

**STATE OF HAWAII**  
**DEPARTMENT OF LAND AND NATURAL RESOURCES**  
**OFFICE OF CONSERVATION AND COASTAL LANDS**  
Honolulu, Hawaii

January 25, 2019

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

- REGARDING:**
1. 2018 Annual Report on the Haleakalā High Altitude Observatory Site Management Plan
  2. 2018 Annual Report on the status of the implementation of the Programmatic Agreement for the Daniel K. Inouye Solar Telescope (DKIST) (Conservation District Use Permit MA-3542)

**PERMITTEE:** University of Hawai'i Institute for Astronomy

**REPRESENTATIVE:** Mike Maberry, Assistant Director, University of Hawai'i, 34 Ōhi'a Kū, Room 216, Makawao, HI 96768

**LANDOWNER:** State of Hawai'i, set aside by Executive Order 1987 to the University of Hawai'i

**LOCATION:** Haleakalā High Altitude Observatories Site (HO) at Pu'u Kolekole, ahupua'a of Papa'anui, moku of Honua'ula, Makawao District, Maui

**TAX MAP KEYS:** (2) 2-2-007:008  
(2) 2-2-007:007 (part; staging only)

**AREA OF PARCEL:** 18.166 acres

**SUBZONE:** General

- ATTACHMENTS:**
- Exhibit 1: 2018 Annual Report on the Haleakalā High Altitude Observatory Site Management Plan
  - Exhibit 2: 2018 Annual Report on the status of the implementation of the Programmatic Agreement for the Daniel K. Inouye Solar Telescope (DKIST)
  - Exhibit 3: Construction Practices, *from* The Haleakalā High Altitude Observatory Site Management Plan

**BACKGROUND: HALEAKALĀ HIGH ALTITUDE OBSERVATORY SITE MANAGEMENT PLAN**

On December 1, 2010, the Board of Land and Natural Resources approved the Haleakalā High Observatory Site Management Plan for the Haleakalā High Altitude Observatory Site at Pu`u Kolekole, Makawao District, Maui. The duration of the management plan is from December 1, 2012 through November 30, 2020. This can be extended as appropriate.

A condition of the approval is that the University submits 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. This report should also be presented to the Board of Land and Natural Resources for the first year, and every five years thereafter.

The duration of the management plan is from December 1, 2012 through November 30, 2020. The Board has the authority to extend the plan “as appropriate.”

The 2018 Annual Report on the Haleakalā High Altitude Observatory Site Management Plan is attached as Exhibit 1.

**BACKGROUND: PROGRAMMATIC AGREEMENT FOR THE DANIEL K. INOUE SOLAR TELESCOPE (DKIST)**

On November 9, 2012, the Board of Land and Natural Resources issued a Decision and Order in favor of Conservation District Use Permit (CDUP) MA-3542 for an advanced solar telescope at the Haleakalā High Altitude Observatory Site.

A condition of the CDUP is that the permittee 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 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 University.

The 2018 Annual Report on the status of the implementation of the Programmatic Agreement for the Daniel K. Inouye Solar Telescope (DKIST) is attached as Exhibit 2.

The telescope is currently under construction and is expected to become operational in 2020. This timeframe will allow researchers to begin observations at the beginning of the next 11-year solar magnetic cycle.

Given that the HO site is currently a major construction area, OCCL is also providing the Board of the Construction Guidelines taken from the Site Management Plan. These are attached as Exhibit 3.

Once construction is complete OCCL will conduct a final site inspection to insure permit compliance.

The permit, management plan, and previous years' reports are available on OCCL's website at <http://dlnr.hawaii.gov/occl/astronomy-facilities/>.

#### RECOMMENDATION

OCCL is presenting the attached annual reports as a "non-action" item on the Board's Agenda. We have invited a representative from University of Hawai'i Institute for Astronomy to give a brief presentation to the Board;

Respectfully submitted,



Michael Cain, Staff Planner  
Office of Conservation and Coastal Lands

Approved for submittal:



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

# **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*<sup>1</sup>) 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<sup>2</sup>) (DKIST Arthropod Monitoring Report Winter-Spring 2018<sup>3</sup>)

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 Kolekole 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-Starr<sup>4</sup>) (HO-Floral\_Survey-Spring\_2018-Starr<sup>5</sup>) (P-200-Annual\_Report-2018-Silverswords-Starr<sup>6</sup>)*

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-Star<sup>7</sup>) (HO-Faunal\_Survey-Spring\_2018-Starr<sup>8</sup>)*

