

**2013 Annual Report**

**To the**

**Board of Land and Natural Resources**

**Status of the Implementation of the**

**Mauna Kea Comprehensive Management Plan**

**Overview of CMP Management Actions**

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

**Assigning Categories and Priorities**

All of the management actions were first sorted into four categories. These categories represent time periods during which it was estimated the actions would be implemented.

Immediate	1 - 3 years
Short term	4 - 6 years
Mid-term	7 - 9 years
Long-term	10 + years

For reporting purposes in 2010 and 2011, each management action was initially assigned one of four progress status designations. For the 2012 report, the Ongoing category was divided into two groups, Ongoing and In Progress, to distinguish management actions that are part of OMKM's regular responsibilities and those that require specialized implementation. **Ongoing** refers to activities that are performed as part of OMKM's daily responsibilities such as reporting disturbances to historic properties. **In Progress** refers to actions that require specialized implementation such as the development of policies or hiring consultants and researchers.

In Progress	Management action that requires specialized implementation
Ongoing	Management action is currently being implemented and/or initiated and will continue indefinitely because they are part of OMKM's continuing management responsibilities
As Needed	Management action is implemented on an as needed basis, such as during a construction project,
Completed	Management action is completed
Short to Long Term	Management action still to be implemented during its scheduled time period

### **2012 – 2013 Summary of Implementation Status**

Of the total 103 management actions, 22 actions are currently **In Progress** (initiated and currently being implemented) and 32 are **Ongoing**. All of the Immediate actions are either In Progress or are Ongoing. Twenty-two are categorized as Short - Long term actions waiting to be implemented according to the implementation schedule described above.

The number of **Completed** actions remains the same at four. Of the total number of management action items, 37 were identified as those that would likely have a completion date while the remaining 66 items, when all are initiated, will continue on an ongoing basis because they part of OMKM's long term management responsibilities. Some of the action items when completed will be re-designated as ongoing such as the completion of plans followed by implementation.

The 23 **As Needed** actions relate to construction and decommissioning activities and will be implemented when these type of activities occur.

Appendix A lists the implementation status with commentary explanations for the CMP management actions.

Table 2 below summarizes of the implementation status for 2013 including a comparison of the ongoing action items for 2012. Appendix A lists the implementation status for all the CMP management actions.

Table 2. 2013 implementation status of the CMP management actions including a comparison between the 2012 and 2013 current (ongoing) implementation.

Component Plan	Implementation Schedule (2013)					
	2012 Ongoing	Ongoing	In Progress	Short to Long Term	Completed	As Needed
<b>7.1: Understanding and Protecting Mauna Kea's Resources</b>						
7.1.1: Native Hawaiian Cultural Resources (14)	1	1	9	2	1	1
7.1.2: Natural Resources (18)	3	5	3	7		3
7.1.3: Education and Outreach (8)	2	5		3		
7.1.4: Astronomy Resources (2)	1	1	1			
<b>7.2: Managing Access and Use</b>						
7.2.1: Activities and Uses (12)	7	7	4		1	
7.2.2: Permitting and Enforcement (8)	6	6			2	
<b>7.3: Managing the Built Environment</b>						
7.3.1: Infrastructure and Maintenance (14)	1	2	4	7		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	1		1		5
<b>7.4: Managing Operations</b>						
7.4.1: Operations and Implementation (5)	3	3	1	1		
7.4.2: Monitoring, Evaluation, and Updates (3)	1	1		1		1
<b>Total</b>	<b>26</b>	<b>32</b>	<b>22</b>	<b>22</b>	<b>4</b>	<b>23</b>

**CMP Management Action Implementation Overview**

As reported in earlier reports OMKM identified five priority categories to be implemented in the immediate term (1 – 3 years). Efforts have been initiated in all of the categories and are described below.

**Priority Categories:**

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

**Research.** Research efforts continue to establish baseline data. In addition to the wekiu bug, alien arthropods and botanical resources, OMKM is planning to initiate a three-year study on the status of permafrost in the summit region. Concerns about climate change places an urgency to learn more about permafrost on the summit and the potential impacts on the biota, and the natural and cultural landscapes. OMKM is also looking into collaborating with the UH Geography and Meteorology departments on developing a sea-level to summit monitoring system to track changes in weather over the long term. Data collected would be useful in monitoring long-term weather conditions on the summit, as well as monitoring altitudinal changes and impacts on ecosystems from sea level to the summit.

