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ANNUAL REPORT TO THE LEGISLATURE
ACT 255, SLH 2022
December 27, 2023



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I. INTRODUCTION

The Mauna Kea Stewardship and Oversight Authority (Authority) was established through Act 255, Session Laws of Hawai'i 2022 to protect Mauna Kea for future generations and manage the lands for the purpose of fostering a mutual stewardship paradigm in which ecology, the environment, natural resources, cultural practices, education, and science are in balance and synergy. The summit region of Mauna Kea is a spiritual and special place of significance that is home to cultural landscapes, fragile habitats, and historical and archaeological artifacts.

The Authority is directed by eleven (11) board voting members, consisting of the following individuals:

1. The Chairperson of the Board of Land and Natural Resources, or the Chairperson's designee;
2. The Mayor of the County of Hawai'i, or the Mayor's designee;
3. The Chairperson of the Board of Regents of the University of Hawai'i; provided that the Chairperson of the University of Hawai'i Board of Regents may designate a:
 - A. Member of the Board of Regents; or
 - B. Past member of the Board of Regents with experience with Mauna Kea, to serve as the Chairperson of the University of Hawai'i Board of Regents' designee;
4. An individual with 'aina (land) resource management expertise and specific experience with Hawai'i island-based management;
5. An individual who is recognized as possessing expertise in the fields of p-12 public education or post-secondary education.
6. A representative who shall be appointed by the Governor from a list of three names submitted by the Maunakea Observatories;
7. An individual with business and finance experience who has previous administrative experience in managing a large private-sector business;
8. An individual who is a lineal descendent of a practitioner of Native Hawaiian traditional and customary practices associated with Mauna Kea;
9. An individual who is a recognized practitioner of Native Hawaiian traditional and customary practices; and
10. Two (2) members who shall be appointed by the Governor from a list of three (3) names submitted for each appointment by the President of the Senate and Speaker of the House of Representatives, respectively; provided that if fewer than three (3) names are submitted for either appointment, the Governor may disregard the list;

Provided further that not less than three (3) of the eleven (11) members of the Authority shall be residents of the County of Hawai'i.

Board Members were confirmed by the State Senate Water and Land Committee in April 2023. Four (4) of the board members' terms expire on June 30, 2024, four (4) other board members' terms expire on June 30, 2025, and the remaining three (3) board members are ex-officio. In accordance with Act 255, Session Laws of Hawai'i 2002, the Authority, after its board members had been confirmed by the Senate, shall have a 5-year transition period beginning on July 1, 2023, to jointly manage the Mauna Kea lands with the University of Hawai'i; provided that the day-to-day operations shall be carried out by the Center for Maunakea Stewardship.

Before the transition period (from November 22, 2022), the Authority held over nine (9) regular board meetings, formed five (5) permitted interaction committee groups (Governance, Procurement, Budget and Internal Operations, Recruitment, and Monitoring the Decommission of the Caltech Observatory), met with local and national community and science leaders, and held a Strategic Planning Meeting.



Since July 1, 2023, the Authority has not only concentrated on working with the University of Hawai'i and the Center for Maunakea Stewardship, but they have worked towards establishing an organization structure and resources that fulfills the mission in Act 255, SLH 2022. They also created an Investigation and Development of a Master Plan for Maunakea Lands and a Communications and Community Outreach Program Permitted Interaction Groups.

II. MANAGEMENT ACTIONS

The Authority Board Members have worked toward taking actions that will establish the foundation for ensuring that the organization can assume full responsibility after the 5-year transition period to preserve, protect, and properly manage the Mauna Kea lands. Although they did not have staff to assist them in executing actions, support and/or cooperation from the State Legislature, 'Imiloa, University of Hawai'i, Center for Maunakea Stewardship, and Department of Land and Natural Resources has enabled them to proceed with the following:

1. Established a working relationship and reporting requirements with the University of Hawai'i to jointly manage the Mauna Kea lands, which includes the daily operations executed by the Center for Maunakea Stewardship (CMS) and the Maunakea Shared Services (MKSS) organization that is a project of the Research Corporation of the University of Hawai'i and is funded by the Observatories on Mauna Kea. Began working on an agreement with the University, CMS, and MKSS that provides clarity on the roles and responsibilities of all entities, including the use of resources and funding for the benefit of Mauna Kea; and established a working relationship with the Department of Land and Natural Resources in executing administrative actions.
2. Developed and adopted Rules of Procedures and Organization for the Authority Board. There are fourteen (14) rules that were adopted by the Authority Board at its meeting on March 9, 2023. (See attached Exhibit A)
3. Obtained the State Legislature's authorization for its biennium budget (fiscal years 2024 and 2025) that establishes and funds six (6) positions for the Authority's operations, including an Executive Director, Project Director (to manage the various consultants), Administrative Services Officer, two (2) Program Specialists – one for compliance and the other for research and reporting, and an Executive Assistant (See Exhibit B for the approved organization chart). Since obtaining legislative authorization effective for July 1, 2023, the Authority established, recruited for, and filled the Executive Assistant position. The Executive Assistant was hired on August 21, 2023. The Executive Director position is in the recruitment process and is scheduled to be completed shortly after the issuance of this report. All other positions have been described and is working its way through the establishment and recruitment process.
4. Established a Co-Management Working Group between the Authority and the University of Hawai'i Board of Regents. The working group will be responsible to take actions that handle the operational and management matters that is consistent with the requirements in Act 255, SLH 2022. (See Exhibit C for the formation of the working group, its members, purpose, and authority.)

5. Hired a facilitator to assist with the Authority's meetings, including community outreach plans and efforts, development of legislative proposals, and resolving stakeholders issues and concerns.
6. Procuring a consultant to provide recommendations on establishing an efficient and effective organization structure, resource requirements, and best practice operating policies and procedures for the Authority to fulfill the requirements of Act 255, SLH2022.
7. Established the structure, model, analytics, and others for developing the Master Plan, which includes the Management and Financial Sustainability Plans.
8. Establishing a training philosophy that requires participation and learning through meetings and presentations from various organizations, including the following:
 - i. Participated in the American Astronomical Society Panel Discussion in January 2023.
 - ii. Maunakea Management Board
 - iii. Kahu Ku Mauna Board
 - iv. Native Hawaiian Hawai'i Island Residents
 - v. Kona Kohala Chamber of Commerce – Economy Committee
 - vi. American Astronomical Society
 - vii. National Science Foundation
 - viii. National Academy of Science – Committee on Astronomy and Astrophysics
9. Working on securing office space sufficient for up to ten (10) Authority employees, furniture, equipment, and others that will enable the Authority staff to operate effectively. Until then, the Executive Assistant and Executive Director will be housed at the 'Imiloa Astronomy Center.

III. IMPLEMENTATION OF ALL LEGISLATIVELY REQUIRED PLANS, INCLUDING FINANCIAL AND MANAGEMENT REPORTS, BUDGETS, EXPENDITURES, AND PLANS

1. Developed an operating structure and resource requirements during the 5-Year Transition Period. This includes the hierarchy, position classification, pay, roles and responsibilities, outcomes, and performance evaluations. A consultant will provide recommendations to improve the structure and Authority outcomes.
2. Developed and received approval for its organization chart and internal reporting structure. (See Exhibit B)
3. Developed an operational expenditure plan for the fiscal year 2024 (See Exhibit D) and a fiscal year 2025 operating budget for the Legislature's consideration.
4. Reviewing current operations on Mauna Kea, assumptions and allocation of expenditures for shared services, consolidating financial statements, and others to determine a workable financial model for future sustainability.
5. Developing financial policies for the Authority prior to and after the 5-year transition period expires on July 1, 2028, including periodic independent audits.
6. An Authority Permitted Interaction Group is working towards developing a master plan and comprehensive management plan to guide the Authority in its efforts to preserve, protect, and properly manage the Mauna Kea lands for the benefit of the people of Hawai'i.

IV. HUMAN USES OF THE NATURAL AND CULTURAL RESOURCES OF MAUNA KEA AND THE IMPACTS OF THE HUMAN USES ON THESE RESOURCES

The following activities or operations occur on Mauna Kea:

1. 12 Observatories conducting astronomical research through the use of 13 telescopes.
2. The Onizuka Center for International Astronomy Visitor Information Station (VIS)
 - a. Contains educational signage, exhibits covering Mauna Kea's cultural history, natural resources, astronomy, and the administrative rule requirements. The exhibits purpose is to educate awareness about Maunakea's cultural heritage, natural environment, astronomical inquiry, safety, and permitted activities.
 - b. Star-gazing.
 - c. Short hiking routes around the VIS.
 - d. First Light e-store offers items for consumers or visitors to purchase such as books, apparel, drinkware, and others.
3. Permits –
 - a. Hiking and biking - Over five thousand (5,000) individuals hiked on the Mauna Trail and Summit in 2022.
 - b. Filming.
 - c. Research.
 - d. Military groups.
4. Halepohaku is a facility on Mauna Kea that provides for food and lodging for those who work, research, or provide technical support to the activities on Mauna Kea.
5. Maunakea Weather Center provides for weather research and forecasting capabilities.
6. 'Āhinahina Propagation Program, and expansion of Visitor Information Station (VIS) out-planting effort with over two thousand (2,000) plant counts covering five (5) different plant types.

The Authority has established a Permitted Interaction Group that is currently meeting to develop the Authority's Management Plan that, among other things, minimizes and evaluates the impact of human uses on the natural and cultural resources. The Authority has been monitoring the activities on Mauna Kea, and the issues and reports to the Authority identified by the University of Hawai'i and Center for Maunakea Stewardship. Until the Authority issues its Master and Management Plans, they are reviewing the reports and issues with the University of Hawai'i and Center for Maunakea Stewardship to identify opportunities for strengthening the Comprehensive Management Plan requirements and

controls so as to form the development of the Authority's Management Plan. (See Exhibit E).

Under the Authority's current joint management relationship with the University of Hawai'i, and until the Authority has its plans, policies, and staff in place, the Center for Maunakea Stewardship (CMS) maintains responsibility for implementing the 103 management actions under their comprehensive management plan with the Authority. CMS provides periodic and timely updates to the Authority on the management actions taken. In fulfilling their own reporting requirements to the Legislature, the University of Hawai'i has summarized the status of their stewardship activities for the FY2023 concerning the protection of the natural and cultural resources of Mauna Kea and various other matters. The University of Hawai'i's 2024 report to the Legislature on their updates of actions to the management plan is included under Exhibit G.

Through the Permitted Interaction Group, the Authority is anticipating the hire of a consultant who will be able to evaluate the human uses on Mauna Kea; and be able to determine the impacts on the lands and other resources that must be protected for the generations to come.

V. COMMERCIAL USES OF THE NATURAL AND CULTURAL RESOURCES OF MAUNA KEA AND THE IMPACTS OF THE COMMERCIAL USES ON THESE RESOURCES

The following commercial use activities occur on Mauna Kea:

1. Commercial Tours – There are nine (9) operator permits issued. Over two thousand (2,000) passengers per month participate in these tours.
2. Film Permits issued – Two (2) for commercial use, eight (8) non-commercial/education in 2022.
3. New Projects – Nine (9) approved in 2022.
4. Activities requiring permits –
 - a. Filming.
 - b. Research.
 - c. Military groups.

The University of Hawai‘i Institute for Astronomy (IfA) plays an important role in the success of the State of Hawai‘i's Astronomy Program and economy. This includes educational opportunities, scientific research and findings, hundreds of millions of dollars or more in internal and external funding, economic benefits through spending from visitors, advanced technology development programs, and others.

As an example, the University of Calgary International has a Group Study Program, where students can gain astronomical knowledge and engage with "local indigenous peoples so students can learn about and reflect upon the controversies surrounding land and resource use and sharing in Indigenous territories specific to the Maunakea facilities site." "Students will also hone their skills in public engagement by helping operate viewing telescopes at the Maunakea Visitor Information Station." This program is tentatively scheduled for May 20, 2024 through May 27, 2024 at an estimated cost of \$4,380 per student of which \$1,865 is estimated to be for accommodations, ground transportation, tours, and meals provided through the Mauna Kea Observatories. Programs like the University of Calgary will continue to benefit the State's economy where University of Hawaii Economic Research Organization (UHERO) in its latest report issued in 2022, estimated that astronomy had a total impact of \$221 million supporting over 1,300 residents.

The Authority has established Permitted Interaction Groups that are currently meeting to develop the Authority's Master and Management Plans that, among other things, minimizes and evaluates the impact of commercial uses on the natural and cultural resources. The Authority has been monitoring the activities on Mauna Kea, and the issues and reports to the Authority identified by the University of Hawai‘i and Center for Maunakea Stewardship. Until the Authority issues its Master and Management Plans, they are reviewing the reports and issues with the University of Hawai‘i and Center for

Maunakea Stewardship to identify opportunities for strengthening the Comprehensive Management Plan requirements and controls so as to form the development of the Authority's Management Plan. (See Exhibit F).

Under the Authority's current joint management relationship with the University of Hawai'i, and until the Authority has its plans, policies, and staff in place, the Center for Maunakea Stewardship maintains responsibility for implementing the 103 management actions under their comprehensive management plan with the Authority. CMS provides periodic and timely updates to the Authority on the management actions taken. In fulfilling their own reporting requirements to the Legislature, the University of Hawai'i has summarized the status of their stewardship activities for the FY2023 concerning the protection of the natural and cultural resources of Mauna Kea and various other matters. The University of Hawai'i's 2024 report to the Legislature on their updates of actions to the management plan is included under Exhibit G.

Through the Permitted Interaction Group, the Authority is anticipating the hire of a consultant who will be able to evaluate the human and commercial uses on Mauna Kea; and be able to determine the impacts on the lands and other resources that must be protected for generations to come.

VI. AN ASSESSMENT OF CUMULATIVE IMPACTS TO MAUNA KEA

While the University of Hawai‘i and Center for Maunakea Stewardship has assessed the overall impact that locals and visitors, science, education, and others have placed on and impacted the Mauna Kea Lands, the Authority plans to perform its own due diligence through the procurement of a consultant that can provide the expertise to independently report on the impacts, assess any damage, provide recommendations and solutions to overcome any impacts and prevent further harm to these sacred lands.

Under the Authority's current joint management relationship with the University of Hawai‘i, and until the Authority has its plans, policies, and staff in place, the Center for Maunakea Stewardship (CMS) maintains responsibility for implementing the 103 management actions under their comprehensive management plan with the Authority. CMS provides periodic and timely updates to the Authority on the management actions taken. In fulfilling their own reporting requirements to the Legislature, the University of Hawai‘i has summarized the status of their stewardship activities for the FY2023 concerning the protection of the natural and cultural resources of Mauna Kea and various other matters. The University of Hawai‘i's 2024 report to the Legislature on their updates of actions to the management plan is included under Exhibit G.

