* 7:11-34.

2005 Archaeological Monitoring of Four Septic Tank Excavations at the Mid-Level Facilities Located at Hale Pohaku, Mauna Kea, Ka'ohe, Hamakua. Island of Hawai'i (TMK: [3]:4-4-015:012. Prepared for the University of Hawaii Institute for Astronomy.

McCoy, Patrick C., and Richard A. Gould
1977 Alpine Archaeology in Hawaii. *Archaeology* 30(4):234-243.

McCoy, Patrick C., Dennis Gosser, Richard Nees, and Reid Yamasato
2005 Mauna Kea Science Reserve Archaeological Inventory Survey, Ka`ohe, Hamakua, Island of Hawai`i, Interim Report No. 1. Prepared for the Office of Mauna Kea Management.

McCoy, Patrick C., Dennis Gosser, and Richard Nees
2006 Interim Archaeological Monitoring Plan for Selective Areas of the Mauna Kea Science Reserve and the Mauna Kea Ice Age Natural Area Reserve. Ka`ohe, Hāmakua, Island of Hawai`i TMK (3): 4-4-015:09. Prepared for the Office of Mauna Kea Management.

McCoy, Patrick C., and Richard Nees
2006 Mauna Kea Science Reserve Archaeological Inventory Survey, Ka`ohe, Hamakua, Island of Hawai`i, Interim Report No. 2. Prepared for the Office of Mauna Kea Management.

2008 Archaeological Inventory Survey of Lake Waiau, Mauna Kea Ice Age Natural Area Reserve, Ka`ohe, Hamakua, Island of Hawai`i. Prepared for Natural Area Reserve, Hawai`i Island Branch [DRAFT].

McEldowney, Holly
1982 Ethnographic Background of the Mauna Kea Summit Region. Report 1 In *Cultural Resources Reconnaissance of the Mauna Kea Summit Region.* Bishop Museum Department of Anthropology ms.

McGimsey, Charles R. III, and Hester A Davis (Eds.)
1977 *The Management of Archaeological Resources: The Airlie House Report.* Special Publication of the Society for American Archaeology.

Moore, James G., Stephen Porter, and Robert Mark
1993 Glaciation of Haleakala Volcano, Hawaii. Geological Society of America, 89th Annual Cordilleran Section Meeting and 46th Annual Rocky Mountain Section Meeting. *Abstracts with Programs-Geological Society of America 25(5):123-124.*

Moore, Kathleen Dean
2004 Forward to *Oregon Wild: Endangered Forest Wilderness* by Andy Kerr. Oregon Natural Resources Council.

Moratto, Michael J., and Roger E. Kelly

1978 "Optimizing Strategies for Evaluating Archaeological Significance." In Michael B. Schiffer, ed., *Advances in Archaeological Method and Theory*, pp. 1-30. New York: Academic Press.

Mueller-Dombois, D., and V. J. Krajina

1968 Comparison of East-Flank Vegetation on Mauna Loa in Mauna Kea, Hawaii. In Proceedings of a Symposium on Recent Advancements on Tropical Ecology pp 508-20. Varanishi, India.

NASA (National Aeronautics and Space Administration)

2005 *Final Environmental Impact Statement for the Outrigger Telescopes Project.* Vols. 1 and 2. Washington, D.C.

National Park Service, U.S. Department of the Interior

1972 News Release. Interior Secretary Morton Names Pacific Volcanic Sites as New Natural Landmarks.

2003 Policy Statement on Native Hawaiian Use of Hawaii Volcanoes National Park. Revised December 2003.

NRHP (National Register of Historic Places)

1990 *Guidelines for Evaluating and Documenting Traditional Cultural Properties.* National Register Bulletin 38, National Park Service, Washington, D.C. [Prepared by Patricia Parker and Tom King].

Office of the Auditor, State of Hawai`i

1998 Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve. A Report to the Governor and the Legislature of the State of Hawaii. Report No. 98-6. Honolulu.

2005 Follow-Up Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve. A Report to the Governor and the Legislature of the State of Hawaii. Report No. 05-13. Honolulu.

Okinanka, Alton M.

2004 Results From a Survey on Managing Access to the Mauna Kea Scientific Reserve. Prepared for the Office of Mauna Kea Management.

Orr, Maria

2004 Cumulative Cultural Impact Study/Assessment, Desktop Study & Ethnographic Survey, NASA W.M. Keck Observatory Outrigger Telescopes, Mauna Kea, Kaohe & Humu`ula Ahupua`a, Moku of Hamakua & Hilo, Hawai`i. Prepared for International Archaeological Institute, Inc. (IARII), National Aeronautics and Space Administration (NASA), Tetra Tech, Inc., and Science Applications International Corporation (SAIC).

Parker, Patricia L.

1985 Bulletin 24: Guidelines for Local Surveys: A Basis for Preservation Planning. U.S. Department of the Interior, National Park Service.

Parker, Patricia L., and Thomas F. King

1998 Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties. U.S. Department of the Interior, National Park Service.

PCSI (Pacific Consulting Services, Inc.)

2009 Final Environmental Assessment for the Mauna Kea Comprehensive Management Plan. Honolulu.

PHRI (Paul H. Rosendahl, Ph.D., Inc.)

1999 Cultural Impact Assessment Study: Native Hawaiian Cultural Practices, Features, and Beliefs Associated with the University of Hawai`i Mauna Kea Science Reserve Master Plan Project Area. Prepared for University of Hawaii Institute for Astronomy. In Mauna Kea Science Reserve Master Plan (Appendix N).

Porter, Stephen C.

1972 Buried Caldera on Mauna Kea Volcano, Hawaii. Science 175:1458-60.

1975 Late Quaternary Glaciation and Tephrochronolgy of Mauna Kea, Hawaii. In R. P. Suggate and M. M. Cresswell, eds., *Quaternary Studies: Selected Papers from the IX INQUA Congress*, pp. 247-51. Wellington: The Royal Society of America, Inc.

1979a Geological Map of Mauna Kea Volcano, Hawaii. The Geological Society of America, Inc.

1979b Hawaiian Glacial Ages. *Quaternary Research* 12:161:87.

1979c Quaternary Stratigraphy and Chronology of Mauna Kea: A 380,000 Year Record of Mid-Pacific Volcanism and Ice-Cap Glaciation. *Geological Society of America Bulletin* II, 90(7):980-1093.

1987 Pleistocene Subglacial Eruption on Mauna Kea. In R.W. Decker, T.L. Wright and P.H. Stauffer (eds.). *Volcanism in Hawaii*, pp. 587-98. U.S. *Geological Survey Professional Paper 1350.*

Powers, W. E., and C. K. Wentworth

1941 Air Movements and Weather in the Mauna Kea-Mauna Loa Saddle, Hawaii. *Bulletin of the Geological Society of America* 56:267-74.

Preston, E. D.
1895 Determination of latitude, gravity, and the magnetic elements at stations in the Hawaiian Islands, including a result for the mean density of the earth, 19-891, 1892. In *Report of the Superintendent of the United States Coast and Geodetic Survey for the Fiscal Year Ending June 30, 1893, part II.* Washington, D. C.: Government Printing Office.

Pukui, Mary Kawena
1983 *`Olelo No`eau: Hawaiian Proverbs & Poetical Sayings*. Bishop Museum Press, Honolulu.

Pukui, Mary Kawena, and Samuel Elbert
1971 *Hawaiian Dictionary*. University Press of Hawaii. Honolulu.

Pukui, Mary Kawena, Samuel Elbert, and Esther T. Mookini
1974 *Place Names of Hawaii*. University of Hawaii Press, Honolulu.

Pukui, Mary Kawena, E.W. Haertig, & Catherine A. Lee
1972 *Nānā I Ke Kumu (Look to the Source). Volume 1.* Hui Hānai, Honolulu, HI.

Robins, Jennifer, and Hallett H. Hammatt
1990 Archaeological Reconnaissance for Summit and Mid-Level Facilities for the Proposed Japan National Large Telescope. Prepared for MCM Planning, Honolulu.

Schmidt, Robert C.
1974 Memorandum dated January 16, 1974 to E.H. Bryan, Jr., Samuel Elbert, Richard Pagliniwan, and Kazutaka Saiki regarding the names of the cones and craters on Mauna Kea. Department of Planning and Economic Planning. Honolulu.

SHPD (State Historic Preservation Division)
2000 Mauna Kea Historic Preservation Management Plan Management Components. In *Mauna Kea Science Reserve Master Plan* (Appendix F), Group 70 International, Inc. Honolulu.

Shore, Bradd
1989 Mana and tapu. In A. Howard and B. Borofsky (ed.) *Developments in Polynesian Ethnology*, pp. 137-174. University of Hawaii Press. Honolulu.

Sinoto, Aki
1987 Post-Field Report on the Archaeological Surface Survey of the Halepohaku Substation Site and Overland Transmission Line-Mauka Approach Areas, Halepohaku, Mauna Kea, Hawai`i Island. Mountain Archaeology Research Area, and Bishop Museum Anthropology Department, Honolulu. Letter Report Submitted to Clyde Akita, Facilities Planning and Management Office, University of Hawai`i, Honolulu.

Smith, C.W., W.J. Hoe, and P.J. O'Connor
1982 Botanical Survey of the Mauna Kea Summit Above 13,000 Feet. Prepared for the University of Hawaii Institute for Astronomy. Ms. on file at Bishop Museum.

Society for Hawaiian Archaeology
2001 Guidelines for Curation Standards and Procedures. Honolulu.

Sole, T., and K. Woods
1992 Protection of Indigenous Sacred Sites: The New Zealand Experience, in Aboriginal Involvement in Parks and Protected Areas. J. Birckhead, T. de Lacy and L. Smith (eds), 339-51. Canberra: Aboriginal Studies Press.

Sustainable Resources Group Intn'l, Inc.
2009 *Natural Resources Management Plan for the UH Management Areas on Mauna Kea*. Prepared for the Office of Mauna Kea Management, Hilo.

Troll, C.
1972 Geoecology and the World-Wide Differentiation of High-Mountain Ecosystems. In C. Troll, ed., *Geoecology of the High-Mountain Regions of Eurasia*. Erdwissenschaftliche Forschung 4, Steiner, Wiesbaden.

Thrum, Thomas G.
1921 Notes. In Kenneth P. Emory, *An archaeological Survey of Haleakala*. Bernice P. Bishop Museum Occasional Papers 7(11):237-259. Honolulu.

Ugolini, F.C.
1974 Hydrothermal Origin of the Clays From the Upper Slopes of Mauna Kea, Hawaii. *Clays and Clay Minerals* 22:189-194.

n.d. Soils of the high elevations of Mauna Kea, Hawaii. Unpublished manuscript.

University of Hawaii
2000 Voices and Visions of Mauna Kea: Mauna Kea Science Reserve Master Plan and Implementation Process Summary. Honolulu.

Valeri, Valerio
1985 Kingship and Sacrifice: Ritual and Society in Ancient Hawaii. The University of Chicago Press, London.

Webber, P.J. (Ed.)
1979 *High Altitude Geoecology*. Westview Press, Boulder, Colorado.

Westervelt, W.D.
1963 *Hawaiian Legends of Volcanoes.* Reprint. Charles E. Tuttle, Rutland, Vermont.

Williams, Scott S.

1987 Post-field Letter Report Dated July 7, 1987 to Mr. Clyde Akita on the Archaeological Reconnaissance Survey of the Summit Road Between Halepohaku and the Stockpile Area, Mauna Kea, Hawai`i Island. Bishop Museum, Honolulu, Hawai`i.

1989 *A Technological Analysis of the Debitage Assemblage from Ko`oko`olau Rockshelter No. 1, Mauna Kea Adze Quarry, Hawai`i.* Unpublished M.A. Thesis, Washington State University.

Wilson, Michael D.

1995 Letter to Dr. Donald Hall, UH IfA dated April 25, 1995 regarding conditions of approval of the Revised Management Plan for UH Management Areas on Mauna Kea. Department of Land and Natural Resources, File No. HA-1573A.

Wiltse, C. S.

1862 Humuula, 1862. Register Map 623, Survey Office, State of Hawaii.

Winterhalder, B.P., and R.B. Thomas

1978 *Geoecology of Southern Highland Peru: A Human Adaptation Perspective.* University of Colorado: Boulder Institute of Arctic and Alpine Research Occasional Paper No. 27.

Wolfe, Edward W., William S. Wise, and G. Brent Dalrymple

1997 *The Geology and Petrology of Mauna Kea Volcano, Hawaii—A Study of Postshield Volcanism.* U.S. Geological Survey Professional Paper 1557. United States Government Printing Office, Washington, D.C.

Woodcock, A.H.