The number of visitors to Mauna Kea is increasing, most are out-of-state visitors who rent vehicles from rental car agencies. The Visitor Information Station is over capacity, particularly during the sunset and stargazing period. Traffic and parking is congested and there is real concern that someone could be hit by vehicles descending from the mountain after dark. There is a need to improve the Visitor Information Station, provide for more parking and design better traffic routing. One of the Hawaii Island representatives introduced a CIP request to study and plan for infrastructure improvements at the mid-level facilities at Hale Pohaku. The outcome of this request is pending.

To immediately address growing concerns about pedestrian safety, OMKM and Mauna Kea Support Services (MKSS) is working with the County of Hawaii to install speed bumps, add “calming” road surface markings, e.g., pedestrian cross walks, impending speed bumps, and speed and caution signs.

Initiate surveys and studies on flora and fauna, geology and hydrology, climate/weather and air quality, and erosion.	<ul style="list-style-type: none"><li>• Initiate study on permafrost</li><li>• 3-year survey on native and other summit arthropods commenced in the Fall 2011.</li><li>• Botanical survey of UH’s lands was completed in the summer 2011.</li><li>• A 4-year climate change study commenced in the Spring 2012.</li><li>• Pending funding, coordinate with UH Geography and Meteorological Depts. on installing a summit weather tower to part of a weather monitoring system stretching from sea level to the summit.</li></ul>
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Initiate surveys of human activities and needs such as commercial tour capacity and fees, traffic, parking and public facilities.	<ul style="list-style-type: none"> <li>• OMKM and Mauna Kea Support Services are currently reviewing the parking and traffic situation at the mid-level facility. A CIP request was submitted by a Hawaii Island representative for the study and planning. The status of the request is pending.</li> <li>• Rangers continue to submit daily reports on human activities; data are inputted into a database.</li> <li>• A vehicle counter is planned for installation that will keep a real time count of all vehicles above Hale Pohaku, including specific counts of observatory and commercial vehicles on the mountain. Submittal to DLNR for approval is pending the conclusion of the contested case for the Thirty Meter Telescope.</li> <li>• Survey of visitors was completed at Hale Pohaku. The majority are non-resident visitors.</li> </ul>
Continue studies on the wēkiu bug and alien arthropods	<ul style="list-style-type: none"> <li>• Research on the biodiversity of arthropods continues.</li> </ul>
Other Studies	<ul style="list-style-type: none"> <li>• Pending funding, OMKM would like to initiate a study of commercial tour activities to determine the “capacity” for commercial tour operators.</li> </ul>

**Monitoring.** Monitoring is an ongoing and long-term priority that is needed to assess the status of the resources over time.

Annual surveys of the wēkiu bug, which began in 2002, and alien arthropods, in 2007, continue. A monitoring plan for botanical resources will be developed following a review of the botanical report.

Initiate monitoring of the archaeological resources.	<ul style="list-style-type: none"> <li>• A monitoring plan is currently undergoing review.</li> </ul>
Continue surveys of the wēkiu bug and arthropods species.	<ul style="list-style-type: none"> <li>• Annual surveys of alien arthropods at the mid-level location and selected locations on the summit.</li> <li>• Annual surveys of the wēkiu bug.</li> <li>• Ant monitoring program of facilities at Hale Pohaku and the summit</li> </ul>
Initiate monitoring of new categories of resources using data obtained during the baseline data gathering stage.	<ul style="list-style-type: none"> <li>• Monitoring plans will be developed following baseline surveys, e.g., monitoring of botanical resources.</li> </ul>

**Resources Management Programs.** Concurrent with the gathering of baseline information is the need to develop and implement resource management programs. OMKM together with Kahu Kū Mauna developed preliminary policies for the construction of new cultural features, scattering of cremated human remains, and the stacking of rocks. The Kahu Ku Mauna believes the construction of ahu is a traditional practice and, therefore, are cultural features. They should not be lumped together with the “stacking of rocks” that is part of CR-9. Instead, ahu should be included as part of CR-7, construction of new cultural features. The next step is to take the ideas and recommended

actions in these preliminary policies to the public for their input. Since these policies impact public activities, they may need to be incorporated into the administrative rules being developed by OMKM.

Data from surveys and the study of the life history of the wēkiu bug, and weather and climate studies provide the basis for developing management programs for the bug. Invasive flora and fauna are a concern because of their potential impact on the wēkiu bug and other native species and on the “health” of Mauna Kea’s unique ecosystem. OMKM is working with the Big Island Invasive Species Committee (BIISC), which includes members from DLNR, on the development of an invasive species prevention, control and response program. A draft is partially complete, but progress may be slowed due to the need to hire a new project coordinator to complete the development of the plan. The original project coordinator was recently promoted to head the BIISC.

