

Haleakalā High Altitude Observatory Site Management Plan

2018 Annual Report

Introduction to Management of the Haleakalā High Altitude Observatory Site

The Haleakalā High Altitude Observatory Site (HO) Management Plan (MP) was approved by the Hawai‘i Board of Land and Natural Resources (BLNR) on December 1, 2010

Condition #2 states:

“Beginning in November 2012 the University will submit to DLNR an annual report summarizing any construction activities occurring at HO; Habitat Conservation Plans; Monitoring Plans for Invertebrates, Flora, and Fauna; Programmatic Agreements on Cultural Resources; Invasive Species Control Plans and other related plans, The Report should be brief but thorough. This report should also be presented to the Board of Land and Natural Resources for the first year, and every five years thereafter.”

Therefore, this report summarizes activities that occurred under the MP from December 1, 2017 to November 30, 2018.

The land use described in this report, on activities under the HO MP, qualifies as an identified use in the General Subzone and is consistent with the objectives of the General Subzone of the land. The objectives of the General Subzone (HAR 13-5-14) are to designate open space where specific conservation uses may not be defined, but where urban uses would be premature. The land use is consistent with astronomical research facilities for advanced studies of astronomy and atmospheric sciences. HO is located within a General Subzone of the State of Hawai‘i Conservation District that has been set aside for observatory site purposes only. Identified applicable land uses in the General Subzone, include R-3 Astronomy Facilities and (D-1) Astronomy facilities under an approved management plan (HAR 13-5-25).

The HO MP offers a physical plan and management structure that seeks to preserve a balance within HO, in which astronomy can continue to evolve at a premier ground-based viewing location, bringing with it the associated economic benefits, while protecting cultural and environmental resources and values.

Construction Activities Occurring at HO Since December 2017

Section 3.5.3.1 of the MP implements a number of measures regarding construction practices, including IfA-approved environmental training for contractors, prevention of introduction of new species during construction, protection of the endangered Hawaiian petrel ('ua'u) residing in burrows on the upper slopes of Haleakalā, pollution prevention, dust prevention, and management of solid waste. In addition, the IfA requires that facilities designed for construction at HO follow certain guidelines regarding obscuration of other facilities, timing of construction to avoid impacts to nesting petrels, avoiding impacts to known archeological resources, painting to blend with surroundings where possible, consideration of site plans to population centers on Maui, use of natural materials, etc. The following construction activities have occurred at HO since December 2, 2017:

Construction Activities

1. November 13, 2012-CDUP MA-3542/MA-11-04 Advanced Technology Solar Telescope (ATST)/underway
2. March 22, 2018 – Site Plan Approval MA-18-61 All-Sky Meteor Orbit System (AMOS) camera/complete

Compliance

- Construction activities listed above are undertaken in compliance with applicable statutes, ordinances, rules, regulations, and conditions of the federal, state, and county governments, and applicable parts of the Hawai'i Administrative Rules, Chapter 13-5;
- Where applicable, plans were submitted and approved;
- Where applicable, notice of commencement and completion was provided;
- Where applicable, mitigations in specific or related CDUPs were/are being adhered to;
- All commercial related vehicles, equipment and materials brought to the HO site were inspected by a qualified biologist before entering Haleakalā National Park (HALE);
- Requirements set out in the Haleakalā Observatories Management Plan for Monitoring Strategies,
- Cultural and Historic Preservation Management, Environmental Protection of Site Resources,
- Construction Practices, and Facility Design Criteria were complied with and a Cultural Specialist was retained when the activity required a permit from the Department of Land and Natural Resource (DLNR).

Habitat Conservation Plans (HCPs)

The National Science Foundation's Advanced Technology Solar Telescope (ATST) Project, renamed the Daniel K. Inouye Solar Telescope (DKIST) on December 15, 2013, obtained approval of an HCP from BLNR in May 27, 2011 and an Incidental Take License from U.S. Fish and Wildlife Service (USFWS) on November 30, 2011 to address anticipated impacts to state and federal threatened, endangered, and listed species from construction, pursuant to Chapter 195D, Hawai'i Revised Statutes (HRS 195D). The Hawaiian petrel ('ua'u) is the principal species of interest in the HCP. In order to initiate and pursue the mitigation measures described in the DKIST HCP, the DKIST Project has had a Resource Biologist on staff since 2011, along with seasonal and permanent field technicians under his direction implemented HCP related mitigation measures that included but are not limited to:

- a) Botanical and archeological surveys of the 328 acre HCP Conservation Area assigned to DKIST;
- b) Survey and census of burrows within that mitigation area;
- c) Video monitoring of burrows in the area closest to DKIST site;
- d) Identification of an approved control area that will not be subject to mitigation measures;
- e) Initial predator control-ungulate removal and cat trapping;
- f) Reproductive success monitoring; and,
- g) Formal reporting on these efforts to Endangered Species Recovery Committee (ESRC)