1974 Permafrost and Climatology of a Hawaii Volcano Crater. Arctic and Alpine Research 6(1):49-62.

Woodcock, A.H., A.S. Furumoto, and G.P. Woollard

1970 Fossil Ice in Hawaii? *Nature* 226(5248):873.

SECTION 9.0 LAWS AND REGULATIONS CITED

FEDERAL LAWS (Responsible Agency)

National Historic Preservation Act (NHPA), 16 U.S.C. 470 (NPS)

National Environmental Policy Act (NEPA), 42 U.S.C. 4321-47 (CEQ)

36 CFR 60: *National Register of Historic Places.* (NPS)

36 CFR 800: *Preservation of Historic Properties.* (ACHP)

40 CFR 1500 – 1508: *Implementing the Procedural Provisions of the National Environmental Policy Act.* (CEQ)

STATE OF HAWAII STATUTES AND REGULATIONS CITED (Responsible Agency)

Chapter 6E, HRS: *Historic Preservation*, Department of Land and Natural Resources, Historic Preservation Division (DLNR, SHPD)

Chapter 205, HRS, *Land Use Commission*, State Land Use Commission, Department of Business, Economic Development & Tourism (LUC, DBEDT)

Chapter 343, HRS, *Environmental Impact Statements*, Office of Environmental Quality Control, Department of Health (OEQC, DOH)

HAR 11-200, *Environmental Impact Statement Rules* (OEQC)

HAR 13-5, Conservation District, DLNR, Office of Conservation & Coastal Lands (OCCL)

HAR 13-5-2 Chapter 122: "Rules Regulating Game Bird Hunting, Field Trials and Commercial Shooting Preserves" (DLNR).

HAR 13-5-2 Chapter 123: Rules Regulating Game Mammal Hunting (DLNR)

HAR 13-275: Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8, HRS (DLNR, SHPD)

HAR 13-300: Rules of Practice and Procedure Relating to Burial Sites and Human Remains (DLNR, SHPD)

COURT CASES CITED

Civil No. 04-1-397, Mauna Kea Ainana Hou at al. vs. Board of Land and Natural Resources et al. Hawaii 3rd Circuit.

PLANNING AND AUDIT DOCUMENTS CITED (Responsible Agency)

The Mauna Kea Plan. 1977. (DLNR)

Hale Pohaku Complex Development Plan. 1980 (UH)

Amendment to the Mauna Kea Science Reserve Complex Development Plan, Draft Supplemental Statement for Construction Camp Housing at Hale Pohaku, Hamakuka, Hawaii. 1985 (UH)

Mauna Kea Science Reserve Complex Development Plan. Prepared for the Research Corporation of the University of Hawaii. 1987 (IfA, UH)

Revised Management Plan for the UH Management Areas on Mauna Kea. 1995 (UH)

Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve. A Report to the Governor and the Legislature of the State of Hawaii. Report No. 98-6. 1998.

Appendix B (Memorandum of Agreement) and Appendix C (Burial Treatment Plan) of the Final Environmental Impact Statement for the Outrigger Telescopes Project. 1999 (IfA,UH)

Mauna Kea Science Reserve Master Plan. 2000. (UH)

Appendix F of the Master Plan: *Historic Preservation Components*. 2000 (UH)

Appendix N of the Master Plan: *Cultural Impact Assessment*. 2000 (UH)

Follow-Up Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve. A Report to the Governor and the Legislature of the State of Hawaii. Report No. 05-13. 2005

APPENDIX A

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
11077	-	A-7	single upright	shrine
11079	-	A-7, A-8	lithic scatter of adze manufacturing byproducts and 2 associated cairns	"workshop" and possible shrine
16163	50-Ha-G28-38	A-6	platform/pavement with 14 uprights	shrine
16164	50-Ha-G28-40	A-6	3 to 5 uprights on platform and 1 isolated upright	shrine
16165	50-Ha-G28-41	A-6	single row of 2 uprights	shrine
16166	5224 50-Ha-G28-42	A-3	2 rows of uprights, 8 to possibly 9 total	shrine
16167	5225 50-Ha-G28-43	A-3	single row of 2 uprights	shrine
16168	5226 50-Ha-G28-44	A-1	semi-enclosure with 21 to possibly 25 uprights	shrine
16169	5227 50-Ha-G28-45	A-1	single row of 2 uprights	shrine
16170	5228 50-Ha-G28-46	A-1	2 cairns with 3 to possibly 4 uprights	shrine
16171	5229 50-Ha-G28-47	A-1	single upright	shrine
16172	5230 50-HA-G28-48	A-1, A-3	single upright	shrine
16173	5231 50-Ha-G28-49	A-3	7 dispersed uprights	shrine
16174	5232 50-Ha-G28-50	A-3	boulder with 1 to possibly 8 uprights on the side	shrine
16175	5233 50-Ha-G28-51	A-3	5 cairns with 1 upright each	shrine
16176	5234 50-Ha-G28-52	A-3	single row of 3 uprights	shrine
16177	5235 50-Ha-G28-53	A-3	platform with 3 uprights	shrine
16178	50-Ha-G28-54	A-3	single upright	shrine
16179	5237 50-Ha-G28-55	A-3	single row of 3 uprights	shrine
16180	5238 50-Ha-G28-56	A-3	boulder with 3 uprights	shrine

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
16181	5239 50-Ha-G28-57	A-3	single upright	shrine
16182	5240 50-Ha-G28-58	A-3	3 to 5 uprights	shrine
16184	5242 50-Ha-G28-60	A-3	semi-enclosure with 24 uprights	shrine
16185	5243 50-Ha-G28-61	A-3	single row of 3 uprights	shrine
16186	50-Ha-G28-67	A-3	single row of 2 and possibly 3 uprights	shrine
16187	50-Ha-G28-68	A-3	single row of 9 uprights	shrine
16188	50-Ha-G28-69	A-3	single upright	shrine
16189	50-Ha-G28-70	A-3	single row of 3 and possibly 4 uprights	shrine
16190	50-Ha-G28-71	A-3	single row of 10 uprights and off-set uprights	shrine
16191	50-Ha-G28-72	A-3	single row of 4 uprights	shrine
16192	50-Ha-G28-73	A-3	2 sets of uprights, 6 total	shrine
16193	50-Ha-G28-74	A-3, A-6	single upright	shrine
16194	50-Ha-G28-75	A-6, A-8	single row of 12-14 uprights	shrine
16195	50-Ha-G28-76	A-6	2 cairns	possible burial
16196	50-Ha-G28-77	A-6	single row of 2 uprights	shrine
16197	50-Ha-G28-78	A-6	single upright	shrine
16198	50-Ha-G28-79	A-6	2-tiered platform with 7 uprights	shrine
16199	50-Ha-G28-80	A-6	1 and possibly 4 uprights	shrine
16200	50-Ha-G28-81	A-6	single row of 5 and possibly 6 uprights	shrine
16201	50-Ha-G28-83	A-6	single row of 3 uprights	shrine
16202	50-Ha-G28-84	A-6	single upright	shrine
16203	50-Ha-G28-86	A-6	single row of 2 and possibly 3 uprights and a lithic scatter of adze manufacturing byproducts	adze "workshop" and shrine
16204	50-Ha-G28-1	A-7	5 shrines, 26 stone-walled enclosures and a lithic scatter of adze manufacturing byproducts	probable rites of passage site for apprentice adze makers
16248	-	A-4	series of cairns	burial
18682	50-Ha-G28-82	A-6	single row of 3 uprights	shrine
18683	50-Ha-G28-83	A-6	single row of 2 uprights	shrine
21197	-	A-6	2 platforms with a total of 5 uprights	shrine
21198	-	A-6	single upright	shrine
21199	-	A-3	single upright	shrine
21200	-	A-3	single upright	shrine

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
21201	-	A-3	single row of 2 uprights	shrine
21202	-	A-3	single row of 6 to possibly 7 uprights	shrine
21203	-	A-3	single row of 2 uprights	shrine
21204	-	A-3	3 areas of stacked rock	indeterminate
21205	-	A-3	single upright	shrine
21206	-	A-3, A-8	single upright	shrine
21207	-	A-3, A-8	single upright	shrine
21208	-	A-6	1 to 2 uprights on a boulder	shrine
21209	-	A-6	cairn on summit	possible shrine
21210	-	A-7, A-8	single upright	shrine
21211	-	A-7, A-8	single row of 2 uprights on a platform and a lithic scatter of adze manufacturing byproducts	adze "workshop" and shrine
21212	-	A-6, A-8	single row of 2 uprights	shrine
21213	-	A-7, A-8	3 piles of rocks with 1 possible upright	possible shrine
21214	-	A-7, A-8	single row of 5 and possibly 7 uprights	shrine
21406	-	A-5	single upright	shrine
21407	-	A-5	single row of 2 uprights	shrine
21408	-	A-5	single upright	shrine
21409	-	A-5	single upright	shrine
21410	-	A-5	single row of 5 uprights	shrine
21411	-	A-5	cairn	possible marker
21412	-	A-1, A-5	cairn	possible marker
21413	-	A-1	cairn	possible burial
21414	-	A-1	cairn	possible burial
21415	-	A-1	cairn on a boulder	indeterminate
21416	-	A-1	cairn	possible burial
21417	-	A-3	cairn	indeterminate
21418	-	A-3	3 and possibly 4 uprights on top and to the side of a boulder	shrine
21419	-	A-2	single upright	shrine
21420	-	A-2	enclosure with 11 and possibly 12 uprights and a nearby stone platform	shrine
21421	-	A-2	2 cairns, one with a possible upright and an isolated upright	possible shrine
21422	-	A-3	single upright	shrine
21423	-	A-2	cobbles on boulder	possible marker

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
21424	-	A-2	4 to 5 uprights on a platform and boulder	shrine
21425	-	A-2	single upright	shrine
21426	-	A-2	single row of 4 uprights	shrine
21427	-	A-2, A-3	terrace with possible upright	indeterminate
21428	-	A-2	single upright	shrine
21429	-	A-2	single upright	shrine
21430	-	A-6	single row of 3 uprights	shrine
21431	-	A-6, A-8	semi-enclosure with 7 to 10 uprights	shrine
21432	-	A-3, A-6, A-8	single row of 2 uprights	shrine
21433	-	A-3, A-4	single upright	shrine
21434	-	A-3, A-4	8 stones on a boulder	indeterminate
21435	-	A-3, A-4, A-8	cairn and boulder with single upright	shrine
21436	-	A-5	cairn	shrine
21437	-	A-5	lithic scatter of adze manufacturing byproducts	adze workshop
21438	-	-	Kukahauula (summit)	TCP
21439	-	-	Pu`u Lilinoe	TCP
21441	-	A-1	3 features with 12 uprights	shrine
21442	-	A-1	single upright	shrine
21443	-	A-1	single upright	shrine
21444	-	A-1	single upright	shrine
21445	-	A-1	3 dispersed uprights	shrine
21446	-	A-3	single row of 9 uprights, plus two additional uprights	shrine
21447	-	A-3	single upright	shrine
21448	-	A-2, A-3	two uprights	shrine
21449	-	A-3	terrace	unknown
21550	-	A-3	3 cairns	historic survey markers
21551	-	A-6	single upright	shrine
21552	-	A-7	platform	probable human burial
25760	-	A-7, A-8	lithic scatter of adze manufacturing byproducts	adze workshop
25761	-	A-7, A-8	lithic scatter of adze manufacturing byproducts	adze workshop
25762	-	A-7, A-8	lithic scatter of adze manufacturing byproducts and enclosures	adze workshop and shelters
25763	-	A-8	single upright on boulder	shrine

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
25764	-	A-7, A-8	5-8 uprights on mound	shrine
25765	-	A-7, A-8	platform	possible burial
25766	-	A-7, A-8	4 mounds	unknown
25767	-	A-7	2 adze preforms	isolate artifacts
25768	-	A-7, A-8	basalt flake	isolate artifacts
25769	-	A-7, A-8	lithic scatter	adze manufacturing
25770	-	A-7, A-8	lithic scatter and rock pile	adze manufacturing; possible burial
25771	-	A-8	single upright in soil	shrine or burial
25772	-	A-8	3 uprights, single upright on boulder, a mound, and lithic scatter of adze manufacturing byproducts	shrines, adze workshop, and markers
25773	-	A-8	single upright on boulder	shrine
25774	-	A-8	4 pavements/low mounds	unknown
25775	-	A-8	1-2 uprights on boulder	shrine
25776	-	A-8	cairn, enclosures, lithic scatter of adze manufacturing byproducts, and 2 possible fallen uprights	shrine, adze workshop, and shelter
25777	-	A-8	mound	marker
25778	-	A-8	1-2 uprights on boulder	shrine
25779	-	A-8	lithic scatter of adze manufacturing byproducts, 3 preforms, and hammerstone	adze workshop
25780	-	A-8	single upright on mound	shrine
25781	-	A-8	3-4 uprights, walled overhang, and lithics	shrine, shelter, and adze manufacturing
25782	-	A-8	single upright, lithic scatter of adze manufacturing byproducts, and 2 enclosures	shrine, adze workshop, and shelter
25783	-	A-8	1 and possible 2 pairs of uprights	shrine
25784	-	A-6, A-8	single upright in bedrock crack	shrine
25785	-	A-8	rock pile	marker
25786	-	A-8	1-3 uprights on bedrock surface	shrine
25787	-	A-8	3-4 uprights in bedrock crack	shrine
25788	-	A-8	possible upright	possible shrine
25789	-	A-6	17-20 uprights on bedrock surface and lithic scatter	shrine and offering
25790	-	A-6	2-6 uprights on mound	shrine
25791	-	A-4, A-8	single upright on boulder	shrine
25792	-	A-4, A-8	rock pile with slabs	shrine
25793	-	A-3	4 uprights on bedrock surface	shrine