*Senecio madagascarensis* (fireweed) removal is an ongoing activity. Rangers remove fireweed when they find it along the road and in the summit areas. In 2012 OMKM organized a community volunteer program to pull invasive weeds, primarily in the mid-level facilities area– the gateway for invasive species to higher elevations. OMKM held eight volunteer days during which 114 volunteers signed up putting in 873 volunteer-hours and filling 205 bags of invasive weeds.

<p>Development of protocols and/or policies related to cultural practices.</p>	<ul style="list-style-type: none"> <li>• A draft of a burial treatment plan has been prepared; the plan was introduced to the Hawaii Island Burial Council</li> <li>• A draft of a preliminary policy for scattering cremated remains was developed and is pending review</li> <li>• Draft of a preliminary policy relating to the construction of cultural features was developed and is pending review</li> <li>• A programmatic agreement is being developed for approval by the Historic Preservation Division on routine maintenance activities on the summit</li> </ul>
<p>Invasive species control</p>	<ul style="list-style-type: none"> <li>• OMKM is working with the Big Island Invasive Species Committee on the development of an invasive species prevention, control and response plan. A draft is in progress.</li> <li>• An active volunteer program to remove <i>Senecio madagascarensis</i> (fireweed) and other invasive plants was initiated; rangers continue to remove fireweed in the upper elevations.</li> <li>• Volunteer Mary Begier and the Hawaii Island Chamber of Commerce were presented the Community Hero Award by the Invasive Species Council at its first annual recognition ceremony. OMKM was the nominator.</li> </ul>
<p>Development of a wēkiu bug management plan and habitat restoration plan.</p>	<ul style="list-style-type: none"> <li>• Data from wēkiu bug, alien arthropod, invertebrate studies, topography and wēkiu bug food distribution, and climate studies will provide the basis for developing management and habitat restoration plans for the bug.</li> </ul>

Public facilities	<ul style="list-style-type: none"> <li>OMKM is evaluating the current infrastructure situation at the Mid-level facilities at Hale Pohaku; may consider moving existing activities to other locations or rearrange existing buildings to avoid potential hazards due to the increase in traffic and visitors. The addition of restroom facilities is still being planned near the Visitor Information Station</li> </ul>
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**Education, Training and Outreach.** OMKM recognizes the need to formally educate and train management staff, stakeholders, construction workers and the general public about the resources and significance of Mauna Kea. 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 developed a preliminary cultural and natural resources orientation program that is applicable primarily for user groups on Mauna Kea. OMKM plans to condense the orientation for visitors to the mountain. OMKM Rangers continue their daily recording of data, for example, vehicle counts and hikers.

OMKM is speaking at various community organizations to inform them about why we manage the mountain. In addition, an eNewsletter was launched in 2012 to keep the community abreast about OMKM activities and programs.

Initiate programs to educate stakeholders, management staff, and the general public.	<ul style="list-style-type: none"> <li>OMKM developed a preliminary cultural and natural resources orientation program that will be used for construction workers, rangers, Visitor Information Station and mid-level employees, observatory personnel, and commercial operators.</li> </ul>
Develop and maintain a GIS and database program.	<ul style="list-style-type: none"> <li>A GIS-based data storage and reporting system is currently under development</li> <li>Data, such as number of vehicles by vehicle type and hikers, visitor activities and trash are reported daily by rangers and stored in a database.</li> </ul>
Develop an outreach program.	<ul style="list-style-type: none"> <li>The collection and compilation of data will provide information for use in an education and outreach program.</li> </ul>

**Printed Materials & Public Forums.** The education process and outreach efforts include the development of educational materials, such as brochures, signage and the dissemination of materials. OMKM initiated the development of informational brochures for adults.