HCP requirements for the DKIST Project correspond with the requirements in Section 3.5.3.2 (2) of the MP regarding protection of the Hawaiian petrel ('ua'u) from noise, vibration, burrow collapse, flight collisions, lighting, and reporting on mortality. (*2018 DKIST HCP Fiscal Year Report*¹) It should be noted that on March 23, 2018 the Hawai'i Board of Land and Natural Resource approved the State of Hawai'i Endangered Species Recovery Committee's recommendation to terminate the DKIST Project's HCP. Therefore, this will be the final HPC report.

Monitoring Plans for Invertebrates, Flora, and Fauna

For about a year before the December 1, 2010 approval of the MP by the BLNR, programmatic monitoring of invertebrates, flora, and fauna was initiated at HO. The surveys conducted pursuant to the MP at HO are part of the long-term effort to characterize floral and faunal populations at the site that may be impacted or benefit from practices and procedures at HO, and thus be more effectively conserved, protected, and preserved by adaptive management of the site.

After preliminary sampling near the HALE Entrance Station and at the DKIST site in 2009, Programmatic Arthropod Monitoring and Assessment at the HO and HALE was initiated with two sampling sessions in 2010. Monitoring is being conducted twice a year during the construction phase of the DKIST, which began in December 2012. Semi-annual monitoring has occurred in 2011, 2012, 2013, 2014, 2015, 2016, 2017 and 2018. The 2018 Annual Inspection was conducted in September of 2018. Arthropods detected during this sampling were for the most part characteristic of the fauna found during previous sampling sessions, with the exception of the detection of the invasive longhorn crazy ant *Paratrechina longicornis* at HO [No ants were observed during the October 20th follow-up]. Most nonnative species detected at HO and DKIST sites are species that have flown or been blown up from lower elevations, and do not appear to be able to reproduce at these high elevation sites. No new invasive arthropod species were discovered at the HALE-ES site; the invasive species observed there, such as the Argentine ant, have been detected in previous sampling sessions. There were several new additions to the species lists at each of the three sampling sites, as detailed above, but none of these species are invasive species that are likely to reproduce at these high elevation sites.

The annual inspection results stated that, “generally, the DKIST construction site and surrounding lay-down and storage areas were found to be well organized and kept neat and clean. The nonnative invasive arthropods (longhorn crazy ants and a roach) that were detected in association with project materials were located near “roll-off” disposal containers, and this may indicate a potential pathway of introduction. Extra care will be taken to ensure that disposal containers are thoroughly inspected before being brought to the construction site.”

This was the final semi-annual arthropod sampling under the construction provisions of the HCP/BO. Moving forward (for the next 50 years), only an annual inspection of DKIST interior facilities and grounds within 100 ft (30 m) of the buildings will be required, in accordance with the provision in the BO (page 21) requiring monitoring during the DKIST’s 50-year operational lifespan.

. (*DKIST Arthropod Monitoring & Inspection Report Summer-Fall 2018*²) (*DKIST Arthropod Monitoring Report Winter-Spring 2018*³)

Programmatic faunal monitoring was implemented in 2012 to insure impacts on biological resources are minimized.

The main area affected is where the DKIST observatory was constructed. Other areas of HO that have been affected include a corridor running from the Maui Space Surveillance Complex (MSSC) Advanced Electro-Optical System (AEOS) facility across Pu'u Kolehale to the Mees Observatory.

These areas received much ground disturbance and many native and non-native plants were removed in the process. There are also large piles of rocks and soil that have been staged on the margin of the retention basin.

No Threatened or Endangered plants appear to have been impacted by construction. As construction wanes, it is likely that native and non-native vegetation will re-colonize much of the site, as has happened at HO in the past. No new non-native, invasive plants were found during the annual inspection. In fact, non-native plant species at HO decreased to 14 compared to 21 species observed during the last survey, and the native species at HO observed remained steady at 14, as it has been since 2015. Also, the silversword count at HO was 437, and while this is slightly lower than the record-high of 492 observed in the spring, it's still the second highest number recorded since 1991. Of the 306 silverswords that were planted in the Conservation Area in 2015, 225 plants remain alive.

(HO-Floral_Survey_and_Annual_Inspection-Fall_2018-Starr⁴) (HO-Floral_Survey-Spring_2018-Starr⁵) (P-200-Annual_Report-2018-Silverswords-Starr⁶)

No signs of non-native invasive animal species were found inside or within 30 m (100 ft) of the DKIST buildings. *(HO-Faunal_Survey_and_Annual_Inspection-Fall_2018-Star⁷) (HO-Faunal_Survey-Spring_2018-Starr⁸)*

Invasive Species Control

The MP provides for active prevention of introduction of invasive species that may threaten HO site resources. The implemented practices include but are not limited to weeding of HO property, vector control for rodents, soil and erosion control in accordance with the HO Storm Water Management Plan, and frequent removal of trash.