### **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*<sup>9</sup>) & (*Maui Space Surveillance Complex located within the Haleakala High Altitude Observatory Invasive Plant Control Report (Reporting Period 1 Nov 2017 to 31 Oct 2018)*)<sup>10</sup>

### **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 19<sup>th</sup> and October 24<sup>th</sup>.

#### ***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](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).





National Solar Observatory  
Daniel K. Inouye Solar Telescope  
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**Conservation District Use Permit MA-11-04  
2018 Annual Report to Condition #7 of Permit  
Daniel K. Inouye Solar Telescope**

**Condition 7 of the Conservation District Use Permit (CDUP) for the Daniel K. Inouye Solar Telescope Project, formerly known as the Advanced Technology Solar Telescope (ATST) Project:**

"The applicant will follow the stipulations agreed upon in the Programmatic Agreement signed between the National Science Foundation, the National Park Service, the University of Hawai'i, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation. These include but are not limited to the establishment of a Native Hawaiian Working Group, the retention of a Cultural Specialist; reserving up to 2% of the total ATST 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 applicant commits to continued mitigation of impacts on cultural resources on the Region of Impact (ROI). The applicant 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 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 University."

**Project Update**

The DKIST project began its seventh year of construction on December 3, 2018. Most of the focus for 2018 continued to be inside the building with the assembly completion of the telescope mount. Periodically, some outside work took place during 2018 toward completing the concrete apron around the S&O Building. The mirror and its components were successfully assembled during 2018. Instruments are still being manufactured and Integration, Testing, and Commissioning (ITC) conducted through 2018 will continue through 2019.

**Status of the Implementation of the Programmatic Agreement**

Pursuant to Condition 7 of the CDUP, the following summarizes the status of pertinent items under Section II- NSF's Area of Responsibility of the Programmatic Agreement (PA). These items are discussed as applicable during the NHWG meetings.

**1. PA Item II. A. 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. The NHWG has conducted ongoing meetings, as shown below.



Operated by the Association of Universities for Research in Astronomy, Inc.  
under a cooperative agreement to the National Science Foundation



	<b>Date</b>	<b>Location</b>
1	Dec 5, 2009	University of Hawai'i, Institute for Astronomy (UH IfA) Maikalani Facility
2	Feb 20, 2010	UH IfA, Maikalani Facility
3	Sep 1, 2010	UH, Maui College, Laulima Room
4	Feb 28, 2011	Mayor Hannibal Tavares Community Center
5	Jun 15, 2011	Haliimaile Community Center. This meeting was a scheduled Section 106 meeting for the Supplemental Draft Environmental Assessment and provided another opportunity for the NHWG to meet.
6	Oct 24, 2011	Mayor Hannibal Tavares Community Center
7	Sep 17, 2012	Mayor Hannibal Tavares Community Center
8	Apr 3, 2013	UH IfA, Maikalani Facility
9	Feb 24, 2014	UH IfA, Maikalani Facility
10	Sep 22, 2014	UH IfA, Maikalani Facility
11	Mar 25, 2015	UH IfA, Maikalani Facility
12	Dec 21, 2015	WEBEX meeting. Note: Due to the threat of a potential government shut-down, a WEBEX meeting was scheduled to comply with the obligation of conducting two NHWG meetings per year.
13	Feb 23, 2016	Mayor Hannibal Tavares Community Center
14	Aug 24, 2016	Kula Community Center
15	Mar 1, 2017	UH Maui College, Class Act Restaurant
16	Nov 8, 2017	UH Maui College, Class Act Restaurant
17	Apr 19, 2018	UH Maui College, Class Act Restaurant
18	Oct 24, 2018	UH Maui College, Class Act Restaurant

Each scheduled meeting is initially announced in advance of a scheduled meeting via email from Caroline Blanco, National Science Foundation (NSF) Assistant General Counsel, with a reminder email also sent before the meeting. A sign-in sheet is provided at each meeting where participants have the opportunity to update contact information. Notifications and sign-in sheets are posted to the DKIST website.

## **2. PA Item II. B. Implementation of Best Management Practices**

DKIST construction activities commenced December 2, 2012. Best Management Practices, as outlined in the approved UH IfA Management Plan, were implemented on this day and continue to be implemented and monitored as required throughout the various stages of construction.

## **3. PA Item II. C. Naming of HO Roads - *PA Item Completed***

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.