Develop and print brochures.	<ul style="list-style-type: none"> <li>A brochure is being developed that will contain information about the resources and significance of Mauna Kea for public distribution at the Visitor Information Station, ‘Imiloa, and at other targeted public venues. OMKM is currently condensing the voluminous information to a more user friendly format.</li> </ul>
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Distribution of informational materials.	<ul style="list-style-type: none"> <li>Continue distribution of existing brochures – cultural, visiting safely, and Mauna Kea hazards. Update as needed</li> </ul>
Participate in public events, community gatherings and other opportunities to inform the community about Mauna Kea.	<ul style="list-style-type: none"> <li>Continue to, and seek opportunities to participate or speak at public forums, including community meetings, organization’s membership meetings, etc.</li> </ul>
Signs	<ul style="list-style-type: none"> <li>With input from Rangers and Kahu Kū Mauna, signs are being considered to address cultural land safety issues</li> <li>A map of all the signs on UH’s managed lands has been completed.</li> </ul>

**Daily Implementation of Ongoing Actions**

The Mauna Kea rangers continue to monitor activities on UH’s managed lands on a daily basis. They record pertinent data including the number of vehicles by type (4 vs. 2-wheel drive, observatory, commercial and motorcycles) and observations of visitor activities, including hikers, bikers, vehicle speeds, trash, etc. Through their interactions with the public they help to educate people about Mauna Kea. Many of the management actions relating to public and commercial activities, and trash pick-up and removal are carried out by the Rangers as part of their daily responsibilities.

The Mauna Kea ranger corps was increased to eight full time rangers. This allows OMKM to schedule three rangers for duty and ensures a minimum of two rangers on duty should one ranger is sick or on vacation.

**Administrative Rules**

The development of administrative rules is still on hiatus due to the ongoing contested case for the Thirty Meter Telescope (TMT) project. Upon conclusion and decision by the BLNR regarding the permit for the TMT the development of rules will resume.

## **Appendix A**

### **April 2013 Summary of In Progress, Ongoing, Completed and As Needed Mauna Kea CMP Management Actions and Relationship to the CMP Sub Plans**

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**TEXT IN BLUE INDICATES CHANGES OR ADDITIONS FROM THE PREVIOUS YEAR'S REPORT**

<b>COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES</b>				
		<b>Implementation Schedule</b>	<b>Comments</b>	<b>Sub Plans</b>
<b>NATIVE HAWAIIAN CULTURAL RESOURCES</b>				
<b>Management</b>				
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.	In Progress	Identification of lineal and historical connections will be part of the development of the Burial Treatment Plan (see CR-13).  Solicitations were made through announcements in the daily newspapers and the OHA newsletter.	NRMP 5.1.1 CRMP 4.2.1 PAP 2.3, 6.1, 6.3, 6.8
CR-3	Conduct educational efforts to generate public awareness about the importance of preserving the cultural landscape.	In Progress	Rangers through their interactions with the visiting public help to educate and raise awareness about Mauna Kea.  The development of an informational brochure is in the editing stage. The next step is review by Kahu Ku Mauna and the MKMB Environment Committee.  OMKM sends out monthly eNewsletters informing the public about OMKM and its activities.	NRMP 4.4.2 CRMP 4.3.3 PAP 4.2, 5.2, 6.1
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.	Short-term	It is our understanding that the State Historic Preservation Division is reviewing the Archeological Inventory Survey for the Mauna Kea Ice Age Natural Area Reserve. Completion of the review means a complete inventory of the historic properties on the summit region of Mauna Kea which will be included in the filing of a petition to designate the summit region of Mauna Kea an Historic District as proposed by SHPD and for placement on the National Register of Historic Places.	CRMP 2.4.2.1
<b>Cultural Practices</b>				
CR-5	Develop and adopt guidelines for the culturally appropriate placement and removal of offerings.	In Progress	Kahu Kū Mauna reviewed a draft of a process. Next step is to take this out for review by the community. The final outcome should be included in administrative rules for UH's managed lands.  Note: CR-5 overlaps with CR-7 (constructing new Hawaiian cultural features) being that offerings are usually associated with the construction of new features.	CRMP 4.2.1.3 PAP 6.3, 6.8
CR-6	Develop and adopt guidelines for the visitation and use of ancient shrines.	In Progress	Visitation is a public access issue and is a matter to be addressed in administrative rules for UH's managed lands.	CRMP 4.2.1.5 PAP 2.7.2, 6.3