HO consists of relatively intact native shrublands and rocklands as well as a variety of disturbed habitats. Native shrublands and rocklands of HO currently support low levels of invasive plant species, both in abundance and species diversity. All identifiable invasive plants located in close-spaced multiple sweeps were removed or treated. It is estimated that 98-99% of all invasive plants within the project site were located this year and treated. This year (2018), there was continuation in the dramatic decline of one invasive species, *Lepidium*, presumably because of repeated control efforts. When control efforts were started, thousands of *Lepidium* individuals were observed and treated. This year, fewer than 25-50 plants were observed and treated. After multiple years of invasive plant control, native shrublands and rocklands of HO are now more weed-free than equivalent areas of adjacent HALE. (*Invasive Plant Control Haleakala High Altitude Observatory Site (HO) 2018 report.pdf*⁹) & (*Maui Space Surveillance Complex located within the Haleakala High Altitude Observatory Invasive Plant Control Report (Reporting Period 1 Nov 2017 to 31 Oct 2018)*)¹⁰

Programmatic Agreements on Cultural Resources

The National Science Foundation (NSF), the National Park Service, the University of Hawai'i, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation signed the Programmatic Agreement (PA). The PA established mitigation measures that include but are not limited to the establishment of a Native Hawaiian Working Group (NHWG), the retention of a Cultural Specialist; reserving up to 2% of the total DKIST usage time for Native Hawaiian scientists, when there are Native Hawaiians among the pool of qualified scientists; and providing support to an educational initiative addressing the intersection between Native Hawaiian culture and science. The IfA commits to continued mitigation of impacts on cultural resources on the Region of Impact (ROI). The IfA will provide a written annual report to the Board on the status of the implementation of the Programmatic Agreement, including: listing the proposed mitigations to impacts on cultural resources developed by the ATST/DKIST Native Hawaiian Working Group (NHWG); the response to those proposed mitigations by the signatory parties to the Programmatic Agreement; and, the implementation of any such mitigation measures by the IfA."

Status of the Implementation of the Programmatic Agreement

The following summarizes the status of pertinent items under Section II- NSF's Area of Responsibility of the PA. These items are discussed as applicable during the NHWG meetings.

Establishment of the DKIST Native Hawaiian Working Group

The PA was fully executed on November 13, 2009. The NHWG first met on December 5, 2009, which was within 60 days of the fully executed date. For calendar year 2018, NHWG meetings were held on April 19th and October 24th.

Implementation of Best Management Practices

Best Management Practices as outlined in the BLNR approved HO MP have been and will continue to be implemented.

Naming of HO Roads

Based on what was communicated during the April 19, 2018 NHWG meeting by Native Hawaiians present, UH-IfA will no longer pursue the renaming of the road within HO. Specifically, it was communicated that naming the road at HO would be deemed “consent” to have DKIST built at HO and, therefore, the Native Hawaiians present at this meeting did not want to rename the road. In response, UH-IfA determined that it would respect those wishes and will not pursue the renaming of the road within HO pursuant to the PA.

Retention of a Cultural Specialist

CKM Cultural Resources, LLC (Kahu Dane Uluwehiokalani Maxwell) is the DKIST Cultural Specialist.

Possible Repainting

DKIST expressed that the project continues to pursue possibilities of new technologies with respect to colors; however, to date, no improved technology exists.

Removal of Reber Circle Site #50-50-11-5443

The Reber Circle concrete ring was removed on December 3, 2012.

Required “Sense of Place” Training

All contractors and employees continue to participate in this training.

Exterior Design

During the April 19, 2018 meeting, Kahu Maxwell suggested using existing rocks/boulders to serve as artwork near the facility. Since then, Mark Warner, DKIST Project Manager, and Kahu Maxwell met at the summit to further discuss placement location and ideas.

Possible Shelter for Cultural Practitioners

During the October 24, 2018 meeting, the DKIST project established a location for a shelter for cultural practitioners.

State Road 378

Under Contract to IARII, Mason Architects completed the State Highway 378 Historic Evaluation Report identifying and photographing Contributing Features of historic significance along the roadway consisting of 10.1 miles from the Crater Road junction to the Haleakalā National Park entrance. The final State Road Historic Archival Engineering Report was completed and transmitted to NPS and SHPD on 11/21/13.

Acknowledgment of Significance of Haleakala and NSF's Gratitude

NHWG determined that acknowledgment language would be inappropriate (closed).