**4. PA Item II. D. Retention of a Cultural Specialist - *PA Item Completed***

Kahu Dane Maxwell (CKM Cultural Resources, LLC) continues his role as the DKIST Cultural Specialist assuming all duties and responsibilities in upholding the protection of existing historic properties and their traditional cultural values during construction. During August 2016, the CKM scope of work was reduced, since outside activities were either completed or only conducted periodically. Kahu Maxwell continues to be in direct communication with the DKIST Site Construction Manager and is informed if outside construction activities are to be scheduled. A CKM cultural monitor is then deployed on site to monitor activities.

**5. PA Item II. E. Decommissioning of the ATST.**

Not applicable at this time.

**6. PA Item II. F. Possible Repainting**

DKIST continues to make efforts to pursue possibilities of new technologies with respect to reassessing technological options for new types of coatings, more efficient cooling methods, or improved compensation for thermal turbulence, which may allow the facility enclosure and buildings to be painted a color other than white to make the structures less noticeable. The current status was that a research chemist from DuPont is working on color paint with the same properties as white; however, any significant proof of concept is still years away.

**7. PA Item II. G. Removal of Unused Facilities at HO - *PA Item Completed***

Telephone poles were removed in 2013. As construction continues, if other remnants are found, the project will consult with Kahu Maxwell for proper removal.

**8. PA Item II. H. Removal of Reber Circle Site #50-50-11-5443 - *PA Item Completed***

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

**9. PA Item II. I. Hawaiian Star Compass - *PA Item Completed***

Based on what was communicated during the April 19, 2018 meeting by Native Hawaiians present, NSF, AURA/NSO, and UH-IfA will no longer pursue placing a Hawaiian star compass at the summit. Specifically, it was communicated that placing a Hawaiian star compass at the summit would signify “consent” to have DKIST built at HO and, therefore, the Native Hawaiians present at the last NHWG meeting expressed their wish to not have a Hawaiian star compass placed at the summit. In response, NSF, AURA/NSO, and UH IfA determined that it would respect those wishes and will not pursue further the placing of a Hawaiian star compass at the summit pursuant to the PA.

**10. PA Item II. J. Required “Sense of Place” Training**

All DKIST Project personnel, contractors/sub-contractors, and project vendors continue to attend “Sense of Place” training prior to working within HO. To date, approximately 400 people have participated in these training sessions. UH IfA has been provided copies of attendee acknowledgement sheets.

**11. PA Item II. K. 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.

**12. PA Item II. L. Possible Shelter for Cultural Practitioners - *PA Item Completed***

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

**13. PA Item II. M. State Road 378**

At the April 3, 2013 NHWG meeting, Dr. Charlie Fein of KC Environmental reported that 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 was sent to the National Park Service Regional office for submission to the Library of Congress on April 30<sup>th</sup>. An acceptance letter from NPS was received on November 21, 2013, confirming the documents were transmitted to the Library of Congress. Contributing features will be documented again after construction.

**14. PA Item II. N. Acknowledgment of Significance of Haleakalā and NSF's Gratitude – *PA Item Completed***

During the February 24, 2014 NHWG meeting, it was suggested that it would be a sign of respect to Native Hawaiians if the acknowledgment did not include any language referencing either the spiritual and cultural significance of the location of the DKIST or NSF's gratitude for using the site. Specifically, it was suggested that the following language be used:

"The research reported herein is based in part on data collected with the Daniel K. Inouye Solar Telescope (DKIST), a facility of the National Solar Observatory (NSO). NSO is funded by the National Science Foundation under a cooperative agreement with the Association of Universities for Research in Astronomy, Inc. "

NSF and AURA/NSO provided (via email on 3/25/14) an opportunity for everyone in the NHWG to comment on the above draft language. A comment period was opened up to and including Wed., April 30, 2014, in which members of the NHWG could submit comments on the latest version (above) of the suggested language. Those interested in submitting comments on the draft language were asked to submit an email to Caroline Blanco at NSF no later than midnight (Hawaiian Standard Time) on Wed., April 30, 2014. At the close of the comment period, NSF and AURA/NSO conferred and, based on all comments received during the NHWG meetings and during the comment period, finalized the above language.

During the September 22, 2014 meeting, the language was again read and discussed. NSF made another request for comments and none were expressed. It was agreed at the meeting that the language above would become the acknowledgement and this PA item would now be considered COMPLETED.