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CR-7	Kahu Kū Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian cultural features.	In Progress	Kahu Kū Mauna reviewed a draft of a process. Next step is to take this out for review by the community. The final outcome should be included in administrative rules for UH's managed lands	CRMP 4.2.1.6
CR-8	Develop and adopt a management policy for the UH Mgt. Areas on the scattering of cremated human remains.	In Progress	Kahu Kū Mauna reviewed a draft of a process. Next step is to take this out for review by the community. The final outcome should be included in administrative rules for UH's managed lands.	
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.	In Progress	Kahu Kū Mauna reviewed a draft of a process. Next step is to take this out for review by the community. The final outcome should be included in administrative rules for UH's managed lands.	CRMP 4.2.1.8 PAP 6.8
CR-4	Establish a process for ongoing collection of information on traditional, contemporary, and customary cultural practices.	Short-Term		CRMP 4.2.1.1
<b>Historic Properties</b>				
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.	In Progress	OMKM is reviewing a draft of the plan	CRMP 4.3.1 PAP 5.2
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
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.	As Needed	Kahu Kū Mauna determined that this should be reviewed on a case-by-case basis instead of taking Immediate implementation.	CRMP 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.	In Progress	OMKM is reviewing a draft of the plan	CRMP 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.	Ongoing	Rangers report disturbance to OMKM.	CRMP 4.3.1.6 PAP 2.5.1

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<b>COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES</b>				
<b>Implementation</b>				
		<b>Schedule</b>	<b>Comments</b>	<b>Sub Plans</b>
<b>NATURAL RESOURCES</b>				
<b>Threat Prevention and Control</b>				
NR-6	Reduce threats to natural resources by educating stakeholders and the public about Mauna Kea's unique natural resources.	Ongoing	Rangers through their interaction with the visiting public help to educate them about Mauna Kea.  See CR-3	NRMP 4.4 PAP 2.7.1, 4.2 5.2, 6.1, 6.3, 6.6
NR-2	Limit damage caused by invasive species through creation of an invasive species prevention and control program.	In Progress	OMKM is working with the Big Island Invasive Species Committee on the development of an invasive species prevention, control and response plan.  <i>A volunteer program was established to pull invasive weeds on UH's managed lands with emphasis in the Hale Pohaku area. Long term goal is to re-vegetate the mid-level area with native plants.</i>	NRMP 4.2.3.7, 4.3 PAP 2.7.1, 6.3
NR-1	Limit threats to natural resources through management of permitted activities and uses.	In Progress	OMKM is currently in the process of developing administrative rules relating to public access and commercial activities.	NRMP 4.2.3
NR-3	Maintain native plant and animal populations and biological diversity.	Mid and Long-term		NRMP 4.2.3.8
NR-4	Minimize barriers to species migration to help maintain populations and protect ecosystem processes and development.	Mid and Long-term		NRMP 4.2.3.11
NR-5	Manage ecosystems to allow for response to climate change.	Long-term		NRMP 4.2.3.11
<b>Ecosystem Protection, Enhancement &amp; Restoration</b>				
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		NRMP 4.1, 4.2.3.1
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		NRMP 4.2.3.7, 4.3
NR-9	Increase native plant density and diversity through an outplanting program.	Long-term	<i>Mamane seedlings germinated from seeds found in the Hale Pohaku area were planted near the Visitor Information Station</i>	NRMP 4.3, 4.4
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

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**COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES**

<b>Implementation Schedule</b>				
<b>Comments</b>				
<b>Sub Plans</b>				
<b>NATURAL RESOURCES</b>				
<b>Program Management</b>				
NR-13	Increase communication, networking, and collaborative opportunities to support management and protection of natural resources.	<del>In Progress</del> Ongoing	OMKM has established and continues to establish working relationships with the community and DLNR through working groups such as the Environment and Rules Committees; the Mauna Kea Neighbors, Big Island Invasive Species Committee, and OHA.	NRMP 4.1.3.3, 4.3, 5.1.3 PAP 4.2, 4.5
NR-14	Use the principles of adaptive management when developing programs and methodologies. Review programs annually and revise any component plan every five years, based on the results of the program review.	Short-term / As needed		NRMP 5.2 PAP 5.1, 5.2, 6.4, 6.7, 7
<b>Inventory, Monitoring and Research</b>				
NR-16	Conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan.	<del>In Progress</del> Ongoing	OMKM conducts annual wēkiu bug and alien arthropod surveys. Botanical monitoring is expected following the submittal of the botanical survey report. Other monitoring plans to be developed following baseline surveys.	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.	In Progress	Wēkiu bug and botanical data <b>location of infrastructure and signs have been mapped.</b> OMKM is working with the University of Hilo Geography Department on the development of the GIS database. All future survey data will be mapped.	NRMP 4.1, 4.5
NR-15	Conduct baseline inventories of high-priority resources, as outlined in an inventory, monitoring, and research plan.	Ongoing	Baseline surveys of invasive arthropods continue. A botanical survey was completed in the Summer of 2011. OMKM is <b>planning to fund a study on permafrost and hopefully a weather monitoring system to help monitor the change in climate over time.</b>	NRMP 4.1
NR-17	Conduct research to fill knowledge gaps that cannot be addressed through inventory and monitoring.	Ongoing	OMKM is funding a study to develop a model relating to climate change and potential impact to the summit ecosystem, and a study of native arthropods.  OMKM funded an international symposium on Tropical Alpine Ecosystems. Invited speakers are experts in research and management of alpine ecosystems. OMKM hopes to develop a network with other researchers and managers to gain knowledge to better manage Mauna Kea.	NRMP 4.1.2.3

