

2010 Annual Report

To the

Board of Land and Natural Resources

Status of the Development of the

Comprehensive Management Plan's Management Actions

Status of the Development of Each Sub Plan

The University successfully completed the four sub plans described above, all of which were shared with the public in open house forums in Hilo, Waimea, and Kona. They were approved by the Mauna Kea Management Board, the volunteer, community-based advisory board, and the Board of Regents.

On March 25, 2010, the four sub plans were approved by the BLNR.

Status of the Development of Each [CMP] Management Action

The CMP contains 103 management actions categorized into four component plans which are further subdivided into sub-components (Table 1).

Table 1. CMP component plans.

CMP Section	Component Plan
7.1	Understanding and Protecting Mauna Kea's Resources
7.1.1	Native Hawaiian Cultural Resources
7.1.2	Natural Resources
7.1.3	Education and Outreach
7.1.4	Astronomy Resources
7.2	Managing Access and Use
7.2.1	Activities and Uses
7.2.2	Permitting and Enforcement
7.3	Managing the Built Environment
7.3.1	Infrastructure and Maintenance
7.3.2	Construction Guidelines
7.3.3	Site Recycling, Decommissioning, Demolition and Restoration
7.3.4	Considering Future Land Use
7.4	Managing Operations
7.4.1	Operations and Implementation
7.4.2	Monitoring, Evaluation, and Updates

Of the total number of management actions, 24 actions are currently under being implemented (ongoing), four (are completed, and 24 will be implemented on an as needed basis (see Appendix A). The latter are management actions that are primarily related to construction and decommissioning activities.

The remaining 51 actions were prioritized and assigned to a time category when they are planned for implementation: immediate (1 – 3 years); short term (4 – 6 years); mid-term (7-9 years); and long term (10+ years). Table 2 is a summary of the management actions implementation schedule by component

and subcomponent plans. Appendix B lists the implementation schedule for all the CMP management actions. Appendix C is a table listing the agency/agencies responsible for implementing the management actions.

CMP Management Action Implementation Overview

OMKM identified several priorities over the immediate and short terms:

- Research
- Monitoring
- Resources Management Programs
- Education, Training and Outreach
- Printed Materials & Public Forums

Table 2. Summary of the CMP implementation schedule showing the number of management actions arranged by component and subcomponent plan categories.

Component Plan	Implementation Schedule (as of 2010)						
	Ongoing	Immediate	Short-term	Mid-term	Long-term	Completed	As needed
7.1: Understanding and Protecting Mauna Kea's Resources							
7.1.1: Native Hawaiian Cultural Resources (14)	1	10	2			1	
7.1.2: Natural Resources (18)	2	5	3	3	2		3
7.1.3: Education and Outreach (8)	3	2		2	1		
7.1.4: Astronomy Resources (2)	2						
7.2: Managing Access and Use							
7.2.1: Activities and Uses (12)	7	2	2			1	
7.2.2: Permitting and Enforcement (8)	4	1				2	1
7.3: Managing the Built Environment							
7.3.1: Infrastructure and Maintenance (14)	1	4	3	3	2		1
7.3.2: Construction Guidelines (9)							9
7.3.3: Site Recycling, Decommissioning, Demolition & Restoration (3)							3
7.3.4: Considering Future Land Use (7)		1					6
7.4: Managing Operations							
7.4.1: Operations and Implementation (5)	4		1				
7.4.2: Monitoring, Evaluation, and Updates (3)		1	1				1
7.5: 1995 Management Plan Controls (1)							1
Total	24	26	12	8	5	4	24

Research. In order to protect and manage the resources, it is necessary to assess the status of the resources by first establishing baseline data. A top priority is the filling of resource data gaps. OMKM will:

- Initiate surveys and studies on flora and fauna, geology and hydrology, climate/weather and air quality, and erosion
- Initiate surveys of human activities and needs such as commercial tour capacity and fees, traffic and parking and public facilities
- Continue studies on the wekiu bug including habitat restoration.

Monitoring. Monitoring is an ongoing and long term priority for assessing the status of the resources over a period of time. Currently OMKM has baseline data on the archaeological resources and wekiu bug. Beginning in 2007 OMKM initiated surveys of arthropods at the mid-level facilities at Hale Pohaku and selected locations on the summit. Other planned monitoring activities include:

- Initiate monitoring of the archaeological resources
- Continue surveys of the wekiu bug and arthropods species
- Initiate monitoring of new categories of resources using data obtained during the baseline data gathering stage.

Resources Management Programs. Concurrent with the gathering of baseline information, is the need to implement several key resource management programs:

- Development of protocols and/or policies related to cultural practices, for example, the development of a burial treatment plan and collection of information of traditional, contemporary and customary practices
- Development of an invasive species control plan.
- Development of a wekiu bug management plan

Education, Training and Outreach. OMKM recognizes the need to formally educate and train management staff, stakeholders, well as the general public about the resources. One of the key tenets of the Public Access Plan is that “an informed public is best prepared to make good decisions and act responsibly.” OMKM plans to:

- Initiate programs to educate stakeholders and management staff, and the general public.
- Develop and maintain a GIS and database programs.
- Update training and education efforts.
- Develop an outreach program.

Printed Materials & Public Forums. The education process and outreach efforts will include the development of educational materials, such as brochures, signage and vehicles for disseminating materials, including public forums.

