

**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS
Honolulu, Hawai'i**

June 12, 2015

**Board of Land and
Natural Resources
State of Hawai'i
Honolulu, Hawai'i**

**REGARDING: 2015 Annual Report
Status of the Implementation of the Mauna Kea Comprehensive
Management Plan**

PERMITTEE: University of Hawai'i at Hilo

AGENT: Stephanie Nagata, Director, Office of Mauna Kea Management, 200 W.
Kawili Street, Hilo, HI 96720

LANDOWNER: State of Hawai'i; leased to the University of Hawai'i under General
Lease S-4191

LOCATION: Mauna Kea Science Reserve, Ka'ohē Mauka, Hāmākua District, Hawai'i

TMK: (3) 4-4-015:009

ARE OF PARCEL: approximately 11,288 acres (Mauna Kea Science Reserve)

SUBZONE: Resource

BACKGROUND

On April 9, 2009, the Board of Land and Natural Resources approved the Mauna Kea Comprehensive Management Plan (CMP) for the Mauna Kea Science Reserve, including Hale Pōhaku and the Summit Access Road, Ka'ohē Mauka, Hāmākua District, Hawai'i

Conditions 2 and 3 of the approval reads:

- 2) That within one year of the approval of the CMP, the BOR (*Board of Regents*) or its authorized designee shall provide the BLNR in writing and in person with the following information:
 - Status of the development of each sub plan;
 - Status of the development of each management action;

- 3) The BOR or its authorized designee shall continue to submit annual reports to the BLNR (in writing and in person), which shall include the items listed in condition No. 2.

This current report reflects the ongoing management actions and activities in the Science Reserve for the 2014 calendar year.

Previous years' reports are available on OCCL's website at dlnr.hawaii.gov/occl/special-projects.

RECOMMENDATION

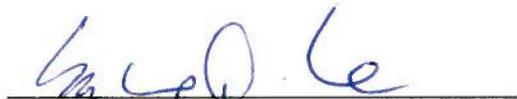
OCCL is presenting the attached report as a "non-action" item on the Board's Agenda, and has invited the permittee to give a brief presentation to the Board.

Respectfully submitted,



Michael Cain, Staff Planner
Office of Conservation and Coastal Lands

Approved for submittal:



Suzanne R. Case, Chairperson
Board of Land and Natural Resources

2015 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.

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| 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: **As Needed**, **Short to Long Term**, **Ongoing**, or **Completed**. For the 2012 report, the **Ongoing** category was further 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. For reports beginning in 2014, based on feedback from the Office of the Auditor, State of Hawaii, we again refined these definitions. **Ongoing** refers to activities that have established processes in place and are performed as part of OMKM's daily responsibilities. For example, processes for reporting disturbances to historic properties are established while actual reporting is

Ongoing as necessary. **In Progress** refers to actions that require specialized implementation such as the development of policies or hiring consultants and researchers, and while efforts are **In Progress** the action or process is not yet complete.

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| Short to Long Term | Management action still to be implemented during its scheduled time period |
| In Progress | Management action that requires specialized implementation has been initiated, process is not yet complete |
| Ongoing | Management action is implemented and processes are in place to fulfill this requirement, actions will continue indefinitely because they are part of OMKM's continuing management responsibilities |
| Completed | Management action is completed |

2014 – 2015 Summary of Implementation Status

Most management actions have either been implemented or are in progress. Many actions are considered 'ongoing' as they are long term, continuous land management responsibilities. Appendix A details the implementation status with explanations for individual CMP management actions.

CMP Management Action Implementation Overview

As reported in earlier reports OMKM identified five priority categories. 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. OMKM in collaboration with UH Hilo Geography Department, initiated a multi-year study of surface erosion processes in cinder cone environments. This study will help to better understand natural erosion and mitigate impacts of existing infrastructure and improve our characterization of arthropod habitat.

Surveys of the wēkiu bug, alien arthropods and botanical resources are still being conducted on an annual basis. The multi-year study of the status of permafrost in the summit region is still ongoing as well as the development of a climate change sea-level to summit monitoring system, and development of a climate change modeling program. The climate change projects will help track changes in weather and climate over the long term and will provide us with data to evaluate altitudinal changes and impacts on ecosystems from sea level to the summit.

Parking, vehicle and pedestrian flow and visitor capacity concerns are being addressed in design improvements and layout of facilities at, and in areas surrounding the Visitor Information Station (VIS). Road improvements are also being evaluated. Capital Improvement Project funds were appropriated for this study.

Summary of activities:

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| Initiate surveys and studies on flora and fauna, geology and hydrology, | • 4-year study on permafrost is ongoing. |
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| <p>Climate/weather and air quality, and erosion.</p> | <ul style="list-style-type: none"> • 4-year survey on native and other summit arthropods commenced in the Fall 2011. • Botanical survey of UH's lands is available on-line. • A 4-year climate change study commenced in the Spring 2012. • OMKM initiated (2014) a study of surficial geology and erosion in cinder cone environments, with LiDAR data collected for the summit and road corridor above 12,500'. Margaux Mellott, a UH Hilo PIPES intern supported project efforts in 2014. • Coordinating with UH Geography and Meteorological Depts. on installing a summit weather tower as part of a weather monitoring system stretching from sea level to the summit. |
| <p>Initiate surveys of human activities and needs such as commercial tour capacity and fees, traffic, parking and public facilities.</p> | <ul style="list-style-type: none"> • OMKM and Maunakea Support Services are implementing an interim plan addressing parking at the VIS. A consultant has been secured using CIP funds to study and design improvements to the VIS and surrounding areas to address, parking, and vehicular and pedestrian flow. The study will also evaluate road improvements. • Rangers continue to submit daily reports on human activities; data are input in a database. • A vehicle counter is installed that will keep a real time count of all vehicles above Halepōhaku, including specific counts of observatory and commercial vehicles on the mountain. • A survey of visitors was completed at Halepōhaku. The majority are non-resident visitors. |
| <p>Continue studies on the wēkiu bug and alien arthropods</p> | <ul style="list-style-type: none"> • Research on the biodiversity of arthropods continues. |
| <p>Other Studies</p> | <ul style="list-style-type: none"> • OMKM will be initiating procurement efforts to study commercial tour activities to determine the "capacity" for commercial tour operators. |

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

Monitoring of the wēkiu bug, which began in 2002, and alien arthropods, in 2007, is conducted annually. A monitoring plan for botanical resources will be developed in collaboration with recommendations for arthropod monitoring.