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**COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES**

Implementation Schedule				
Comments				Sub Plans
EDUCATION AND OUTREACH				
<b>Program Development</b>				
EO-1	Develop and implement education and outreach program	In-Progress Ongoing		NRMP 4.1 CRMP 4.3.3 PAP 2.7.1, 4.2, 5.2, 6.1, 6.3, 6.6
<b>Education</b>				
EO-3	Continue to develop, update, and distribute materials explaining important aspects of Mauna Kea.	In-Progress Ongoing	Materials on culture, visiting safely and responsibly and Mauna Kea hazards are distributed at the Visitor Information Station. An informational brochure on the significance of Mauna Kea is currently being developed	NRMP 4.4 CRMP 4.3.3 PAP 6.1
EO-4	Develop and implement a signage plan to improve signage throughout the UH Management Areas (interpretive, safety, rules and regulations).	Short Term	This was originally classified as Immediate implementation but has been deferred to Short Term to accommodate the accrual of additional resource information. <a href="#">A map showing the location of signs on UH's managed lands has been completed.</a> <a href="#">New cultural and safety related signs are planned.</a>	NRMP 4.4.2 PAP 4.2, 5.2, 6.2
EO-5	Develop interpretive features such as self-guided cultural walks and volunteer-maintained native plant gardens.	Mid-term		NRMP 4.3, 4.4.2 CRMP 4.3.3 PAP 6.2
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		NRMP 4.4.2 PAP 5.2, 6.1
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.	In-Progress Ongoing	<a href="#">OMKM initiated a test orientation of consultants working on the mountain. The program is undergoing edits.</a>	NRMP 4.4.2 PAP 6.1, 6.6
<b>Outreach</b>				
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	OMKM through the MKMB, Kahu Kū Mauna, Environment and Rules Committees provide opportunity for members of the community and other organizations to participate in the management activities of the mountain.	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	OMKM through the MKMB, Kahu Kū Mauna, Environment and Rules Committees provide opportunity for members of the community to participate in the management activities of the mountain.	NRMP 4.4.2

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**COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES**

		Implementation Schedule	Comments	Sub Plans
<b>ASTRONOMICAL RESOURCES</b>				
<b>Protection of Astronomical Resources</b>				
AR-1	Operate the UH Management Areas to prohibit activities resulting in negative impacts to astronomical resources.	In Progress	OMKM is currently in the process of developing administrative rules relating to public access and commercial activities.	PAP 5.1
AR-2	Prevent light pollution, radio frequency interference (RFI) and dust.	Ongoing	Project proposal requesting the use of radio signals are reviewed by the Institute for Astronomy for potential interference with astronomical research activities.	NRMP 4.2.3.2

**COMPONENT PLAN: MANAGING ACCESS AND USE**

<b>ACTIVITIES AND USES</b>				
<b>General Management</b>				
ACT-2	Develop parking and visitor traffic plan.	In Progress	OMKM is currently working with Mauna Kea Support Services to develop a plan to address parking at the Visitor Information Station. <a href="#">A CIP request was submitted to study and design improvements at the Mid-level facilities and summit access road.</a>	NRMP 3.1.1.2 PAP 5.2, 6.4, 6.6, 6.7
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	Mauna Kea Rangers are present year round from 7 am to 10 pm daily; DOCARE officers and Hawaii County Police are called in on an as needed basis.	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	OMKM prohibits the use of off-road vehicles on UH's managed lands.  Commercial operators and film crews are required to stay on the road or within the footprint of existing facilities, unless granted permission from OMKM.  OMKM is currently in the process of developing administrative rules relating to public access and commercial activities. <a href="#">There is a stay on the development of rules until the conclusion of the contested case for a proposed project for Mauna Kea</a>	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
ACT-1	Continue and update managed access policy of 1995 Management Plan.	In Progress	OMKM is currently in the process of developing administrative rules relating to public access and commercial activities. <a href="#">There is stay on the development of rules until the completion of the contested case for a proposed project for Mauna Kea</a>	NRMP 4.2, 4.4 PAP 2.5.2, 5.2, 7