- Develop and implement a signage program
- Develop and print brochures
- Hold public and/or town hall meetings, participate in public events

Appendix A

Summary of Ongoing, Completed and As Needed Mauna Kea CMP Management Actions

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CMP Management Actions that are Ongoing, As Needed and Completed

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES			
		Implementation Schedule	Subplans
NATIVE HAWAIIAN CULTURAL RESOURCES			
Historic Properties			
CR-14	Immediately report any disturbance of a shrine or burial site to the rangers, DOCARE, Kahu Kū Mauna Council, and SHPD.	Ongoing	CRMP 4.3.1.6 PAP 2.5.1
CR-11	Complete an archaeological survey of the portions of the Summit Access Road corridor that are under UH management.	Completed	CRMP 4.3.7
COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES			
NATURAL RESOURCES			
Inventory, Monitoring and Research			
NR-16	Conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan.	Ongoing	NRMP 4.1 PAP 6.4
NR-18	Develop geo-spatial database of all known natural resources and their locations in the UH Management Areas that can serve as baseline documentation against change and provide information essential for decision-making.	Ongoing	NRMP 4.1, 4.5
NR-10	Incorporate mitigation plans into project planning and conduct mitigation following new development.	As needed	NRMP 4.3
NR-11	Conduct habitat rehabilitation projects following unplanned disturbances.	As needed	NRMP 4.3
NR-12	Create restoration plans and conduct habitat restoration activities, as needed.	As needed	NRMP 4.3
COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES			
EDUCATION AND OUTREACH			
Education			
EO-3	Continue to develop, update, and distribute materials explaining important aspects of Mauna Kea.	Ongoing	NRMP 4.4 CRMP 4.3.3 PAP 6.1
Outreach			
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.	Ongoing	NRMP 4.4.2 CRMP 5.3 PAP 5.2, 6.3, 6.8
EO-8	Provide opportunities for community members to participate in stewardship activities.	Ongoing	NRMP 4.4.2

		Implementation Schedule	Subplans
ASTRONOMICAL RESOURCES			
Protection of Astronomical Resources			
AR-1	Operate the UH Management Areas to prohibit activities resulting in negative impacts to astronomical resources.	Ongoing	PAP 5.1
AR-2	Prevent light pollution, radio frequency interference (RFI) and dust.	Ongoing	NRMP 4.2.3.2
COMPONENT PLAN: MANAGING ACCESS AND USE			
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.	Ongoing	NRMP 5.1.2 CRMP 4.1.1 PAP 4.2, 4.4, 4.5, 4.6, 5.2, 6.1, 6.2, 6.5, 6.6, 6.7
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.	Ongoing	NRMP 4.2.3.1 CRMP 4.1.2 PAP 2.5.1, 2.5.2, 2.6.3, 5.2, 6.3, 6.5
Recreational			
ACT-6	Define and maintain areas where snow-related activities can occur and confine activities to slopes that have a protective layer of snow.	Ongoing	NRMP 4.2.3.1 CRMP 4.2.3.2 PAP 3.3.5, 5.2, 6.1, 6.3, 6.4
ACT-7	Confine University or other sponsored tours and star-gazing activities to previously disturbed ground surfaces and established parking areas.	Ongoing	NRMP 6.2.3 CRMP 4.2.3.1 PAP 2.5.3, 2.6.2, 3.3.3, 5.2
Commercial			
ACT-9	Maintain commercial tour permitting process; evaluate and issue permits annually.	Ongoing	NRMP 3.1.4 PAP 2.5.3, 2.5.4, 3.3.3, 4.3, 5.2, 6.1, 6.7
ACT-10	Ensure OMKM input on permits for filming activities	Ongoing	NRMP 3.1.4.2 PAP 2.5.3, 3.3.3, 4.3, 6.1, 6.7
ACT-11	Seek statutory authority for the University to regulate commercial activities in the UH Management Areas.	Completed	NRMP 1.4.2.3
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.	Ongoing	NRMP 4.2.3.1, 4.2.3.7, 4.2.3.9 CRMP 4.2.6

		Implementation Schedule	Subplans
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.	Ongoing	NRMP 1.4.3 PAP 2.4, 2.5, 2.5.1, 2.5.2, 2.5.3, 5.1
P-2	Strengthen CMP implementation by recommending to the BLNR that the CMP conditions be included in any Conservation District Use Permit or other permit.	As needed	NRMP 1.4.3.2
P-3	Obtain statutory rule-making authority from the legislature, authorizing the University of Hawai'i to adopt administrative rules pursuant to Chapter 91 to implement and enforce the management actions.	Completed	NRMP 1.4.3.2
Enforcement			
P-5	Continue coordinating with other agencies on enforcement needs.	Ongoing	NRMP 5.1 PAP 4, 6.5
P-6	Obtain legal authority for establishing, and then establish, a law enforcement presence on the mountain that can enforce rules for the UH Management Areas on Mauna Kea.	Completed / As Needed	NRMP 1.4.2.3, 3.1.3.2, 5.1 PAP 4.4, 4.5, 4.6, 5.2, 6.5, 6.6
P-7	Develop and implement protocol for oversight and compliance with Conservation District Use Permits.	Ongoing	NRMP 1.4.2.3
P-8	Enforce conditions contained in commercial and Special Use permits.	Ongoing	NRMP 3.1.4 PAP 2.5.3, 3.3.3, 4.3, 4.5, 4.6, 6.5
COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT			
INFRASTRUCTURE AND MAINTENANCE			
Routine Maintenance			
IM-1	Develop and implement an OMMP.	Ongoing	
Sustainable Technologies			
IM-11	Encourage existing facilities and new development to incorporate sustainable technologies, energy efficient technologies, and LEED standards, whenever possible, into facility design and operations.	As needed	

COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT			
		Implementation Schedule	Subplans
CONSTRUCTION GUIDELINES			
General Requirements			
C-1	Require an independent construction monitor who has oversight and authority to insure that all aspects of ground based work comply with protocols and permit requirements.	As needed	NRMP 3.2, 4.2
Best Management Practices			
C-2	Require use of Best Management Practices Plan for Construction Practices.	As needed	NRMP 4.2.3
C-3	Develop, prior to construction, a rock movement plan.	As needed	NRMP 4.2.3.1
C-4	Require contractors to provide information from construction activities to OMKM for input into OMKM information databases.	As needed	
C-5	Require on-site monitors (e.g., archaeologist, cultural resources specialist, entomologist) during construction, as determined by the appropriate agency.	As needed	CRMP 4.2.7
C-6	Conduct required archaeological monitoring during construction projects per SHPD approved plan.	As needed	CRMP 4.2.7
C-7	Education regarding historical and cultural significance	As needed	NRMP 4.4
C-8	Education regarding environment, ecology and natural resources	As needed	NRMP 4.4
C-9	Inspection of construction materials	As needed	NRMP 4.2.3.7
SITE RECYCLING, DECOMMISSIONING DEMOLITION AND RESTORATION			
Site Recycling, Decommissioning, Demolition, and Restoration			
SR-1	Require observatories to develop plans to recycle or demolish facilities once their useful life has ended, in accordance with their sublease requirements, identifying all proposed actions.	As needed	NRMP 4.3.3.4.1
SR-2	Require observatories to develop a restoration plan in association with decommissioning, to include an environmental cost-benefit analysis and a cultural assessment.	As needed	NRMP 4.3.3.4.1
SR-3	Require any future observatories to consider site restoration during project planning and include provisions in subleases for funding of full restoration.	As needed	NRMP 4.3.3.4.1

		Implementation Schedule	Subplans
CONSIDERATION OF FUTURE LAND USE			
Facility Planning Guidelines			
FLU-1	Follow design guidelines presented in the 2000 Master Plan.	As needed	NRMP 5.1.1
FLU-3	Require cataloguing of initial site conditions for use when conducting site restoration.	As needed	
FLU-4	Require project specific visual rendering of both pre- and post-project settings to facilitate analysis of potential impacts to view planes.	As needed	NRMP 4.1.4.11
FLU-5	Require an airflow analysis on the design of proposed structures to assess potential impacts to aeolian ecosystems.	As needed	NRMP 4.1.4.4
FLU-6	Incorporate habitat mitigation plans into project planning process.	As needed	NRMP 4.3.3.3
FLU-7	Require use of close-contained zero-discharge waste systems for any future development in the summit region, from portable toilets to observatory restrooms, if feasible.	As needed	NRMP 3.1.1.2.6
COMPONENT PLAN: MANAGING OPERATIONS			
OPERATION AND IMPLEMENTATION OF THE CMP			
Management			
OI-1	Maintain OMKM, MKMB, and Kahu Kū Mauna in current roles, with OMKM providing local management of the UH Management Areas, and MKSS providing operational and maintenance services.	Ongoing	
OI-2	Develop training plan for staff and volunteers.	Ongoing	NRMP 5.1 CRMP 5.2 PAP 5.1, 5.2, 6.1, 6.4, 6.5
OI-3	Maintain and expand regular interaction and dialogue with stakeholders, community members, surrounding landowners, and overseeing agencies to provide a coordinated approach to resource management.	Ongoing	NRMP 5.1 PAP 5.1
OI-5	Update and implement emergency response plan.	Ongoing	CRMP 4.1.6, 4.3.5 PAP 6.1, 6.4, 6.5, 6.7
CMP MONITORING, EVALUATION AND UPDATES			
Management			
MEU-3	Revise and update planning documents, including the master plan, leases, and subleases, so that they will clearly assign roles and responsibilities for managing Mauna Kea and reflect stewardship matters resolved with DLNR.	As needed	PAP 7

Appendix B

Mauna Kea CMP Management Actions Implementation Schedule

Note: In cases where an action continues after it is initially developed or implemented, the shading continues to denote ongoing activity.

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Management Action			Duration of Implementation					
			Initiation of Action	Yr 1	Yr 2	Yr 3	Yrs 4-6	Yrs 7-9
COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES								
NATIVE HAWAIIAN CULTURAL RESOURCES								
Management								
CR-3	Conduct educational efforts to generate public awareness about the importance of preserving the cultural landscape.	Immediate						
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.	Immediate						
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.	Short-term						
Cultural Practices								
CR-4	Establish a process for ongoing collection of information on traditional, contemporary, and customary cultural practices.	Short-term						
CR-5	Develop and adopt guidelines for the culturally appropriate placement and removal of offerings	Immediate						
CR-7	Kahu Kū Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian cultural features.	Immediate						
CR-8	Develop and adopt a management policy for the UH Management Areas on the scattering of cremated human remains.	Immediate						
CR-9	A management policy for the cultural 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.	Immediate						
CR-6	Develop and adopt guidelines for the visitation and use of ancient shrines.	Immediate						
Historic Properties								