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| Initiate monitoring of the archaeological resources. | <ul style="list-style-type: none"> • A monitoring plan was reviewed and approved by the State Historic Preservation Division and is being implemented. |
| Continue surveys of the wēkiu bug and arthropods species. | <ul style="list-style-type: none"> • Monthly surveys for alien arthropods of the mid-level facilities. Quarterly surveys of the summit facilities, and annual surveys of alien arthropods across UH managed lands are conducted. • Annual surveys of the wēkiu bug. • Ant monitoring program of facilities at Halepōhaku and the summit. |
| Initiate monitoring of new categories of resources using data obtained during the baseline data gathering stage. | <ul style="list-style-type: none"> • Monitoring plans will be developed following baseline surveys, e.g., monitoring of botanical and arthropod resources. |

Resources Management Programs. Concurrent with the gathering of baseline information is the need to develop and implement resource management programs. It was reported previously that OMKM together with Kahu Kū Mauna developed preliminary policies for the construction of new cultural features. Kahu Kū Mauna also developed policies related to the scattering of cremated human remains, and the stacking of rocks. In order for these two policies to be enforceable OMKM plans to incorporate these policies into its administrative rules. .

Data from surveys and studies provide valuable information for developing management programs for the wēkiu bug. Invasive flora and fauna are a concern because of their potential impact not only on the wēkiu bug, but also on other native species, and on the “health” of Maunakea’s unique ecosystem. OMKM developed an invasive species prevention, response and control plan which was reviewed by both the Kahu Kū Mauna and the Mauna Kea Management Board (MKMB) and approved by the latter.

Senecio madagascarensis (fireweed) removal is an ongoing activity. Rangers continue to remove fireweed when they find it along the road and in the summit areas. Since its inception in the Spring of 2012, OMKM’s community volunteer weed pull program affiled a total of 1,080 bags of weeds by 688 volunteers putting in 4,975 hours. OMKM assisted a Kamehameha high school student with his science project which included propagating native plants. These plants are being cared for by OMKM and will be planted in the Halepōhaku area. It is OMKM’s goal to control invasive weeds and to restore the area with native vegetation.

The invasive ant, *Cardiocondyla kagutsuchi*, was discovered at Halepōhaku in 2013. Subsequent ant surveys documented their presence along the Maunakea Access road from the Mauna Kea Forest Reserve up to Halepōhaku. It was discovered upon further investigation that this ant is also present along the Mana Road, in Hakalau National Wildlife Refuge, and in Department of Hawaiian Home Lands. It is estimated that this ant has been present in the area since at least 2007. Preventing the introduction of predatory ants remain a high priority, fortunately *C.kagutsuchi* is a relatively benign non-native species. Recently, *Ochetellus glaber* was discovered in palm fronds that was brought up for thatching for a hale that was constructed in the area across from the VIS on DLNR Forest Reserve lands. DLNR put out ant baits to determine the presence of the ants and OMKM assisted with surveys. Survey results indicate the ants had not migrated onto UH’s lands. Surveys of local

populations of, *C. kagatsuchi* and *O. glaber* coordinated with the Mauna Kea Forest Reserve continues.

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| <p>Development of protocols and/or polices related to cultural practices.</p> | <ul style="list-style-type: none"> • A burial treatment plan has been prepared; approved by the Hawaii Island Burial Council and Division of Historic Preservation. • A policy for scattering cremated remains was developed. • A policy relating to the construction of cultural features was developed. • A policy relating to the stacking of rocks was developed. |
| <p>Invasive species control</p> | <ul style="list-style-type: none"> • The Maunakea Invasive Species Management Plan is approved and implemented. • The Hawaii Ant Lab and Big Island Invasive Species Committee continue to support implementation of the Invasive Species Management Plan. • OMKM hosted two UH Hilo Pacific Internship Programs for Exploring Science (PIPES) interns for the summer. One intern, worked with OMKM to implement portions of this plan. • An active volunteer program to remove <i>Scenicio madagascarensis</i> (fireweed) and other invasive plants continues; rangers continue to remove fireweed in the upper elevations. • Ant monitoring is conducted quarterly at the summit facilities, monthly at the facilities at Halepōhaku, and large deliveries are inspected by a DLNR-approved biologist. |
| <p>Development of a wēkiu bug management plan and habitat restoration plan.</p> | <ul style="list-style-type: none"> • 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. • A wēkiu bug habitat restoration plan has been reviewed and implementation is anticipated in fall 2015, fulfilling TMT CDUP requirements. |
| <p>Public facilities</p> | <ul style="list-style-type: none"> • With the release of CIP funds OMKM is studying and designing improvements to the VIS, parking and traffic flow in an around Halepōhaku. |

Education, Training and Outreach. OMKM recognizes the need to formally educate and train management staff, stakeholders and the general public about the resources and significance of Maunakea. 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.” The OMKM Maunakea User/Resource Orientation program was launched in the Summer of 2013. It is a requirement that all observatory and support staff (both office and on-mountain), vendors, construction workers, mid-level support and VIS staff, UH employees, and commercial tour drivers attend the orientation. Current participation statistics for 2013-2014 are:

- 1,309 employees are identified as needing this training across all observatories, OMKM, MKSS, commercial tour companies, etc.
- 1,218 employees attended the training
- 91 employees still need the training
- 93% of employees completed the requirement.