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State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
25794	-	A-3	single upright in bedrock crack	shrine
25795	-	A-3	single upright on boulder	shrine
25796	-	A-3	lithic scatter of adze manufacturing byproducts and preforms	adze workshop
25797	-	A-3, A-4	single upright on boulder	shrine
25798	-	A-3, A-4	single upright on boulder	shrine
25799	-	A-3, A-4	single upright, terrace, pavement, possible boulder shrine	shrine complex
25800	-	A-3, A-4	horseshoe	historic artifact
25801	-	A-4	lithic scatter of adze manufacturing byproducts	adze workshop
25802	-	A-4	terrace and mound	burials
25803	-	A-4	mound	possible burial
25804	-	A-4	mound	possible burial
25805	-	A-4	mound	possible burial
25806	-	A-4	3 rock piles/mounds	possible burials
25807	-	A-4	3 mounds	burial
25808	-	A-4	human remains and terraces	burials
25809	-	A-4	exposed human remains	burials
25810	-	A-4	4 rock mounds	shrine and markers
25811	-	A-4	possible upright	possible shrine
25812	-	A-4	overhang and crude wall	possible burial
25813	-	A-4	mound with possible uprights (2)	possible shrine
25814	-	A-4	3 mounds on cinder cone	possible burials
25815	-	A-4	mound	possible burial
25816	-	A-4	mound	possible burial
25817	-	A-4	2 enclosed areas	shelter
25818	-	A-4	terrace with 5-7 uprights	shrine
25819	-	A-2, A-4	two groups of uprights (15-16 uprights)	shrine
25820	-	A-2, A-4	3 uprights on mound	shrine
25821	-	A-2, A-4	single upright on boulder	shrine
25822	-	A-2, A-4	terrace with 6-9 uprights	shrine
25823	-	A-2, A-4	mound	possible burial
25824	-	A-2, A-4	mound	possible burial
25825	-	A-2, A-4	2-3 uprights on mound	shrine
25826	-	A-3	2 uprights on bedrock	shrine

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
25827	-	A-3	2-4 uprights on bedrock	shrine
25828	-	A-3	lithic scatter of adze manufacturing byproducts	adze workshop
25829	-	A-1	mound	possible burial
25830	-	A-1	platform	possible burial
25831	-	A-1	mound	possible burial
25832	-	A-1	mound	possible burial
26217	-	A-3	3 uprights on mound	shrine
26218	-	A-2	piled cobbles, alignments, historic trash	USGS camp site
26219	-	A-2	1-2 uprights on mound	shrine
26220	-	A-2	C-shapes	temporary shelters?
26221	-	A-2	single upright on bedrock	shrine
26222	-	A-2	1-2 uprights on mound	shrine
26223	-	A-2	single upright	shrine
26224	-	A-2	3 uprights on bedrock	shrine
26225	-	A-2	single upright on boulder	shrine
26226	-	A-3	mound	possible shrine
26227	-	A-3	single upright on mound and lava tube	shrine and possible shelter
26228	-	A-3	6-12 uprights on mound	shrine
26229	-	A-2	1-2 uprights on boulder	shrine
26230	-	A-2	mound	unknown
26231	-	A-2	2 uprights on mound	shrine
26232	-	A-2	rock wall and find spot	temporary shelter and marker
26233	-	A-1, A-2	6-12 uprights on horseshoe-shaped enclosure	shrine
26234	-	A-1, A-2, A-3	single upright	shrine
26235	-	A-1	single upright	shrine
26236	-	A-1	single upright	shrine
26237	-	A-1	mound	possible burial
26238	-	A-1	single upright on boulder	shrine
26239	-	A-1	single upright on boulder	shrine
26240	-	A-1	4-5 uprights on mound and single upright in overhang	shrines
26241	-	A-1	mound	unfinished shrine
26242	-	A-1, A-5	cairns	marker and shrine

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
26243	-	A-1, A-5	single upright	shrine
26244	-	A-1, A-5	single upright	shrine
26245	-	A-1, A-5	cairn	marker
26246	-	A-1, A-5	cairn	marker
26247	-	A-1, A-5	cairn	marker
26248	-	A-5	3-4 uprights on bedrock	shrine
26249	-	A-5	lithic scatter of adze manufacturing byproducts	adze workshop
26250	-	A-5	1-3 uprights on mound, single upright on bedrock, and historic trash	shrines and dump
26251	-	A-5	single upright	shrine
26252	-	A-5	2 uprights on bedrock	shrine
26253	-	A-5	Complex consisting of multiple uprights, multiple lithic scatters of adze manufacturing byproducts, and quarried area for adze manufacturing	shrines, adze workshops, and quarrying areas
26254	-	A-5	3 uprights on mound and cairns	shrines and markers?
26255	-	A-5	single boulder	shrine
26256	-	A-5	cairn	marker

APPENDIX B

SHPD Review Letter on Proposed W.M. Keck Outrigger Project

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JANET E. KAWELO

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
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AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
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CONVEYANCES
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MAY 07 1999

May 3, 1999

Dr. Robert A. McLaren, Interim Director
Institute for Astronomy
University of Hawaii at Manoa
2680 Woodlawn Drive
Honolulu, Hawaii 96822

LOG NO: 23155
DOC NO: 9903PM07

Dear Dr. McLaren:

SUBJECT: Request for Historic Preservation (Chapter 6E, HRS) and National Historic Preservation Act (Section 106) Review --W.M. Keck Observatory Outrigger Telescope Project in the Mauna Kea Science Reserve, Ka`ohe, Hamakua, Hawaii Island TMK: 4-4-15:09

Thank you for your letter of March 17, 1999 and the opportunity to review and comment on the Draft Environmental Assessment (DEA) prepared for the proposal to add four to six 1.8-meter "outrigger" telescopes around the two existing 10-meter Keck telescopes located on Pu`u H.ai Oki.

Before discussing our review of the DEA, two aspects of the review process need clarification. First, the DEA and your letter correctly indicate that the project needs to comply with Section 106 of the National Historic Preservation Act (NHPA) because federal funds are being used for the project. Your letter, however, asks that we coordinate our review with the Advisory Council on Historic Preservation (ACHP). According to the Section 106 regulations, it is technically the responsibility of the federal agency, in this case NASA, to determine the effect of a project on historic properties and to consult with the State Historic Preservation Office on its determination. The agency may designate another party, such as IFA, to execute its responsibility. We suggest that you or NASA review our comments on the DEA and, if you agree, submit the recommended determination to our office for our official comment. We would be glad to provide you with any information you need on the Section 106 process. Second, your letter asks us to review the finding of "no significant impact" proposed by the DEA. We do not review determinations of this sort because, if we understand correctly, this assessment considers a combination of factors, issues, and subject matters that are beyond our expertise and jurisdiction. Our assessment of effect in the following discussion conforms with our standard review process and we ask that it be incorporated in the final Environmental Assessment.

The DEA proposes that IFA will be requesting a "no effect" determination for the construction of the outrigger observatories when applying for the appropriate permits. To support this finding, the DEA cites past studies and a compliance letter to argue that no historic properties are present in the project area. It notes that no cultural remains were found on Pu`u Hau Oki in a 1982 reconnaissance survey of the summit cones[1] and no sub-surface remains were reported during the construction of the Keck I or Keck II observatories. It concludes that Pu`u Hau Oki appears to be of no particular cultural significance because ethnographic information compiled in conjunction with the 1982 survey did not attribute any particular significance to the *pu`u.*[2] Finally, the DEA cites a "no effect" assessment received from the State Historic Preservation Office (SHPO) for the establishment of optical test sites on Pu`u Hau Oki (Ltr. Wilson to McLaren, June 30, 1998).

As a point of clarification, the first archaeological reconnaissance of Pu`u Hau Oki actually took place in 1981 when a portion of the cinder cone was surveyed as one of the five alternative locations for the proposed Kitt Peak National Observatory data collecting facilities (Ltr. McCoy to Jeffries, June 9, 1981). A third reconnaissance survey of another part of Pu`u Hau Oki was undertaken in 1990 when the 5.1 acre Subaru Observatory site was surveyed[3]. No archaeological sites were found in either of these surveys.

As you are aware, we are currently reviewing historical, ethnographic, and archaeological information on Mauna Kea in the process of preparing an historic preservation plan for the Science Reserve which includes the summit region. During this process, we have come to believe that the cluster of cinder cones which merge and collectively form the summit of Mauna Kea is an historic property and that this single landscape feature probably bore the name Kukahau`ula. This single landscape feature is now called Pu`u Hau Oki, Pu`u Kea, and Pu`u Wekiu. Several lines of evidence lead us to the conclusion that the cluster of cones is an historic property. These will be discussed in more detail in documents being prepared for the preservation plan. The first line of evidence indicating the cultural and historical importance of the summit is that, at a minimum, some portion of the summit cluster bore the name Kukahau`ula who appears as a character in recorded Hawaiian traditions and as a figure in legends about Mauna Kea[4]. As a character in traditional histories and genealogies, he is the husband of Lilinoe and is named as an *`aumakua* (family deity) of fishermen. A descendant, Pae, was known as an exceptional fisherman whose bones were coveted for fishhooks by the paramount chief Umi. In one legend, Kukahau`ula is cast in a more fanciful role as the suitor and husband of Poliahu, the deity of snow and, poetically, his name is said to allude to the pink hue that can be seen reflecting from the snow-covered summit. Lilinoe plays a similar role in the mountain's traditions in that she appears both as a traditional character and a mythical

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[1] McCoy, P. "Archaeological Reconnaissance Survey." In *Cultural Resources Reconnaissance of the Mauna Kea Summit Region.* Manuscript, Anthropology Department, Bernice P. Bishop Museum, 1982.
[2] McEldowney, H. "Ethnographic Reconnaissance Survey" In *Cultural Resources Reconnaissance of the Mauna Kea Summit Region.* Manuscript, Anthropology Department, Bernice P. Bishop Museum, 1982.
[3] Robbins, J. and H Hammatt. Archaeological Reconnaissance for the Proposed Japanese National Large Telescope, Maunakea, Hawaii. Manuscript prepared by Cultural Surveys Hawaii for MCM Planning, 1990.
[4] Kamakau, S.M. *Ruling Chiefs of Hawaii.* Honolulu: Kamehameha School Press, 1961:215-17. Poepoe, J.M. "Kamehameha I, Ka Nai Aupuni o Hawaii, K Liona o ka Moana Pakipika." *Ka Nai Aupuni,* 1906:April 30. Poepoe, J.M. Bishop Museum Genealogy Book 13:20, B.P. Bishop Museum Library. Taylor, E.A. "Ku-Kahau-ula and Poliahu" *Paradise of the Pacific,* Vol. 44(7):12-15, 1931.

figure[5]. She is, however, even more frequently associated with the summit region of Mauna Kea. In addition to being the wife of Kukahau`ula in some traditions, she is said to have been buried near the summit and is called the "woman of the mountain." One tradition has her being an ancestor of the illustrious Mahi family who served as warriors and attendants to the paramount *ali`i* of Hawaii Island. In legends, Lilinoe becomes the embodiment of fine mist, the literal meaning of her name, and as such is the companion or sister of Poliahu.

The names Kukahau`ula and Lilinoe are both attributed to cinder cones in the summit region: Kukahau`ula to the summit and Lilinoe to a cone immediately to the southeast of the summit cluster. These names, along with that of Waiau, appear on the earliest reliable map in 1884 and are repeated in the next survey of the summit region in 1891 and 1892[6]. Kukahau`ula is given as the name of "the highest peak" even earlier in 1873 land boundary testimonies[7]. Of all the place names in the summit region, these three are applied the earliest and most consistently to specific landmarks on the mountain. In compiling the 1892 map of Mauna Kea, W.D. Alexander refers to these as "genuine native names[8]." The place name Poliahu appears in traditions and native testimonies as being applied to a trail, spring, pond, and cave[9], but it is not consistently applied to a single and identifiable landscape feature until 1892 when W.D. Alexander proposes attaching this name to "a nameless peak" in honor of the demigoddes, Poliahu, who figures in the tale of Laieikawai[10].