Until the Authority hires the consultant, performs the study, and issues a report, the Authority will monitor the activities on Mauna Kea to ensure that requirements are met in accordance with the Comprehensive Management Plan 2022 Supplement that was approved by the University Board of Regents and the Board of Land and Natural Resources.

VII. ALL COMMUNITY DIALOGUE, OUTREACH, ENGAGEMENT, AND CONSULTATION

Before communication plans are developed and adopted, the Authority will be working with the Center for Maunakea Stewardship (CMS) on presentations, communication materials, and meetings. For reporting purposes in 2023, CMS held four (4) group presentations, four (4) community events, six (6) mauna workdays, and other project related activities. Collectively, these presentations, events, workdays, and projects were attended by more than 300 individuals. These community education and outreach focused on the importance of cultural and historical sites on Mauna Kea. It also provided opportunities that encourage students to explore STEM related careers in conservation, resource management, astronomy, education, and 'aina stewardship. The Malama 'aina projects focused on the unique natural and biocultural ecosystem of Mauna Kea for which volunteers had the opportunity to plant native flora and fauna, help with the conservation area maintenance, and learn native plant propagation techniques.

Strategically for the upcoming year, CMS is planning for at least one field project per month, one guided field trip per month, presentations to one class group per month, participate in six (6) community outreach events per year, coordinate two (2) community events per year, expand community engagement activities to include on-line educational opportunities and updates on CMS programs and activities, and monthly cultural trainings for employees.

Among other events, the Authority, in 2024, is also planning for four (4) in-community meetings on Hawai'i island, and six (6) in-community meetings for 2025.

VIII. THE UNIVERSITY OF HAWAI'I'S USE OF ITS RESERVED VIEWING OR OBSERVING TIME



According to the University of Hawai'i Institute for Astronomy (IfA), (See Exhibit F prepared by the IfA) "Astronomers worldwide are provided observing time, at no charge to researchers, through peer reviewed competitive proposal systems, that are synchronized to occur twice a year." Through its UH 88 telescope and agreements with non-UH Maunakea Observatories, the IfA receives the following allocations of observing time on the Maunakea Observatories:

1. UH 2.2-m Telescope (UH 88)	100%
2. Canada-France-Hawai'i Telescope (CFHT)	15%
3. NASA Infrared Telescope Facility (IRTF)	15%
4. United Kingdom Infrared Telescope (UKIRT)	15%
5. James Clerk Maxwell Telescope (JCMT)	12%
6. Subaru Telescope	15%
7. W.M. Keck Observatory	10%
8. W.M. Keck Observatory II	15%
9. Gemini Observatory	10%

- | | |
|---|-----|
| 10. Submillimeter Array (SMA) | 15% |
| 11. Caltech Submillimeter Observatory (CSO) | * |
| 12. UH Hilo Hoku Kea Telescope | * |
| 13. Very Long Baseline Array (VLBA) | # |

* - being decommissioned

- operates as a global interferometer

As previously reported, important scientific discoveries were determined from the observations on Mauna Kea including the accelerating expansion of the Universe, a supermassive Black Hole in the Milky Way galaxy, another planetary system, detection of asteroids that could potentially put the Earth at risk, finding water in protoplanetary discs from other solar systems, and others.

IX. SUMMARY

The Mauna Kea Stewardship and Oversight Authority Board, since its establishment and confirmation of all Authority Board Members, has been working on getting organized; moving forward as one; working with State departments, stakeholders, and interested parties; gaining an understanding of the current operations, policies, procedures, issues, pending actions, budgets, reports, internal controls, and oversight on Mauna Kea by the University of Hawai'i and Center for Maunakea Stewardship; establishing internal board policies, permitted interaction and working groups, developing a workable operating budget, identifying and acquiring foundational resources needed to accomplish its mission during the transition period and beyond. The administrative start-up for a new state agency are numerous and complex given the many strategic and sensitive issues, and currently without sufficient staff, will take time to attain operational efficiency in meeting the requirements of Act 255, SLH 2022.

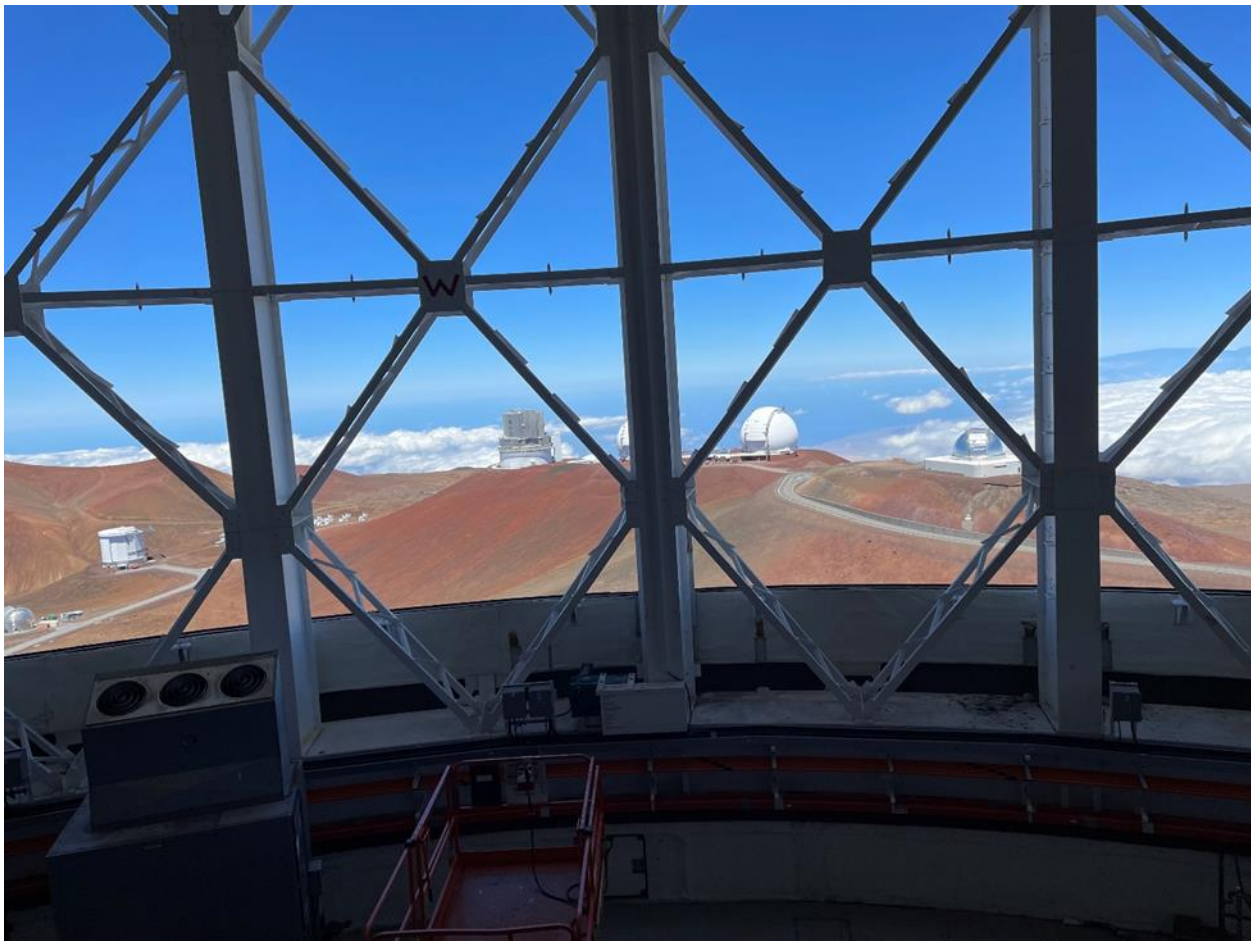


EXHIBIT A

RULES OF PROCEDURE AND ORGANIZATION

OF THE

**BOARD OF DIRECTORS OF THE MAUNA KEA STEWARDSHIP
AND OVERSIGHT AUTHORITY**



March 9, 2023

**RULES OF PROCEDURE AND ORGANIZATION
OF THE BOARD OF DIRECTORS OF THE
MAUNA KEA STEWARDSHIP AND OVERSIGHT AUTHORITY**

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RULE NO. 1

INITIAL ADOPTION OF THE RULES

1. At the earliest point in time after the first meeting of the Board of Directors, the Chairperson shall bring to the floor the Board's Rules of Procedures and Organization. The Board shall then adopt the Rules of Procedure and Organization. Immediately after adoption, the Board shall elect the Vice Chairpersons of the Board.
2. The rules of procedure shall become effective upon adoption and shall remain in effect until amended or revised as provided herein.
3. Upon initial adoption of the Rules of Procedure, the Board shall vote to ratify all previous decisions taken by the Board prior to the adoption of the rules.

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RULE NO. 2

MEETINGS

1. Regular Board Meetings. The Board shall meet at least ten times annually at the place and time designated by the Board. Whenever possible, the meetings will be scheduled on the 2nd Thursday of the month.
2. Special Meetings. Special meetings may be called by the Chairperson or a majority of the Board. Notice of any special meeting must be filed at least six calendar days before the meeting, and also meet all other requirements of HRS 92-7.
3. Executive Meetings.
 - (a) Allowable Purposes for an Executive Meeting. The Board may hold a meeting closed to the public:
 - (1) For one or more of the purposes set forth in HRS 92-5; or
 - (2) Where personal matters affecting the privacy of an individual are to be considered and the individual involved requests a closed meeting to consider such matter (HRS 92-5).
 - (b) Votes Required to Enter an Executive Meeting. The Board may hold an executive meeting closed to the public upon an affirmative vote, taken at an open meeting, of two-thirds of the voting membership present; provided the affirmative vote constitutes a majority of the voting membership to which the Board is entitled. The reason for holding such a meeting shall be publicly announced and the vote of each member on the question of holding a meeting closed to the public shall be recorded and entered into the minutes of the meeting.

Chart of Minimum Required Votes

Members Present	2/3 of Members Present	Required Votes
11	7.33	8
10	6.67	7
9	6	6
8	5.33	6

- (c) Any resultant official action that occurs during an Executive Meeting shall be acted upon in open meeting.
 - (d) An Executive Meeting shall be terminated when the purpose of the meeting has been fulfilled.
 - (e) The references for this section are HRS 92-4 and 92-5.
4. Skipped.
 5. Emergency Meetings.
 - (a) Imminent Peril. If the Board finds that an imminent peril to the public health, safety, or welfare requires a meeting in less time than is provided for in HRS 92-7, the Board may hold an emergency meeting in accordance with the provisions of HRS 92-8.
 - (b) Unanticipated Event. If an unanticipated event requires the Board to take action on a matter over which it has supervision, control, jurisdiction, or advisory power, within less time than is provided for in Section 92-7 to notice and convene a meeting of the Board, the Board may hold an emergency meeting to deliberate and decide whether and how to act in response to the unanticipated event in accordance with HRS 92-8.
 6. Videoconference Meetings. The Board may hold videoconference meetings in accordance with HRS 92-3.5 or HRS 92-3.7, provided that:
 - (a) If the Board is convening a remote meeting by interactive conference technology (see HRS 92-3.7), a Board member shall notify the Board Chairperson prior to the meeting that the Member will be attending the meeting from a non-public location.
 7. Availability of Agenda to Board Members. Except as otherwise provided by law, the agenda and all referrals for a regular meeting of the Board shall be made available to Board Members at least six (6) calendar days prior to the meeting.
 8. Attendance. If a Board Member is unable to attend a meeting, prior notice shall be given to the Board Chairperson.
 9. Skipped.
 10. Roll Call. A voice roll call will be taken to confirm each Board Member's attendance.
 11. Recesses. Notwithstanding the need to occasionally call for short recesses or meal breaks, when there may be unusual circumstances for the Chairperson to call for a recess, the Chairperson shall announce the anticipated length of the recess and time of reconvening.
 12. Scheduling.
 - (a) The Board Chairperson is authorized to schedule or reschedule the location, time, date and/or subject matter of Regular, Special, or Executive meetings.

- (b) Public notice for any Regular, Special, or rescheduled meetings, or Executive meetings when anticipated in advance, shall be provided pursuant to HRS 92-7.
- (c) Any request for a presentation shall be approved in advance by the Board Chairperson. The request shall include the proposed date for the presentation, a brief description of the content of the presentation, and the person(s) or group that will be providing the presentation.

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RULE NO. 3

QUORUM

1. A majority of the voting membership of the Board shall constitute a quorum for meetings.

The term “voting membership,” as it pertains to Board voting, means the membership of eleven voting members, even if there are vacancies.

2. In the absence of a quorum, a meeting may not be convened or continued except for the purpose of either recessing the meeting to another date, time and specific location or publicly adjourning the meeting due to a lack of quorum.

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RULE NO. 4
OFFICERS AND THEIR DUTIES

1. Officers. The officers of the Board shall consist of the Chairperson, 1st Vice Chairperson, and 2nd Vice Chairperson who shall perform the duties prescribed by law and these rules. The Chairperson shall be appointed by the Governor. The 1st Vice Chairperson shall be elected by a majority vote of the voting membership of the Board and will be selected using the same criteria stated in Section 3(c) of Act 255. The 2nd Vice Chairperson shall be elected by a majority vote of the entire voting membership of the Board and will be selected from any of the voting members. Any vacancy shall be filled in like manner.
2. Presiding Officer. The Chairperson of the Board shall be the Presiding Officer of the Board and have the right to vote as other members. In the absence or disability of the Chairperson, the 1st Vice Chairperson shall serve as the Acting Presiding Officer. If the absence or disability of both the Chairperson and 1st Vice Chairperson, the Board shall elect from among its members a temporary presiding officer, using the criteria for electing a 1st Vice Chairperson.

It shall be the duty of the Presiding Officer to:

- (a) Open all meetings of the Board at the appointed hour by taking the chair and calling the Board to order.
- (b) Maintain order and proper decorum and reasonably administer the receipt of oral and written testimony in accordance with these rules.
- (c) Announce the business before the Board in the order prescribed by these rules and the results of any Board vote.
- (d) Sign all documents and authenticate all official acts of the Board as required.
- (e) Receive all reports, communications, bills, resolutions, and other items from the public, various departments of the government, and individual Board Members, and immediately make the proper referrals of these matters to the Board. All communications shall be numbered and made available to the public, except as otherwise provided by law.
- (f) Provide for the coordination of all meetings, functions, and legislative and administrative activities of the Board, and assure that they are honestly, efficiently and lawfully conducted.