	Management Action	Initiation of Action	Duration of Implementation					
			Yr 1	Yr 2	Yr 3	Yrs 4-6	Yrs 7-9	Yrs 10+
CR-14	Immediately report any disturbance of a shrine or burial site to the rangers, DOCARE, Kahu Kū Mauna Council, and SHPD.	Ongoing						
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.	Immediate						
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.	Immediate						
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.	Immediate						
CR-11	Complete an archaeological survey of the portions of the Summit Access Road corridor that are under UH management.	Completed	--	--	--	--	--	--
NATURAL RESOURCES								
Threat Prevention and Control								
NR-6	Reduce threats to natural resources by educating stakeholders and the public about Mauna Kea's unique natural resources.	Immediate						
NR-2	Limit damage caused by invasive species through creation of an invasive species prevention and control program.	Immediate						
NR-1	Limit threats to natural resources through management of permitted activities and uses.	Short-term						
NR-3	Maintain native plant and animal populations and biological diversity.	Mid and Long-term						
NR-4	Minimize barriers to species migration, to help maintain populations and protect ecosystem processes and development.	Mid and Long-term						
NR-5	Manage ecosystems to allow for response to climate change.	Long-term						
Ecosystem Protection, Enhancement & Restoration								
NR-7	Delineate areas of high native diversity, unique communities, or unique geological features within the Astronomy Precinct and at Hale Pōhaku and consider protection from development.	Short and Mid-term						

	Management Action	Initiation of Action	Duration of Implementation					
			Yr 1	Yr 2	Yr 3	Yrs 4-6	Yrs 7-9	Yrs 10+
NR-8	Consider fencing areas of high native biodiversity or populations of endangered species to keep out feral ungulates (applies to areas below 12,800 ft elevation).	Mid-term						
NR-9	Increase native plant density and diversity through an outplanting program.	Long-term						
NR-10	Incorporate mitigation plans into project planning and conduct mitigation following new development.	As needed						
NR-11	Conduct habitat rehabilitation projects following unplanned disturbances.	As needed						
NR-12	Create restoration plans and conduct habitat restoration activities, as needed.	As needed						
Program Management								
NR-13	Increase communication, networking, and collaborative opportunities, to support management and protection of natural resources.	Immediate						
NR-14	Use the principles of adaptive management when developing programs and methodologies. Review programs annually and revise any component plans every five years, based on the results of the program review.	Short-term / As needed						
Inventory, Monitoring and Research								
NR-16	Conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan.	Ongoing						
NR-18	Develop geo-spatial database of all known natural resources and their locations in the UH Management Areas that can serve as baseline documentation against change and provide information essential for decision-making.	Ongoing						
NR-15	Conduct baseline inventories of high-priority resources, as outlined in an inventory, monitoring, and research plan.	Immediate						
NR-17	Conduct research to fill knowledge gaps that cannot be addressed through inventory and monitoring.	Immediate						

Management Action		Initiation of Action	Duration of Implementation					
			Yr 1	Yr 2	Yr 3	Yrs 4-6	Yrs 7-9	Yrs 10+
EDUCATION AND OUTREACH								
Program Development								
EO-1	Develop and implement education and outreach program	Immediate and Short-term						
Education								
EO-3	Continue to develop, update, and distribute materials explaining important aspects of Mauna Kea.	Ongoing						
EO-4	Develop and implement a signage plan to improve signage throughout the UH Management Areas (interpretive, safety, rules and regulations).	Immediate						
EO-5	Develop interpretive features such as self-guided cultural walks and volunteer-maintained native plant gardens.	Mid-term						
EO-6	Engage in outreach and partnerships with schools, by collaborating with local experts, teachers, and university researchers, and by working with the 'Imiloa Astronomy Center of Hawai'i.	Mid-term						
EO-2	Require orientation of users, with periodic updates and a certificate of completion, including but not limited to visitors, employees, observatory staff, contractors, and commercial and recreational users.	Long-term						
Outreach								
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.	Ongoing						
EO-8	Provide opportunities for community members to participate in stewardship activities.	Ongoing						
ASTRONOMICAL RESOURCES								
Protection of Astronomical Resources								
AR-1	Operate the UH Management Areas to prohibit activities resulting in negative impacts to astronomical resources.	Ongoing						
AR-2	Prevent light pollution, radio frequency interference (RFI) and dust.	Ongoing						

Management Action		Initiation of Action	Duration of Implementation					
			Yr 1	Yr 2	Yr 3	Yrs 4-6	Yrs 7-9	Yrs 10+
COMPONENT PLAN: MANAGING ACCESS AND USE								
ACTIVITIES AND USES								
General Management								
ACT-1	Continue and update managed access policy of 1995 Management Plan.	Short-term						
ACT-2	Develop parking and visitor traffic plan.	Immediate						
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.	Ongoing						
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.	Ongoing						
Recreational								
ACT-5	Implement policies to reduce impacts of recreational hiking	Short-term						
ACT-6	Define and maintain areas where snow-related activities can occur and confine activities to slopes that have a protective layer of snow.	Ongoing						
ACT-7	Confine University or other sponsored tours and star-gazing activities to previously disturbed ground surfaces and established parking areas.	Ongoing						
ACT-8	Coordinate with DLNR in the development of a policy regarding hunting in the UH Management Areas.	Immediate						
Commercial								
ACT-9	Maintain commercial tour permitting process; evaluate and issue permits annually.	Ongoing						
ACT-10	Ensure OMKM input on permits for filming activities	Ongoing						
ACT-11	Seek statutory authority for the University to regulate commercial activities in the UH Management Areas.	Completed	--	--	--	--	--	--