While the association between the summit and Kukahau`ula is sufficiently clear, it is not as clear which specific topographic features at the summit are encompassed by the name. The conclusion drawn here that Kukahau`ula, and thus its association with a significant individual and character, probably applied to the entire summit cluster relies on four major arguments. First, use of the name Pu`u o Kukahau`ula in the boundary testimonies and in subsequent

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[5] Kamakau, S.M. *Ruling Chiefs of Hawaii.* Honolulu: Kamehameha School Press, 1961:215-17, 285. Poepoe, J.M. "Kamehameha I, Ka Nai Aupuni o Hawaii, Ka Liona o ka Moana Pakipika." *Ka Nai Aupuni,* 1906:April 30. Poepoe, J.M. Bishop Museum Genealogy Book 13, page 20, B.P. Bishop Museum Library. Haleole, S.N. "The Hawaiian Romance of Laieikawai.". In *33rd Annual Report of the Bureau of American Ethnology,* Edited by M.W. Beckwith, (1919):480. Taylor, E.A. "Ku-Kahau-ula and Poliahu" *Paradise of the Pacific,* Vol. 44(7):12-15, 1931 Fornander, A. *Fornander Collection of Hawaiian Antiquities and Folk-lore.* Translated and edited by T.G. Thrum. Memoirs of the Bernice P. Bishop Museum, 1919:269. Westervelt, W.D *Legends of Gods and Ghosts.* Boston: H. Ellis, 1915:56.

[6] Lyons, C.J. "North Side of Mauna Kea, Information Sketch." Register Map 1210, Survey Office, State of Hawaii, 1884 to 1891. Lyons, C.J. "Kaohe and Humuula, Hawaii." Register Map 1891, Survey Office, State of Hawaii, 1891. Alexander, W.D. "Summit Peaks of Mauna Kea." Register Map 1860, Survey Office, State of Hawaii, 1892. Baldwin, E.D. Field Book 323:55, Survey Office, State of Hawaii, 1891.

[7] Boundary Commission Books for Hawaii, Microfilm in Archives of Hawaii, Vol. B:35.

[8] Preston, E.D. "Determination of Latitude, Gravity, and the Magnetic Elements at Stations in the Hawaiian Islands, Including a Result for the Mean Density of the Earth, 1891, 1892. In *Report of the Superintendent of the U.S. Coast and Geodetic Survey for the Fiscal Year Ending June 30, 1893, Part II.* Washington: Government Printing Office, 1895:596.

[9] Kamakau, S.M. *Ruling Chiefs of Hawaii.* Honolulu: Kamehameha School Press, 1961:16. Poepoe, J.M. "Kamehameha I, Ka Nai Aupuni o Hawaii, Ka Liona o ka Moana Pakipika." *Ka Nai Aupuni,* 1906:April 30. Boundary Commission Books for Hawaii, Microfilm in Archives of Hawaii, Vol. B:40, 1873.

[10] Preston, E.D. "Determination of Latitude, Gravity, and the Magnetic Elements at Stations in the Hawaiian Islands, Including a Result for the Mean Density of the Earth, 1891, 1892. In *Report of the Superintendent of the U.S. Coast and Geodetic Survey for the Fiscal Year Ending June 30, 1893, Part II.* Washington: Government Printing Office, 1895:596.

notes of field surveys[11] indicates that the name was applied, at a minimum, to the cinder cone (i.e., *pu`u*) as a whole and not just to the highest peak or what would generally be considered the summit in English usage. Second, on the early survey maps (i.e., 1884 to 1891 and 1891), the name Kukahau`ula is written to the east of the cluster of cones and is not immediately associated with a particular point. In contrast, the highest point on the mountain on these maps is labeled the "summit" and "summit cone" and the triangulation marker on the northeastern peak of the cluster is labeled "Mauna Kea."

The third argument is that place names attributed to the summit cluster are relatively modern because these cones were not differentiated by name until after the 1920s. The name Pu`u Kea, the northeastern part of cluster, first appears in 1937 when commemorative names, such as Macrae, Douglas and Goodrich, were given to other unnamed cones. The names Pu`u Wekiu for the southernmost cone in the cluster and Pu`u Hau Oki for the westernmost cone were recorded by Forester L.W. Bryan in the 1920s and were officially adopted by the Advisory Committee on Geographic Names in 1974[12]. Another factor suggesting the relatively modern origin of these three names is that all are highly descriptive in nature, particularly in contrast to those older names which tend to be associated with traditional or legendary characters. Pu`u Hau`Oki literally means "frosty peak," Pu`u Kea means "white peak," and Pu`u Wekiu means "summit peak." Finally, from most angles of approach, these three named cones or peaks have the appearance of a single, although uneven and complex, landscape feature. It is only after a more thorough examination of this feature that one, if so inclined, would begin to differentiate particular cinder slopes with their associated crater features. Most early historic accounts of visits to the summit essentially describe the summit as a single feature with some parts being higher than others. This is also reflected in the early survey maps which, through hatch marks, depict the cluster of cones as a single unit. At this time, it can not be known with certainty how Hawaiians during the early historic period and their predecessors would have viewed the cluster or what purposes they may have had to make and name particular distinctions within the cluster. Given the unified appearance of the cluster and the prominence of the name Kukahau`ula, however, it seems reasonable, if not probable, that this name applied to this entire landscape feature, including that which is now called Pu`u Hau Oki.

Another line of evidence indicating the summit cluster was of particular and singular significance can be drawn from the archaeological data. The distribution of known shrine locations essentially radiates, at various distances, outward from the base of the summit cluster. This suggests that the summit cluster could have been the central focus of ritual observances and that part of these observances was to avoid or stop short of this central feature. This is further supported by there being no records, with one possible exception (i.e., a 1935 photograph of a slab and stone mound at the summit peak[13]), of shrines on the summit cluster. The practice of avoiding or staying outside that area of greatest significance is common in many religious observances recorded throughout the world. Thus the summit cluster could have been a focal point of the presumably long journey to the summit region. Avoidance of the summit, or the summit region as a whole, for fear of the spiritual nature of

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[11] Boundary Commission Books for Hawaii, Microfilm in Archives of Hawaii, Vol. B:35, 1873. Baldwin, E.D. Field Book 323:55, Survey Office, State of Hawaii, 1891.

[12] Bryan, L.W. Letter to Libert K. Landgraf, December 31, 1973, Department of Planning and Economic Development. Mark, Shelley. Memorandum to Members of Advisory Council on Geographic Names, March 13, 1974, Department of Planning and Economic Development.

[13] Bryan, E.H. *Mauna Kea Here We Come: The Inside Story of an Scientific Expedition.* Honolulu: Privately Published, 1979:35.

this area may be one explanation for the number of times native Hawaiian guides refused or found excuses not to accompany early historic visitors to the summit. In discussing his tour of Hawaii Island in 1823, missionary William Ellis noted that he was told "numerous fabulous tales relative to its [Mauna Kea] being the abode of the gods, and none ever approach its summit..."[14]

Given our conclusion that Pu`u Hau Oki is part of an historic property, we believe the proposed construction of four to six outrigger telescopes on the site of the W.M. Keck Observatory will have an "adverse effect" both on this historic property and on the summit region which we believe is eligible for inclusion in the National Register as an historic district. In the historic preservation plan we will also be proposing that the summit region of Mauna Kea is eligible for inclusion in the National Register of Historic Places as an historic district because it encompasses a sufficient concentration of historic properties (i.e., shrines, burials and culturally significant landscape features) that are historically, culturally, and visually linked within the context of their setting and environment. Tentatively the boundaries of this district will coincide with the extent of the glacial moraines and the crest of the relatively pronounced change in slope that creates the impression of a summit plateau surrounding the cinder cones at or near the summit (i.e., generally the area above the 11,600 to 12,000 foot contour). The cluster of cones forming the summit, including Pu`u Hau Oki, would be a contributing property to this district. We believe, however, that these "adverse effects" can be mitigated if appropriate measures are adopted. To be in compliance with the Section 106 regulations, these mitigation measures need to be stipulated in a signed Memorandum of Agreement (MOA). The MOA should also address those activities occurring at the stockpiling area which could affect, indirectly, the surrounding areas which are also part of the historic district.

The MOA should be relatively easy to prepare as the DEA has already proposed many of the measures we would find appropriate, including those to be executed during the construction phases and those designated as long-range plans. Descriptions of these measures would need to be slightly reworded to explain how these actions would specifically curtail any further degradation of the summit *pu`u* or the historic district. For example, appropriate measures would include those proposed to stabilize the cinder cone slopes, control the accidental dispersal of debris during and after construction, determine the disposition of excavated material which cannot be reused on site, minimize the visibility of the outrigger observatories within the summit region as well as from a distance, and reduce noise during construction and operation of the observatories. In the case of Puu Hau Oki, mitigation should focus on measures that would prevent or minimize those actions that would further deteriorate the structural and visual integrity (i.e., shape and contour) of the cinder cone and its crater.

The history of the project site given on page VI-1 indicates that 34 feet of earth was removed from the top of the site during the construction of the Keck I telescope. We would concur that this alteration effectively precludes the presence of burials. What isn't clear is the exact history of the 71,700 square feet, apparently the site of Keck II, which was left "in its natural state." The description says that this area was leveled during the construction of Keck II. The process of leveling this area or covering it with excavated material from the Keck I site would not necessarily preclude the possibility of burials because they could lie at moderate depths below the natural surface. The specific history of the northern part of the project area should be clarified and, if ground surfaces still exist that were only superficially altered, then we feel

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[14] Ellis, W. *Journal of William Ellis.* 1827 London ed. and 1917 Hawaii ed. Reprint, Honolulu: Advertiser Publishing, 1963:292.

some provision for dealing with potential burials. These should be included in the MOA for the proposed excavation of the light pipes, junction boxes and tunnels. In the historic preservation plan we are currently preparing, we will be asking that any excavation taking place on the summit cones be subject to testing and/or monitoring. This measure would address the persistent claim that burials were previously disturbed during construction of an observatory and the fact that known and suspected burials are present on other cinder cones in the summit region. Exceptions would be those areas that have been previously altered to such an extent that this degree of alteration would preclude the possibility of remaining burials.

To be in compliance with the 1992 amendments of the NHPA, the federal agency or its designee needs to consult with native Hawaiian organizations on undertakings that could have a potential effect on historic properties which are of religious and cultural significance to them. We suggest that you consider contacting those native Hawaiian groups and individuals who have been identified as having a particular interest in Mauna Kea during preparation of the new Mauna Kea Master Plan.

On another matter, concerns have been raised that this assessment and the pending permit applications may be approved and construction begin before the new Mauna Kea Master Plan has been completed and adopted. We agree it would be preferable to complete the application process after the new Master Plan has been adopted. While we feel there is sufficient information to assess the effects of this project on historic properties, it would be preferable to know that the final decisions were made within the context of the new, long-term development and management plan for the summit region.

Our detailed comments on the DEA can be found in Attachment 1. If you should have any questions about our review comments please contact either Patrick McCoy (692-8029) or Holly McEldowney (692-8028).

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

PM:amk

Attachment 1
Detailed Comments on W.M. Keck Observatory Outrigger Telescope Project in the Mauna Kea Science Reserve

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Page S-3, para. 7. A number of the mitigation measures proposed to minimize impacts on the arthropod fauna are also applicable to historic preservation concerns. These should be included in the MOA.

Page S-4, para. 2. The term "historic properties" or "historic sites" should be used instead of "cultural remains" to describe the results of the 1982 archaeological survey of the summit area. This more specifically indicates that the survey was to identify archaeological surface features.

Page S-4, para. 3. This paragraph describes the recent survey work done by our office in 1995 and 1997. As written, this paragraph gives the somewhat misleading impression that this recent work to relocate and assess the condition of sites found in 1982 and 1984 took place near areas where telescopes were being constructed. While it is true that none appear to have been disturbed directly by construction activities, almost all are at quite a distance from existing telescopes. Also we would not refer to the 1995 work as "a full reconnaissance survey." It was simply a survey to relocate and assess previously identified historic properties. It should also be mentioned that the sites being assessed are mostly shrines.

Page S-4, para. 5. Some of the commitments made here to reduce the visual impacts of the observatories and associated infrastructure would be appropriate in the MOA. For example, constructing retaining walls to maintain the structure of the cinder cone and its slopes is a mitigation measure that would help maintain the integrity of this historic property. Constructing the retaining walls of natural-colored materials so that they blend with the existing terrain is another appropriate mitigation measure.

Page S-7, Table S-1 and Page II-15, Table 2-1. In this summary table, Section 106 of the National Historic Preservation Act and the accompanying regulations should be listed under federal compliance and not the state or Board of Land and Natural Resources. The State Historic Preservation Office only plays a role in the Section 106 process, it does not implement the process. This law, like that of NEPA, is triggered in this case by the expenditure of federal funds on the project. Chapter 6E.8 is triggered by the project taking place on state land and the involvement of a state agency.