- (g) Make known all rules of order when so requested and decide all questions of order and procedure, subject to appeal to the Board.
- (h) Serve as the chief spokesman and representative of the Board for matters before the public, and the State and Federal governments, in accordance with the official position of the Board.
- (i) Authorize (approve or deny) all travel requests of Board Members and staff, with exception of Chairperson's own travel requests. Any Chairperson travel request or reimbursement shall be approved by the Chair, Department of Land and Natural Resources (DLNR), or the DLNR Chair's designee.
- (j) Delegate, using the discretion of the Chairperson, authority to conduct the functions listed in these rules.
- (k) Skipped.
- (l) Recommend a calendar of events, to include Board meetings, agenda deadlines, recesses, special meetings, holidays, etc.

RULE NO. 5

VOTING

1. There shall be four (4) methods of voting:
 - (a) By voice
 - (b) By raising of hands
 - I By unanimous consent
 - (d) By roll call
2. The method of voting at Board Meetings shall be determined by the Chairperson, provided that if a vote is not unanimous, the Chairperson shall announce the names of those members voting in the minority and those who are absent. The Chairperson shall state the question prior to calling for the vote. The Executive Assistant (Board Secretary) shall record each vote in the minutes and report the result to the Chairperson who shall announce whether the motion passed or failed. The Chairperson shall use a roll call vote:
 - (a) When the result of a vote is not unanimous;
 - (b) Upon the request of any member of the Board; or
 - I At the discretion of the Chairperson.
3. When a voice or roll call vote is called, each member shall answer in a clear voice in the affirmative, the negative, “kanalua”, or abstention. After all the members have voted, any member who voted “kānalua” will be asked again to give a voice vote.
4. The Chairperson may excuse a member from voting if so requested by that member for a stated conflict of interest.
5. After the announcement of the result, a Board Member shall not be permitted to change a vote.
6. No official action shall be taken except at a meeting open to the public.
7. The vote of a majority of the voting membership of the Board shall be necessary for a motion to pass.

RULE NO. 6
DISCLOSURE OF INTEREST

1. Any member who has a substantial financial and/or personal interest, direct or indirect, in any action proposed or pending before the Board, shall make full disclosure in writing to the Chairperson of such interest prior to the taking of any vote thereon.
2. Any member who has a substantial financial and/or personal interest directly affected in any action proposed or pending before the Board may refrain from deliberating on said action and may be excused from voting on the matter thereon.
 - (a) “Substantial” means an interest which is sufficient in magnitude to influence one’s official action.
 - (b) “Financial interest” means an interest held by a Board Member, his or her spouse, domestic partner, children, siblings, parents, grandparents, or grandchildren, which is:
 - (1) An ownership interest in a business;
 - (2) A creditor interest in an insolvent business;
 - (3) An employment, or prospective employment, for which negotiations have begun;
 - (4) An ownership interest in real or personal property;
 - (5) A loan or other debtor interest; or
 - (6) A directorship or officership in a business, including nonprofit businesses.
3. Such written disclosure of financial or personal interest in any proposal pending before the Board, shall be recorded in the minutes of the meetings of the Board, and shall be made a matter of public record prior to the taking of any vote on such proposal. Such written disclosure shall be applicable to all subsequent actions relating to the same subject matter.
4. Prior to any vote in the Board on a proposal for which the Board Member has made a written disclosure of a financial or personal interest, the Board Member shall also orally disclose the interest to the Board after each motion and second on the proposal, but before the commencement of debate on the motion or, if there is no debate, before the calling of the question on the motion. The Chairperson may waive this requirement after initial disclosure at a meeting where said motion is being considered.

RULE NO. 7

PUBLIC STATEMENTS AND TESTIMONY

1. Written Testimony. Written testimonies shall be received for the record on any agenda item. Testimonies received after the deadline for receipt shall still be received for the record and will be presented to the Board members as soon as practicable.
2. Oral Testimony. Oral statements from any member of the public shall abide by the following:
 - (a) Pursuant to Chapter 92, Hawai‘i Revised Statutes, any person wishing to present oral testimony on any agenda item may do so consistent with this rule.
 - (b) Persons wishing to present oral testimony relating to any agenda item shall register with the Board Secretary prior to the item being read into the record, indicating the item on which they wish to speak and their position, if any. Persons may provide their name, address, and organization they represent, if any.
 - I Persons sharing the same or similar points of view may testify as a group with one spokesperson who shall list the names of all persons in the group in attendance and may state their home community or district, and that listing of names shall not be considered as part of the time allotted for public testimony.
 - (d) Each person may speak for a specific time period, to be determined by the Chairperson prior to the commencement of public testimony.
 - I Each person must speak at the time of calling, unless the Chairperson determines otherwise.
 - (f) No person will be allowed to speak twice on the same subject.
 - (g) Any person wishing to speak on more than one subject shall register separately for each agenda item.
 - (h) Those speaking shall direct their remarks to the Chairperson and not to any individual Board Member or person in the audience.
 - (i) All members of the public shall extend proper courtesy and respect to one another and to all Board Members, and all persons shall be addressed by their surnames. No profanity or abusive remarks will be allowed at any time in any meeting.

- (j) Any person, not a member of the Board, who is disrespectful to the Board by any disorderly or contemptuous behavior in its presence or who disrupts the exercise of any Board Member's function, may be removed from the meeting at the discretion of the Chairperson.
 - (k) Any person who does not abide by these rules may be ruled out of order by the Chairperson.
3. Nothing in this rule shall diminish the responsibility or the authority of the Chairperson to maintain order and decorum.
 4. Board Members shall refrain from making comments or asking questions of testifiers during statements from the public. A Board Member may, however, request that a person presenting public testimony on an agenda item be available for questions during subsequent discussion. Such a request shall be responded to by the Chairperson at the time of the request.

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RULE NO. 8
ORDER OF BUSINESS

1. The order of business is subject to the discretion of the Chairperson.

Page 12

RULE NO. 9

AMENDMENTS, REVISIONS, AND FORMAT OF THE RULES OF PROCEDURE

1. Amendments. These rules may be amended at a regular Board meeting by a resolution approved by an affirmative majority vote of the entire membership of the Board; provided that such amendment(s) are placed on the agenda of a duly noticed meeting.
2. Revisions. Whenever changes of the rules are so extensive and general that they are scattered throughout the rules such that an entirely new set of rules called a revision is necessary, then such revision shall require the adoption of a resolution by a two-thirds affirmative vote of the entire membership of the Board. The notice requirements shall be the same as those for amendments.
3. Each page of these rules shall have its page number on it at the bottom right of the page. Pages shall be numbered starting with the rule number, a hyphen, and the page number starting with "1." (Example: 17-1, 17-2, etc.)
4. If a rule is amended, the resolution number providing that amendment, including date of adoption, shall be placed at the bottom left corner of the affected page(s). (Example: Amended - Resolution No. 1-10, 4-1-11.)

Page 13

RULE NO. 10
SUSPENSION OF RULES

1. When the Board proposes to do something that it cannot do without violating one or more of these rules, it can adopt a motion to Suspend the Rules interfering with the proposed action; provided, however, that neither the proposal nor the suspension shall result in a conflict with any constitutional provision, local, state, or national law or the fundamental principles of parliamentary law.
2. A motion to Suspend the Rules is:
 - (a) An incidental motion, and no subsidiary motion can be applied to it.
 - (b) Out of order when another has the floor.
 - (c) Not debatable or amendable.
3. Such a motion requires a two-thirds vote of the entire membership, unless otherwise provided, and cannot be reconsidered.

Page 14

RULE NO. 11

NEWS MEDIA

1. Members of the news media covering the business of the Board may be assigned to selected areas by the Chairperson.
2. Except as provided by law, members of the news media shall be permitted to televise and sound-record the proceedings of the Board under such rules and/or conditions as the Chairperson may prescribe.

Page 15

RULE NO. 12

OPERATIONAL VALUES, PRINCIPLES AND PARLIAMENTARY AUTHORITY

1. Whenever possible, the operational values and principles of Mauna Aloha, Opu Kupuna, and Holomua Oi Kelakela defined in Act 255 shall guide the Board in its interactions and decision-making processes.
2. When these rules are silent, the rules of parliamentary procedure contained in the current edition of Robert's Rules of Order Newly Revised shall govern the Board in all cases to which they are applicable and in which they are not inconsistent with any constitutional provision, any law, or these rules.

Page 16

RULE NO. 13

EXECUTIVE ASSISTANT (BOARD SECRETARY)

1. Executive Assistant. The Executive Assistant shall be appointed by and serve at the pleasure of the Board under the direct supervision of the Chairperson.
2. Duties. It shall be the duty of the Executive Assistant, in addition to those duties prescribed by law, to:
 - (a) Be responsible for the administration of the Board of Directors.
 - (b) Have charge of all the records of the Board, keep an accurate journal of proceedings, and make accessible to the general public, in a timely manner, all written materials of public record and be responsible for the same.
 - (c) Forward at once to the Chairperson and Board Members all official reports, communications and other matters related to the Board's business.
 - (d) Serve in all matters as Secretary of the Board and perform all clerical and office duties pertaining to such position as the Board shall from time to time direct, as well as other duties assigned by law or these rules.
 - (e) Absent extenuating circumstances, attend all Board meetings and read bills, resolutions, and other matters to the Board, as required.
 - (f) Maintain order among those members of the public present at Board meetings and, when required by the Chairperson, remove any person who violates these rules.
 - (g) Be the authorized representative for the Board on the Destruction of Records.

RULE NO. 14

SEVERABILITY

If any rule contained herein is in conflict with the provisions of the U.S. Constitution, Hawai'i State Constitution, or the Hawai'i Revised Statutes, such rule shall be deemed invalid. Such invalidity shall not affect other rules contained herein which, otherwise, can be given effect without the invalid rule, and to this end these rules are severable.

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EXHIBIT B

Mauna Kea Stewardship and Oversight Authority Approved Organization Chart

APPROVED DISAPPROVED:



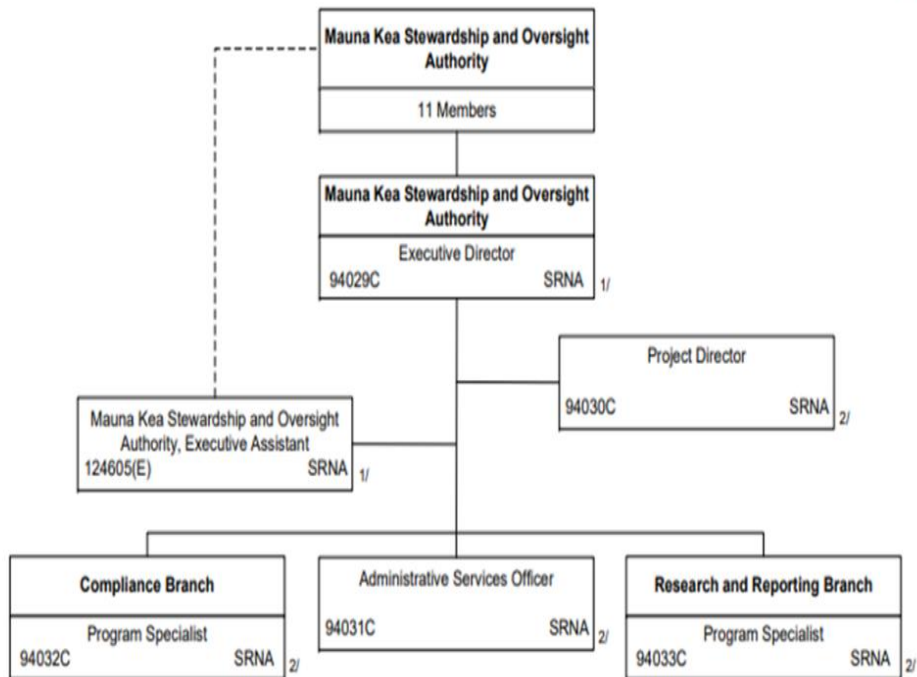
Chairperson
Department Of Land And Natural Resources

Aug 24, 2023

Date

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
MAUNA KEA STEWARDSHIP AND OVERSIGHT AUTHORITY

POSITION ORGANIZATION CHART
PROPOSED



1/ Budgeted exempt posn #124605(E), NTE 6-30-24.
2/ Estab posns 94029C, 94030C, 94031C, 94032C, 94033C
per Act 164, SLH 2023.

EXHIBIT C

MAUNAKEA STEWARDSHIP AND OVERSIGHT AUTHORITY

“Co-Management Working Group”

The State of Hawai‘i, Legislature promulgated Act 255 signed by the Governor on July 7, 2022 engendering the Maunakea Stewardship and Oversight Authority (hereinafter referred to as the “Authority”). Act 255 provides for a “transition period” of five (5) years beginning July 1, 2023 whereby the Authority is mandated to “jointly manage” the Maunakea lands with the University of Hawai‘i. In order to fulfill and carry out the aforesaid joint management mandate and responsibility, both the Authority and the University of Hawai‘i, Board of Regents have agreed to the formation of an operational management working group (hereinafter referred to as the “Co-Management Working Group”).

It is intended that the Co-Management Working Group, during the aforesaid transitional period, jointly manage the operational and management issues pertaining to the Maunakea lands, and that it be terminated on or by July 1, 2028 or extended for a period not exceeding one (1) year therefrom if deemed necessary to complete its responsibilities. The responsibilities of the Co-Management Working Group will initially include the establishment of procedures, protocols, and systems to receive and handle various types of operational and management issues in a manner consistent with Act 255. The Co-Management Working Group will then be responsible to take any necessary action to handle the operational and management matters coming before it consistent with the purpose and intent of Act 255. Pursuant to Act 255, the day-to-day operation of the Maunakea lands will be carried out by the Center for Maunakea Stewardship as directed by the Co-Management Working Group.

The Co-Management Working Group will be structurally and functionally established as follows:

- A. The Co-Management Working Group will be composed of the following members and invitees:
 1. University of Hawai‘i – The Chair of the Board of Regents or its designee and one (1) additional member of the Board of Regents;
 2. Authority – The Chair of the Authority or its designee and one (1) additional member of the Authority;
 3. From time to time and when deemed appropriate by the members of the Co-Management Working Group, invite the Director of the State Department Land and Natural Resources or its designee; and
 4. The Co-Management Working Group may also invite third parties, consultants or staff to assist in the conduct of its work.
- B. The Co-Management Working Group will have the authority to perform the following functions:
 1. To establish categories or a hierarchy of operational/management issues in which a joint decision is required by both the University of

- Hawai‘i and the Authority, including any third parties deemed necessary by the Co-Management Working Group;
2. To establish categories or a hierarchy of operational/management issues which can be decided and carried out solely by the Co-Management Working Group; provided that such decisions shall be reported to the Authority and University of Hawai‘i governing bodies;
 3. To establish categories or a hierarchy of operational/management issues which can be carried out solely by either the University of Hawai‘i or the Authority;
 4. To investigate and analyze the operational and management issues presented;
 5. To make recommendations to the Authority and University of Hawai‘i as to a course of action or alternatives deemed appropriate in accord with the above protocol;
 6. To issue notices, communications or information, which are deemed necessary and prudent, including but not limited to, providing guidance and input to the University of Hawai‘i and Authority on community engagement and outreach;
 7. To establish clear and timely communication and messaging to existing staff and employees of the Center for Maunakea Stewardship on any issue which may affect their position, employment role and function during the transition period and beyond;
 8. To establish protocols of working with the various advisory groups and boards which serve Maunakea, including but not limited to, Maunakea Management Board, Kahu Ku Mauna, Environment Committee, Mauna Kea Support Services Oversight Committee, etc.;
 9. To provide input and direction on the fiscal and budgetary matters affecting the management of Maunakea, including the Center for Maunakea Stewardship;
 10. To implement any decision of the Co-Management Working Group;
and
 11. To perform any and all other actions necessary to carry out the purposes stated herein and consistent with Act 255.