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| <p>Initiate programs to educate stakeholders, management staff, and the general public.</p> | <ul style="list-style-type: none"> • OMKM continues to offer orientations trying to reach the remaining employees and new employees. The current focus is to incorporate contractors and vendors. • OMKM plans to launch orientation sessions on online as a more efficient means of reaching contractors, vendors, visiting staff, or other interested parties. Working with Kahu Kū Mauna on updates and narrative for the online version of the orientation. • Plans are to initiate the development of a refresher program as many of those working on Maunakea are long-serving employees. • A video orientation for visitors will be developed and shown in the VIS. |
| <p>Develop and maintain a GIS and database program.</p> | <ul style="list-style-type: none"> • A GIS-based data storage and reporting system has been developed and continues its efforts to expand and enhance the system. • Rangers continue to submit daily reports summarizing their observations and their activities. • An automated vehicle data collection system is operational. |
| <p>Develop an outreach program.</p> | <ul style="list-style-type: none"> • In 2014, OMKM's volunteer program engaged 283 volunteers, working 1,944 hours, and removed 392 bags of invasive weeds. This year's program once again focused on removing invasive plants in the Halepōhaku parcel and along the access corridor. • Speakers at the volunteer events included UH Hilo faculty and astronomers. |

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| | <ul style="list-style-type: none"> • Volunteer groups included the Hawaii Island Chamber of Commerce, Circle K (Kiwanis youth), Interact (Rotary Youth) Hawaii National Guard Youth Challenge Academy, UH Hilo student groups, and general community members. We also had the privilege of hosting student groups from Ke Ana La'ahana Public Charter School and Hawaii Academy of Arts and Sciences. |
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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.

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| <p>Develop and print brochures.</p> | <ul style="list-style-type: none"> • A resource brochure containing information about the resources and significance of Maunakea is available. Also available are <i>Visiting Maunakea Safely and Responsibly</i> and a cultural brochure. These are available for public distribution at the VIS, 'and other public venues. |
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| <p>Distribution of informational materials.</p> | <ul style="list-style-type: none"> • Continue distribution of existing brochures – cultural, visiting safely, and Maunakea hazards. • The public safety brochures updated. |
| <p>Participate in public events, community gatherings and other opportunities to inform the community about Maunakea.</p> | <ul style="list-style-type: none"> • Continue to seek opportunities to participate or speak at public forums, including community meetings, local organization's membership meetings, etc. • Mentoring young students with as bee h science projects and participation in local science and state science fairs. Jesse Eiben, wēkiu bug researcher for OMKM mentored a 7th grade student at Waiākea Intermediate who studied a ant feeding (bait) preferences of the non-native species found at Halepōhaku. This young student won many local awards and place in the junior division. • Kamehameha High School student Isreal Stillman conducted his senior legacy project in the Science & Natural Resources academy; repeating the vegetation inventory in Halepōhaku and building plant propagation benches and planting several hundred native plant seedlings. • Two free public talks on were held on the UH Hilo campus. Dr. Kenji Yoshikawa (University of Alaska Fairbanks) discussed tropical mountain permafrost including Maunakea and Dr. Norbert Schorghofer discussed snow cover on Maunakea. • Dr. Norbert Schorghofer's (principle investigator for OMKM's sponsored permafrost study) colleague Dr. Kenji Yoshikawa continues work with Hilo Intermediate School 7th & 8th grade science classes to collect comparable data in their school yard for comparison with Maunakea and other sites across the globe. |
| <p>Signs</p> | <ul style="list-style-type: none"> • With input from Rangers and Kahu Kū Mauna, signs were installed to highlight cultural awareness and safety issues. • A map of all the signs on UH's managed lands has been completed. |

Daily Implementation of Ongoing Actions

The Maunakea 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 Maunakea. 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 Maunakea 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 progressing. Small group meetings were held and draft rules are being prepared for public review and comment.

