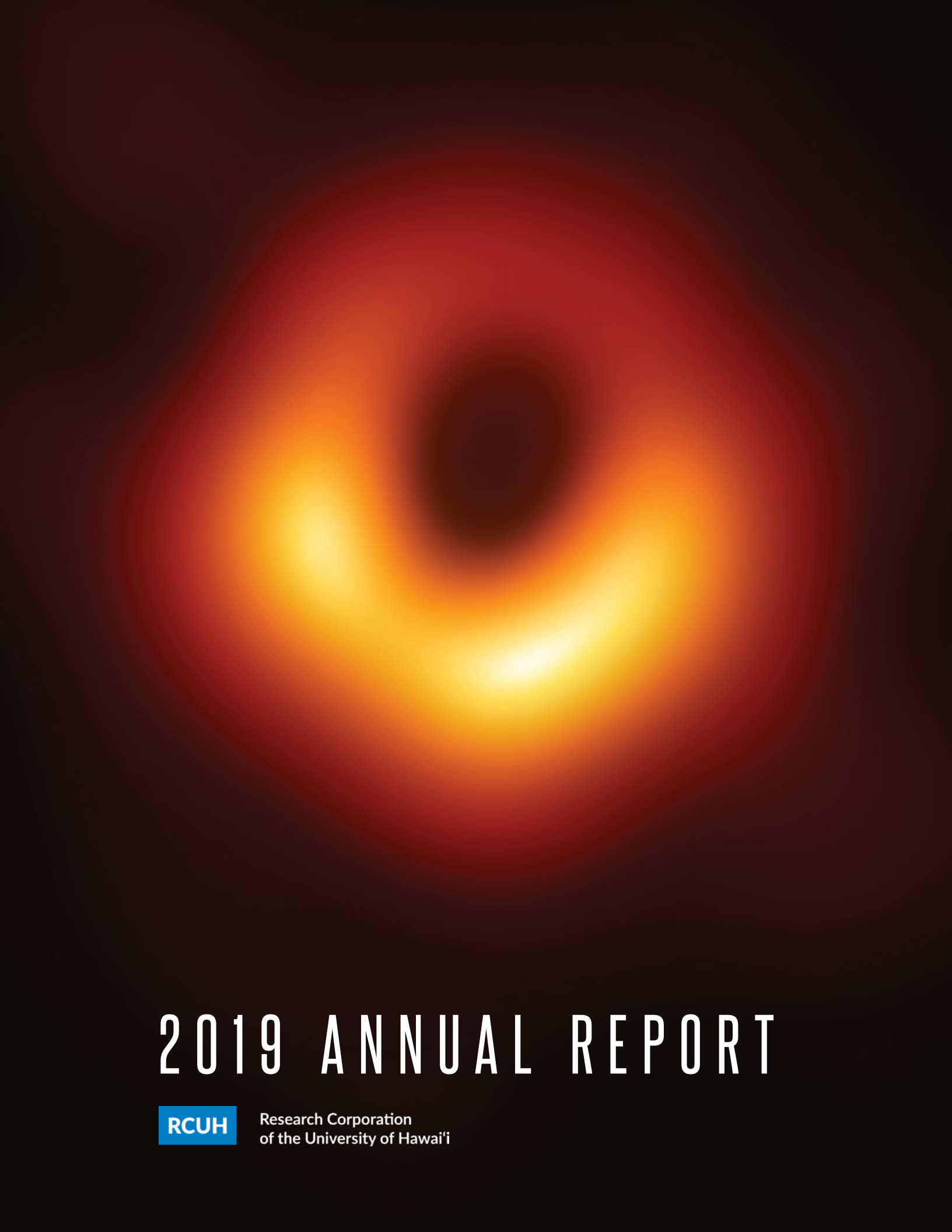


2019 ANNUAL REPORT

RCUH Research Corporation of the University of Hawai'i

WELCOME



Sylvia Yuen, Ph.D.
Executive Director



Donna Ikeda
Board Chair

2019 was a remarkable year, replete with many notable achievements by the Research Corporation of the University of Hawai'i (RCUH) and its projects. Leading the way were scientists from the Academia Sinica Institute of Astronomy & Astrophysics and East Asian Observatory who joined 347 of their colleagues around the world to capture the first-ever image of a black hole, which graces the cover of this report. Read about their work—considered one of the biggest space discoveries of the past decade—and the outstanding accomplishments of other researchers and their staff, which are featured on pages 9–15.