EXHIBIT D

FY2024 Operating Expenditure Plan

		Executive Assistant Start Date on 8-21-23 Days	7-1-23 thru 7-31-23 31	8-01-23 thru 8-20-23 20	8-21-23 thru 9-30-23 11	10-1-23 thru 12-31-23 30	Total 92
				51		41	92
				Quarter			
	<u>Total Estimated Authorized Amounts</u>		<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>Total</u>
Personnel Services							
Executive Assistant	\$ 68,556.00		\$ 7,638.03	\$ 17,139.00	\$ 17,139.00	\$ 17,139.00	\$ 59,055.03
Executive Director	\$ 160,000.00		N/A	\$ 40,000.00	\$ 40,000.00	\$ 40,000.00	\$ 120,000.00
Project Director	\$ 140,000.00		N/A	\$ 35,000.00	\$ 35,000.00	\$ 35,000.00	\$ 105,000.00
Administrative Services Officer	\$ 110,000.00		N/A	\$ 27,500.00	\$ 27,500.00	\$ 27,500.00	\$ 82,500.00
Program Specialist	\$ 70,000.00		N/A	\$ 17,500.00	\$ 17,500.00	\$ 17,500.00	\$ 52,500.00
Program Specialist	\$ 70,000.00		N/A	\$ 17,500.00	\$ 17,500.00	\$ 17,500.00	\$ 52,500.00
Total Estimated Payroll	\$ 618,556.00		\$ 7,638.03	\$ 154,639.00	\$ 154,639.00	\$ 154,639.00	\$ 471,555.03
Other Current Expenses							
Strategic & Organizational Consultant	\$ 2,000,000.00			\$ 330,000.00	\$ 500,000.00	\$ 500,000.00	\$ 1,330,000.00
Lease Rent at \$36 - \$42 per square foot	\$ 39.00	2,000	\$ 9,750.00	\$ 19,500.00	\$ 19,500.00	\$ 19,500.00	\$ 68,250.00
Office Supplies	\$ 80,000.00			\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 60,000.00
Travel & Per Diem	\$ 30,000.00	120	\$ 4,000.00	\$ 7,500.00	\$ 7,500.00	\$ 7,500.00	\$ 26,500.00
Training & Professional Development	\$ 30,000.00		\$ 2,000.00	\$ 7,500.00	\$ 7,500.00	\$ 7,500.00	\$ 24,500.00
Communications Consultant	\$ 1,000,000.00				\$ 250,000.00	\$ 250,000.00	\$ 500,000.00
Furniture and Equipment	\$ 400,000.00		\$ 25,000.00	\$ 100,000.00	\$ 100,000.00	\$ 100,000.00	\$ 325,000.00
Shared Operational Activities	\$ 4,000,000.00			\$ 1,000,000.00	\$ 1,000,000.00	\$ 1,000,000.00	\$ 3,000,000.00
Repairs and Maintenance	\$ 900,000.00			\$ 225,000.00	\$ 225,000.00	\$ 225,000.00	\$ 675,000.00
Other	\$ 20,000.00		\$ 2,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 17,000.00
Capital Improvements	\$ 3,000,000.00				\$ 750,000.00	\$ 750,000.00	\$ 1,500,000.00
Total Other Current Expenses	\$ 11,460,039.00		\$ 42,750.00	\$ 1,714,500.00	\$ 2,884,500.00	\$ 2,884,500.00	\$ 7,526,250.00
Total Estimated Payroll & Other Current Expenses	\$ 12,078,595.00		\$ 50,388.03	\$ 1,869,139.00	\$ 3,039,139.00	\$ 3,039,139.00	\$ 7,997,805.03

EXHIBIT E

University of Hawai'i – Comprehensive Management Plan General Objectives and Controls

The University of Hawai'i and Center for Maunakea Stewardship (CMS) developed and implemented the Comprehensive Management Plan that provides guidance, protections, and controls over the activities and uses on the Mauna Kea lands. Their focus of managing the activities and uses includes some of the following:

- Limit threats to natural resources through management of activities and uses.
- Implement the Maunakea Invasive Species Management Plan.
- Minimize loss of native biodiversity.
- Minimize barriers to species migration.
- Allow, and where possible facilitate, ecosystems to respond to climate change.
- Conduct educational efforts to generate public awareness about the importance of preserving Maunakea's natural resources.
- Protect areas with high biodiversity or unique communities/features from development.
- Establish conditions under which UH would fence areas to keep out feral ungulates.
- Increase native plant density and diversity through an out-planting program.
- Require mitigation measures in plans for new development.
- Conduct habitat rehabilitation projects following unplanned disturbances.
- Plan and conduct habitat restoration activities, as needed.
- Increase communication, networking, and collaborative opportunities that support management and protection of natural resources.
- Follow adaptive management principles when reviewing/updating programs.
- Continue regular long-term monitoring.
- Conduct research to fill knowledge gaps that cannot be addressed through monitoring.
- Maintain geospatial database of natural resources.
- Managing access and parking.
- Maintaining interpretive and compliance personnel (Rangers) on the mauna to educate users, deter violations, and encourage adherence to restrictions.
- Implementing guidelines to reduce impact of recreational hiking and snow play.
- Confining tours and stargazing activities to previously disturbed areas and established parking areas and managing commercial tours.
- Overseeing and providing recommendations concerning the issuance of film permits.

- Ensuring input by CMS staff, Maunakea Management Board, Kahu Ku Mauna, and Environment Committee on all scientific research permits.
- Implement measures to minimize or prevent habitat alteration and disturbance related to:
 - Facilities and land uses.
 - Construction activities.
 - Inspecting facilities compliance with permits, rules, and regulations.
 - Maintaining spill response materials in Ranger staff vehicles.
 - Requiring those entering the UH Management Areas to have educated themselves through the orientation program.
 - Removing trash at the end of each snow play season from areas where snow play has taken place, which will be done in addition to the Rangers' normal trash removal efforts.
 - Maintaining infrastructure in a manner that encourages compliance with rules and limits the potential for adverse impacts to resources.

EXHIBIT F

Summary Report on UH Institute for Astronomy
Maunakea Observing Time in 2022 – 2023



December 2023

Doug Simons
Director, UH Institute for Astronomy



Background

A number of major astronomical observatory complexes have been established at sites around the world. In exchange for site access to build and operate observatories, often the governing entities for those sites receive observing time as a form of compensation for land access. Examples of this include the governments of Chile, Spain, and Hawai'i, all of which receive observing time on observatories they host, through their respective university systems. This allows each of these governments to support robust astronomy research and education programs at vastly reduced cost compared to building and operating entire observatory complexes themselves. In the case of the Maunakea Observatories (MKOs), the replacement cost for the existing observatories exceeds \$1B. The vast majority of the construction and operating costs for the MKOs is provided by Federal research sponsors, including NASA, National Science Foundation, National Research Council (Canada), Centre national de la recherche scientifique (CNRS, France), the National Astronomical Observatory of Japan, etc. Astronomers worldwide are provided observing time, at no charge to researchers, through peer reviewed competitive proposal systems, that are synchronized to occur twice a year. In the US this Federal funding for astronomy research is akin to Federal sponsorship of research in medicine/health (NIH), chemistry, geology, mathematics, etc. After a proprietary period most of the data sourced by the MKOs is stored in public archives. This helps maximize the scientific product of and public access to this valuable resource.

The Hawai'i State astronomy program emerged in 1964 when Governor Burns advanced a vision for Hawai'i predicated on Hawai'i's unique natural resources, among them the pristine, clear and calm air above Maunakea. It was also motivated by the Hawai'i Island community's desire to rebuild and diversify their economy after the 1960 earthquake in Chile left Hilo in ruins through a devastating tsunami. That confluence of events, among other factors, led to Maunakea astronomy today being world leading in its total scientific impact – a metric that gauges the number and quality of peer reviewed research publications. The Hawai'i State government identified the University of Hawai'i as the host for the State's astronomy program, which in turn led to the formation of the UH Institute for Astronomy (IfA) roughly 50 years ago. Today IfA has 34 faculty (26 are MKO users, the rest study solar, theory, etc.), 46 graduate students (31 are MKO users), and 18 postdocs (about a dozen are MKO users). Hawai'i is now recognized internationally as a premier location to conduct astronomical research. The MKOs are an economic aggregator for international funds used to sponsor their operations. They employ ~600 people in what is likely the largest assemblage of STEM jobs on Hawai'i Island.

Through its UH 88 telescope and agreements with non-UH MKOs, the IfA receives the following allocations of observing time on the MKOs -

UH 88	100%
CFHT	15%
IRTF	15%
UKIRT	15%
JCMT	12%
Subaru	15%
Keck 1	10%
Keck 2	15%
Gemini	10%
SMA	15%

Not included on this list are CSO and Hoku Kea (being decommissioned) and VLBA, which operates only as a global interferometer, not standalone on Maunakea for UH access.

Observing Time Allocations – 2022A to 2023B

Observing semesters run from February through July (“A” semester) and August through January (“B” semester). Observing time is awarded to IfA faculty, postdoctoral researchers and graduate students via peer reviewed proposals that are scored by IfA’s Time Allocation Committee (TAC). The TAC is composed of IfA faculty, postdocs and graduate students, with memberships rotating every 3 years. Each semester the TAC submits their evaluations of proposals, based upon scientific merit and technical feasibility, to the IfA Director for final review and execution. The TAC proposal evaluations lead to prioritized lists of observing programs that are awarded observing time, utilizing all of the time available for each MKO. UH Hilo astronomy researchers also receive observing time through this system.

One of the important distinctions of IfA’s program is the diversity of observatory capabilities that are available to IfA researchers. This enables complex and coordinated observations across facilities. For rare events, most or all of the observatories can be used simultaneously to observe an object, using imaging and spectroscopy from ultraviolet to radio wavelengths. This also promotes scientific and technical collaboration across the MKOs and IfA.

Listed in Appendix A are the titles of observing proposals that received observing time by IfA researchers from 2022A to 2023B (4 semesters) on the MKOs. This information is intended to provide visibility into the range of research topics being pursued at IfA via the MKOs. These same researchers also use other ground-based and space-based observatories to conduct comprehensive research often involving large international teams. To be succinct in this report, many details, nuances, and interconnections between the research program titles and other dimensions of IfA research are not covered. For example,

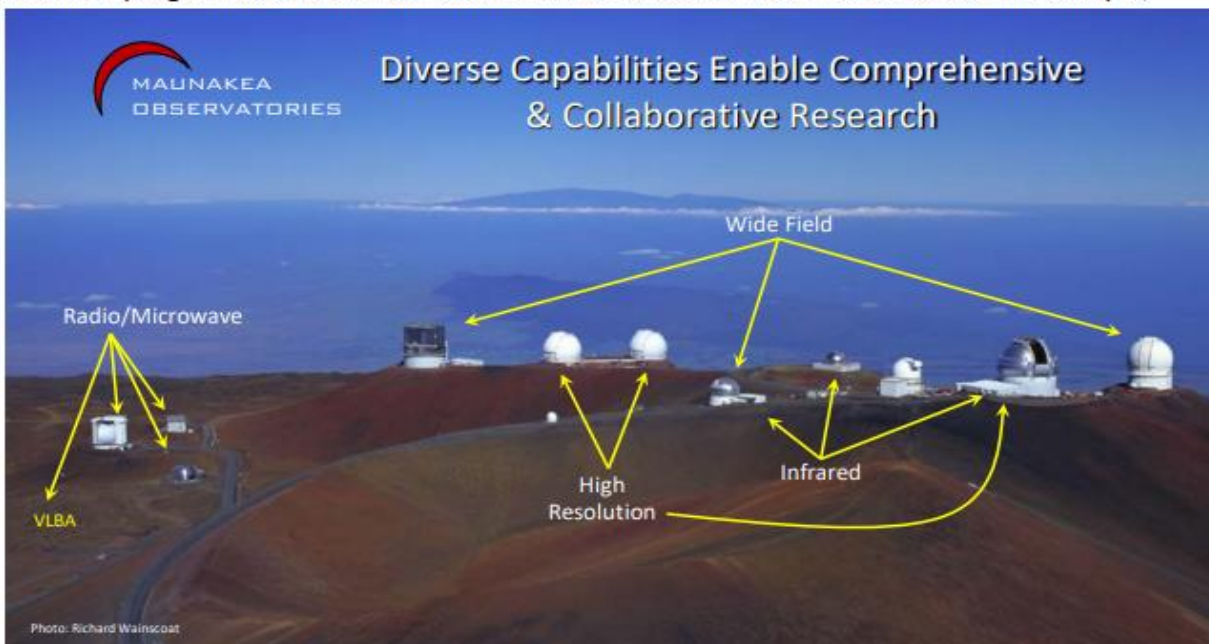


Figure 1 - Over time the MKOs have advanced a range of specialized research capabilities, allowing multifaceted observations of objects from radio to ultraviolet radiation. As an observatory complex, this diversification is one of the most important and unique aspects of the MKOs. Many research programs use multiple observatories to explore the underlying astrophysics of objects.

remarkable coordinated observations occur frequently between the Pan-STARRS telescopes on Haleakalā (operated by IfA), CFHT, and the UH 88 as they collectively are used to support a key NASA funded mission to identify Near Earth Objects (NEOs aka “killer asteroids”). The 1.4B pixel Pan-STARRS cameras are used for the initial discovery of NEOs. Positions of NEOs discovered are then transferred to observers at the UH 88 and CFHT to perform detailed observations that allow their orbits to be measured, determining their status as potential “impactors”. This system of telescopes finds more NEOs than any other observatory complex worldwide. Furthermore a significant fraction of the UH 88 time is dedicated to engineering new technologies, where a new NSF funded robotic adaptive optics system is being installed along with major upgrades to the telescope’s control systems. Similarly, the low number of programs listed for UKIRT is because that telescope has been substantially dedicated to creating an infrared map of the northern sky for the US Naval Observatory. Among the applications for this enormous dataset is calibrating the “Celestial Reference Frame”, an essential positional fiducial system used to support GPS. These “large programs” or surveys require enormous amounts of dedicated observing time but in Appendix A would only appear as a single title.