Management Action			Initiation of Action	Duration of Implementation				
				Yr 1	Yr 2	Yr 3	Yrs 4-6	Yrs 7-9
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.	Ongoing						
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.	Ongoing						
P-2	Strengthen CMP implementation by recommending to the BLNR that the CMP conditions be included in any Conservation District Use Permit or other permit.	As needed						
P-3	Obtain statutory rule-making authority from the legislature, authorizing the University of Hawai'i to adopt administrative rules pursuant to Chapter 91 to implement and enforce the management actions.	Completed	--	--	--	--	--	--
P-4	Educate management staff and users of the mountain about all applicable rules and permit requirements.	Immediate						
Enforcement								
P-5	Continue coordinating with other agencies on enforcement needs.	Ongoing						
P-6	Obtain legal authority for establishing, and then establish, a law enforcement presence on the mountain that can enforce rules for the UH Management Areas on Mauna Kea.	Completed - As needed						
P-7	Develop and implement protocol for oversight and compliance with Conservation District Use Permits.	Ongoing						
P-8	Enforce conditions contained in commercial and Special Use permits.	Ongoing						

Management Action			Duration of Implementation					
			Initiation of Action	Yr 1	Yr 2	Yr 3	Yrs 4-6	Yrs 7-9
COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT								
INFRASTRUCTURE AND MAINTENANCE								
Routine Maintenance								
IM-1	Develop and implement an OMMP.	Ongoing						
IM-2	Reduce impacts from operations and maintenance activities by educating personnel about Mauna Kea’s unique resources.	Immediate						
IM-3	Conduct historic preservation review for maintenance activities that will have an adverse effect on historic properties.	Short-term						
IM-4	Evaluate need for and feasibility of a vehicle wash station near Hale Pōhaku, and requiring that vehicles be cleaned.	Short-term						
IM-5	Develop and implement a Debris Removal, Monitoring and Prevention Plan.	Immediate						
IM-6	Develop and implement an erosion inventory and assessment plan.	Long-term						
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.	Mid-term						
Infrastructure								
IM-8	Assess feasibility of paving the Summit Access Road.	Long-term						
IM-9	Evaluate need for additional parking lots and vehicle pullouts and install if necessary.	Mid-term						
IM-10	Evaluate need for additional public restroom facilities in the summit region and at Hale Pōhaku, and install close-contained zero waste systems if necessary.	Immediate						
Sustainable Technologies								
IM-11	Encourage existing facilities and new development to incorporate sustainable technologies, energy efficient technologies, and LEED standards, whenever possible, into facility design and operations.	As needed						
IM-12	Conduct energy audits to identify energy use and system inefficiencies, and develop solutions to reduce energy usage.	Immediate						

	Management Action	Initiation of Action	Duration of Implementation					
			Yr 1	Yr 2	Yr 3	Yrs 4-6	Yrs 7-9	Yrs 10+
IM-13	Conduct feasibility assessment, in consultation with Hawaii Electric Light Company, on developing locally-based alternative energy sources.	Mid-term						
IM-14	Encourage observatories to investigate options to reduce the use of hazardous materials in telescope operations.	Short-term						
CONSTRUCTION GUIDELINES								
General Requirements								
C-1	Require an independent construction monitor who has oversight and authority to insure that all aspects of ground based work comply with protocols and permit requirements.	As needed						
Best Management Practices								
C-2	Require use of Best Management Practices Plan for Construction Practices.	As needed						
C-3	Develop, prior to construction, a rock movement plan.	As needed						
C-4	Require contractors to provide information from construction activities to OMKM for input into OMKM information databases.	As needed						
C-5	Require on-site monitors (e.g., archaeologist, cultural resources specialist, entomologist) during construction, as determined by the appropriate agency.	As needed						
C-6	Conduct required archaeological monitoring during construction projects per SHPD approved plan.	As needed						
C-7	Education regarding historical and cultural significance	As needed						
C-8	Education regarding environment, ecology and natural resources	As needed						
C-9	Inspection of construction materials	As needed						
SITE RECYCLING, DECOMMISSIONING DEMOLITION AND RESTORATION								
Site Recycling, Decommissioning, Demolition, and Restoration								
SR-1	Require observatories to develop plans to recycle or demolish facilities once their useful life has ended, in accordance with their sublease requirements, identifying all proposed actions.	As needed						

			Duration of Implementation					
	Management Action	Initiation of Action	Yr 1	Yr 2	Yr 3	Yrs 4-6	Yrs 7-9	Yrs 10+
SR-2	Require observatories to develop a restoration plan in association with decommissioning, to include an environmental cost-benefit analysis and a cultural assessment.	As needed						
SR-3	Require any future observatories to consider site restoration during project planning and include provisions in subleases for funding of full restoration.	As needed						
CONSIDERATION OF FUTURE LAND USE								
Facility Planning Guidelines								
FLU-1	Follow design guidelines presented in the 2000 Master Plan.	As needed						
FLU-2	Develop a map with land-use zones in the Astronomy Precinct based on updated inventories of cultural and natural resources, to delineate areas where future land use will not be allowed and areas where future land use will be allowed but will require compliance with prerequisite studies or analysis prior to approval of Conservation District Use Permit.	Immediate						
FLU-3	Require cataloguing of initial site conditions for use when conducting site restoration.	As needed						
FLU-4	Require project specific visual rendering of both pre- and post-project settings to facilitate analysis of potential impacts to view planes.	As needed						
FLU-5	Require an airflow analysis on the design of proposed structures to assess potential impacts to aeolian ecosystems.	As needed						
FLU-6	Incorporate habitat mitigation plans into project planning process.	As needed						
FLU-7	Require use of close-contained zero-discharge waste systems for any future development in the summit region, from portable toilets to observatory restrooms, if feasible.	As needed						