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COMPONENT PLAN: MANAGING ACCESS AND USE				
Implementation				
		Schedule	Comments	Sub Plans
ACTIVITIES AND USES				
<b>Recreational</b>				
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	Generally, this is a self-regulated activity. People usually do not venture to areas where there is no snow.	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	Star gazing activities on UH's lands are limited to parking lots, or in areas in close proximity to the Visitor Information Station.	NRMP 6.2.3 CRMP 4.2.3.1 PAP 2.5.3, 2.6.2, 3.3.3, 5.2
ACT-8	Coordinate with DLNR in the development of a policy regarding hunting in the UH Management Areas.	In Progress	Hunting policy similar to DLNR's is being addressed in the development of UH's administrative rules.	NRMP 3.1.3.5 3.2.12 CRMP 4.2.3.3 PAP 2.5.1, 3.3.6, 5.2
ACT-5	Implement policies to reduce impacts of recreational hiking	In Progress	OMKM is currently in the process of developing administrative rules relating to public access and commercial activities.	NRMP 4.2.3.1 CRMP 4.2.3.4 PAP 3.3.7, 5.2, 6.2, 6.3
<b>Commercial</b>				
ACT-9	Maintain commercial tour permitting process; evaluate and issue permits annually.	Ongoing	UH oversees commercial tour permits. A responsibility transferred to UH from BLNR.	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	All film permits require OMKM's approval.  OMKM is currently in the process of developing administrative rules relating to public access and commercial activities. <a href="#">There is stay on the development of rules until the conclusion of the contested case for a proposed project for Mauna Kea</a>	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	Transfer of commercial tour permitting function was transferred to UH by BLNR. OMKM oversees commercial tour operations and film activities.  Statutory authority to promulgate administrative rules was granted by the Legislature in 2009	NRMP 1.4.2.3

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<b>COMPONENT PLAN: MANAGING ACCESS AND USE</b>				
<b>Implementation</b>				
		<b>Schedule</b>	<b>Comments</b>	<b>Sub Plans</b>
<b>ACTIVITIES AND USES</b>				
<b>Scientific Research</b>				
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	All research proposals must be approved by OMKM. Proposals requiring ground disturbing activities or potential impact to the cultural and/or natural landscape are reviewed by MKMB, Kahu Kū Mauna and the Environment Committee.	NRMP 4.2.3.1, 4.2.3.7, 4.2.3.9 CRMP 4.2.6
<b>COMPONENT PLAN: MANAGING ACCESS AND USE</b>				
<b>PERMITTING AND ENFORCEMENT</b>				
<b>Laws and Regulations</b>				
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-4	Educate management staff and users of the mountain about all applicable rules and permit requirements.	Ongoing		NRMP 4.4 PAP 4.2, 5.2, 6.1, 6.2, 6.5
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.	Ongoing	Relevant CMP management actions were incorporated into the CDUA for the Thirty Meter Telescope project. <a href="#">The MKMB requires proposals for projects for Mauna Kea include a review and comments on how the proposer will comply with CMP action items relevant to the project.</a>	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
<b>Enforcement</b>				
P-5	Continue coordinating with other agencies on enforcement needs.	Ongoing	Representatives from DOCARE, NAR and Land Division are members of OMKM's administrative rules committee.	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		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	OMKM rangers conduct twice yearly inspections for CDUP compliance.	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