Key Education and Research Outcomes

In 2022 IfA researchers published a total of 274 refereed papers, of which 88 included MKO data and of those papers, one or more IfA graduate students were coauthors on 30. In other words, in 2022 34% of the papers that included MKO data involved IfA graduate students. In 2023 (through mid-October) IfA researchers published 211 refereed papers, of which 65 used MKO data and of those papers, 19 have one or more IfA graduate students listed as coauthors. Overall, during the 2022-2023 reporting period for this report, IfA researchers publish 458 refereed papers, 153 of which used data from at least one MKO, and IfA graduate students coauthored 49 of those papers. These statistics are captured in Figure 4. Refereed papers that do not directly rely on MKO data are often strategically important since they help enable research collaborations which drive extramural funding generated at IfA (~\$20M annually). Those funds in turn enable graduate student careers at IfA, i.e., it is all interconnected.

Graduate students at IfA serve as Principal Investigators for their observing proposals, and in that sense develop an end-to-end research experience during their graduate studies, from developing a concept for research, through submitting observing proposals, reducing their data, interpreting results, and having it published. As a result of MKO access (about 1/3 of IfA observing time is used by students), IfA graduates have a competitive advantage over their counterparts at other universities and have received [numerous awards](#), including within UH System. For example IfA graduate student Jason Hinkle received this year the Student Excellence in Research Award from the Office of the Vice Chancellor for Research. He has 10 first-authored papers in topics ranging from active galactic nuclei to tidal disruption events in the vicinities of black holes. Jason is also a 2022 ARCS Scholar and has mentored numerous undergraduate REU students and high school students via the Maunakea Scholars program.



Figure 2 – IfA graduate students have received numerous awards for their research. Pictured here is Jason Hinkle, 2023 recipient of the UH Student Excellence in Research Award.

Student access to the Maunakea Observatories is essential to IfA’s mission and extends beyond IfA’s graduate program. High school students across the State also have access to the world’s most powerful collection of observatories through the [Maunakea Scholars](#) program, which is made possible through a partnership between the State Department of Education, University of Hawai’i, and the Maunakea Observatories. Starting as a pilot program in 2016 involving students at Kapolei High and Waikeka High, today nearly a thousand students have participated in the program in schools on Oahu, Lāna’i, Moloka’i, Maui, and Hawai’i Island. This program, the first and only one of its kind in the world, pairs high school students with mentors (mostly graduate students at the UH Institute for Astronomy) to help them design and execute their own research projects using all of the observatories on Maunakea and several on Haleakalā. Through mentoring and collaboration, numerous Maunakea Scholars have gone on to pursue STEM degrees, including astronomy degrees at UH Mānoa and UH Hilo. Spinoff programs include the new Waipahu High School Observatory (principally sponsored by the McNerny Foundation and the only professional grade high school observatory in the State), on-line classes as part of Mānoa Academy, science fair entries leading to scholarships, STEM capstone projects, internships, and more.

Summary

Observing time on the MKOs is fundamental to the success of the State of Hawai’i’s astronomy program. From that key resource stems educational opportunities, scientific prestige and leadership for Hawai’i, hundreds of millions of dollars in extramural funding, advanced technology development programs, broad economic benefit and diversification for our communities, and much more. The IfA’s program helps leverage that resource for multilateral benefits, consistent with the mission of the University of Hawai’i, and the vision of those who inspired Maunakea astronomy decades ago.

UNIVERSITY OF HAWAII NEWS

Aspiring astronomer from Hawai'i Island heads to world's largest HS science fair

UH News • Community • Aspiring astronomer from Hawai'i...

May 5, 2017 • UH News

Designed to help aspiring young astronomers envision their potential to pursue a career in STEM-related fields, the Maunakea Scholars program is sending its first representative from Hawai'i to the International Science and Engineering Fair (ISEF) May 14-19, 2017 in the largest science and engineering fair for high school students in the world.

Ciana-Lei Bence, who is also the first Maunakea Scholar from the Kamehameha Schools Hawai'i Island campus, is mentored by University of Hawai'i Institute for Astronomy Director Doug Simon. She is currently a high school senior and plans to go to college to pursue a PhD in astrophysics. Her ultimate goal is to come back to work in Hawai'i and inspire more community

NEWS

Kamehameha Schools grad wins surprise scholarship

By MICHAEL BRESTOROVICH
Hawaii Times Herald

A Kamehameha Schools Hawai'i senior was surprised Monday with a \$10,000 scholarship to pursue a degree in astrophysics at Yale University.

Ciana Lei Bence, who graduated from Kamehameha Schools this year, is a member of the Maunakea Scholars program, a partnership by the Maunakea Observatories and the state Department of Education that pairs students at participating Hawaii high schools with astronomy mentors to develop research projects and spend time the opportunity to use the Maunakea telescopes to observe space.

"Before, I was interested in photography and art, but perhaps, because I wanted to learn more about where we all came from," Bence said. "But I started to love space and astronomy, because that's where all that started."

Mentored by Doug Simon, the director of the University of Hawai'i Institute for Astronomy, Bence entered the East Hawaii District Science and Engineering Fair last year and won with an ambitious project. "I was investigating the mean-motion resonances of active galactic nuclei," she said. Bence said the "M. M. Keck Observatories to observe a distant quasar in conjunction with a host of archival data from several other facilities. By analyzing the spectroscopy of distant galaxies, Bence hoped to find evidence that would bolster theories for the M-Sigma relation, an observed correlation between the mass of galactic supermassive black holes and the velocity of the stars surrounding them.

On the strength of that project — which even drew praise from the fair's Physics and Astronomy divisions — Bence was invited to participate last month in the International Science and Engineering Fair, the world's largest high school science fair.

In recognition of her achievement, Hilo Rep. Richard Doshi presented Bence a certificate of achievement Monday, calling for a "showing respect of inspiration" for Kamehameha students.

She is now studying Bence with another certificate, the Maunakea Scholar's Hawaii Scholarship, which she said that the Maunakea Scholars program is making it a "lifelong partnership" from this year, and Doshi said he hopes to work with the state Legislature to provide additional funding for the program.

UH Hilo astronomer and astrophysicist Michael Brestorovich was the donor.

Ciana Lei Bence and Hilo Rep. Richard Doshi pose for a photo Monday.

Scholarship, a \$10,000 award for the top performing seniors in the program who are pursuing an astronomy-related college degree.

"It's a testament to the really hard work that Ciana, Bence, Simon said, adding that Bence's special project on cosmological concepts is extraordinary.

Simon suggested that the results of the project could end up being professionally published, as other Maunakea Scholars' work has been.

"She's been working up awards for me," Simon said. "Working published was great."

Bence said she will attend Yale University in the fall as the begin of eventually obtaining a doctorate in astrophysics.

"I'm really excited," Bence said. "I met a lot of cool people when I visited Yale. There's a big Native Hawaiian community there, and other Native American groups. It's a bit of a 'Maunakea' feel. It's a bit of a 'Maunakea' feel."

Figure 3 – Last school year Maunakea Scholar Ciana-Lei Bence from Kamehameha Schools won first place in the Hawai’i Island and State science fairs for her project that used data from Keck Observatory. She went on to compete at the International Science and Engineering Fair, received a \$10,000 scholarship from the Maunakea Scholars program, and is now majoring in astronomy at Yale University.

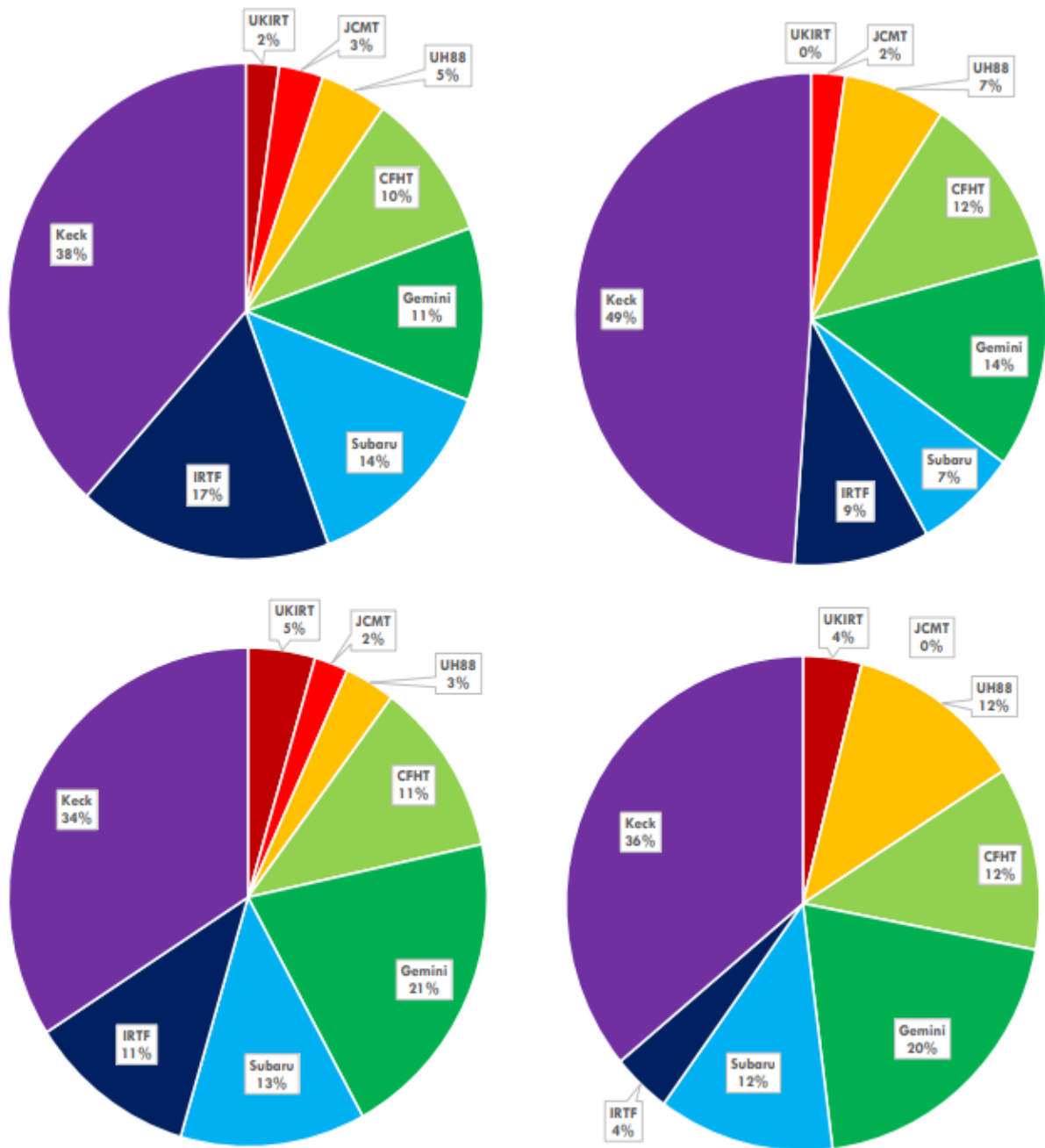


Figure 4 – Top left: MKO data sources for IfA coauthored refereed papers in 2022. Top right: MKO data sources for refereed papers with an IfA graduate student coauthor. Bottom left: MKO data sources for IfA coauthored refereed articles in 2023. Bottom right: MKO data sources for refereed articles with an IfA graduate student coauthor in 2023.

Appendix A

IfA Observing Programs Selected for Execution - Semester 2022A

CFHT

- Rapid follow-up of important solar system discoveries from Pan-STARRS
- Solar system dynamical models: manxes
- Doppler tomography of the inner disk of a T Tauri star
- Extending dynamical masses to the planetary-mass regime
- Completing the CFHT infrared parallax large program
- Observations of near-Earth objects
- The frontiers of galaxy evolution in the North Ecliptic Pole
- Volatile vehicles to past: characterizing the activity of long-period comets
- Hawaii supernova flows: SNe Ia distances
- Confirming the first close-in planet surviving host giant star evolution

Gemini

- 3I-Characterizing the third interstellar object
- Spectral observations of infant supernovae
- The C/O ratio in cool brown dwarfs and free-floating planets
- Probing the progenitors of fast-declining supernovae
- Mind the gap: bridging the radius valley with keystone planets from TESS
- Volatile vehicles to past: characterizing the activity of long-period comets
- Rapid spectroscopic classification and follow-up of faint, fast-evolving transients
- Diversity of rocky planet compositions
- Spectroscopic classification of obscured AGNs at $0.4 < z < 1.1$
- Spectroscopy of strongly lensed arcs pilot program (SSLAPP)

IRTF

- ToO study of young stars with major eruptions
- Eruptions from Young Stars: Following the next outburst from V347 Aurigae
- Transit Spectroscopy of a Nearby Young Exo-Neptune
- Hidden Binaries in the Beta Pictoris Moving Group
- Retrieving Physical Parameters of a Volume-Limited Sample of Brown Dwarfs
- Improving SN Ia IR K-Corrections for Dark Energy, Peculiar Velocities, and the Hubble Constant
- Nuclear Transients Through the Lens of SpeX
- Calibrating Brackett alpha as a protostellar mass accretion tracer
- Determining stellar embryo properties from present day observations of young stars
- SpeX validation of the high abundance of olivine-rich asteroids from Gaia spectra.
- Water in the Moon

JCMT

- Early planet formation in embedded disks
- Developing a sample of faint submm sources and determining their properties
- Rainbow tide: multi-wavelength follow-up of tidal disruption events
- Mapping the magnetic fields in massive star forming regions
- Understanding massive star formation through submm spectral line and contin obs

Keck 1

- TKS²: TESS-Keck stellar spectroscopy
- A uniquely massively star-forming protocluster at $z=3.15$ in the GOODS-N
- The fate of planets orbiting evolved stars
- The orbital dynamics of planets in close binary systems
- Confirming the first close-in planet surviving host giant star evolution
- Investigating the near-IR properties of ASASSN-14ko
- Verifying galaxy overdensities and ionized bubbles at $z=6-8$ in COSMOS
- Spectroscopic observations of exciting ASAS-SN, ATLAS, PS, LIGO transients
- Rainbow tide: multi-wavelength follow-up of tidal disruption events
- Sudden onset of dipper variability: Gaia21bcv
- Diversity of rocky planet compositions
- A redshift survey of candidate extreme starbursts at $z>2$
- Physics of luminous star formation at $z\sim 2$