Management Action		Initiation of Action	Duration of Implementation					
			Yr 1	Yr 2	Yr 3	Yrs 4-6	Yrs 7-9	Yrs 10+
COMPONENT PLAN: MANAGING OPERATIONS								
OPERATION AND IMPLEMENTATION OF THE CMP								
Management								
OI-1	Maintain OMKM, MKMB, and Kahu Kū Mauna in current roles, with OMKM providing local management of the UH Management Areas, and MKSS providing operational and maintenance services.	Ongoing						
OI-2	Develop training plan for staff and volunteers.	Ongoing						
OI-3	Maintain and expand regular interaction and dialogue with stakeholders, community members, surrounding landowners, and overseeing agencies to provide a coordinated approach to resource management.	Ongoing						
OI-4	Establish grievance procedures for OMKM, to address issues as they arise.	Short-term						
OI-5	Update and implement emergency response plan.	Ongoing						
CMP MONITORING, EVALUATION AND UPDATES								
Management								
MEU-1	Establish a reporting system to ensure that the MKMB, DLNR, and the public are informed of results of management activities in a timely manner.	Immediate						
MEU-2	Conduct regular updates of the CMP that reflect outcomes of the evaluation process, and that incorporate new information about resources.	Short-term / As needed						
MEU-3	Revise and update planning documents, including the master plan, leases, and subleases, so that they will clearly assign roles and responsibilities for managing Mauna Kea and reflect stewardship matters resolved with DLNR.	As needed						

Appendix C

Entities Responsible for Implementation

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Responsible Entity		
COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES		
NATIVE HAWAIIAN CULTURAL RESOURCES		
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.	To be developed by Kahu Kū Mauna, Mauna Kea Management Board (MKMB), and Hawaiian Cultural Committee, in consultation with families with historic connections Mauna Kea, cultural practitioners, and other Native Hawaiians.
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.	OMKM
CR-3	Conduct educational efforts to generate public awareness about the importance of preserving the cultural landscape.	OMKM
Cultural Practices		
CR-4	Establish a process for ongoing collection of information on traditional, contemporary, and customary cultural practices.	OMKM, in partnership with UH-Hilo and Hilo Community College to establish an oral history program.
CR-5	Develop and adopt guidelines for the culturally appropriate placement and removal of offerings	Kahu Kū Mauna, and/or the Hawaiian Cultural Committee, in consultation with families of lineal connections, kūpuna, cultural practitioners, or Native Hawaiian organizations.
CR-6	Develop and adopt guidelines for the visitation and use of ancient shrines.	Kahu Kū Mauna, and/or the Hawaiian Cultural Committee, in consultation with families of lineal connections, kūpuna, cultural practitioners, or Native Hawaiian organizations.
CR-7	Kahu Kū Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian cultural features.	Kahu Kū Mauna, and/or the Hawaiian Cultural Committee, in consultation with families of lineal connections, kūpuna, cultural practitioners, or Native Hawaiian organizations.

		Responsible Entity
CR-8	Develop and adopt a management policy for the UH Management Areas on the scattering of cremated human remains.	Kahu Kū Mauna, and/or the Hawaiian Cultural Committee, in consultation with families of lineal connections, kūpuna, cultural practitioners, or Native Hawaiian organizations.
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.	Kahu Kū Mauna, and/or the Hawaiian Cultural Committee, in consultation with families of lineal connections, kūpuna, cultural practitioners, or Native Hawaiian organizations.
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.	OMKM
CR-11	Complete an archaeological survey of the portions of the Summit Access Road corridor that are under UH management.	OMKM – completed by consultants
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.	OMKM, Kahu Kū Mauna, DLNR (SHPD)
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.	OMKM, with approval as indicated.
CR-14	Immediately report any disturbance of a shrine or burial site to the rangers, DOCARE, Kahu Kū Mauna Council, and SHPD.	OMKM, rangers, DOCARE, Kahu Kū Mauna Council, and SHPD.
NATURAL RESOURCES		
Threat Prevention and Control		
NR-1	Limit threats to natural resources through management of permitted activities and uses.	OMKM
NR-2	Limit damage caused by invasive species through creation of an invasive species prevention and control program.	OMKM
NR-3	Maintain native plant and animal populations and biological diversity.	OMKM
NR-4	Minimize barriers to species migration, to help maintain populations and protect ecosystem processes and development.	OMKM
NR-5	Manage ecosystems to allow for response to climate change.	OMKM