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| Implementation Schedule | | | | Comments | Sub Plans |
|------------------------------------|--|------------|--|--|-----------|
| 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. | Ongoing | <p>Identification of lineal and historical connections is part of the development and State Historic Preservation division approval (2014) of the Burial Treatment Plan (see CR-13). Solicitations were made through announcements in the daily newspapers and the OHA newsletter.</p> <p>There were no responses to our solicitations but OMKM continues to seek out individuals as part of its interaction and relationship building with the community.</p> <p>Fall 2013 the Hawaii Island Burial Council officially recognized several individuals as cultural descendants of Kaohe Ahupua'a.</p> | 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. | Ongoing | <p>Rangers through their interactions with the visiting public help to educate and raise awareness about Mauna Kea.</p> <p>An informational brochure on cultural and natural resources was released in 2014 and will be revised in 2015 based on public feedback.</p> <p>OMKM sends out monthly eNewsletters informing the public about OMKM and its activities.</p> <p>Resource orientation of those who work on the mountain including observatory personnel, VIS and MKSS staff, rangers, commercial tour operators and staff, and construction workers commenced in 2013. Orientation will be made available in the near future.</p> | 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 | The State Historic Preservation Division approved the Archeological Inventory Survey for the Mauna Kea Ice Age Natural Area Reserve. A complete inventory of the historic properties on the summit region of Mauna Kea 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 | |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| Implementation Schedule | | | | |
|---------------------------|--|-------------|---|--------------------------------|
| | | | Comments | Sub Plans |
| Cultural Practices | | | | |
| 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. The final outcome will 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 |
| 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 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. | 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 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| | | Implementation Schedule | Comments | Sub Plans |
|----------------------------|--|-------------------------|---|---------------------------|
| 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. | Completed | SHPD approved our monitoring plan, monitoring is ongoing according to the plan's schedule. | 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. | Ongoing | Kahu Kū Mauna determined that this should be reviewed on a case-by-case basis. They identified criteria for when to consult for routine (minimal impact) project proposals, as well as with future development. | 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 | SHPD reviewed and approved the Burial Treatment Plan for Mauna Kea in 2014.. | 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 and OMKM in turn notifies other parties. | CRMP 4.3.1.6 PAP 2.5.1 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| Implementation Schedule | | | | |
|-------------------------------|--|-------------------|--|---|
| | | | Comments | Sub Plans |
| 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. | Ongoing | Rangers through their interaction with the visiting public help to educate them about Mauna Kea. See CR-3 and EO-2 | 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. | Ongoing | The Maunakea Invasive Species Management Plan is approved and implemented. Additional topics and procedures will be address based on scientific, management board, and community feedback. A volunteer program was established to pull invasive weeds on UH's managed lands with emphasis in the Halepōhaku area. Long term goal is to re-vegetate the mid-level area with native plants. Beginning in 2007 OMKM conducted annual surveys of invasive arthropod species on UH's managed lands. This program was expanded to include monthly and quarterly monitoring depending on the nature of the arthropod threat, and annual invasive plant monitoring concurrent with arthropod surveys. Rapid response strategies, using carabid beetles as an example, were drafted as part of the Invasive Species Management Plan. Inspections of heavy equipment, construction material, and other items too large to be carried by an individual occur prior to coming on to UH's lands. Specific requirements are part of the Invasive Species Management Plan. | 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 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| | | Implementation Schedule | Comments | Sub Plans |
|--|--|-------------------------|--|--|
| 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. | In Progress | Vegetation surveys completed. Biodiversity, wēkiu bug, and erosion and surficial geology surveys are ongoing. | 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). | Ongoing | Assisted DLNR with fencing Silverswords. Other areas will be fenced when areas are identified and needed. | NRMP 4.2.3.7, 4.3 |
| NR-9 | Increase native plant density and diversity through an outplanting program. | Long-term | Mamane seedlings germinated from seeds found in the Halepōhaku area were planted near the Visitor Information Station Worked with DLNR and planted 200 Silversword seedlings in the Halepōhaku area. Collaborated with Kamehameha Schools to build plant propagation benches and start seedlings for eventual habitat restoration and enhancement at Halepōhaku. | NRMP 4.3, 4.4 |
| NR-10 | Incorporate mitigation plans into project planning and conduct mitigation following new development. | Ongoing | Mitigation and best management practices plans are required for projects as appropriate. | NRMP 4.3 |
| NR-11 | Conduct habitat rehabilitation projects following unplanned disturbances. | Ongoing | Vehicle accident (passenger car rolling down summit pu'u) in 2013 was used as a template for developing damage assessment, monitoring, and rehabilitation criteria. | NRMP 4.3 |
| NR-12 | Create restoration plans and conduct habitat restoration activities, as needed. | Mid and Long-term | A proposal to study wēkiu bug habitat restoration has been reviewed and will be initiated. | NRMP 4.3 |
| Program Management | | | | |
| NR-13 | Increase communication, networking, and collaborative opportunities to support management and protection of natural resources. | 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. | In Progress | Potential CMP revisions are identified in annual program documentation. Proposed revisions, for submission to BLNR, are in preparation in 2014. | NRMP 5.2 PAP 5.1, 5.2, 6.4, 6.7, 7 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| Implementation Schedule | | | | |
|---|---|---------|---|---------------------|
| | | | Comments | Sub Plans |
| Inventory, Monitoring and Research | | | | |
| NR-16 | Conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan. | 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. | Ongoing | Wēkiu bug and botanical data location of infrastructure and signs have been mapped. OMKM is working with the University of Hilo Geography Department on the development of the GIS database. All future survey data will be mapped. GoogleEarth layers of priority resources are now complete. . | 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 studying permafrost and designing a weather monitoring system to help monitor the change in climate over time. The botanical survey was published in 2013 and is currently on-line. OMKM is funding a 4-year study on permafrost and working on designing a climate monitoring network. OMKM is also studying erosion to better understand surficial geology, cinder cone erosion, and characterize arthropod habitat. | 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 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

Implementation

Schedule

Comments

Sub Plans

EDUCATION AND OUTREACH

Program Development

| | | | | |
|------|--|---------|--|--|
| EO-1 | Develop and implement education and outreach program | Ongoing | Volunteer, Orientation, Brochures (Safety, Culture, Resources, What is OMKM), in-school visits (Hilo Inter, HAAS, Ke Ana La'ahana, Waiakea High, Kealakehe Elementary) Coordinated with Kealakehe Elementary School the organization of the first annual Science Showcase at the school | NRMP 4.1 CRMP 4.3.3 PAP 2.7.1, 4.2, 5.2, 6.1, 6.3, 6.6 |
|------|--|---------|--|--|

Education

| | | | | |
|------|---|------------|---|--|
| EO-3 | Continue to develop, update, and distribute materials explaining important aspects of Mauna Kea. | Ongoing | Materials on culture, resources, visiting safely and responsibly and Mauna Kea hazards are distributed at the Visitor Information Station. | 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 map showing the location of signs on UH's managed lands has been completed. New cultural and safety related signs are installed. | 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 | Included as part of ongoing CIP funded project. | 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. | Ongoing | See EO-1 | 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. | Ongoing | Resource orientation of those who work on the mountain including observatory personnel, VIS and MKSS staff, rangers, commercial tour operators and staff, and construction workers commenced in 2013. Orientation is available to all interested parties in-person or on-line and will be made available online soon. | NRMP 4.4.2 PAP 6.1, 6.6 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| Implementation Schedule | | | | |
|-------------------------|--|---------|---|---|
| | | | Comments | Sub Plans |
| 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 | 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. Monthly volunteer activities provide an alternative venue for the community to participate and share knowledge. | 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. Monthly volunteer activities provide an alternative venue for the community to participate and share knowledge. Student projects and mentoring provides opportunities (science fair, legacy, etc.) for one-on-one interaction and more in-depth efforts. | NRMP 4.4.2 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| Implementation Schedule | | | | |
|---|---|-------------|--|--------------|
| | | | Comments | Sub Plans |
| ASTRONOMICAL RESOURCES | | | | |
| Protection of Astronomical Resources | | | | |
| 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