Keck 2

- Unraveling the perilous lives of planets in binary star systems with Gaia and Keck
- Match made in heaven: white dwarf - M dwarf calibrators for stellar ages
- Target of opportunity observations of novel small bodies
- Probing the epoch of reionization with Lyman Alpha emitters
- Infrared AO survey for the nearest protoplanetary systems
- Extending dynamical masses to the planetary-mass regime
- Analyzing the early Solar system through icy bodies
- The orbital dynamics of planets in close binary systems
- Determining stellar embryo properties from present day observations of young stars
- Spectroscopic observations of exciting ASAS-SN, ATLAS, PS, LIGO transients
- DEIMOS spectroscopy of $z\sim 5$ protoclusters in the H20 fields
- Verifying galaxy overdensities and ionized bubbles at $z=6-8$ in COSMOS
- Understanding SNe Ia through NIR nebular phase spectra
- Measuring the onset of CO formation in core-collapse SNe

SMA

- A uniquely massively star-forming protocluster at $z=3.15$ in the GOODS-N

- Do disks clear out gradually or suddenly?
- Search for sulfur organics in embedded disks in the Taurus molecular region
- Rainbow tide: multi-wavelength follow-up of tidal disruption events
- Physics of extreme star formation at $z \sim 2$

Subaru

- High-contrast spectropolarimetric imaging of protoplanetary disks
- Deep optical polarimetric imaging of planet-forming regions with VAMPIRES
- Mind the gap: bridging the radius valley with keystone planets from TESS
- Hawaii supernova flows: host-galaxy redshifts
- Waterloo Hawaii IFA G-band survey (WHIGS) as part of the UNIONS
- Deep photometric follow-up of the GD-1 stellar stream, as unveiled by Gaia DR2
- Mapping the main body of the Sagittarius dwarf galaxy
- The frontiers of galaxy evolution in the North Ecliptic Pole
- Extreme trans-Neptunian objects
- HSC search for near Earth objects at small solar elongation

UH 88

- Confirmation of Yarkovsky candidate asteroids
- Spectroscopic observations of exciting ASAS-SN, ATLAS, PS, LIGO transients
- Complementary optical spectroscopy for SNe Ia observed in the IR
- Observations of near-Earth objects
- Sudden onset of dipper variability: Gaia21bcv
- Filling the gap: follow-up observations of Pan-STARRS NEO candidates
- Probing the progenitors of fast-declining supernovae
- Hawaii supernova flows: host-galaxy redshifts

UKIRT

- Photometric monitoring of of the highly variable exoplanet analog VHS 1256-1257b
- Sudden onset of dipper variability: Gaia21bcv
- Rainbow tide: multi-wavelength follow-up of tidal disruption events
- Hawaii supernova flows: SNe Ia distances
- Photometric and spectroscopic observations of young stellar objects

IfA Observing Programs Selected for Execution - Semester 2022B

CFHT

- Rapid follow-up of important solar system discoveries from Pan-STARRS
- Observations of near-Earth objects
- Hawai'i supernova flows: SNe Ia distances
- Old clusters for a new spin on M dwarf gyrochronology
- Solar system dynamical models: manxes
- Running out of gas near the end of planet formation
- Volatile vehicles to past: characterizing the activity of long-period comets
- Fossil magnetic fields at the surface of seismically peculiar red giants
- Rapid follow-up of kilonovae and other fast-evolving transients
- Completing the CFHT infrared parallax large program
- From active to inactive magnetic dynamos in pre-main sequence stars
- The frontiers of galaxy evolution in the North ecliptic pole
- CFHT MegaCam imaging of the H20 EDRS deep field

Gemini

- 3I - Characterizing the 3rd interstellar object
- Investigating the diversity of rocky planet compositions (Kepler 100)
- Investigating the diversity of rocky planet compositions (Kepler 407)
- Volatile vehicles to past: characterizing the activity of long-period comets
- Infrared AO survey for the nearest protoplanetary systems
- Rapid follow-up of kilonovae and other fast-evolving transients
- The C/O ratio in cool brown dwarfs and free-floating planets
- Mind the gap: bridging the radius valley with Keystone planets from TESS
- Spectroscopy of lensed arcs pilot program (SLAPP)

IRTF

- Running Out of Gas near the End of Planet Formation
- From active to inactive magnetic dynamos in pre-main-sequence stars
- A SpeX View of Luminous Nuclear Transients
- Spectro-astrometry of the planet-forming regions of circumstellar disks
- Rapid SpeX Follow-up of a New Kilonova
- Improving SN Ia IR K-Corrections for Dark Energy, Peculiar Velocities, and the Hubble Constant
- Near-Infrared Spectral Observations of High Priority Near-Earth Objects
- The Moon's three micron band: Behavior during partial and total eclipse

JCMT

- Developing a sample of faint submm sources and determining their properties
- Direct measurements of envelope evolution in protostars

- Connecting the magnetic field geometry from cores to disks
- Rainbow tide: multi-wavelength follow-up of tidal disruption events

Keck 1

- Spectroscopic observations of exciting ASAS-SN, ATLAS, PS, LIGO trans
- TKS²: TESS-Keck stellar spectroscopy
- Investigating the diversity of rocky planet compositions
- The fate of planets orbiting evolved stars
- Infrared AO survey for the nearest protoplanetary systems
- The architecture and orbital dynamics of transiting S-type planets in close binaries
- Developing a sample of faint submm sources and determining their properties
- Rainbow tide: multi-wavelength follow-up of tidal disruption events
- Identifying binary companions to post-mass-transfer He-burning red giants
- Spectroscopic confirmation of protoclusters at $2 < z < 5.5$ in the H20 fields
- Investigating the spectropolarimetric properties of TDEs

Keck 2

- Spectroscopic observations of exciting ASAS-SN, ATLAS, PS, LIGO trans
- Target of Opportunity observations of novel small bodies
- We have liftoff, JWST is GO (this is about SNe)
- Infrared AO survey for the nearest protoplanetary systems
- Resolving protoplanetary disk kinematics to interpret JWST spectra
- The composition of comet C/2017 K2
- Rotation and multiplicity of Hyades M dwarf stars
- Probing the epoch of reionization with Ly alpha emitters
- The architecture and orbital dynamics of transiting S-type planets in close binaries
- Spectroscopic confirmation of protoclusters at $2 < z < 5.5$ in the H20 fields
- Galaxy clusters: probing formation, growth and interaction of dark and lum matter

SMA

- Developing a sample of faint submm sources and determining their properties
- Resolving disks in the massive protostellar binary W3 IRS5
- Rainbow tide: multi-wavelength follow-up of tidal disruption events
- Finishing up the SMA study of the R Mon/NGC2261 molecular outflow

Subaru

- High-contrast spectropolarimetric imaging of protoplanetary disks
- The architecture and orbital dynamics of transiting S-type planets in close binaries
- Deep optical polarimetric imaging of planet-forming regions with VAMPIRES
- Hawai'i supernova flows: host-galaxy redshifts

- Mind the gap: bridging the radius valley with Keystone planets from TESS
- Uncovering the mystery of missing galaxies in massive high-z protoclusters
- WHIGS as part of the UNIONS survey
- HSC search for near-Earth objects at small solar elongation
- Deep photometric follow-up of the GD-1 stellar stream as unveiled by Gaia DR2
- Extreme trans-Neptunian objects

UH 88

- Spectroscopic observations of exciting ASAS-SN, ATLAS, PS, LIGO trans
- Observations of near-Earth objects
- Hawai'i supernova flows: host-galaxy redshifts
- Filling the gap: follow-up observations of Pan-STARRS NEO candidates
- Complementary optical spectroscopy for SNe Ia observed in the IR

UKIRT

- Hawai'i supernova flows: SNe Ia distances
- Rainbow tide: multi-wavelength follow-up of tidal disruption events
- Near-IR photometric observations of young stellar objects

IfA Observing Programs Selected for Execution - Semester 2023A

CFHT

Rapid follow-up of important solar system discoveries from Pan-STARRS
Observations of Near-Earth objects
Completing the CFHT infrared parallax large program
Extending dynamical masses to the planetary-mass regime
Probing surface activity during the epoch of core-envelope recoupling
Rapid follow-up of kilonovae during LIGO/Virgo/KAGRA 4th obs run and other trans
Confirmation of a magnetic morphology shift in old Sun-like stars
Through a protoplanetary disk, darkly
Cepheids: abundances along the Perseus Arm
Comet interceptor mission: objects on long period comet orbits
Old clusters for a new spin on M dwarf gyrochronology
Velocity anisotropy in two double disrupting clusters: Group-X and Coma Berenices
Hawaii supernova flows

Gemini

3I - Characterizing the 3rd interstellar object
Rapid follow-up of kilonovae during LIGO/Virgo/KAGRA 4th obs run and other trans
Investigating the diversity of rocky planet compositions
Mind the gap: bridging the radius valley with keystone planets from TESS
Comet interceptor mission: objects on long period comet orbits
Rainbow tide: multi-wavelength follow-up of tidal disruption events
Diversity of rocky planet compositions
Short-period comet 96P/Machholz
C/O ratios in brown dwarfs

IRTF

Rapid SpeX Follow-up of a New Kilonova
Time-Series Infrared Spectroscopy of an Inner Protoplanetary Disk
Measuring protostellar mass accretion rates using Brackett lines
Organic Inventory of Protoplanetary Disks
Spectroscopic Survey of Embedded Young Stars in the Serpens Star Forming Region
Surveying the Structure of Massive Protostellar Disks
COncnecting the inner and outer regions of protoplanetary disks
A SpeX View of Nuclear Transients
Early-time NIR Observations of Rising Type Ia Supernovae
Characterization of Small NEOs

JCMT

Direct measurements of envelope evolution in protostars

Sub-mm follow-up of a newly discovered kilonova
Developing a sample of faint submm sources and determining their properties

Keck 1

Spectrosc obs of exciting ASAS-SN, ATLAS, PS, LIGO transients & novel small bodies
Asteroseismology of a K dwarf with the Keck Planet Finder
The architecture and orbital dynamics of transiting S-type planets in close binaries
The fate of planets orbiting evolved stars
The architecture and orbital dynamics of transiting S-type planets in close binaries
The fate of planets orbiting evolved stars
Investigating the diversity of rocky planet compositions
Re-characterization of spectroscopic rotational velocities with EPRV spectroscopy
Confirming GAIA binaries with impossibly small separations
Rossiter-McLaughlin measurements for Kepler-91 B
The metallicity and distance of M 101 from blue supergiants

Keck 2

Spectrosc obs of exciting ASAS-SN, ATLAS, PS, LIGO transients & novel small bodies
The architecture and orbital dynamics of transiting S-type planets in close binaries
Orbits of planet-hosting binaries
COncnecting the inner and outer regions of protoplanetary disks
Resolving protoplanetary disk kinematics to interpret JWST spectra
Extending dynamical masses to the planetary-mass regime
Infrared AO survey for the nearest protoplanetary systems
Probing the epoch of reionization with Lyman Alpha emitters
Spectroscopic confirmation of protoclusters at $2 < z < 5.5$ in the H2O fields
Match made in heaven: white dwarf - M dwarf binaries for calibrated stellar ages
Galaxy clusters: probing formation, growth & interaction of dark and luminous matter
Characterizing the activity of long-period comets

SMA

The chemical composition of gas in the disk-clearing phase of planet formation
Sub-mm follow-up of a newly discovered kilonova
From ratios to reactions: inferring organosulfur chemistry in embedded protostars
A survey of submm flux densities in water megamaser black hole galaxies

Subaru

The architecture and orbital dynamics of transiting S-type planets in close binaries
Deep optical polarimetric imaging of planet-forming regions with VAMPIRES
Uncovering the mystery of missing galaxies in massive high-z protoclusters
Confirming a newly discovered PDS70 analog
Hawaii supernova flows

Imaging of circumstellar disks
The explanation of dipper stars
The frontiers of galaxy evolution in the North Ecliptic Pole
HSC search for near Earth objects at small solar elongation
Extreme trans-Neptunian objects
WHIGS as part of the UNIONS survey
Mapping the main body of the Sagittarius dwarf galaxy

UH 88

Spectrosc obs of exciting ASAS-SN, ATLAS, PS, LIGO transients & novel small bodies
Observations of Near-Earth objects
Filling the gap: follow-up observations of Pan-STARRS NEO candidates
Hawaii supernova flows

UKIRT

Rainbow tide: multi-wavelength follow-up of tidal disruption events
Hawaii supernova flows

IfA Observing Programs Selected for Execution - Semester 2023B

CFHT

Rapid follow-up of kilonovae and other fast-evolving transients
Chemical signatures of planetary engulfment in red giants
Old clusters for a new spin on M dwarf gyrochronology
Investigating the diversity of rocky planet compositions
Comet interceptor mission: objects on long-period comet orbits
Extending dynamical masses to the planetary-mass regime
Observations of near-Earth objects
Rapid follow-up of important solar system discoveries from Pan-STARRS
Confirmation of a magnetic morphology shift in old Sun-like stars
Through a protoplanetary disk, darkly
Cepheids: abundances along the Perseus Arm
While the iron is hot: SN physics in the IR

Gemini

Rapid follow-up of kilonovae and other fast-evolving transients
3I - Characterizing the 3rd interstellar object
Investigating the diversity of rocky planet compositions
Comet interceptor mission: objects on long-period comet orbits
Mind the gap: bridging the radius valley with Keystone planets from TESS
Spectroscopic follow-up of directly imaged substellar companions
The C/O ratio in cool brown dwarfs and free-floating planets
Spectroscopy of high-z lensed quasars
Comet interceptor mission: objects on long-period comet orbits

IRTF

COnecting the inner and outer regions of protoplanetary disks
Rapid SpeX and `Opihi Follow-up of a New Kilonova
Eruptions from Young Stars: Following the next outburst from V347 Aurigae
Expanding the Sample of NIR Changing-Look AGNs with SpeX
Striking while the Iron is Hot: Supernova Physics in the Infrared
Disk winds from embedded protostars
High Resolution Infrared Spectra of Stellar Mergers
Measuring protostellar mass accretion rates using Brackett lines
A ToO study of young stars with major eruptions
Optical-Infrared Spectroscopic Extinction Curves in the Diffuse Interstellar Medium
Star spots physics across the HR diagram.
A Near-Infrared Spectroscopic Survey of Class 0 Protostars
Characterization of Small NEOs
Evaluating the JWST Sun-Shield as a Spectroscopic Calibrator for Solar System Observations

JCMT

JWST and SCUBA-2: a powerful combination for studying submm galaxies

Submm follow-up of a newly discovered kilonova

Lynds 914: a new star-forming filament in Cygnus

Keck 1

Spectroscopic obs of exciting ASAS-SN, ATLAS, PS, LIGO trans + novel small bodies

The fate of planets orbiting evolved stars

JWST and SCUBA-2: a powerful combination for studying submm galaxies

Investigating the diversity of rocky planet compositions

The architecture and orbital dynamics of transiting S-type planets in close binaries