		Responsible Entity
NR-6	Reduce threats to natural resources by educating stakeholders and the public about Mauna Kea's unique natural resources.	OMKM
Ecosystem Protection, Enhancement & Restoration		
NR-7	Delineate areas of high native diversity, unique communities, or unique geological features within the Astronomy Precinct and at Hale Pōhaku and consider protection from development.	OMKM
NR-8	Consider fencing areas of high native biodiversity or populations of endangered species to keep out feral ungulates (applies to areas below 12,800 ft elevation).	OMKM
NR-9	Increase native plant density and diversity through an outplanting program.	OMKM
NR-10	Incorporate mitigation plans into project planning and conduct mitigation following new development.	Prepared by project applicants; approved by UH and DLNR.
NR-11	Conduct habitat rehabilitation projects following unplanned disturbances.	As determined
NR-12	Create restoration plans and conduct habitat restoration activities, as needed.	OMKM
Program Management		
NR-13	Increase communication, networking, and collaborative opportunities, to support management and protection of natural resources.	OMKM; working group
NR-14	Use the principles of adaptive management when developing programs and methodologies. Review programs annually and revise any component plans every five years, based on the results of the program review.	OMKM
Inventory, Monitoring and Research		
NR-15	Conduct baseline inventories of high-priority resources, as outlined in an inventory, monitoring, and research plan.	OMKM
NR-16	Conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan.	OMKM
NR-17	Conduct research to fill knowledge gaps that cannot be addressed through inventory and monitoring.	OMKM
NR-18	Develop geo-spatial database of all known natural resources and their locations in the UH Management Areas that can serve as baseline documentation against change and provide information essential for decision-making.	OMKM

		Responsible Entity
EDUCATION AND OUTREACH		
Program Development		
EO-1	Develop and implement education and outreach program	OMKM
Education		
EO-2	Require orientation of users, with periodic updates and a certificate of completion, including but not limited to visitors, employees, observatory staff, contractors, and commercial and recreational users.	OMKM
EO-3	Continue to develop, update, and distribute materials explaining important aspects of Mauna Kea.	OMKM
EO-4	Develop and implement a signage plan to improve signage throughout the UH Management Areas (interpretive, safety, rules and regulations).	OMKM, with approval by DLNR
EO-5	Develop interpretive features such as self-guided cultural walks and volunteer-maintained native plant gardens.	OMKM/DLNR (SHPD/DOFAW)
EO-6	Engage in outreach and partnerships with schools, by collaborating with local experts, teachers, and university researchers, and by working with the 'Imiloa Astronomy Center of Hawai'i.	OMKM, with public and private schools, and universities.
Outreach		
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.	OMKM
EO-8	Provide opportunities for community members to participate in stewardship activities.	OMKM
ASTRONOMICAL RESOURCES		
Protection of Astronomical Resources		
AR-1	Operate the UH Management Areas to prohibit activities resulting in negative impacts to astronomical resources.	OMKM
AR-2	Prevent light pollution, radio frequency interference (RFI) and dust.	OMKM

		Responsible Entity
COMPONENT PLAN: MANAGING ACCESS AND USE		
ACTIVITIES AND USES		
General Management		
ACT-1	Continue and update managed access policy of 1995 Management Plan.	OMKM and DLNR
ACT-2	Develop parking and visitor traffic plan.	OMKM
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.	OMKM
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.	OMKM/DLNR working group
Recreational		
ACT-5	Implement policies to reduce impacts of recreational hiking	OMKM
ACT-6	Define and maintain areas where snow-related activities can occur and confine activities to slopes that have a protective layer of snow.	OMKM
ACT-7	Confine University or other sponsored tours and star-gazing activities to previously disturbed ground surfaces and established parking areas.	OMKM
ACT-8	Coordinate with DLNR in the development of a policy regarding hunting in the UH Management Areas.	OMKM and DLNR with hunting associations.
Commercial		
ACT-9	Maintain commercial tour permitting process; evaluate and issue permits annually.	OMKM
ACT-10	Ensure OMKM input on permits for filming activities	OMKM
ACT-11	Seek statutory authority for the University to regulate commercial activities in the UH Management Areas.	UH/OMKM – completed
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.	OMKM, MKMB, and Kahu Kū Mauna

		Responsible Entity
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.	UH / OMKM
P-2	Strengthen CMP implementation by recommending to the BLNR that the CMP conditions be included in any Conservation District Use Permit or other permit.	OMKM / BLNR
P-3	Obtain statutory rule-making authority from the legislature, authorizing the University of Hawai'i to adopt administrative rules pursuant to Chapter 91 to implement and enforce the management actions.	UH/OMKM – completed
P-4	Educate management staff and users of the mountain about all applicable rules and permit requirements.	OMKM
Enforcement		
P-5	Continue coordinating with other agencies on enforcement needs.	OMKM
P-6	Obtain legal authority for establishing, and then establish, a law enforcement presence on the mountain that can enforce rules for the UH Management Areas on Mauna Kea.	UH with rule-making authority, or DLNR (DOCARE)
P-7	Develop and implement protocol for oversight and compliance with Conservation District Use Permits.	DLNR (OCCL) with assistance from OMKM
P-8	Enforce conditions contained in commercial and Special Use permits.	OMKM, MKMB, and Kahu Kū Mauna