**15. PA Item II. O. Status of Implementation of this PA Reported on Project Website**

The “Status of Implementation of Programmatic Agreement” is available on the Internet at: <http://atst.nso.edu/node/747>.

**Additional Items Listed in Condition 7 of the CDUP**

- 1. 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.

- 2. 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 continues annual funding of a ten-year, \$20M award to the University of Hawaii Maui College (UHMC). To date, \$16M has been awarded to UHMC. The award is being funded, contingent upon the availability of appropriations, at a rate of \$2M annually and is being used to establish and fund programs to address the intersection of Native Hawaiian culture and science, technology, engineering and mathematics. Recruitment for student participants continues under the direction of the UHMC Director for the program. The Director continues to implement and develop the details of the program that involve student stipends, mentoring, internships, as well as training in Native Hawaiian culture.

- 3. 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://atst.nso.edu/node/747>.





## Haleakalā High Altitude Observatory Site Management Plan

### 3.5.3.2 Construction Practices

All subcontractor personnel working at HO must receive IfA-approved environmental training, prior to beginning work. This training program explains and amplifies the requirements imposed on all construction projects within HO boundaries. For environmental protection, the IfA requires the following to protect vital environmental resources:

1. Haleakalā National Park (HALE) has experienced the introduction of destructive non-native species that compete with and have in some cases displaced native plants and insects. These introductions threaten the ecological balance at the summit area, and in cooperation with HALE, IfA requires any contractor to take the following measures at HO to prevent construction or repair activities from introducing new species:
  - a. Any equipment, supplies, and containers with construction materials that originate from elsewhere, i.e., the other islands or the mainland, must be checked for infestation by unwanted species by a qualified biologist or agricultural inspector prior to being transported to the summit. Specimens of non-native species found in these inspections are to be offered to the state for curation, and those not wanted are to be destroyed. All construction vehicles that will be used off paved surfaces must be steam cleaned/pressure washed before they travel or are transported through HALE. It shall be the sole responsibility of the contractor to coordinate inspections with the HALE Business and Revenue Program Specialist.
  - b. Importation of fill material to the site is prohibited, unless such fill (e.g., sand) is sterilized to remove seeds, larvae, insects, and other biota that could survive at HO and propagate. All material obtained from excavation is to remain on Haleakalā. Surplus excavated cinders, soil, etc., is to be offered to other agencies located at the summit or HALE.
  - c. Contractors are required to participate in IfA-approved pre-construction briefings to inform workers of the damage that can be done by unwanted introductions. Satisfactory fulfillment of this requirement can be evidenced by a signed certification from the contractor.
  - d. Parking of heavy equipment and storage of construction materials outside the immediate confines of HO property is prohibited.
  - e. Contractors are required to remove construction trash frequently, particularly materials that could serve as a food source that would increase the population of mice and rats that prey on native species.
2. The endangered 'ua'u, or Hawaiian Petrel, occupies burrows on the upper slopes of Haleakalā from February to October. The burrows are located in cinder and are active year after year, since the birds return to the site of their birth. Petrels are night flying birds, leaving their burrows to search for food during nesting and fledgling seasons. The burrows are located on the south slopes below the MSO facility and on the north slopes below the MSSC. The following requirements are in place to ensure that the 'ua'u habitat will be protected during any construction activities.

- a. During the months when 'ua'u are present on Haleakalā, care must be exercised to ensure that 'ua'u will not be disturbed. Therefore, vibration and noise from heavy construction equipment or activities must not impact the normal life-cycle of resident birds. If heavy construction equipment will be necessary at the HO site, consultation with the USFWS, the Division of Forestry and Wildlife (DOFAW), and avifaunal experts will be required to determine feasibility and any applicable mitigation requirements.

Furthermore, it would be necessary to determine whether human receptors in areas outside of the HO would be affected by construction noise. There are areas within HO close enough to HALE visitors, such that they would be able to detect noise from construction of and traffic at the proposed facilities. These sounds could affect Native Hawaiian cultural practitioners and those engaged in recreation at nearby locations. The analyses provided by the contractor would be used to help develop methods to avoid, minimize, or mitigate such noise where it would or may affect endangered species, sensitive cultural practices, or the experience of visitors to the summit area outside of HO.