Pages II-11 and II-13 and Page IV-8. These discussions make numerous commitments that would be appropriate in the MOA. The commitment is made to prevent the accidental dispersal of debris from construction and storage sites (Page II-13, para. 9), but the discussion does not address who is responsible for collecting debris and materials that are dispersed despite the best of intentions. Contingency plans for clean-up should be included. Also, the discussion mentions monitoring by the Mauna Kea Support Services and that additional recommendations by the consulting entomologist will be in the construction contract. Additional recommendations may also result from consultations with the native Hawaiian community.

Page III-9, paras. 3 and 4. This "Cultural Resources" section does not really depict the nature and distribution of known historic properties in the summit region or in these areas closest to the proposed project area. We suggest that this section be revised so that the results of the 1982 and 1984 surveys are better represented in the opening paragraph. It should be made clear that the 40 sites identified during those surveys are almost certainly religious shrines and that these surveys were limited geographically. While it is true that pre-construction surveys have not found historic sites in the summit area, some were found during the survey conducted for the VLBA Antenna. The sentence that "No additional sites were located" is also misleading because the more recent surveys have identified a substantial number of addition shrines in the summit region. Although the reports of these surveys have not been completed, a draft report on site characteristics and distribution patterns was submitted to IFA in February 1999. At a minimum these greater numbers should be mentioned. As we mentioned in an earlier comment (Page S-4, para. 3), our field work in 1995 had other objectives and it is somewhat misleading to say these sites were not damaged by telescope construction when the historic sites are located a considerable distances from the observatories. We are also puzzled by the description of the geological attributes of the Mauna Kea Ice Age Reserve in the "Cultural Resources" section. The adze quarry is appropriate in this discussion but it should also be mentioned after the distribution of known shrines.

Page IV-1, para. 5 and Page IV-2, paras. 1 and 2. As discussed in our cover letter, this history of the project area should be clarified as it is not clear if the 71,700 square feet used for the Keck II Observatory has been substantially or only moderately altered.

Page IV-3, para. 5. The potential need to stabilize the cinder cone and its slopes should be addressed in the MOA as should a commitment to maintain the general shape and form of the cone in a manner that blends with the terrain.

Page IV-3, paras. 7 and 8. The issue of drainage and erosion should be addressed in the MOA because the formation of gullies on the cone slopes would affect the integrity of the historic property. While the mitigation proposed may alleviate the problem, the MOA should probably include a provision for the long-term monitoring of their effectiveness in case unforeseen erosion occurs.

Page IV-8 and IV-9, Historical and Cultural Resources. Our comments on this section are similar to those expressed earlier (Page S-4, para. 3; Page III-9, paras. 3 and 4). We feel the known distribution of shrines in the summit region should be given greater prominence than the adze quarry in this context. It should be explicitly stated that the forty known sites are most likely religious shrines. As we have argued in our cover letter, our assessment of historic properties in the project area and the potential effects of the project is substantially different from that which is stated here.

Page IV-9 and IV-10, Aesthetics. A number of the identified issues in this section and proposed mitigation measures should be included in the MOA. This includes potential affects during the construction period and those that are long-range.

University of Hawaii at Manoa

Institute for Astronomy
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Telex: 723-8459 • UHAST HR

Office of the Director

January 4, 2000

Dr. Don Hibbard, Administrator
Department of Land and Natural Resources
Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokula Blvd.
Kapolei, HI 96707

Dear Dr. Hibbard:

Subject: Request for Historic Preservation (Chapter 6E, HRS) and National Historic Preservation Act (Section 106) Review — W. M. Keck Observatory Outrigger Telescope Project, Mauna Kea, Hamakua, Hawai'i (TMK 4-4-15:09)

Thank you for reviewing our request and also for providing us with new information concerning the cultural significance of the Mauna Kea summit. We will include all of the new information and your assessment of effects in the Final EA. We also appreciate you assistance in navigating through the NHPA Section 106 consultation process and suggesting mitigating measures that would prevent or minimize those actions that would further deteriorate the structural and visual integrity (i.e., shape and contour) of the cinder cone and its crater.

NASA has authorized the University of Hawai'i Institute for Astronomy (UH IfA) to initiate and conduct working level consultations and negotiations to meet the requirements of Section 106 as implemented by the Advisory Council on Historic Preservation (ACHP) regulations at 36 CFR Part 800, "Protection of Historic and Cultural Properties." However, NASA will make all formal findings, such as a finding that historic properties are affected. In the event that a memorandum of agreement (MOA) with the State Historic Preservation Officer and, if appropriate, the ACHP is necessary, the UH IfA is authorized to negotiate the terms, conditions, and stipulations of the MOA on NASA's behalf. However, NASA will be the signatory of the MOA with the SHPO and, if appropriate, the ACHP. UH IfA will sign as a concurring party.

In regard to the history of the project site given on page VI-1, review of all of the past grading plans for the WMKO site indicates that the entire area to be used for the Outriggers has been previously graded, cut and altered to an extent that precludes the presence of burials. To alleviate

concerns, however, and to prevent the highly unlikely inadvertent disturbance of remains, an archaeologist will be retained to monitor all excavations during the construction period.

In regard to your concern about the Master Plan update process, the proposed project is explicitly included as one component of the astronomy development proposed in the new Master Plan. The new plan, which is programmatic, and intended to cover the next 20 years, will be presented to the UH Board of Regents in the near future. We understand that the CDUA for the project will not be presented for approval to the Land Board until the updated Master Plan is adopted by the Board of Regents. In addition, we do not plan to file the Final EA/FONSI until the Section 106 consultation process has been completed.

The Keck Interferometer/Outrigger Project is a key element within the National Aeronautics and Space Administration (NASA) Origins program. As it is part of a larger endeavor, its schedule is critical to the overall success of the program. For this reason, and the fact that it would be constructed on a currently developed site and cause minimal disturbance to the environment, UH decided to allow the environmental review and permitting activities to proceed in parallel with the Master Plan process. Relevant recommendations from the Master Plan will be incorporated into the design and construction plans.

In response to your detailed comments on the EA:

Page S-3, para. 7. A number of the mitigation measures proposed to minimize impacts on the arthropod fauna are also applicable to Historic Preservation concerns, These should be included in the MOA.

Response: We will do so. In addition, we are working with an entomologist to identify other mitigating measures. These will also be included in the MOA if they are applicable to Historic Preservation.

Page 8-4, para. 2. The term "historic properties" or "historic sites" should be used instead of "cultural remains" to describe the results of the 1982 archaeological survey of the summit area. This more specifically indicates that the survey was to identify archaeological surface features.

Response: We will make the appropriate changes in the text.

Page S-4, para, 3, This paragraph describes the recent survey work done by our office in 1995 and 1997. As written, this paragraph gives the somewhat misleading impression that this recent work to relocate and assess the condition of sites found in 1982 and 1984 took place near areas where telescopes were being constructed. While it is true that none appear to have been disturbed directly by construction activities, almost all are at quite a distance from existing telescopes. Also we would not refer to the 1995 work as "a full reconnaissance survey." It was simply a survey to relocate and assess previously identified historic properties. It should also be mentioned that the sites being assessed are mostly shrines.

Response: We will make the necessary corrections. We wanted to make it clear that telescope construction on the summit has in no way disturbed previously-located archaeological sites. As you are aware, an archaeological clearance was given for each facility built on the mountain.

We will revise the statement in the EA to state "survey" rather than "full reconnaissance survey." We will also mention that the sites being assessed are mostly shrines although we did incorporate the 1983 SRCDP EIS into the EA by reference. The archaeological study in the EIS described each of the sites located. It also included an ethnographic study of the summit area.

Page S-4, para. 5. Some of the commitments made here to reduce the visual impacts of the observatories and associated infrastructure would be appropriate in the MOA. For example, constructing retaining wells to maintain the structure of the cinder cone and its slopes is a mitigation measure that would help maintain the integrity of this historic property. Constructing the retaining wells of natural-colored materials so that they blend with the existing terrain is another appropriate mitigation measure.

Response: Thank you. We will include the measures in the MOA.

Page S-7, Table S-1 and Page II-15, Table 2-1. In this summary table, Section 106 of the National Historic Preservation Act and the accompanying regulations should be listed under federal compliance and not the state or Board of Land and Natural Resources. The State Historic Preservation Office only plays a role in the Section 106 process, it does not implement the process. This law, like that of NEPA, is triggered in this case by the expenditure of federal funds on the project. Chapter 6E.8 is triggered by the project taking place on state land and the involvement of a state agency.

Response: It was included under the State because of the critical role the State Historic Preservation Officer (SHPO) plays in the Section 106 process. We will, however, make your suggested correction in the Final EA.

Pages II-11 and II-13 and Page IV-8. These discussions make numerous commitments that would be appropriate in the MOA. The commitment is made to prevent the accidental dispersal of debris from construction and storage sites (Page II-13, para. 9), but the discussion does not address who is responsible for collecting debris and materials that are dispersed despite the best of intentions. Contingency plans for clean-up should be included. Also, the discussion mentions monitoring by the Mauna Kea Support Services and that additional recommendations by the consulting entomologist will be in the construction contract. Additional recommendations may also result from consultations with the native Hawaiian community.

Response: UH IfA is now incorporating stringent conditions in its agreements with the observatories. These conditions must also be incorporated into the construction contracts. In other words, they must do it. We will accept suggestions from any group on how to better manage containment of construction debris.

Page III-9, paras, 3 and 4. This "Cultural Resources" section does not really depict the nature and distribution of known historic properties in the summit region or in these areas closest to the proposed project area. We suggest that this section be revised so that the results of the 1982 and 1984 surveys are better represented in the opening paragraph. It should be made clear that the 40 sites identified during those surveys are almost certainly religious shrines and that these surveys were limited geographically. While it is true that pre-construction surveys have not found historic

sites in the summit area, some were found during the survey conducted for the VLBA Antenna. The sentence that "No additional sites were located" is also misleading because the more recent surveys have identified a substantial number of addition shrines in the summit region. Although the reports of these surveys have not been completed, a draft report on site characteristics and distribution patterns was submitted to IFA in February 1999. At a minimum these greater numbers should be mentioned. As we mentioned in an earlier comment (Page S-4, para. 3), our field work in 1996 had other objectives and it is somewhat misleading to say these sites were not damaged by telescope construction when the historic sites are located a considerable distances from the observatories. We are also puzzled by the description of the geological attributes of the Mauna Kea Ice Age Reserve in the "Cultural Resources" section. The adze quarry is appropriate in this discussion but it should also be mentioned after the distribution of known shrines.

Response: As stated previously, the SRCDP FEIS was incorporated into this EA by reference (Page I-8). In the interest of brevity, we did not repeat all of the information that was presented in that document. The VLBA survey was not included because the area surveyed, 12,200-foot elevation, was not directly or indirectly affected by the proposed project. We will, nonetheless expand the section in the final EA and include statements selected from your letter. We will also mention the latest 1999 study. We wanted to make it clear that telescope construction on the summit has in no way disturbed previously-located archaeological sites. As you are aware, an archaeological clearance was given for each facility built on the mountain. We will work with you to present the adze quarry properly in the EA.

Page IV-1, para. 5 and Page IV-2, paras, 1 and 2. As discussed in our cover letter, this history of the project area should be clarified as it is not clear if the 71,700 square feet used for the Keck II Observatory has been substantially or only moderately altered.

Response: As stated previously, an extensive review was undertaken of the Keck I and Keck II grading plans compared to the topography of the Pu'u prior to any construction taking place. It is evident from these surveys that all of the area to be used for the construction of the Outrigger telescopes and associated infrastructure has been extensively graded, cut and altered from its original state.

Page IV-3, para, 5, The potential need to stabilize the cinder cone and its slopes should be addressed in the MOA as should a commitment to maintain the general shape and form of the cone in a manner that blends with the terrain.

Response: We will do so.

Page IV-3, paras. 7 and 8. The issue of drainage and erosion should be addressed in the MOA because the formation of gullies on the cone slopes would affect the integrity of the historic property. While the mitigation proposed may alleviate the problem, the MOA should probably include a provision for the long-term monitoring of their effectiveness in case unforeseen erosion occurs.

Response: We will do so.

Page IV-8 and IV-9, Historical and Cultural Resources. Our comments on this section are similar to those expressed earlier (Page S-4, para, 3; Page III-9, paras. 3 and 4). We feel the known distribution of shrines in the summit region should be given greater prominence than the adze quarry in this context. It should be explicitly stated that the forty known sites are most likely religious shrines. As we have argued in our cover letter, our assessment of historic properties in the project area and the potential effects of the project is substantially different from that which is stated here.

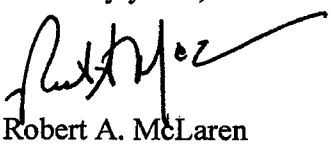
Response: As stated previously, we will expand the section with more information from previous referenced studies. We are aware that your assessment is different from what is stated in the EA. As you know, we were unable to obtain this information prior to filing the DEA and we depended on your office's past determinations for the project site.

Page IV-9 and IV-10, Aesthetics. A number of the identified issues in this section and proposed mitigation measures should be included in the MOA. This includes potential affects during the construction period and those that are long-range.