Near-IR spectroscopy of protoclusters at cosmic noon in the H20 fields

Cosmology with H II galaxies: Hubble constant and L-sigma relation at high z

Asteroseismology of the highest-mass Kepler red giant stars

Rotational measurement systematics of rapidly rotating red giants

Keck 2

Spectroscopic obs of exciting ASAS-SN, ATLAS, PS, LIGO trans + novel small bodies

Search for an accreting companion in the inner cavity of HD 34700

IR AO survey for the nearest protoplanetary systems

The Ly alpha morphologies of z=6.6 ultraluminous Ly alpha emitters

Feeding time: spectrosc follow-up of tidal disrupt events + ambig nuclear transients

The architecture and orbital dynamics of transiting S-type planets in close binaries

Resolving protoplanetary disk kinematics to interpret JWST spectra

Extending dynamical masses to the planetary-mass regime

Spectroscopic redshifts of strongly lensed galaxies

Spectroscopic confirmation of protoclusters at $3.5 < z < 5.5$ in the H20 fields

Disk winds from embedded protostars

Probing the epoch of reionization with Ly alpha emitters

SMA

JWST and SCUBA-2: a powerful combination for studying submm galaxies

Submm follow-up of a newly discovered kilonova

Disks in the binary massive YSO W3 IRS5

EGS.0006

Subaru

Spectroscopic obs of exciting ASAS-SN, ATLAS, PS, LIGO trans + novel small bodies

High-resolution polarimetric imaging of debris disks

Deep visible polarimetric imaging of planet-forming regions with VAMPIRES

Search for an accreting companion in the inner cavity of HD 34700

The architecture and orbital dynamics of transiting S-type planets in close binaries
High-contrast spectropolarimetric imaging of protoplanetary disks
Mind the gap: bridging the radius valley with Keystone planets from TESS
Uncovering the mystery of missing galaxies in massive high-z protoclusters
Spectroscopic follow-up of directly imaged substellar companions
Cosmology with H II galaxies: Hubble constant and L-sigma relation at high z
Finalizing H2O imaging in Euclid Deep Field Fornax
The frontiers of galaxy evolution in the North ecliptic pole
Extreme trans-Neptunian objects
HSC search for near-Earth objects at small solar elongation

UH 88

Spectroscopic obs of exciting ASAS-SN, ATLAS, PS, LIGO trans + novel small bodies
Observations of near-Earth objects
The mass accretion rates of disk-bearing M dwarfs
Optical-IR spectroscopic extinction curves in the diffuse interstellar medium
Filling the gap: follow-up observations of Pan-STARRS NEO candidates
Building a sub-percent calibrated spectrophotometric stellar library with SNIFS
While the iron is hot: SN physics in the IR

UKIRT

While the iron is hot: SN physics in the IR

EXHIBIT G

UNIVERSITY OF HAWAI‘I SYSTEM ANNUAL REPORT



REPORT TO THE 2024 LEGISLATURE

Annual Report on the Mauna Kea Lands

HRS 304A-1905

December 2023

REPORT TO THE THIRTY-SECOND LEGISLATURE
STATE OF HAWAII
2024 REGULAR SESSION

ANNUAL REPORT ON THE MAUNA KEA LANDS

Pursuant to Hawai'i Revised Statutes (HRS) § 304A-1905, "Mauna Kea Lands; reporting requirements," the University of Hawai'i (UH) respectfully submits its report on (1) Maunakea lands activities; (2) current and pending lease agreements and fees; (3) the status of current and pending administrative rules; (4) income and expenditures of the Mauna Kea lands management special fund established in HRS § 304A-2170; and (5) other issues that may impact the activities on the Mauna Kea lands. Consistent with past practice, this report covers the fiscal year 2023 (FY23), which started on July 1, 2022, and ended on June 30, 2023, but may also include matters and data outside FY23 where relevant.

I. Current and Pending Lease Agreements and Fees

In 1964 the Hawai'i State Legislature passed Senate Concurrent Resolution 16 (SCR 16) stating that the "State of Hawaii and its citizenry are most desirous and willing to co-operate and aid in the promotion of our nation's space program and research to the benefit of the County of Hawaii, the state and the nation." It was resolved that the governor set aside and establish an appropriate area on the summit of Maunakea for the installation and operation of telescope observatory and astronomical activities. In fulfillment of SCR 16, the Mauna Kea Science Reserve (MKSR) was established in 1968, and the Board of Land and Natural Resources (BLNR) and UH entered into an agency-to-agency lease granting UH a lease of the Science Reserve for a term expiring on December 31, 2033 (MKSR General Lease). The lease is gratis, a common practice for leases between government agencies and one that supports the goal of benefiting the County of Hawai'i, the State, and the Nation.

Also in 1964, Governor John A. Burns recognized that Hawai'i has ". . . some obvious natural advantages in this area of scientific research, [and that Hawai'i] must capitalize on these, utilizing all our available resources at the University, in the industrial community and at the levels of State and local government." He also emphasized that Hawai'i is not "constrained by these physical advantages." "We can acquire competence in any field of scientific inquiry," and "[t]he limitations are only those we impose on ourselves." (Honolulu Advertiser, August 7, 1964).

Governor Burns understood the demand for manual labor in agriculture would decrease over time, and that future jobs would require technicians and scientists. The development of a research enterprise would provide jobs of the future. The two areas Governor Burns felt the state should pursue were in the fields of oceanography and astronomy, areas in which the State of Hawai'i unquestionably excels.

In a State-supported effort to establish astronomy as a viable research endeavor and establish Hawai'i as a center for astronomical research, UH entered into subleases with 11 organizations to operate astronomical observatories. BLNR approved all subleases, which are co-terminus with the MKSR General Lease. Each sublessee is obligated to provide a guaranteed percentage of viewing time to UH. Viewing time provides invaluable advantages for advancing UH, Hawai'i's only State-funded institution of higher education, as a center for excellence in research, including astronomy.

At little cost and risk to the State, UH is recognized as one of the Nation's leading astronomical research institutions and globally as the center of excellence for astronomical research. This recognition contributes significantly to the State's efforts to expand its high-technology sector. The annual economic impact of astronomy in the State in 2019 was \$220.95 million (\$261.33 million in 2022 dollars (CPI-U)), with the largest impacts found on Hawai'i Island and Honolulu, \$101.68 million (\$120.26 million in 2022 dollars (CPI-U adjusted)) and \$86.96 million (\$102.85 million in 2022 dollars (CPI-U adjusted)), respectively. Additional benefits accrue to the State and local communities through opportunities in scientific, professional, technical, and administrative employment within the local community.

In preparation for seeking a new land authorization (e.g., a new general lease from the BLNR beyond 2033), UH updated the "Mauna Kea Science Reserve Master Plan," adopted by the UH Board of Regents (BOR) in 2000, and the "Mauna Kea Comprehensive Management Plan," adopted by the BLNR in 2009 (collectively, the Plans). The effort to update the Plans involved significant community and stakeholder input. UH's new master plan, E O Nā Leo: Listen to the Voices, was adopted by the Board of Regents in January 2022, and the updated Mauna Kea Comprehensive Management Plan, Comprehensive Management Plan 2022 Supplement, was approved by the BLNR in July 2022. Among other things, the Plans integrate management actions that strive for a renewed balance across the cultural, natural, educational, and recreational values Maunakea provides the State. The Plans also address decommissioning commitments UH has made and the replacement of the University of Hawai'i Hilo's educational telescope from the summit to the mid-level facilities at Halepōhaku.

In 2018, UH began preparing an environmental impact statement (EIS) for UH's proposed new land authorization to continue astronomy on Maunakea. Prior to the 2022 Legislative Session the House of Representatives established the Maunakea Working Group to recommend alternative governance structures for the future management of Maunakea. The purpose was to replace UH as the responsible entity for managing the Mauna Kea Science Reserve, Hale Pōhaku, and the roadway easement connecting Hale Pōhaku and the Mauna Kea Science Reserve. After considering the Working Group's recommendation, HB 2024 was introduced which eventually resulted in Act 255 which was signed into law by Governor Ige in June 2022.

Act 255 establishes the Mauna Kea Stewardship and Oversight Authority (MKSOA) comprised of eleven voting Board members. Act 255 sets a five-year transition period ending July 1, 2028. During the transition period, UH and MKSOA will "jointly manage" certain aspects of Maunakea while MKSOA is formally organized and prepares to assume all legal and operational responsibilities currently under UH management (e.g., UH's two general leases, grant of easement, and all conservation district Use Permits (CDUPs) held by UH for third party non-UH astronomy facilities and buildings, vendor contracts, liabilities, etc.). Act 255 also grants MKSOA certain land disposition responsibilities currently under the jurisdiction of the BLNR and appropriated \$14M for MKSOA start-up.

Act 255 prohibits new leases on Maunakea until after the transition period ends and leases are taken over by MKSOA. Consequently, all UH work on the EIS, new land authorizations from BLNR, and new real property sub-agreements with Maunakea observatories have stopped. As reiterated in Act 255, the two astronomy facility decommissioning projects already underway for the Caltech Submillimeter Observatory (CSO) and UH Hilo's Hōkū Ke'a teaching telescope are progressing to completion.

A. Thirty Meter Telescope (TMT) Sublease

On September 27, 2017, the BLNR issued its 271-page Findings of Fact, Conclusions of Law and Decision and Order containing 1,070 Findings of Fact and 512 Conclusions of Law, for the CDUP allowing the construction and operation of TMT. On October 30, 2018, the Hawai'i Supreme Court affirmed the CDUP after various parties appealed. The process for obtaining the CDUP approval took approximately seven years from the permit application's initial submission in 2010, including two contested cases, several judicial appeals, and two Hawai'i Supreme Court decisions. Parties continue to challenge the TMT project, for example, in cases before BLNR, the State Land Use Commission, and Hawai'i's circuit and appeals courts.

Unlike the other existing observatory subleases, which provide for nominal rent in exchange for viewing time and sublessee contributions to shared operations, maintenance, and stewardship of Maunakea, the TMT International Observatory (TIO) sublease provides for substantial lease rent payments. Pursuant to TIO's sublease, annual lease rent starts at \$300,000. The lease rent schedule is phased, with increases based on construction activity. Full annual lease rent payments of \$1,080,000 a year will begin in FY 2025. In FY23 TMT paid \$846,996 in lease rent and, to date, \$4,282,254 has been paid. These payments are deposited into the Mauna Kea lands management special fund as the legislature directed in 2009 Hawai'i Session Laws Act 132 (codified at HRS § 304A-2170). In addition, as a result of UH's negotiations, TIO committed \$1 million per year in donations to community benefits, primarily by advancing STEM education on Hawai'i Island, and a similar amount to a workforce pipeline initiative as operations become imminent to maximize employment opportunities for residents. To date, TIO has contributed \$5.5 million dollars to the THINK fund and at least \$25,000 to programs that assist at risk youth, specifically focusing on the children of incarcerated parents. TIO is currently waiting on National Science Foundation (NSF) funding. NSF initiated a Section 106 consultation process as part of their review of TIO's application for funding. This process, conducted by NSF, involved months of pre-consultation meetings with the community and in 2022 three public meetings held on Hawai'i Island. NSF is still in the process of reviewing comments submitted during the public comment period. NSF has not set a date for issuing its report.

B. New Maunakea Observatory (MKO) Agreements

In FY21 discussions with MKO Directors commenced regarding new agreements post-2033 which is when their current subleases terminate. Those discussions continued into FY22 and covered various terms including rent, stewardship fees, community benefits, shared use and maintenance costs, and property or use rights. The goal of these negotiations was to have an agreed-upon set of terms by the end of 2022. The process for developing these new agreements included discussions with the community.

Consistent with Act 255, in addition to stopping UH work on a new general lease from BLNR, UH has halted all work on new MKO agreements. Act 255 states that the MKSOA "shall develop a management plan," and that the management plan shall, among other things, "[p]repare for and establish the framework, criteria, and procedures for any leases and permits."

II. Administrative Rules

Hawai'i Administrative Rules Chapter 20-26, "Public and Commercial Activities on Mauna Kea Lands," was adopted by the BOR on November 6, 2019, and approved by Governor David Ige on January 13, 2020 (MK Rules). UH has no pending administrative rules amendments related to Maunakea at this time. BOR's adoption of the administrative rules are being challenged by opponents in *Flores-Case 'Ohana v. University of Haw.*, No. SCRQ-22-0000118.

The focus in FY23 was on continuing the implementation of the Comprehensive Management Plan (CMP) and MK Rules. This work included staff training, developing administrative systems, improving signage, revamping employee and visitor orientation, improving education at the Visitor Information Station (VIS), and updating the Rangers' operating procedures. This work also included key hires and recruitment to fill recent vacancies and positions established based on the reorganization of Maunakea management approved by the BOR on August 20, 2020.

One example of new procedures implemented through the Ranger program as a result of the MK Rules was instituting brake temperature checks for all vehicles descending the mauna. This procedure was the result of a Ranger recommendation after a serious vehicle accident and fatality on January 1, 2022 due to brake failure. All vehicles found to have elevated brake temperatures upon descent are directed to the parking area at the Visitor Information Station to allow their brakes to cool. Our most recent data for the first quarter of FY24 found 13% of descending vehicles to have brake temperatures in excess of 300 degrees which is the threshold used to indicate an elevated risk for brake failure. Since implementing these temperature checks, there has been one reported vehicle accident (March 2022) due to brake failure and no vehicle-related fatalities.

Act 255 repeals the MK Rules after the transition period, and grants the MKSOA authority to develop its own administrative rules.

III. Income and Expenditures of the Mauna Kea Lands Management Special Fund (HRS § 304A-2170)

Income and expenditures during the reporting period remained affected by the effects of the operational and travel restrictions due to the COVID-19 pandemic though not as significant as the previous year. During FY 2023, \$173,690 in fees were collected from commercial tour operators, \$400 in fees collected from film permit applicants, \$846,996 in lease fee payments from TMT, \$975,938 carryover from FY 2022, and \$28,001 in interest for a total of \$2,025,025. A total of \$601,646 was used to help defray the cost to operate the Maunakea Ranger program, VIS, and road, facility, and infrastructure maintenance expenses.

Total payments of \$207,276 were made to the Office of Hawaiian Affairs (OHA) in FY 2023, as follows: \$9,658 (FY 2022 4th Quarter payment) and \$197,618 (total of 1st thru 3rd Quarter payments). A payment for \$6,599 for 4th Quarter 2023 was paid to OHA following the start of FY 2024.