Such methods could include:

- i. Workers at the site must be informed of vibration, noise, and lighting hazards to endangered species, that their activities are to be confined to the construction site to minimize risk to birds in adjacent areas, and that noise sources should be shielded where possible
  - ii. Conducting all noise-emitting activities within strict day and time constraints, with work prohibited during sensitive nighttime periods.
  - iii. Reducing or substituting power operations/processes through use of proportionally sized and powered equipment necessary only for tasks at hand.
  - iv. Maintaining all powered mechanical equipment and machinery in good operating condition with proper intake and exhaust mufflers.
  - v. Turning off or shutting down equipment and machinery between active operations.
- b. Contractors will be given current maps of locations of 'ua'u burrows to assist with 'ua'u conservation. HALE biologists are continuously finding and mapping new 'ua'u burrows and these maps are made available to IfA for planning purposes.
- c. HO personnel will notify USFWS of any 'ua'u mortalities. Contractor personnel will report mortalities to IfA immediately.
- d. Construction of fences will be avoided, to prevent 'ua'u mortality from collisions.
- e. Lighting for construction hazards or night work must be approved by IfA prior to installation. All lighting must be shielded from above, so that night flying birds will not be disoriented by upward projecting lights that are mistaken for natural sources of navigable lighting.

3. HO is located in a cinder cone in a State Conservation District. Construction at the site requires special care to maintain the unpolluted environment.
  - a. No hazardous materials are to be released at the site. Substances such as surplus or used paint, oil, solvents, cleaning chemicals, etc., must be removed from the area and disposed of properly.
  - b. Accidental spills of any hazardous material during the execution of a contractor's project at the site must be reported immediately to the IfA. Spill containment will be supervised by UH personnel at the site.
  - c. Spill remediation methods must be approved by the University of Hawaii's Environmental Health and Safety Office (EHSO) prior to clean-up, and all costs incurred for clean-up will be paid by the contractor. In the event of a release, the contractor will be liable for any Federal- or State-imposed response action, costs, or penalties.
  - d. Washing and curing water used for aggregate processing, concrete curing, clean up, etc., cannot be released into the soil at the site. A recovery process is required by the contractor to capture wastewaters.
4. It is of particular importance to maintain a dust-free environment at HO. Telescope mirrors, lenses, and sensors can be quickly damaged by wind born dust. HO is located at 10,000 feet, and is often exposed to winds in excess of 30 miles per hour (mph). Before, during, and after winter storms, winds can exceed 50 mph. The natural substrate at the site is a mixture of fine volcanic sand and cinders. Fugitive dust from the finer material can be released when the substrate is disturbed. Therefore:
  - a. Contractors must establish a written dust control plan that must be observed by all contractor personnel during the project. Contractors will adhere strictly to the requirement that dust be controlled at all times, including non-working hours, weekends, and holidays.
  - b. Dust control must be accomplished by equipment that the Contractor keeps on site and sprinkling or similar methods will be required to keep disturbed finer material from becoming airborne and must result in less than 10 pounds of fugitive dust released into the atmosphere per 24-hour period, as measured by standard collection methods.
  - c. No oil or chemical treating shall ever be used at the site for dust control.
  - d. Dust resulting from surface preparation of surfaces to be painted by sanding, power tools, or scraping and brushing shall be controlled by the Contractor by use of catchments and filtering systems/devices to prevent damage to the telescope mirrors, lenses and sensors.
  - e. Where practical, erect a designated on-site facility with wash racks to clean equipment and machinery before they are removed from construction zones.
  - f. Reduce vehicle emissions from construction projects and operations at HO by establishing worker carpools and shuttles to and from the job site, and mitigate construction equipment/machinery emissions by using proper emission-control technologies and standard exhaust filtration devices.

5. Construction or refurbishing of existing facilities will result in quantities of solid waste, and remnants of food and packaging that construction crews may bring for consumption at the site. Therefore:
- a. Only materials that are not hazardous wastes can be managed as solid waste at the site.
  - b. Solid waste cannot be stockpiled or dumped at the site or on the slope below the HO facilities. Construction contractors must remove construction trash frequently, particularly food sources that could increase the population of mice and rats that prey on native species. Most construction waste should be removed in roll-off trash receptacles that are covered before transport.
  - c. Construction and demolition solid waste and debris must be secured such that strong winds cannot disperse materials. This is particularly important during weekends, holidays, and other non-working hours.
  - d. Construction and demolition solid waste and debris should be transported to the Maui Demolition and Construction Landfill in Ma`alaea.
  - e. No food is to be left on the ground or in HO solid waste storage areas. This is to prevent attraction of rats and other pests.
  - f. Non-hazardous trash and solid waste will be transported in covered refuse containers and disposed of off-site at Maui's licensed landfill.