Response: Construction sites are inherently somewhat unsightly; however, every effort will be made to minimize the negative visual effects of construction activities. These and the previously-mentioned long-range mitigations will be incorporated into the MOA.

Thank you again for all of your assistance in insuring that all historic and cultural issues are addressed. We will be in contact with your office throughout the Section 106 consultation and review process.

Sincerely yours,



Robert A. McLaren
Interim Director

RAM:nll
cc: OEQC
CARA
MCM Planning

APPENDIX C

LIST OF HISTORIC PROPERTIES LOCATED IN THE HALE POHAKU AREA (SITE 50-10-23-16244)

LIST OF HISTORIC PROPERTIES LOCATED IN THE HALE POHAKU AREA (SITE 50-10-23-16244)**

State Site No.	BPBM Site No. 50-Ha-G28-87-	Description	Functional Interpretation
10310	Locality 1	Lithic scatter	Adze and octopus sinker manufacturing workshop
10311	Locality 2	Lithic scatter	Adze and octopus sinker manufacturing workshop
10312	Localities 3 and 4	Lithic scatter	adze and octopus sinker manufacturing workshop
10313	Shrine 1	3-5 uprights and octopus sinker manufacture offerings	Octopus sinker manufacturing ritual
10314	Locality 5	Lithic scatter	Adze and octopus sinker manufacturing workshop
10315	Shrine 2	1 upright	ritual
10316	Locality 6	Lithic scatter	Adze and octopus sinker manufacturing workshop
10317	Locality 7	Lithic scatter and firepit	Possible temporary camp and adze and octopus sinker manufacturing workshop
10318	Locality 9	Lithic scatter	Adze and octopus sinker manufacturing workshop
10319	Locality 10	Lithic scatter	Octopus sinker manufacturing workshop
10320	Locality 8	Lithic scatter and firepit	Temporary camp and adze and octopus sinker manufacturing workshop
10321	Locality 11	Lithic scatter	Adze and octopus sinker manufacturing workshop
10322	Locality 12	Lithic scatter	Octopus sinker manufacturing workshop
10323	Locality 4	Lithic scatter	Adze and sinker manufacturing workshop
16245	Locality 13	Lithic scatter	Adze and octopus sinker manufacturing workshop
16246	Locality 14	Lithic scatter	Adze and octopus sinker manufacturing workshop

**The State site numbers were arbitrarily assigned by Cordy (1994:Table 28) before the 1991 site report was submitted to SHPD. Cordy assigned numbers to each of the 14 remains identified in the survey and also gave a number (50-10-23-16244) to the whole site complex (BPBM Site No. 50-Ha-G28-87), which was called the Pu`u Kalepeamoa Site by McCoy (1985, 1991)

APPENDIX D

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
1997.02	*12,979*	*Stacked rocks*	*Historic shelter/PM2006.014*
1997.07	*13,308*	*Stacked (2) rocks on a boulder*	*Marker/2005.04*
1997.11	12,864	Stacked (2) rocks on an outcrop	Unknown
1997.12	13,028	Leaning stone	Unknown
1997.13	13,124	Stone slabs on outcrop	Unknown
1997.15	12,994	Stacked (2) rocks on outcrop	Marker
1997.17	*12,506*	*Stacked (4) rock on boulder*	*Marker/RN2006.006*
1997.18	*12,457*	*Single rock on boulder*	*Marker/RN2006.068*
1997.19	12,342	Stacked (9) rocks on a boulder	Marker
1997.20	13,054	Filled areas (2) on outcrop	Unknown
1997.21	13,091	Overhang with stacked rock wall	Temporary shelter
2005.01	13,803	C-shape at Site 21209	Temporary shelter
2005.02	12,950	Stacked rocks	Marker
2005.03	13,271	Stacked (3) rocks	Marker
2005.04	*13,220*	*Stacked rocks*	*Marker/1997.07*
2005.05	13,220	Stacked rocks	Marker
2005.06	13,202	Possible upright	Unknown
2005.07	13,000	Possible uprights	Unknown
2005.08	13,140	Two uprights near weather station	Unknown
2005.09	13,016	Stacked rocks	Marker
2005.10	13,250	Air Force drone	Surveillance plane?
2005.11	12,770	Stacked (3) rocks on ridge toe	Marker
2005.12	13,340	Stacked boulders on whaleback ridge	Marker
2005.13	13,000	Stacked (4) rocks on a boulder	Marker
2005.14	13,000	Stacked (4) rocks on a boulder	Marker
2005.15	13,000	Stacked (2) rocks	Marker
2005.16	13,245	Stacked (3) rocks	Marker
2005.17	13,122	Stacked (8) rocks on a boulder/piled rock against a boulder, over shallow overhang	Marker
2005.18	13,093	Piled rock	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
2005.19	12,647	Stacked (4) rocks on a boulder and 2 rocks on an outcrop	Marker
2005.20	12,378	Stacked (2) rocks on a boulder	Marker
2005.21	13,000	Stacked rocks	Marker
2005.22	12,950	Stacked rocks	Marker
2005.23	12,850	Stacked rocks	Marker
2005.24	12,820	Stacked rocks	Marker
2005.25	12,790	Stacked (4) rocks on a boulder	Marker
2005.26	12,000*	Stacked (2) rocks on a boulder	Marker
2005.27	12,000*	Stacked linear mound	Unknown
2005.28	12,000*	Stacked rocks	Marker
2005.29	12,000*	Stacked rocks	Marker
2005.30	12,000*	Stacked rocks on a boulder	Marker
2005.31	12,841	Stacked (5) rocks with orange spray paint on one	Marker
2005.32	12,800	Single upright abutting a boulder	Unknown
2005.33	12,000*	Single upright	Unknown
2005.34	12,943	Stacked (3) rocks	Marker
2005.35	12,632	Stacked (5) rocks on a boulder	Marker
2005.36	12,654	Rock placed upright on a boulder	Marker
PM2006.01	13,159	Two (2) stacked rock on boulder	Marker
PM2006.02	13,057	Single upright leaning on boulder	Modern shrine?
PM2006.03	12,919	Single rock on boulder	Marker
PM2006.04	12,826	Support rocks and wood	Surveyor's marker
PM2006.05	12,817	Two (2) rocks	Marker
PM2006.06	11,894	Six (6) rocks next to boulder	Unknown
PM2006.07	11,893	Three (3) rocks on boulder	Marker
PM2006.08	12,627	Four (4) rocks	Marker
PM2006.09	12,040	Upright on soil	Unknown
PM2006.10	11,976	Seven (7) piled rocks on boulder	Marker
PM2006.11	11,997	Two (2) rocks on boulder	Marker
PM2006.12	12,251	Single rock on boulder	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
PM2006.13	12,255	Three (3) rocks on boulder	Marker
PM2006.14	*12,233*	*Single rock on boulder*	*Marker/1997.02*
PM2006.15	12,211	Single rock on boulder	Marker?
PM2006.16	12,036	Single rock on boulder	Marker?
PM2006.17	12,047	Single rock on boulder	Marker?
PM2006.18	12,002	Single rock on boulder	Marker?
PM2006.19	12,010	Single rock on boulder	Marker??
PM2006.20	11,970	Single rock on boulder	Marker?
PM2006.21	11,885	Seven (7) rocks on two boulders	Marker
PM2006.22	11,905	Two (2) rocks on boulder	Marker
PM2006.23	11,895	Six (6) rocks on boulder	Marker
PM2006.24	11,885	Two (2) rocks on boulder	Marker
PM2006.25	11,905	Single rock on each boulder(2)	Marker?
PM2006.26	11,895	Single rock on boulder	Marker?
PM2006.27	11,885	Single rock on boulder	Marker?
PM2006.28	11,905	Four (4) rocks on boulder	Marker
PM2006.29	11,895	Cluster of Find Spots	Marker?
PM2006.30	11,885	Cluster of Find Spots on a ridge below Pu'u Lilinoe	Marker?
PM2006.31	12,234	Single Rock on boulder adjacent to Site 25769 (lithic scatter)	Modern site marker?
PM2006.32	12,522	Single rock on boulder	Marker?
PM2006.33	12,203	Single rock on boulder	Marker?
PM2006.34	12,107	Stacked rock on boulder	Marker/Cairn
PM2006.35	12,215	Three (3) rocks on boulder	Marker
PM2006.36	12,057	Four (4) rocks on boulder	Marker
PM2006.37	12,084	Single rock on boulder	Marker
PM2006.38	12,149	Three (3) rocks on boulder	Marker
PM2006.39	*12,108*	*Two (2) rocks on boulder*	*Marker/RN2006.024*
PM2006.40	12,147	Three (3) rocks on boulder	Marker
PM2006.41	12,904	Two (2) rocks on boulder	Marker
PM2006.42	12,054	Seven (7) rocks on boulder	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
PM2006.43	12,877	Four (4) rocks on boulder	Marker
PM2006.44	12,881	Nine (9) rocks on boulder	Marker
PM2006.45	12,346	Four (4) rocks on boulder	Marker
PM2006.46	12,339	Two (2) rocks on boulder with roses, ti leaf, a crystal, and a heart-shaped piece of coral	Modern shrine
PM2006.47	12,988	Three (3) rocks on boulder	Marker
PM2006.48	12,795	Six (6) rocks, two (2) stacked on boulder	Marker
PM2006.49	12,964	Single upright, no support stones	Unknown
PM2006.50	12,234	Single rock on boulder with three (3) stacked rocks next to boulder	Unknown
PM2006.51	12,522	Vertically oriented stone on boulder	Modern shrine
PM2006.52	12,203	Cluster of four (4) find spots, including one (1) with a rounded stone boulder	Markers?
PM2006.53	12,107	Two (2) stacked rocks on boulder	Marker
PM2006.54	12,215	Single rock on boulder	Marker
PM2006.55	12,057	Single Rock on boulder	Marker
PM2006.56	12,084	Two (2) rocks on boulder	Marker
PM2006.57	12,149	Two (2) stacked rocks on boulder	Marker
PM2006.58	12,108	Two (2) stacked rocks and three to four (3-4) piled rocks on outcrop	Marker?
PM2006.59	12,147	Seven (7) stacked rocks on ridgetop	Marker
PM2006.60	12,904	Two (2) boulders, one with two (2) stones on top, the second with seven (7) stones	Marker
PM2006.61	12,054	Four (4) stacked rocks on ridgetop	Marker?
PM2006.62	12,877	Two (2) stacked rocks on boulder	Marker
PM2006.63	12,881	Two (2) rocks on boulder	Marker
PM2006.64	12,346	Ten (10) piled rocks on glacial outwash plain ca. 5 m north of Site 25766	Modern site marker?
PM2006.65	12,339	Three (3) mounds of piled rocks, 2-3 meter area	Markers
PM2006.66	12,505	name "Adam" spelled out with rocks on summit of cinder cone	Memorial marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
PM2006.67	12,423	Two (2) adjacent boulders with two (2) piled rocks on one and four (4) on the other	Marker
PM2006.68	12,425	Two (2) adjacent boulders with two (2) rocks on one and four (4) on the other	Marker
PM2006.69	12,390	Six (6) piled rocks on boulder	Marker
PM2006.70	12,304	Five (5) piled stones on boulder	Marker
RN2006.01	12,505	Single rock on boulder	Marker?
RN2006.02	12,423	Wood and metal	Surveyors marker
RN2006.03	12,425	Rock alignment	Hunters blind?
RN2006.04	12,390	Rock alignment	Hunter blind?
RN2006.05	12,304	Single rock on boulder	Marker
RN2006.06	*12,505*	*Four (4) stacked rock on small boulder*	*Marker/1997.017*
RN2006.07	12,423	Seven (7) piled rock on boulder	Marker
RN2006.08	12,425	Three (3) features: 1= single rock on boulder 2 = Three (3) rock on boulder one is upright with the other two on top 3= four (4) rock on boulder	Recent shrine or marker
RN2006.09	12,390	Three (3) rocks next to boulder (rock are light grey in color)	Unknown
RN2006.10	**12,304**	**Fifteen plus (15+) slabs and rock on boulder; one aluminum can present**	**Disturbed shrine? Now reported as Site 25792**
RN2006.11	12,505	Two (2) rock on boulder	Marker
RN2006.12	12,423	Two rock on boulder	Marker
RN2006.13	12,425	Single rock on boulder	Marker
RN2006.14	12,390	Three (3) rocks on boulder	Marker
RN2006.15	12,304	Two (2) rocks on boulder	Marker
RN2006.16	12,505	Eleven (11) rocks on boulder	Marker?
RN2006.17	12,423	Three (3) mounds with wood and metal	Surveyors markers
RN2006.18	12,425	Single rock on boulder	Marker
RN2006.19	12,390	Single rock on boulder	Marker?
RN2006.20	12,304	Two (2) rocks on boulder	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2006.21	11,948	Three (3) rocks on boulder; two additional spots N and NE	Marker
RN2006.22	11,924	Four (4) features: 1= 13 rocks on boulder [6 are slabs] 2= single rock on boulder 3 = four rocks on boulder and 4 = 11 rocks on boulder [7 are light grey in color]	Unknown
RN2006.23	11,933	Single rock on boulder	Marker
RN2006.24	12,099	Two (2) stacked rocks on boulder	Marker
RN2006.25	12,138	Two (2) stacked rocks on boulder (another spot west ~25 m)	Marker
RN2006.26	12,133	Thirty plus (30+) rocks on boulder	Marker
RN2006.27	12,148	Six plus (6+) single cobble on boulder spots in this area	Unknown
RN2006.28	12,204	Single rock on boulder (another spot downslope [SE])	Marker
RN2006.29	12,225	One (1) cobble on boulder	Marker
RN2006.30	12,225	Three (3) rocks on boulder	Marker?
RN2006.31	12,190	Single rock on boulder	Marker?
RN2006.32	12,033	Single rock on boulder	Marker?
RN2006.33	12,033	Thirteen plus (13+) pebbles and cobbles and boulder	Unknown
RN2006.34	12,003	Two rocks on outcrop	Unknown
RN2006.35	11,949	Two (2) stacked rock on boulder	Marker
RN2006.36	11,916	Three (3) rocks on boulder; two (2) are stacked	Marker
RN2006.37	11,868	Single rock on boulder	Marker
RN2006.38	11,889	Single rock on boulder	Marker
RN2006.39	11,898	Four features: three are single rocks on boulder and one has 25 pebbles and cobbles on a boulder	Modern marker?
RN2006.40	11,881	Three (3) rocks and a slab on boulder: another spot is E/NE (15 m) and is a single rock on boulder	Marker, possibly a shrine
RN2006.41	11,976	Two (2) rocks on boulder; Adze blank found here. Another spot is 30 m downslope and looked like a single on boulder	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2006.42	11,987	Single rock on boulder	Marker
RN2006.43	11,994	Two (2) stacked rocks on boulder	Marker
RN2006.44	12,003	Single rock on boulder	Marker
RN2006.45	12,001	Two (2) rocks on boulder; two additional spots S and N. Each has 2-3 rocks on a boulder	Marker
RN2006.46	12,080	Single light grey slab on boulder	Unknown
RN2006.47	12,103	Single rock on outcrop	Unknown
RN2006.48	12,222	Two (2) stacked cobbles on gelifluction terrace	Unknown
RN2006.49	12,125	Single rock on boulder and four (4) rocks on second boulder	Markers
RN2006.50	12,131	Single rock on boulder	Marker?
RN2006.51	12,261	Single rock on boulder	Marker?
RN2006.52	12,539	Several single rocks on whaleback ridge	Markers?
RN2006.53	12,492	Two (2) rocks on outcrop	Unknown
RN2006.54	12,427	Two (2) stacked rocks on boulder	Marker
RN2006.55	12,418	Two (2) stacked rocks on boulder	Marker
RN2006.56	12,214	Two single rocks on boulders with rusted cans (sardine and pork and beans – key openers for the bean cans. Stick wedged between boulder and rocks	Historic markers?
RN2006.57	12,165	Six (6) pebbles and cobbles on small boulder	Unknown
RN2006.58	12,210	Two (2) stacked small boulders	Unknown
RN2006.59	12,295	Two (2) stacked rocks on boulder	Marker
RN2006.60	12,239	Single rock on boulder	Marker?
RN2006.61	12,241	Single rock on boulder	Marker?
RN2006.62	----	Single rock on boulder and 2-3 rocks on second boulder	Unknown/No GPS data
RN2006.63	13,291	Two (2) stacked rocks on boulder	Marker
RN2006.64	12,964	Nine (9) rocks on boulder, second boulder has three (3) rocks	Markers?
RN2006.65	12,896	Two (2) stacked rocks on boulder	Marker
RN2006.66	12,785	Single (large) tabular slab broken into three pieces	Unknown