Implementation

Schedule

Comments

Sub Plans

ACTIVITIES AND USES

| General Management | | | | |
|--------------------|---|-------------|---|--|
| ACT-2 | Develop parking and visitor traffic plan. | In Progress | <p>OMKM is currently working with Mauna Kea Support Services to develop a plan to address parking at the Visitor Information Station. A CIP request was submitted to study and design improvements at the Mid-level facilities and summit access road.</p> <p>OMKM and MKSS developed a parking plan. Due to ex parte concerns during the contested case for the TMT CDUP, we were not able to communicate with DLNR regarding permitting approvals. This plan may be modified or replaced following the CIP infrastructure study and design process, and this has not been submitted at this time.</p> <p>On a daily basis OMKM Rangers implement an interim parking plan to maintain order, accommodate as many vehicles as possible and to ensure the safety of visitors to the VIS.</p> | 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 | <p>OMKM prohibits the use of off-road vehicles on UH's managed lands.</p> <p>Commercial operators and film crews are required to stay on the road or within the footprint of existing facilities, unless granted permission from OMKM.</p> <p>OMKM is currently in the process of developing administrative rules relating to public access and commercial activities.</p> <p>The process for developing administrative rules resumed following the conclusion of the contested case and final decision by the Board of Land and Natural Resources regarding the Thirty Meter Telescope (TMT) project.</p> | 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. | NRMP 4.2, 4.4 PAP 2.5.2, 5.2, 7 |

COMPONENT PLAN: MANAGING ACCESS AND USE

Implementation

Schedule

Comments

Sub Plans

ACTIVITIES AND USES

| 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 | 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 |

COMPONENT PLAN: MANAGING ACCESS AND USE

Implementation
Schedule

Comments

Sub Plans

| Commercial | | | | |
|-------------------|---|-----------|---|---|
| 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. The process for developing administrative rules resumed following the conclusion of the contested case and final decision by the Board of Land and Natural Resources regarding the Thirty Meter Telescope (TMT) project. | 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 |

| COMPONENT PLAN: MANAGING ACCESS AND USE | | | | |
|---|--|-------------------------|---|--|
| | | Implementation Schedule | Comments | Sub Plans |
| ACTIVITIES AND USES | | | | |
| 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 | 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 |
| COMPONENT PLAN: MANAGING ACCESS AND USE | | | | |
| 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-4 | Educate management staff and users of the mountain about all applicable rules and permit requirements. | Ongoing | Included as part of the orientation and with new project start-up meetings. | 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. 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. | 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 | 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 | Rangers' responsibilities includes oversight of commercial tour activities and special use permits issued by OMKM. | 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

Implementation

Schedule

Comments

Sub Plans

INFRASTRUCTURE AND MAINTENANCE

Routine Maintenance

| | | | | |
|------|--|-------------|--|---|
| 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. | Ongoing | A draft of a cultural and natural resources orientation program has been developed and is implemented. | 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 Waiau (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. | In Progress | Will be included in the Invasive Species Management plan updates. | NRMP 4.2.3.7 |
| IM-6 | Develop and implement an erosion inventory and assessment plan. | In Progress | OMKM partnered with UH Hilo geography department to study surficial geology and cinder cone erosion issues. | 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 |

| | | Implementation Schedule | Comments | Sub Plans |
|---------------------------------|---|-------------------------|---|--|
| Infrastructure | | | | |
| 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 | <p>A CIP request was submitted to study and design improvements at the Mid-level facilities and summit access road.</p> <p>To relieve congestion at the VIS, MKSS proposed to convert a portion of the presentation room building into a rest and eating stop for commercial tour operators. Due to ex parte concerns during the contested case for the TMT CDUP, we were not able to communicate with DLNR regarding permitting approvals. Upon conclusion of the contested case the cost to renovate increased significantly and the project did not move forward. The CIP study will look at the needs and alternatives for additional public restrooms.</p> | 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 funded CIP request will 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 |
| 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. | Ongoing | The proposed Thirty Meter Telescope is incorporating energy efficiency in its design. MKSS received approval from the MKMB and OCCL to install a photovoltaic system at Halepōhaku. | |
| 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 | <p>Mauna Kea Support Services is currently looking at the feasibility of installing a photo voltaic system at Halepōhaku.</p> <p>MKSS received approval from the MKMB and OCCL to install a photovoltaic system at Halepōhaku.</p> | 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 | | |

COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT

Implementation
Schedule

Comments

Sub Plans

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. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 3.2, 4.2 |
|-----|--|---------|---|---------------|

Best Management Practices

| | | | | |
|-----|---|---------|---|--------------|
| C-2 | Require use of Best Management Practices Plan for Construction Practices. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 4.2.3 |
| C-3 | Develop, prior to construction, a rock movement plan. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 4.2.3.1 |
| C-4 | Require contractors to provide information from construction activities to OMKM for input into OMKM information databases. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | |
| C-5 | Require on-site monitors (e.g., archaeologist, cultural resources specialist, entomologist) during construction, as determined by the appropriate agency. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | CRMP 4.2.7 |
| C-6 | Conduct required archaeological monitoring during construction projects per SHPD approved plan | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | CRMP 4.2.7 |
| C-7 | Education regarding historical and cultural significance | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 4.4 |
| C-8 | Education regarding environment, ecology and natural resources | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 4.4 |
| C-9 | Inspection of construction materials | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 4.2.3.7 |

COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT

Implementation
Schedule

Comments

Sub Plans

SITE RECYCLING, DECOMMISSIONING, DEMOLITION AND RESTORATION

| | | Implementation Schedule | Comments | Sub Plans |
|------|--|----------------------------|--|-------------------|
| 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. | Ongoing | This will be part of the TMT decommissioning plan, with the TMT decommissioning funding plan approved in 2014. | TMT was example |
| SR-2 | Require observatories to develop a restoration plan in association with decommissioning, to include an environmental cost-benefit analysis and a cultural assessment. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | 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. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 4.3.3.4.1 |

COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT

Implementation

Schedule

Comments

Sub Plans

CONSIDERATION OF FUTURE LAND USE

| Facility Planning Guidelines | | | | |
|-------------------------------------|---|------------|--|----------------|
| 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. | Ongoing | TMT was example (photo documentation received) | |
| FLU-4 | Require project specific visual rendering of both pre- and post-project settings to facilitate analysis of potential impacts to view planes. | Ongoing | TMT was example (photo documentation received) | NRMP 4.1.4.11 |
| FLU-5 | Require an airflow analysis on the design of proposed structures to assess potential impacts to aeolian ecosystems. | Ongoing | TMT was example | NRMP 4.1.4.4 |
| FLU-6 | Incorporate habitat mitigation plans into project planning process. | Ongoing | TMT was example | 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. | Ongoing | TMT was example | NRMP 3.1.1.2.6 |

COMPONENT PLAN: MANAGING OPERATIONS

Implementation

Sub Plans

Schedule

Comments

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. | In Progress | OMKM requires all staff and volunteers to attend the Maunakea orientation. | 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 | OMKM has frequent contact with particularly with its neighbor, DLNR on resource management issues. OMKM rangers report unusual or suspicious behavior observed on DLNR lands to DOCARE. | 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 |

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. | 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 | Five-year CMP revision interval is 2014. Revision process initiated by OMKM for eventual submission to BLNR. | 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. | In Progress | Updates to the Master lease have been initiated. | PAP 7 |

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

1945-1946

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|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| <p>1945-1946</p> <p>1945-1946</p> | <p>1945-1946</p> <p>1945-1946</p> | <p>1945-1946</p> <p>1945-1946</p> | <p>1945-1946</p> <p>1945-1946</p> |
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COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| | | Implementation Schedule | Comments | Sub Plans |
|---|--|----------------------------|--|---|
| 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. | Ongoing | <p>Identification of lineal and historical connections is part of the development and State Historic Preservation division approval (2014) of the Burial Treatment Plan (see CR-13). Solicitations were made through announcements in the daily newspapers and the OHA newsletter.</p> <p>There were no responses to our solicitations but OMKM continues to seek out individuals as part of its interaction and relationship building with the community.</p> <p>Fall 2013 the Hawaii Island Burial Council officially recognized several individuals as cultural descendants of Kaohe Ahupua'a.</p> | 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. | Ongoing | <p>Rangers through their interactions with the visiting public help to educate and raise awareness about Mauna Kea.</p> <p>An informational brochure on cultural and natural resources was released in 2014 and will be revised in 2015 based on public feedback.</p> <p>OMKM sends out monthly eNewsletters informing the public about OMKM and its activities.</p> <p>Resource orientation of those who work on the mountain including observatory personnel, VIS and MKSS staff, rangers, commercial tour operators and staff, and construction workers commenced in 2013. Orientation will be made available in the near future.</p> | 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 | The State Historic Preservation Division approved the Archeological Inventory Survey for the Mauna Kea Ice Age Natural Area Reserve. A complete inventory of the historic properties on the summit region of Mauna Kea 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 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| | | Implementation Schedule | Comments | Sub Plans |
|---------------------------|--|-------------------------|---|--------------------------------|
| Cultural Practices | | | | |
| 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. The final outcome will 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 |
| 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 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| | | Implementation Schedule | Comments | Sub Plans |
|----------------------------|--|----------------------------|---|---------------------------|
| 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. | Completed | SHPD approved our monitoring plan, monitoring is ongoing according to the plan's schedule. | 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. | Ongoing | Kahu Kū Mauna determined that this should be reviewed on a case-by-case basis. They identified criteria for when to consult for routine (minimal impact) project proposals, as well as with future development. | 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 | SHPD reviewed and approved the Burial Treatment Plan for Mauna Kea in 2014.. | 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 and OMKM in turn notifies other parties. | CRMP 4.3.1.6 PAP 2.5.1 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| Implementation Schedule | | | | |
|-------------------------------|--|-------------------|--|---|
| | | | Comments | Sub Plans |
| 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. | Ongoing | Rangers through their interaction with the visiting public help to educate them about Mauna Kea. See CR-3 and EO-2 | 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. | Ongoing | The Maunakea Invasive Species Management Plan is approved and implemented. Additional topics and procedures will be address based on scientific, management board, and community feedback. A volunteer program was established to pull invasive weeds on UH's managed lands with emphasis in the Halepōhaku area. Long term goal is to re-vegetate the mid-level area with native plants. Beginning in 2007 OMKM conducted annual surveys of invasive arthropod species on UH's managed lands. This program was expanded to include monthly and quarterly monitoring depending on the nature of the arthropod threat, and annual invasive plant monitoring concurrent with arthropod surveys. Rapid response strategies, using carabid beetles as an example, were drafted as part of the Invasive Species Management Plan. Inspections of heavy equipment, construction material, and other items too large to be carried by an individual occur prior to coming on to UH's lands. Specific requirements are part of the Invasive Species Management Plan. | 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 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| Implementation Schedule | | | | |
|--|--|-------------------|--|--|
| | | | Comments | Sub Plans |
| 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. | In Progress | Vegetation surveys completed. Biodiversity, wēkiu bug, and erosion and surficial geology surveys are ongoing. | 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). | Ongoing | Assisted DLNR with fencing Silverswords. Other areas will be fenced when areas are identified and needed. | NRMP 4.2.3.7, 4.3 |
| NR-9 | Increase native plant density and diversity through an outplanting program. | Long-term | Mamane seedlings germinated from seeds found in the Halepōhaku area were planted near the Visitor Information Station Worked with DLNR and planted 200 Silversword seedlings in the Halepōhaku area. Collaborated with Kamehameha Schools to build plant propagation benches and start seedlings for eventual habitat restoration and enhancement at Halepōhaku. | NRMP 4.3, 4.4 |
| NR-10 | Incorporate mitigation plans into project planning and conduct mitigation following new development. | Ongoing | Mitigation and best management practices plans are required for projects as appropriate. | NRMP 4.3 |
| NR-11 | Conduct habitat rehabilitation projects following unplanned disturbances. | Ongoing | Vehicle accident (passenger car rolling down summit pu'u) in 2013 was used as a template for developing damage assessment, monitoring, and rehabilitation criteria. | NRMP 4.3 |
| NR-12 | Create restoration plans and conduct habitat restoration activities, as needed. | Mid and Long-term | A proposal to study wēkiu bug habitat restoration has been reviewed and will be initiated. | NRMP 4.3 |
| Program Management | | | | |
| NR-13 | Increase communication, networking, and collaborative opportunities to support management and protection of natural resources. | 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. | In Progress | Potential CMP revisions are identified in annual program documentation. Proposed revisions, for submission to BLNR, are in preparation in 2014. | NRMP 5.2 PAP 5.1, 5.2, 6.4, 6.7, 7 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| Implementation Schedule | | | | |
|---|---|---------|---|---------------------|
| | | | Comments | Sub Plans |
| Inventory, Monitoring and Research | | | | |
| NR-16 | Conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan. | 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. | Ongoing | Wēkiu bug and botanical data location of infrastructure and signs have been mapped. OMKM is working with the University of Hilo Geography Department on the development of the GIS database. All future survey data will be mapped. GoogleEarth layers of priority resources are now complete. | 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 studying permafrost and designing a weather monitoring system to help monitor the change in climate over time. The botanical survey was published in 2013 and is currently on-line. OMKM is funding a 4-year study on permafrost and working on designing a climate monitoring network. OMKM is also studying erosion to better understand surficial geology, cinder cone erosion, and characterize arthropod habitat. | 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 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| Implementation | | | | |
|-------------------------------|---|------------|---|--|
| | | Schedule | Comments | Sub Plans |
| EDUCATION AND OUTREACH | | | | |
| Program Development | | | | |
| EO-1 | Develop and implement education and outreach program | Ongoing | Volunteer, Orientation, Brochures (Safety, Culture, Resources, What is OMKM), in-school visits (Hilo Inter, HAAS, Ke Ana La`ahana, Waiakea High, Kealakehe Elementary) Coordinated with Kealakehe Elementary School the organization of the first annual Science Showcase at the school | NRMP 4.1 CRMP 4.3.3 PAP 2.7.1, 4.2, 5.2, 6.1, 6.3, 6.6 |
| Education | | | | |
| EO-3 | Continue to develop, update, and distribute materials explaining important aspects of Mauna Kea. | Ongoing | Materials on culture, resources, visiting safely and responsibly and Mauna Kea hazards are distributed at the Visitor Information Station. . | 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 map showing the location of signs on UH's managed lands has been completed. New cultural and safety related signs are installed. | 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 | Included as part of ongoing CIP funded project. | 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. | Ongoing | See EO-1 | 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. | Ongoing | Resource orientation of those who work on the mountain including observatory personnel, VIS and MKSS staff, rangers, commercial tour operators and staff, and construction workers commenced in 2013. Orientation is available to all interested parties in-person or on-line and will be made available online soon. | NRMP 4.4.2 PAP 6.1, 6.6 |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| Implementation Schedule | | | | | |
|-------------------------|--|---------|---|---|-----------|
| | | | | Comments | Sub Plans |
| 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 | 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. Monthly volunteer activities provide an alternative venue for the community to participate and share knowledge. . | 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. Monthly volunteer activities provide an alternative venue for the community to participate and share knowledge. Student projects and mentoring provides opportunities (science fair, legacy, etc.) for one-on-one interaction and more in-depth efforts. | NRMP 4.4.2 | |

COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES

| Implementation Schedule | | | | | |
|---|---|-------------|--|--------------|-----------|
| | | | | Comments | Sub Plans |
| ASTRONOMICAL RESOURCES | | | | | |
| Protection of Astronomical Resources | | | | | |
| 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

Implementation

Schedule

Comments

Sub Plans

ACTIVITIES AND USES

General Management

| | | | | |
|-------|---|-------------|---|--|
| ACT-2 | Develop parking and visitor traffic plan. | In Progress | <p>OMKM is currently working with Mauna Kea Support Services to develop a plan to address parking at the Visitor Information Station. A CIP request was submitted to study and design improvements at the Mid-level facilities and summit access road.</p> <p>OMKM and MKSS developed a parking plan. Due to ex parte concerns during the contested case for the TMT CDUP, we were not able to communicate with DLNR regarding permitting approvals. This plan may be modified or replaced following the CIP infrastructure study and design process, and this has not been submitted at this time.</p> <p>On a daily basis OMKM Rangers implement an interim parking plan to maintain order, accommodate as many vehicles as possible and to ensure the safety of visitors to the VIS.</p> | 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 | <p>OMKM prohibits the use of off-road vehicles on UH's managed lands.</p> <p>Commercial operators and film crews are required to stay on the road or within the footprint of existing facilities, unless granted permission from OMKM.</p> <p>OMKM is currently in the process of developing administrative rules relating to public access and commercial activities.</p> <p>The process for developing administrative rules resumed following the conclusion of the contested case and final decision by the Board of Land and Natural Resources regarding the Thirty Meter Telescope (TMT) project.</p> | 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. | NRMP 4.2, 4.4 PAP 2.5.2, 5.2, 7 |

COMPONENT PLAN: MANAGING ACCESS AND USE

Implementation

Schedule

Comments

Sub Plans

ACTIVITIES AND USES

| 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 | 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 |