		Responsible Entity
COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT		
INFRASTRUCTURE AND MAINTENANCE		
Routine Maintenance		
IM-1	Develop and implement an OMMP.	OMKM
IM-2	Reduce impacts from operations and maintenance activities by educating personnel about Mauna Kea's unique resources.	OMKM and DLNR.
IM-3	Conduct historic preservation review for maintenance activities that will have an adverse effect on historic properties.	OMKM and DLNR (SHPD)
IM-4	Evaluate need for and feasibility of a vehicle wash station near Hale Pōhaku, and requiring that vehicles be cleaned.	OMKM
IM-5	Develop and implement a Debris Removal, Monitoring and Prevention Plan.	OMKM
IM-6	Develop and implement an erosion inventory and assessment plan.	OMKM
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.	OMKM / Department of Defense
Infrastructure		
IM-8	Assess feasibility of paving the Summit Access Road.	OMKM
IM-9	Evaluate need for additional parking lots and vehicle pullouts and install if necessary.	OMKM
IM-10	Evaluate need for additional public restroom facilities in the summit region and at Hale Pōhaku, and install close-contained zero waste systems if necessary.	OMKM
Sustainable Technologies		
IM-11	Encourage existing facilities and new development to incorporate sustainable technologies, energy efficient technologies, and LEED standards, whenever possible, into facility design and operations.	OMKM
IM-12	Conduct energy audits to identify energy use and system inefficiencies, and develop solutions to reduce energy usage.	OMKM
IM-13	Conduct feasibility assessment, in consultation with Hawaii Electric Light Company, on developing locally-based alternative energy sources.	OMKM
IM-14	Encourage observatories to investigate options to reduce the use of hazardous materials in telescope operations.	OMKM

		Responsible Entity
CONSTRUCTION GUIDELINES		
General Requirements		
C-1	Require an independent construction monitor who has oversight and authority to insure that all aspects of ground based work comply with protocols and permit requirements.	DLNR (OCCL) and OMKM
Best Management Practices		
C-2	Require use of Best Management Practices Plan for Construction Practices.	Project proposer, DLNR (OCCL) and OMKM
C-3	Develop, prior to construction, a rock movement plan.	Project proposer
C-4	Require contractors to provide information from construction activities to OMKM for input into OMKM information databases.	OMKM
C-5	Require on-site monitors (e.g., archaeologist, cultural resources specialist, entomologist) during construction, as determined by the appropriate agency.	Project proposer
C-6	Conduct required archaeological monitoring during construction projects per SHPD approved plan.	Project proposer with DLNR (SHPD) approval
C-7	Education regarding historical and cultural significance	OMKM in consultation with Kahu Kū Mauna or other Native Hawaiian groups, and approval by DLNR (SHPD).
C-8	Education regarding environment, ecology and natural resources	OMKM
C-9	Inspection of construction materials	OMKM under review by DLNR.
SITE RECYCLING, DECOMMISSIONING DEMOLITION AND RESTORATION		
Site Recycling, Decommissioning, Demolition, and Restoration		
SR-1	Require observatories to develop plans to recycle or demolish facilities once their useful life has ended, in accordance with their sublease requirements, identifying all proposed actions.	Project proposer
SR-2	Require observatories to develop a restoration plan in association with decommissioning, to include an environmental cost-benefit analysis and a cultural assessment.	Project proposer
SR-3	Require any future observatories to consider site restoration during project planning and include provisions in subleases for funding of full restoration.	Project proposer

		Responsible Entity
CONSIDERATION OF FUTURE LAND USE		
Facility Planning Guidelines		
FLU-1	Follow design guidelines presented in the 2000 Master Plan.	OMKM and DLNR (OCCL)
FLU-2	Develop a map with land-use zones in the Astronomy Precinct based on updated inventories of cultural and natural resources, to delineate areas where future land use will not be allowed and areas where future land use will be allowed but will require compliance with prerequisite studies or analysis prior to approval of Conservation District Use Permit.	OMKM
FLU-3	Require cataloguing of initial site conditions for use when conducting site restoration.	OMKM, project proposer
FLU-4	Require project specific visual rendering of both pre- and post-project settings to facilitate analysis of potential impacts to view planes.	Project proposer
FLU-5	Require an airflow analysis on the design of proposed structures to assess potential impacts to aeolian ecosystems.	Project proposer
FLU-6	Incorporate habitat mitigation plans into project planning process.	Project proposer
FLU-7	Require use of close-contained zero-discharge waste systems for any future development in the summit region, from portable toilets to observatory restrooms, if feasible.	Project proposer

		Responsible Entity
COMPONENT PLAN: MANAGING OPERATIONS		
OPERATION AND IMPLEMENTATION OF THE CMP		
Management		
OI-1	Maintain OMKM, MKMB, and Kahu Kū Mauna in current roles, with OMKM providing local management of the UH Management Areas, and MKSS providing operational and maintenance services.	OMKM, MKMB, and Kahu Kū Mauna
OI-2	Develop training plan for staff and volunteers.	OMKM
OI-3	Maintain and expand regular interaction and dialogue with stakeholders, community members, surrounding landowners, and overseeing agencies to provide a coordinated approach to resource management.	OMKM
OI-4	Establish grievance procedures for OMKM, to address issues as they arise.	OMKM
OI-5	Update and implement emergency response plan.	OMKM
CMP MONITORING, EVALUATION AND UPDATES		
Management		
MEU-1	Establish a reporting system to ensure that the MKMB, DLNR, and the public are informed of results of management activities in a timely manner.	OMKM
MEU-2	Conduct regular updates of the CMP that reflect outcomes of the evaluation process, and that incorporate new information about resources.	OMKM
MEU-3	Revise and update planning documents, including the master plan, leases, and subleases, so that they will clearly assign roles and responsibilities for managing Mauna Kea and reflect stewardship matters resolved with DLNR.	OMKM