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2006.67	12,774	Single rock on small boulder	Unknown
RN2006.68	*12,476*	*Single rock on boulder*	*Unknown/1997.018*
RN2006.69	12,391	Multiple find spots – rocks on boulders	Markers
RN2006.70	12,386	Eleven (11) rocks on boulder, three additional find spots with 1-2 rocks on boulders nearby	Markers
RN2006.71	12,854	Eight (8) rocks on red-colored boulder	Marker
RN2006.72	12,779	Ten (10) piled rocks on outcrop	Marker
RN2006.73	12,799	Six (6) rocks (three cobbles and three pebbles) on boulder	Unknown
RN2006.74	12,897	Two (2) stacked rocks on outcrop	Unknown
RN2006.75	12,703	Two (2) stacked rocks on small boulder	Unknown
RN2006.76	11,860	Piled rock on boulder	Marker
RN2006.77	11,914	One (1) rock on boulder	Marker
RN2006.78	11,928	Piled rock on boulder	Marker
RN2006.79	11,595	Piled rock on boulder	Marker
RN2006.80	12,239	Two (2) rocks on boulder	Marker
RN2006.81	12,094	Stacked rock on boulder	Marker
RN2006.82	11,935	Two (2) rocks on boulder	Marker
RN2006.83	11,894	Piled rock on boulder	Recent marker?
RN2006.84	12,323	Seven (7) FS recent construction	Recent practitioners
RN2006.85	**12,335**	**Adze preform**	**Isolate artifact/changed to Site 25767**
RN2006.86	12,358	Piled rock on boulder	Marker
RN2006.87	13,012	Two (2) rocks on boulder	Marker
RN2006.88	13,053	1 (1) rock on boulder	Marker
RN2006.89	12,479	Cairn, stake, pins, stakes, and wire	Survey marker
RN2006.90	12,442	U-shaped enclosure w/ rusted cans	Historic temporary shelter
RN2006.91	12,457	Boulder with four (4) cobbles on top with a wooden pole placed against the boulder	Marker
RN2006.92	12,341	Boulder with four (4) cobbles on top	Marker
RN2006.93	12,479	Wall with cleared area east of wall	Temporary shelter
RN2006.94	12,768	Cairn with pole in center	Marker
RN2006.95	12,767	Cairn with pole in center	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2006.96	12,442	Boulder with scattered cobbles	Marker
RN2006.97	12,702	Mound	Unknown
RN2006.98	12,478	Four (4) cobbles holding down a piece of aluminum	Marker
RN2006.99	11,791	Piled rock on boulder	Marker
RN2006.100	12,196	Boulder with two (2) cobbles stacked on top	Marker
RN2006.101	12,065	Boulder with five (5) cobbles on top and a possible fallen upright at the base of the boulder	Marker
RN2006.102	12,327	Boulder with two (2) cobbles stacked on top	Marker
RN2006.103	12,331	Boulder with 13 cobbles on top	Marker
RN2006.104	12,418	Enclosure	Temporary shelter
RN2006.105	12,475	Two (2) rocks on boulder	Marker
RN2006.106	12,135	Two (2) FS: 1) is a boulder with five (5) cobbles on top 2) a split boulder with seven (7) cobbles piled in crack	Markers
RN2006.107	12,058	Enclosure – outside boundary	Temporary shelter
RN2006.108	12,222	Boulder with five (5) cobbles on top	Marker
RN2006.109	12,925	Rock pile with two (2) sticks	Marker
RN2006.110	12,583	Small boulder with four (4) stacked cobbles on top	Marker
RN2006.111	12,507	Boulder with seven (7) cobbles on top	Marker
RN2006.112	12,448	Boulder with two (2) cobbles on top	Marker
RN2006.113	11,870	Boulder with two (2) cobbles on top	Marker
RN2006.114	12,088	Rock pile with lava bomb on top	Marker
RN2006.115	12,081	Mound	Unknown
RN2006.116	12,085	Mound with two (2) sticks	Unknown
RN2006.117	12,113	Rock pile	Unknown
RN2006.118	12,416	Boulder with two (2) cobbles on top	Marker
RN2006.119	11,879	Two rock mounds	Unknown
RN2006.120	12,029	Mound with cobbles on top	Marker
RN2006.121	11,853	Boulder with three (3) cobbles on top. Possible flake on north side of boulder	Marker
RN2006.122	12,099	Boulder with two (2) cobbles on top	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2006.123	13,130	Cairn with slab on end on top	Recent marker
RN2006.124	**12,546**	**Eight (8) cobbles stacked on boulder**	**Marker/Site 21434**
RN2006.125	12,058	Enclosure	Temporary shelter
PM2007.01	12,535	Upright-like cobble supported by two cobbles	Marker
PM2007.02	12,197	Two cobbles on low angular boulder	Marker
PM2007.03	11,984	Two cobbles on small boulder	Marker
PM2007.04	11,859	Two large cobbles and three medium cobbles on flat, low boulder	Marker
PM2007.05	12,129	Two flat cobbles and one angular cobble on boulder	Marker
PM2007.06	12,118	Two large cobbles on flat boulder	Marker
PM2007.07	12,153	Five medium cobbles on medium boulder	Marker
PM2007.08	12,125	Four cobbles/small boulders on large boulders	Marker
PM2007.09	12,069	Four cobbles and a few pebbles on large boulder	Marker
PM2007.10	12,051	Two large cobbles on outcropping	Marker
PM2007.11	12,707	Three cobbles on boulder	Marker
PM2007.12	13,036	Two sets of stacked cobbles on outcropping	Marker
PM2007.13	13,056	Three cobbles on small boulders	Marker
PM2007.14	13,035	Eight to ten cobbles stacked on boulder	Marker
PM2007.15	12,889	Six cobbles stacked on outcropping	Marker
PM2007.16	12,804	Seventeen cobbles piled on outcropping	Marker
PM2007.17	12,521	Two find spots: cobbles on boulders	Marker
PM2007.18	13,017	Two large cobbles stacked on boulder	Marker
PM2007.19	13,619	Five cobbles on boulder	Marker
PM2007.20	13,577	Seven cobbles piled on outcropping	Marker
PM2007.21	12,823	Five cobbles stacked on boulder	Marker
PM2007.22	12,800	Three cobbles stacked on outcropping	Marker
PM2007.23	12,729	Four cobbles stacked on outcropping	Marker
PM2007.24	12,599	Three cobbles stacked on boulder	Marker
PM2007.25	11,696	Three cobbles stacked on outcropping	Marker
PM2007.26	12,564	Three cobbles stacked on outcropping	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
PM2007.27	11,875	Three cobbles on boulder	Marker
PM2007.28	12,069	Two cobbles stacked on boulder	Marker
PM2007.29	12,059	Two find spots: cobbles stacked on two boulders	Marker
PM2007.30	12,047	Three cobbles stacked on boulder	Marker
PM2007.31	12,006	Three cobbles stacked on boulder	Marker
PM2007.32	12,085	Seven cobbles on boulder	Marker
PM2007.33	12,398	Two cobbles on boulder	Marker
PM2007.34	12,381	Fifteen cobbles piled on boulder	Marker
PM2007.35	12,707	Two cobbles piled on outcropping	Marker
PM2007.36	12,614	Six cobbles piled on boulder	Marker
PM2007.37	12,918	Four cobbles stacked on boulder	Marker
RN2007.01	12,968	Cobbles scattered on boulder	Marker
RN2007.02	12,091	Four cobbles, one small boulder, and one slab on boulder	Marker
RN2007.03	12,942	Two cobbles stacked on flat slab	Marker
RN2007.04	11,933	Wall-like structure	Temporary shelter
RN2007.05	11,960	Four cobbles piled on boulder	Marker
RN2007.06	12,140	Six cobbles piled on boulder	Marker
RN2007.07	12,129	Two cobbles on boulder	Marker
RN2007.08	12,123	Two cobbles stacked on boulder	Marker
RN2007.09	12,034	Camping gear: tent, sleeping mat, sleeping bag, and one plastic bottle	Temporary camp site
RN2007.10	12,290	Two cobbles piled on boulder	Marker
RN2007.11	12,450	Two cobbles on boulder with a tabular slab on the ground	Marker
RN2007.12	12,434	Seventeen cobbles piled on boulder	Marker
RN2007.13	12,686	Single cobble on boulder visible from a distance	Marker
RN2007.14	12,778	Eight cobbles piled on boulder	Marker
RN2007.15	11,905	90-100 cobbles piled	Marker
RN2007.16	12,001	Two cobbles piled on boulder	Marker
RN2007.17	12,041	Three cobbles stacked on boulder	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2007.18	12,149	Two cobbles piled small boulder	Marker
RN2007.19	11,982	Two cobbles on large boulder	Marker
RN2007.20	12,244	Five cobbles piled on large boulder	Marker
RN2007.21	12,214	Fifteen cobbles piled on medium boulder	Marker
RN2007.22	12,169	Seven cobbles stacked on large boulder. A 2nd FS nearby	Marker
RN2007.23	12,138	Eight cobbles piled on small boulder	Marker
RN2007.24	12,239	Seven cobbles piled on outcropping	Marker
RN2007.25	12,358	Five cobbles stacked on outcropping	Marker
RN2007.26	12,451	Four cobbles piled on large boulder	Marker
RN2007.27	12,432	Eleven cobbles piled on large boulder	Marker
RN2007.28	12,679	Two cobbles on outcropping	Marker
RN2007.29	12,662	Five slabs stacked on low flat boulder	Marker
RN2007.30	13,207	Eleven cobbles piled on outcropping	Marker
RN2007.31	12,964	Two cobbles stacked on outcropping	Marker
RN2007.32	13,698	Thirty+ cobbles and small boulders piled on cinder (recent offering present)	Marker
RN2007.33	13,667	Alignment of cobbles forming an enclosure	Temporary shelter
RN2007.34	12,923	Two cobbles stacked on small boulder	Marker
RN2007.35	12,871	Two cobbles stacked on small boulder	Marker
RN2007.36	12,776	Three flat slabs stacked on outcropping	Marker
RN2007.37	12,760	Six cobbles dispersed on outcropping	Marker
RN2007.38	12,686	Three cobbles piled on medium boulder	Marker
RN2007.39	12,662	Two find spots: stacked cobbles on outcropping	Marker
RN2007.40	12,799	Five slabs stacked on outcropping	Marker
RN2007.41	12,711	Six cobbles piled on small boulder	Marker
RN2007.42	12,536	Two cobbles stacked on small boulder	Marker
RN2007.43	12,055	Three cobbles piled on large boulder. Two other FS nearby. One pair of Army issued boots observed	Marker
RN2007.44	12,056	Eight cobbles stacked on small boulder	Marker
RN2007.45	11,976	Three cobbles piled on large boulder	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2007.46	12,493	Seven cobbles stacked on large boulder. A stick is placed in the center	Marker
RN2007.47	12,368	Two find spots: cobbles stacked on boulders	Marker
RN2007.48	12,349	Thirty six cobbles stacked on large boulder. A towel is placed on south side with 12 cobbles holding the towel in place	Marker
RN2007.49	12,331	Three cobbles piled on boulder	Marker
RN2007.50	12,451	Three cobbles stacked on boulder	Marker
RN2007.51	12,422	Three cobbles stacked on boulder	Marker
RN2007.52	12,486	Four cobbles piled on boulder	Marker
RN2007.53	12,472	Five cobbles stacked on boulder	Marker
RN2007.54	12,657	Two cobbles on boulder	Marker
RN2007.55	12,705	Eight cobbled piled on outcropping. Rusted can nearby	Marker
RN2007.56	12,497	Four cobbles stacked on small boulder	Marker
RN2007.57	11,801	Five cobbles piled on large boulder	Marker
RN2007.58	11,794	Three cobbles piled on medium boulder	Marker
RN2007.59	11,697	Three cobbles piled on boulder	Marker
RN2007.60	11,701	Three cobbles piled on boulder	Marker
RN2007.61	11,699	Four cobbles on boulder	Marker
RN2007.62	11,683	Two cobbles stacked on large boulder	Marker
RN2007.63	11,738	Four cobbles piled on large boulder	Marker
RN2007.64	11,711	Seven cobbles piled on boulder	Marker
RN2007.65	11,739	Two find spots: cobbles piled on two large boulder	Marker