COMPONENT PLAN: MANAGING ACCESS AND USE

Implementation
Schedule

Comments

Sub Plans

Commercial

| | | | | |
|--------|---|-----------|--|---|
| 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 | <p>All film permits require OMKM's approval.</p> <p>OMKM is currently in the process of developing administrative rules relating to public access and commercial activities.</p> <p>The process for developing administrative rules resumed following the conclusion of the contested case and final decision by the Board of Land and Natural Resources regarding the Thirty Meter Telescope (TMT) project.</p> | 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 | <p>Transfer of commercial tour permitting function was transferred to UH by BLNR. OMKM oversees commercial tour operations and film activities.</p> <p>Statutory authority to promulgate administrative rules was granted by the Legislature in 2009.</p> | NRMP 1.4.2.3 |

| COMPONENT PLAN: MANAGING ACCESS AND USE | | | | |
|---|--|-------------------------|---|--|
| | | Implementation Schedule | Comments | Sub Plans |
| ACTIVITIES AND USES | | | | |
| 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 | 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 |
| COMPONENT PLAN: MANAGING ACCESS AND USE | | | | |
| 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-4 | Educate management staff and users of the mountain about all applicable rules and permit requirements. | Ongoing | Included as part of the orientation and with new project start-up meetings. | 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. 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. | 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 | 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 | Rangers' responsibilities includes oversight of commercial tour activities and special use permits issued by OMKM. | 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

Implementation

Schedule

Comments

Sub Plans

INFRASTRUCTURE AND MAINTENANCE

Routine Maintenance

| | | | | |
|------|--|-------------|--|---|
| 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. | Ongoing | A draft of a cultural and natural resources orientation program has been developed and is implemented. | 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 Waiau (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. | In Progress | Will be included in the Invasive Species Management plan updates. | NRMP 4.2.3.7 |
| IM-6 | Develop and implement an erosion inventory and assessment plan. | In Progress | OMKM partnered with UH Hilo geography department to study surficial geology and cinder cone erosion issues. | 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 |

| | | Implementation Schedule | Comments | Sub Plans |
|---------------------------------|---|-------------------------|---|--|
| Infrastructure | | | | |
| 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 | <p>A CIP request was submitted to study and design improvements at the Mid-level facilities and summit access road.</p> <p>To relieve congestion at the VIS, MKSS proposed to convert a portion of the presentation room building into a rest and eating stop for commercial tour operators. Due to ex parte concerns during the contested case for the TMT CDUP, we were not able to communicate with DLNR regarding permitting approvals. Upon conclusion of the contested case the cost to renovate increased significantly and the project did not move forward. The CIP study will look at the needs and alternatives for additional public restrooms.</p> | 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 funded CIP request will 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 |
| 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. | Ongoing | The proposed Thirty Meter Telescope is incorporating energy efficiency in its design. MKSS received approval from the MKMB and OCCL to install a photovoltaic system at Halepōhaku. | |
| 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 | <p>Mauna Kea Support Services is currently looking at the feasibility of installing a photo voltaic system at Halepōhaku.</p> <p>MKSS received approval from the MKMB and OCCL to install a photovoltaic system at Halepōhaku.</p> | 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 | | |

COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT

| Implementation Schedule | | | | |
|----------------------------------|--|---------|---|---------------|
| | | | Comments | Sub Plans |
| 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. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 3.2, 4.2 |
| Best Management Practices | | | | |
| C-2 | Require use of Best Management Practices Plan for Construction Practices. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 4.2.3 |
| C-3 | Develop, prior to construction, a rock movement plan. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 4.2.3.1 |
| C-4 | Require contractors to provide information from construction activities to OMKM for input into OMKM information databases. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | |
| C-5 | Require on-site monitors (e.g., archaeologist, cultural resources specialist, entomologist) during construction, as determined by the appropriate agency. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | CRMP 4.2.7 |
| C-6 | Conduct required archaeological monitoring during construction projects per SHPD approved plan | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | CRMP 4.2.7 |
| C-7 | Education regarding historical and cultural significance | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 4.4 |
| C-8 | Education regarding environment, ecology and natural resources | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 4.4 |
| C-9 | Inspection of construction materials | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 4.2.3.7 |

COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT

Implementation

Schedule

Comments

Sub Plans

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. | Ongoing | This will be part of the TMT decommissioning plan, with the TMT decommissioning funding plan approved in 2014. | TMT was example |
|------|--|---------|--|-------------------|
| SR-2 | Require observatories to develop a restoration plan in association with decommissioning, to include an environmental cost-benefit analysis and a cultural assessment. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | 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. | Ongoing | Included as part of the TMT Management Plan in its approved CDUP. | NRMP 4.3.3.4.1 |

COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT

Implementation
Schedule

Comments

Sub Plans

CONSIDERATION OF FUTURE LAND USE

| Facility Planning Guidelines | | | | |
|-------------------------------------|---|------------|--|----------------|
| 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. | Ongoing | TMT was example (photo documentation received) | |
| FLU-4 | Require project specific visual rendering of both pre- and post-project settings to facilitate analysis of potential impacts to view planes. | Ongoing | TMT was example (photo documentation received) | NRMP 4.1.4.11 |
| FLU-5 | Require an airflow analysis on the design of proposed structures to assess potential impacts to aeolian ecosystems. | Ongoing | TMT was example | NRMP 4.1.4.4 |
| FLU-6 | Incorporate habitat mitigation plans into project planning process. | Ongoing | TMT was example | 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. | Ongoing | TMT was example | NRMP 3.1.1.2.6 |

COMPONENT PLAN: MANAGING OPERATIONS

Implementation

Sub Plans

Schedule

Comments

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. | In Progress | OMKM requires all staff and volunteers to attend the Maunakea orientation. | 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 | OMKM has frequent contact with particularly with its neighbor, DLNR on resource management issues. OMKM rangers report unusual or suspicious behavior observed on DLNR lands to DOCARE. | 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 |

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. | 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 | Five-year CMP revision interval is 2014. Revision process initiated by OMKM for eventual submission to BLNR. | 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. | In Progress | Updates to the Master lease have been initiated. | PAP 7 |

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