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<b>COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT</b>				
<b>Implementation</b>				
		<b>Schedule</b>	<b>Comments</b>	<b>Sub Plans</b>
<b>INFRASTRUCTURE AND MAINTENANCE</b>				
<b>Routine Maintenance</b>				
IM-1	Develop and implement an OMMP.	In Progress	Draft of plan is being developed.	
IM-2	Reduce impacts from operations and maintenance activities by educating personnel about Mauna Kea's unique resources.	<del>In Progress</del> Ongoing	A draft of a cultural and natural resources orientation program has been developed.	NRMP 4.4
IM-5	Develop and implement a Debris Removal, Monitoring and Prevention Plan.	Ongoing	Trash from the HP facilities and Visitor Information Station are removed daily. Each observatory removes trash from their respective facilities. Rangers routinely check for and pick up trash and debris while on their daily patrols. Rangers pick up and map the location of trash at the parking lot near the trail head to Lake Waiiau (NAR). The amount of trash decreased following the installation of a portable toilet.	NRMP 4.2.3.5 CRMP 4.1.4, 4.3.4
IM-3	Conduct historic preservation review for maintenance activities that will have an adverse effect on historic properties.	In Progress	OMKM is currently developing a Programmatic Agreement relating to maintenance activities that will be submitted to State Historic Preservation Division	CRMP 4.1.3
IM-4	Evaluate need for and feasibility of a vehicle wash station near Hale Pōhaku, and requiring that vehicles be cleaned.	Short-term		NRMP 4.2.3.7
IM-6	Develop and implement an erosion inventory and assessment plan.	Long-term		NRMP 3.2.4, 4.1.4.2, 4.2.3.4 PAP 2.6.3, 6.3, 6.4
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		CRMP 4.3.4.1
<b>Infrastructure</b>				
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.	In Progress	A CIP request was submitted to study and design improvements at the Mid-level facilities and summit access road.	NRMP 3.1.3.1 3.2.3, 4.2.3.3 PAP 5.2, 6.4, 6.6, 6.7, 6.8
IM-8	Assess feasibility of paving the Summit Access Road.	In Progress	A CIP request was submitted to study and design improvements at the Mid-level facilities and summit access road.	NRMP 4.2.3
IM-9	Evaluate need for additional parking lots and vehicle pullouts and install if necessary.	Mid-term		NRMP 3.1.1.2.3 PAP 5.2, 5.4, 6.7

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COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT				
		Implementation Schedule	Comments	Sub Plans
<b>Sustainable Technologies</b>				
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.	Short-Term	This was initially scheduled for Immediate implementation but has been deferred to Short Term implementation.	NRMP 4.2.3.3
IM-13	Conduct feasibility assessment, in consultation with Hawaii Electric Light Company, on developing locally-based alternative energy sources.	Mid-term	<a href="#">Mauna Kea Support Services is currently looking at the feasibility of installing a photo voltaic system at Hale Pohaku</a>	NRMP 3.1.1.2.3
IM-14	Encourage observatories to investigate options to reduce the use of hazardous materials in telescope operations.	Short-Term		

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<b>COMPONENT PLAN: MANAGING THE BUILD ENVIRONMENT</b>				
		<b>Implementation Schedule</b>	<b>Comments</b>	<b>Sub Plans</b>
<b>CONSTRUCTION GUIDELINES</b>				
<b>General Requirements</b>				
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
<b>Best Management Practices</b>				
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
<b>SITE RECYCLING, DECOMMISSIONING, DEMOLITION AND RESTORATION</b>				
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

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<b>COMPONENT PLAN: MANAGING THE BUILD ENVIRONMENT</b>				
<b>Implementation</b>				
		<b>Schedule</b>	<b>Comments</b>	<b>Sub Plans</b>
<b>CONSIDERATION OF FUTURE LAND USE</b>				
<b>Facility Planning Guidelines</b>				
FLU-1	Follow design guidelines presented in the 2000 Master Plan.	Ongoing	The Design Review Process, which incorporated the 2000 Master Plan's design guidelines, are being used in the review of the Thirty Meter Telescope project	NRMP 5.1.1
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.	Short-Term	This was originally listed for Immediate implementation. However, this task will require additional data gathered from baseline surveys of the resources.	NRMP 4.3.3.1
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

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<b>COMPONENT PLAN: MANAGING OPERATIONS</b>				
<b>Implementation Schedule</b>			<b>Comments</b>	<b>Sub Plans</b>
<b>OPERATION AND IMPLEMENTATION OF THE CMP</b>				
<b>Management</b>				
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.	In Progress	OMKM initiated a test orientation of consultants working on the mountain. The program is undergoing edits.	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	A draft of an emergency response is currently being developed.	CRMP 4.1.6, 4.3.5 PAP 6.1, 6.4, 6.5, 6.7
OI-4	Establish grievance procedures for OMKM, to address issues as they arise.	Short-term		PAP 6.6
<b>CMP MONITORING, EVALUATION AND UPDATES</b>				
<b>Management</b>				
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.	Ongoing	Reports are provided at the publicly held Mauna Kea Management Board Meeting. DLNR is represented on the Mauna Kea Management Board.	NRMP 4.1.3.3 PAP 6.4, 6.6, 7
MEU-2	Conduct regular updates of the CMP that reflect outcomes of the evaluation process, and that incorporate new information about the resources.	Short-Term/ As needed		NRMP 5.2 CRMP 5.5 PAP 7
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

CRMP - Cultural Resources Management Plan; NRMP – Natural Resources Management Plan; PAP – Public Access Plan