Italicized	*Find Spot recorded and has multiple identification numbers*
Bold	**FS changed to Site**
*	Estimated elevation

APPENDIX E

SAMPLE CONSULTATION LETTER ON OBSERVATORY MAINTENANCE ACTIVITIES

SAMPLE CONSULTATION LETTER ON OBSERVATORY MAINTENANCE ACTIVITIES

Dr. Robert A. McLaren
Associate Director
Institute for Astronomy
University of Hawaii
2680 Woodlawn Drive
Honolulu, HI 96822

Dear Dr. McLaren,

Pacific Consulting Services, Inc. (PCSI), a Honolulu-based consulting firm, is currently under contract to the Office of Mauna Kea Management (OMKM) to complete an archaeological inventory survey of the Mauna Kea Science Reserve and to develop several components of an historic preservation management plan for the Science Reserve. The following documents are being prepared for submittal to the State Historic Preservation Division for the purpose of demonstrating that the University of Hawai'i is complying with Chapter 6E (Hawaii Revised Statutes) and Section 106 of the National Historic Preservation Act:

1. List of maintenance activities and routine operations carried out by IfA and/or OMKM that may be excluded from the Historic Preservation Review and Compliance Process
2. Map and description of previously altered areas within the Area of Potential Effect (APE)
3. List of maintenance activities needing prior review, and potential compliance measures, and
4. An emergency plan that describes how OMKM/IfA will avoid or minimize damage to historic properties during emergency situations.

We need your assistance in preparing some of these documents.

The Area of Potential Effect (APE), a term used in cultural resource management studies, is commonly defined as the geographic area or areas within which an action may affect historic properties, if any such properties are present or thought to exist. The APE does not equate to the "footprint" of a building or road, for example, and must therefore take into consideration a larger geographic area. The definition of the APE is not limited to the consideration of physical effects alone, but should also take into consideration the potential for visual and auditory effects and indirect impacts, such as erosion, especially in the case of culturally and spiritually significant places like Mauna Kea. The APE for the maintenance activities and routine operations carried out by IfA and/or OMKM includes the 11,288 acre Mauna Kea Science Reserve (TMK: (3) 4-4-15:09) and a 19.3 acre parcel (TMK: (3) 4-4-15:12) at Hale Pohaku, which is the site of the mid-level facilities that include the Onizuka Center for International Astronomy, dormitories, maintenance buildings, and construction worker cabins.

The Mauna Kea Science Reserve contains a large number of historic properties, including the overlapping series of cinder cones that form the summit (Kūkahau'ula), which is a recognized Traditional Cultural Property (historic properties that are eligible for inclusion in the National Register of Historic Places because of their association with cultural practices or beliefs of a living community). Historical information indicates that Kūkahau'ula referred to both a legendary figure and to a character in traditional histories and genealogies. The Mauna Kea Science Reserve is also included in the Mauna Kea Summit Region Historic District, which was determined eligible for both the State and National Register of Historic Places in 1999.

A site called the Pu'u Kalepeamoa, after the name of the prominent cinder cone, was discovered at Hale Pohaku in 1984. A series of archaeological investigations have been conducted at this site, only a portion of which is located within UH lease area. The most recent work at Hale Pohaku, conducted in March 2005, involved archaeological monitoring of four septic tank excavations. The monitoring report noted that while all of the known surface features in the lease area have undergone data recovery and no longer exist, there is the possibility that buried cultural deposits might exist in some undisturbed areas.

The road between Hale Pohaku and the summit, which is currently maintained by Mauna Kea Observatories Support Services (MKOSS), is included in the APE because, except for specific areas that are under the responsibility of the Natural Areas Reserve System (NARS), the roadway and a 400-yard corridor on either side of it are the responsibility of the UH. Although a reconnaissance survey of a 100-ft wide corridor on both sides by the Bishop Museum in 1987 yielded negative results and subsequent archaeological investigations of selected areas near the road above the 12,000 ft elevation have not yielded evidence of sites either, a significant portion of the roadway easement has not yet undergone a systematic archaeological survey. The actual roadway between Hale Pohaku and the summit, and the previously surveyed 100-foot corridors on either side will be included on the map of previously altered areas, which means that these portions of the roadway easement can be listed among the excluded areas not requiring historic preservation review and compliance.

While most maintenance activities and routine operations related to the support of astronomical research on Mauna Kea are conducted or overseen by OMKM and/or MKOSS, there may be activities undertaken by some observatories that could potentially have an adverse effect on historic properties in the Science Reserve. The consultation process has thus been expanded to include each of the existing observatories, which is why we are asking for your assistance in providing information to help determine which activities should be included in the list of activities requiring historic preservation review and compliance and which activities can be excluded.

We are currently in the process of reviewing the Environmental Impact Statement (EIS) for the Keck Outrigger project and will be contacting you for clarification or any new or additional information pertaining to the following activities:

1. maintenance activities or routine operations involving the use of chemicals and other hazardous wastes in terms of how often they are delivered, how they are handled, how and where they are disposed of, and plans to mitigate accidental spills.

2. maintenance of the exterior dome surfaces and associated out-buildings (e.g., sheds), if they exist, in terms of, for example, how often they are painted and what kinds of repairs are made. The installation of safety ladders, small weather vanes and various other small instruments, such as cameras and anemometers, on a dome would be classified as "excluded activities."
3. maintenance activities that involve ground disturbance, such as the repair of underground utility lines, in terms of the equipment that is used, the extent of the area that is opened up, and how the excavations are filled.

We would like to contact you or a designated member of your staff by phone to discuss each of the above activities. Our plan is to begin this phone consultation process beginning June 5, 2006. If you should have any questions in the interim please contact Dr. Patrick C. McCoy in Honolulu at (808) 546-5557 Ext. 212 or via email at pat.mccoy@pcsihawaii.com

Sincerely,

Patrick C. McCoy
Senior Archaeologist
Pacific Consulting Services, Inc.

APPENDIX F

LIST OF GROUPS, AGENCIES AND INDIVIDUALS CONSULTED

LIST OF GROUPS, AGENCIES, AND INDIVIDUALS CONSULTED

	NAME	AFFILIATION
1	Ed Stevens	Kahu Ku Mauna Council member
2	Arthur Hoke	Kahu Ku Mauna Council member
3	Larry Kimura	Kahu Ku Mauna Council member
4	Leilehua Omphroy	Kahu Ku Mauna Council member
5	Toni Mallow	Kahu Ku Mauna Council member
6	Tiffnie Kakalia	Kahu Ku Mauna Council member
7	Sean Naleimaile	Kahu Ku Mauna Council member
8	Sharon Medeiros	Cultural practitioner
9	Maile (Spencer) Napoleon	Waimea resident
10	Anne Dressel	Guest
11	Betty and Fred Lau	Waimea Hawaiian Homes Board and Waimea Hawaiian Civic Club (HCC)
12	Ku "Clarence" Ching	Farmer
13	Kanani Kapuniai	Waimea Hawaiian Homesteaders Assn. Inc.
14	Reynolds N. Kamakawiwo`olea	Former Kahu Ku Mauna Council member
15	George K. Kahananui, Sr.	Community resident; no affiliation noted
16	Annie K. Coelho	Community resident; no affiliation noted
17	Aaron Kahananui	Community resident; no affiliation noted
18	Robert Boenig	Guest
19	Charles Young	Chair, Hawai`i Island Burial Council (HIBC)
20	Kaleo Kualii	HIBC member
21	Kimo Lee	HIBC member
22	Roy Helbush	HIBC member
23	Leningrad Elarionoff	HIBC member
24	Ronald Dela Cruz	HIBC member
25	Cynthia Nazara	HIBC member
26	Monica Bacon	Office of Hawaiian Affairs, Native Hawaiian Historic Preservation Committee (OHA, NHHPC)
27	Dr. Charles Burrows	OHA, NHHPC
28	Leslie Burrows	OHA, NHHPC
29	Jeno Enocencio	OHA, NHHPC
30	Ke`eaumoku Kapu	OHA, NHHPC
31	Christopher Kauwe	OHA, NHHPC
32	Kamika Kepaa	OHA, NHHPC
33	Kealakahi Meyers	OHA, NHHPC
34	Benjamin Noeau	OHA, NHHPC
35	Ke`ala Soares	OHA, NHHPC

LIST OF GROUPS, AGENCIES, AND INDIVIDUALS CONSULTED

	NAME	AFFILIATION
36	Noelani Watanabe	OHA, NHHPC
37	Apolei Bargamento	OHA, NHHPC
38	Sweet Mathews	OHA, NHHPC
39	Keola Lindsay	OHA, NHHPC
40	Ruby McDonald	Kona HCC; President [Chair] Assn. of HCCs, Hawai`i Island)
41	Sam Moniz	President, Waimea HCC
42	Lucille V. Chung	Laupahoehoe HCC
43	Nani Langridge	Prince David Kawananakoa HCC
44	Shirley Kanehailua	Laupahoehoe HCC
45	Les Goveia	Ka`u HCC
46	Anna Cariaga	Ka`u HCC
47	Raylene Moses	No affiliation noted
48	Christine Naito	President, Prince David Kawananakoa HCC
49	Andy Wynn	President, South Kohala HCC
50	Kaena Peterson	Vice President, South Kohala HCC
51	Lily K. Pa	Hilo HCC
52	Paulette Ke	Hilo HCC
53	Martha McNicoll	Hilo HCC
54	Mabel Tolentino	Waimea HCC
55	Moana DeLeon	No affiliation noted
56	Aileen Hussey	Community resident
57	Kris Hoke	Hilo HCC
58	Jerry Konanui	Hilo HCC; cultural practitioner
59	Sibi Hoke	Hilo HCC
60	Martha McNicoll	Hilo HCC
61	Paul Neves	Royal Order of Kamehameha