HRS § 304A-1905 requires reporting in this annual report of "income and expenditures of the Mauna Kea Lands Management Special Fund established in HRS § 304A-2170". However, it is important to note that the Mauna Kea Lands Management Special Fund comprises a small fraction of the revenue required to fund the overall direct costs to UH for the management and stewardship of Mauna Kea. In FY23, the Mauna Kea Lands Management Special Fund was used to cover 31% of UH's direct management costs.. The remaining 89% was covered by a combination of UH tuition, fees, and research funds. In addition to management expenses, and as part of its stewardship responsibilities, UH has also funded planning,

permitting, and legal expenses needed to ensure compliance with conservation district rules and lease requirements. In recent years, these costs have ranged between \$500,000-\$1.2M annually. Act 255 repeals the Mauna Kea lands management special fund on July 1, 2028 with any remaining balance being transferred to the new Mauna Kea management special fund established thereunder. UH's direct costs for management, stewardship, planning, permitting, litigation, and compliance will need to be replaced by MKSOA through other funding sources.

IV. Maunakea Lands Activities and Other Activities

A. Commercial Tour Operations

Nine commercial tour operator permits were transferred from State of Hawai'i Department of Land and Natural Resources (DLNR) to UH in 2005. Two operators have gone out of business and seven operator permits remain active. With the pandemic, only six have been operating; the seventh planned to restart in 2022 but has not done so yet. That permittee continues to pay their monthly minimum payment to keep their permit active. Each commercial tour operator is charged a \$6.00/tour passenger fee, which is submitted to the Center for Maunakea Stewardship (CMS) (formerly the Office of Maunakea Management (OMKM)) every month. All fees are deposited into the Mauna Kea Lands Management Special Fund and are used to cover management and stewardship activities on Maunakea. Twenty percent of the fees collected are set aside for payment to OHA. In FY23 a total of \$173,690 was collected from commercial tour operators.

The COVID-19 pandemic significantly impacted commercial tour operators, demonstrating the risks of an overreliance on this revenue stream. With the easing of COVID and travel restrictions, commercial tour passenger numbers have increased but not to pre-pandemic levels. UH has engaged in outreach to individual commercial tour operators to seek their input on fee increases and permitting requirements. While working to bring existing permits into compliance with the new MK Rules, UH is also considering additional options for managing visitor access, including concessions, a shuttle system, and new permit requirements. UH will continue work on updating commercial tour permits as required by the MK Rules.

To support the assessment of permit fees and the evaluation of alternative managed access options, UH contracted with the UH at Mānoa School of Travel Industry Management (TIM) to conduct a visitor and operator survey to better understand the relationship between demand, fee acceptance, and capacity. Completion of this study was impacted by COVID-19 which resulted in significantly reduced commercial tour demand and overall visitor traffic to Maunakea. Partial conclusions were submitted on a new fee structure, but in light of Act 255, the scope of the remainder of this work is being re-evaluated since commercial activities and access management will fall under the purview of MKSOA after the transition period.

B. Decommissioning

Pursuant to the CDUP for the TMT project, the BLNR imposed special conditions regarding the decommissioning of telescopes on Maunakea, including the following:

Special Condition 10. The University will decommission three telescopes permanently, as soon as reasonably possible, and no new observatories will be constructed on those sites. This commitment will be legally binding on the University and shall be included in any lease renewal or extension proposed by the University for Mauna Kea.

Special Condition 11. Notwithstanding any lease renewal or extension, consistent with the Decommissioning Plan, at least two additional facilities will be permanently decommissioned by December 31, 2033, including the Very Long Baseline Array antenna and at least one additional observatory.

Related to decommissioning, on November 6, 2019, the BOR adopted Resolution 19-03, "Resolution to Act on Items Relating to Maunakea Management" (later revised in part by BOR Reso. 21-02)(BOR Reso. 19-03). Accordingly, a schedule to decommission CSO and Hōkū Ke'a by December 31, 2021, was presented to the BOR. This presentation including the schedule is available at <http://go.hawaii.edu/Fp3>. This schedule has been updated due to COVID-19 and permitting delays with the new projected timelines discussed below.

BOR Reso. 19-03 established a December 30, 2025 deadline to determine which three additional telescopes will be decommissioned in compliance with existing or future permits or governmental approvals. UH began discussions with sublessees to prepare a framework for decision-making for public comment and review as part of the Plans update process. However, these discussions between UH and sublessees has stopped per the passage of Act 255, which will transfer the CDUP for TMT to MKSOA in 2028 after the transition period. UH Plans will also no longer be applicable after the transition period, wherein UH committed to nine (9) operating astronomy facilities on Maunakea after decommissioning conditions had been met. Important to note here is that subleases are co-terminus with the MKSR General Lease, which expires in 2033. The subleases and MKSR General Lease all provide provisions for the removal or transfer of ownership of astronomy facilities on Maunakea on or before 2033.

The CSO and Hōkū Ke'a facilities are currently undergoing the decommissioning process as both projects had commenced prior to the passage of Act 255. Both CSO and Hōkū Ke'a issued a Notice of Intent to decommission in 2015 and have been coordinating and consulting with UH and DLNR in the preparation of their permitting requirements and environmental assessments under HRS Chapter 343 to address impacts associated with removal and restoration activities.

CSO's environmental assessment (EA) was accepted, and their CDUP was approved, in FY 22 by the BLNR. Currently, the telescope and its support structure, and all internal structures, fixtures and furnishings have been removed. CSO has halted work for the 2023-24 winter season and plans to commence with the remaining facility deconstruction in the Spring 2024. Decommissioning and removal is estimated to be completed by September 2024.

UH Hilo submitted the Hōkū Kea CDUA to DLNR in August 2022. The BLNR approved the CDUP on April 14, 2023. County permits have been secured and contractor bids have been solicited with selection projected to occur in December 2023. Due to the impending winter season, issuance of a Notice to Proceed is anticipated for March 2024 with facility demolition to be completed by October 2024.

In addition to CSO and Hōkū Ke‘a, finding of fact 171 of the TMT CDUP issued for TMT identified the United Kingdom Infrared Telescope (UKIRT) for decommissioning by the time the TMT project becomes operational, and the BLNR identified the Very Long Baseline Array (VLBA) for decommissioning in Special Condition 11 of the same CDUP.. Act 255 contemplates the transfer all CDUPs issued to UH for astronomy facilities owned by third parties, like TMT, to MKSOA. Act 255 also directs MKSOA to develop a framework for future astronomy development on Maunakea, as codified under HRS § 195H-6:

(d) The authority shall be responsible for the establishment of a framework for astronomy-related development on Mauna Kea. The framework may include: (1) Limitations on the number of observatories and astronomy-related facilities, or an astronomy facility footprint limitation; (2) Prioritizing the reuse of footprints of observatories that are scheduled for decommissioning, or have been decommissioned, as sites for facilities or improvements over the use of undeveloped lands for such purposes; and (3) A set of principles for returning the lands used for astronomy research to their natural state whenever observatories are decommissioned or no longer have research or educational value.

Consequently, the MKSOA will need to determine the future status of these permit conditions.

C. Cesspool Removal

In FYs 22 and 23 UH completed the process of closing two cesspools that were not in service and replacing two others with zero discharge waste systems. All four served UH-owned facilities. Notifications have been provided to the appropriate regulating agencies.

D. Center for Maunakea Stewardship: Internal Restructuring Plan

At its August 20, 2020 meeting, the BOR considered and adopted agenda item VI.B, “Approval of Revised Internal Restructuring Plan for Management Operations of Maunakea Lands (continued from May 21, 2020).” The proposed plan is a requirement of BOR Reso. 19-03, paragraph 8, which provides that the “purpose of the plan is to improve operations and management and make it more efficient, effective, and transparent.” Outreach was a key element of BOR Reso. 19-03, paragraph 8.

Among other things, the restructuring included the creation of CMS, which coordinates all activities on land managed by UH on Maunakea with direct reporting to the UH Hilo chancellor. The restructuring also provides more direct input from cultural, community, and stakeholder advisory groups. Details of the “Center for Maunakea Stewardship: Internal Restructuring Plan for Management Operations of Maunakea Lands,” are posted online at <http://go.hawaii.edu/3zF>.

In December 2021, the UH BOR directed UH Internal Audit to review the status of the reorganization and establishment of CMS. The objective of this audit project was to evaluate the status of the Restructuring Plan in addition to the status of Corrective Actions to address recommendations included in historical audit reports by Internal Audit (September 2018) and the State Auditor (most recent dated July 2017). Internal Audit released its report in April 2022 stating that “Internal Audit believes that the reorganized and restructured management of Maunakea is more streamlined and provides a better reporting structure when compared to the historical convoluted structure. Based on the work performed, Internal Audit believes CMS has either completed or is in the process of meeting the Restructuring Plan’s objectives. Interviews with leaders of the various advisory groups support Internal

Audit's conclusions. In addition, Internal Audit has determined that all recommendations noted in historical State Auditor and Internal Audit reports have been properly addressed and/or implemented." The report of Internal Audit is posted online at <https://go.hawaii.edu/9Jk>.

E. Collaborative Stewardship in Maunakea Governance

At its April 16, 2020 meeting, the BOR considered agenda item V.C, "Status Update on Items Relating to Maunakea Management Pursuant to Board of Regents Resolution 19-03 (Discussion Only)." The BOR was presented with alternative governance models to fulfill the requirements of BOR Reso. 19-03, Paragraph 9, which asks "whether the management of the Maunakea Science Reserve (MKSr) would be better served if transferred to a governmental authority or other third-party entity, or through alternate management mechanisms."

A number of existing management models used by other state agencies and private organizations that manage large tracts of land with diverse and complex land management issues were reviewed. Land managers were asked about the benefits and challenges of working under various land management structures. Five models were developed: Attached State Agency Model, BLNR Management Model, Third-Party Model, Collaborative Stewardship Model, and Collaborative Stewardship within UH Model. These models are more fully discussed in the presentation to BOR available online at <http://go.hawaii.edu/3zb>.

UH's preference was for Model 4A identified in the review (Collaborative Stewardship within UH). This model could be implemented without legislation, minimizes the complications arising from HRS Chapter 171 provisions governing disposition of public lands, and leaves only the summit area and Hale Pōhaku under direct UH management in full collaboration with stakeholders. Supporting this preference was the understanding that if the world-class astronomy envisioned in the 1960s by the state, Hawai'i County, and UH leaders is still one of the key objectives for Maunakea, UH must play an active role not only in astronomy but other educational opportunities that the unique cultural and natural attributes of Maunakea provide. The BOR took no action on this matter and noted that a change to a completely new model would require action by state entities outside UH.

UH's analysis and offers to consult were made available to the Maunakea Working Group formed by the Legislature to develop a recommendation for an alternative governance model.. In addition, upon passage of Act 255 in FY23 this information was made available to the MKSOA. MKSOA board composition as established by Act 255 parallels Model 4A with the exception that instead of implementation occurring within UH, a new state agency was created attached to DLNR. Many of the start-up tasks and challenges identified in UH's analysis for Model 4A appear to be relevant for MKSOA, which has been provided to MKSOA.

F. MKSOA Transition

In FY23 UH provided temporary administrative support to MKSOA to facilitate their start-up as a new body corporate and a public instrumentality of the state, placed within DLNR for administrative purposes. These services included board and logistical coordination, and staff training for MKSOA's sole employee. Currently, UH provides office space for MKSOA's employee who is located at the 'Imiloa Astronomy Center of Hawai'i ('Imiloa Center) on the UH Hilo campus.

In addition to this administrative support, UH, through the CMS, has provided the MKSOA board with comprehensive reviews covering all UH plans, policies, leases, finances, operations, and other matters for which MKSOA assumes responsibility in July 2028. The purpose of these reviews was to educate MKSOA board members on the basic management functions they will assume responsibility for so they have a basis for developing their management plans, policies, administrative rules, and programs. In total, UH has conducted/hosted nine (9) orientation sessions and site visits for the MKSOA board since January 2023. UH will conduct as many additional sessions on topics of interest as needed.

To facilitate and ensure open and ongoing communications with the MKSOA board, the CMS Executive Director meets weekly with the MKSOA Chair on a variety of strategic and operational matters. This will continue until MKSOA hires their own Executive Director at which time it is assumed that management-to-management level coordination will commence consistent with the governance role of the MKSOA board. In addition, the CMS Executive Director provides regular operational updates to the MKSOA board at their monthly board meetings. This is intended to keep the MKSOA board apprised of current issues and general matters UH is addressing on a day-to-day basis in UH's management role and which are likely to recur when MKSOA assumes management responsibility in July 2028.

CMS is working on a comprehensive list of items that need to be transferred from UH to the MKSOA under Section 9 of Act 255. A substantial portion of these items was identified and listed in a letter from CMS to the BLNR chair and MKSOA chair on August 1, 2023. This letter was posted by the DLNR Office of Conservation and Coastal Lands on its Maunakea Management website, at <https://dlnr.hawaii.gov/occl/maunakea-management/>.

G. Stewardship

In accordance with the CMP, UH's resource management team completed several priority management actions in FY23 as required under the plan. This included annual monitoring surveys of 100 cultural sites, arthropod monitoring of 115 sites, removal of 13,200 pounds of invasive plants through our volunteer programs (engaging 130 community members) and staff efforts, outplanting of 286 native plants, and 119 vehicle inspections for invasive species. A highlight of UH's resource management team's stewardship efforts this year was development of the 'ahinahina (Silversword) propagation and outplanting program in partnership with the DLNR Division of Forestry and Wildlife (DOFAW). In part due to the success of this program, CMS successfully secured and entered into a research agreement with DOFAW to assist with their stewardship of the 'ahinahina enclosure located adjacent to UH managed lands at the VIS. This partnership greatly supports DOFAW's monitoring and stewardship responsibilities for the preserve and supports a more holistic stewardship program for that area by providing CMS access to a nearby outplanting site.

H. Education and Outreach

During FY22, work on a new training and orientation video and materials for employees, contractors, and vendors was completed that replaced the previous training that had been in place since 2009. In FY 23, work focused on refining the online system. Also in FY23, CMS redescribed and filled an Education and Outreach position that had been vacant due to the uncertainty surrounding passage of Act 255. Given the five-year transition period with MKSOA, UH decided to move forward with filling this important function. Under the leadership of CMS's new coordinator, a new and updated education and outreach program is under development. The program has three (3) areas of focus: exploration,

conservation, and community with a priority on developing collaborative partnerships with UH programs, the State of Hawai'i Department of Education (DOE), and other community organizations. A key initial step in preparing for plan implementation is staff development with a particular focus on natural and cultural resource education and training in cultural protocols.

In FY 23, CMS completed the remodeling of the VIS to prepare for new exhibits that are being developed in consultation with the 'Imiloa Center.. Temporary educational exhibits occupy the space while exhibit development continues. CMS has developed and installed new educational signage at the VIS covering Maunakea's cultural history, natural resources, astronomy, and the administrative rules. These exhibits are intended to help educate and foster visitor awareness about Maunakea's cultural heritage, natural environment, and astronomical inquiry while informing the public about safety and permitted activities.