Status of Implementation of this PA Reported on Project Website

The "Status of Implementation of Programmatic Agreement" web page is available on the Internet at: <http://dkist.nso.edu/node/747>

DKIST Telescope time for Native Hawaiian Scientists

Reserving up to 2% of the total DKIST usage time for Native Hawaiian scientists, when there are Native Hawaiians among the pool of qualified scientists. Not applicable at this time.

Providing support to an educational initiative addressing the intersection between Native Hawaiian culture and science

The Division of Astronomical Sciences of the National Science Foundation funded the seventh year of a ten-year, \$20M award has been made to the University of Hawaii Maui College (UHMC). This brings the total amount funded to UHMC under this award to \$16M. The award is being funded, contingent upon the availability of appropriations, at a rate of \$2M annually and is being used to operate the Ka Hikina O Ka Lā program <http://maui.hawaii.edu/hikina/>, which addresses the intersection of Native Hawaiian culture and science, technology, engineering and mathematics.

Details of the award can be found at:

http://nsf.gov/awardsearch/showAward?AWD_ID=1135694

Proposed mitigations to impacts on cultural resources developed by the NHWG and the response to those proposed mitigations by the signatory parties to the Programmatic Agreement the implementation of any such mitigation measures by the University

The role of the DKIST NHWG is to provide consultation concerning historic property matters related to the construction and operation of the DKIST Project. The NHWG meeting minutes are summarized and posted to the "Status of Implementation of

Programmatic Agreement” web page is available on the Internet at:

<http://dkist.nso.edu/node/747>

Summary of Activities Under the HO Site Management Plan

The IfA, its lessees, and contractors conducted numerous studies, surveys, and inventories at HO during the reporting period from December 2017 to November 2018, and undertook preventive actions to protect and preserve environmental and cultural resources. The above descriptions of programmatic activities do not include or assign credit for the many day-to-day actions by the employees and contractors at HO to preserve and protect environmental and cultural resources and values at HO. A few examples of such daily actions (and non-actions) by site occupants include:

- a) Construction within HO requiring a permit from DLNR requires the consultation and monitoring of a Cultural Specialist;
- b) Respectful, helpful and courteous support to Native Hawaiian practitioners who enter the HO site for traditional cultural practices;
- c) Vigilance to keep seeds, spores, or invasive plants from “hitchhiking” on persons or personal items;
- d) Parking only in designated areas;
- e) Avoiding known archeological sites and features;
- f) Care to avoid harassment or injury to endangered petrels during nesting season;
- g) Not damaging or removing endangered Silversword plants; and,
- h) Avoiding noise not absolutely necessary for construction or operations.

It is the commitment of the IfA to use past, present, and future knowledge of the dynamic environment at HO to continually inform its site MP, so that site personnel who work there can preserve a balance within HO. It is the objective of IfA to proactively provide effective stewardship of an environment where astronomy can continue to evolve to move mankind toward a deeper understanding of the Universe in which we live while ensuring the cultural and environmental resources and values of HO are protected.

References

1. Chen, Huisheng / DKIST Resource Biologist. 2018 DKIST HCP State Fiscal Year Report.
2. Pacific Analytics, LLC. Programmatic Arthropod Monitoring at the Haleakalā High Altitude Observatories and Haleakalā National Park, Maui Hawai'i, September 2018.
3. Pacific Analytics, LLC. Programmatic Arthropod Monitoring at the Haleakalā High Altitude Observatories and Haleakalā National Park, Maui Hawai'i, May 2018.
4. Starr, Forest & Kim. Starr Environmental. 2018 Botanical Survey, November 2018 Haleakalā High Altitude Observatories, Maui, Hawai'i.
5. Starr, Forest & Kim. Starr Environmental. 2018 Botanical Survey, May 2018 Haleakalā High Altitude Observatories, Maui, Hawai'i.
6. Starr, Forest & Kim. Starr Environmental. 2018 Yearly Report Threatened and Endangered Plant Species Permit P-200, Haleakalā High Altitude Observatories, Maui, Hawai'i.
7. Starr, Forest & Kim. Starr Environmental. 2018 Faunal Survey, November 2018 Haleakalā High Altitude Observatories, Maui, Hawai'i.
8. Starr, Forest & Kim. Starr Environmental. 2018 Faunal Survey, May 2018 Haleakalā High Altitude Observatories, Maui, Hawai'i.
9. Arthur C. Medeiros Ph.D. Haleakala High Altitude Observatory Invasive Plant Control Project at the Haleakalā High Altitude Observatories, Maui Hawai'i, May 2018.
10. Maui Space Surveillance Complex located within the Haleakalā High Altitude Observatory (HO) Invasive Species Report (Reporting Period 20 Dec 2017 to 19 Dec 2018).