The RCUH annual reports provide the opportunity to celebrate the people who contribute to advancing our mission to support and enhance research, development, and training in Hawai'i, with a focus on the University of Hawai'i. These important people certainly include RCUH's core staff, whose daily work makes it possible to deliver "rapid and efficient financial and human resources services, which enable more productivity to meet research and training objectives," observed Marla Berry, a principal investigator at the UH John A. Burns School of Medicine. Data relating to these business transactions are presented in the following pages, along with the results of RCUH's investments in technology and staff professional development, which provide new services to our clients more efficiently and cost-effectively. Information relating to RCUH's financial and personnel status is for the July 2018–June 2019 fiscal year, while the program reports are for the calendar year. Worthy of note is that the reviews of external auditors indicate, once again, that RCUH is operating without any major weaknesses.

We acknowledge and thank the RCUH Board of Directors for their support and guidance, and recognize its new chair, Donna Ikeda. She's the third woman to assume that position since RCUH was established in 1965. We hope you find this report interesting and inspiring. It is also posted at www.rcuh.com.

ABOUT RCUH

The Research Corporation of the University of Hawai'i (RCUH) was established by the Hawai'i State Legislature in 1965 as a public instrumentality and is attached to the University of Hawai'i for administrative purposes.

To fulfill its mission, RCUH is exempt from certain state procurement and personnel laws. This allows RCUH to provide rapid and efficient financial and human resources services that enable its clients to be more productive and to meet their research, development, and training objectives in a timely manner.

OUR VISION

A Hawai'i where research, development, and training flourish and energize a prosperous state economy.

OUR MISSION

To support and enhance research, development, and training in Hawai'i, with a focus on the University of Hawai'i.

RCUH BOARD OF DIRECTORS

The affairs of the Research Corporation of the University of Hawai'i are under the general management and control of its eight-member Board of Directors.



Donna Ikeda
Chair



Michael Maberry
Vice Chair



Eugene Bal III



David Duffy



Kelli Goodin



Randolph Moore



Raynard Soon

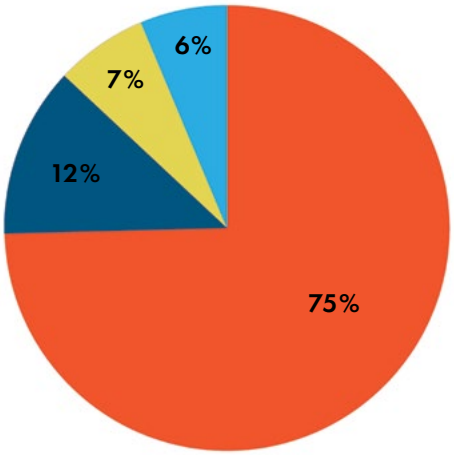


Vassilis Syrmos

FINANCIAL & HR REPORT

VOLUME OF BUSINESS BY PROJECT TYPE

Total Volume of Business: $263,221,027



UH EXTRAMURAL PROJECTS ($196,349,191)

Externally sponsored federal and non-federal contracts, grants, and other agreements.

UH REVOLVING PROJECTS ($32,562,946)

Self-sustaining, income-generating projects established to support a specialized service activity, a recharge center, or other sales and service activities.

DIRECT PROJECTS ($17,683,134)

Projects assigned to and accepted by RCUH from non-UH organizations, including federal and state agencies, international organizations, and other not-for-profit organizations.

UH INTRAMURAL PROJECTS ($16,625,756)

Internally sponsored programs or activities funded with UH Research and Training Revolving Funds (RTRF) or Tuition and Fee Special Funds (TFSF).

PROJECTS BY COUNTY



HONOLULU COUNTY
No. of projects: 5,955
No. of employees: 1,576
Vol. of business: $219,066,597



HAWAI'I COUNTY
No. of projects: 349
No. of employees: 612
Vol. of business: $28,246,499



MAUI COUNTY
No. of projects: 116
No. of employees: 293
Vol. of business: $15,246,245

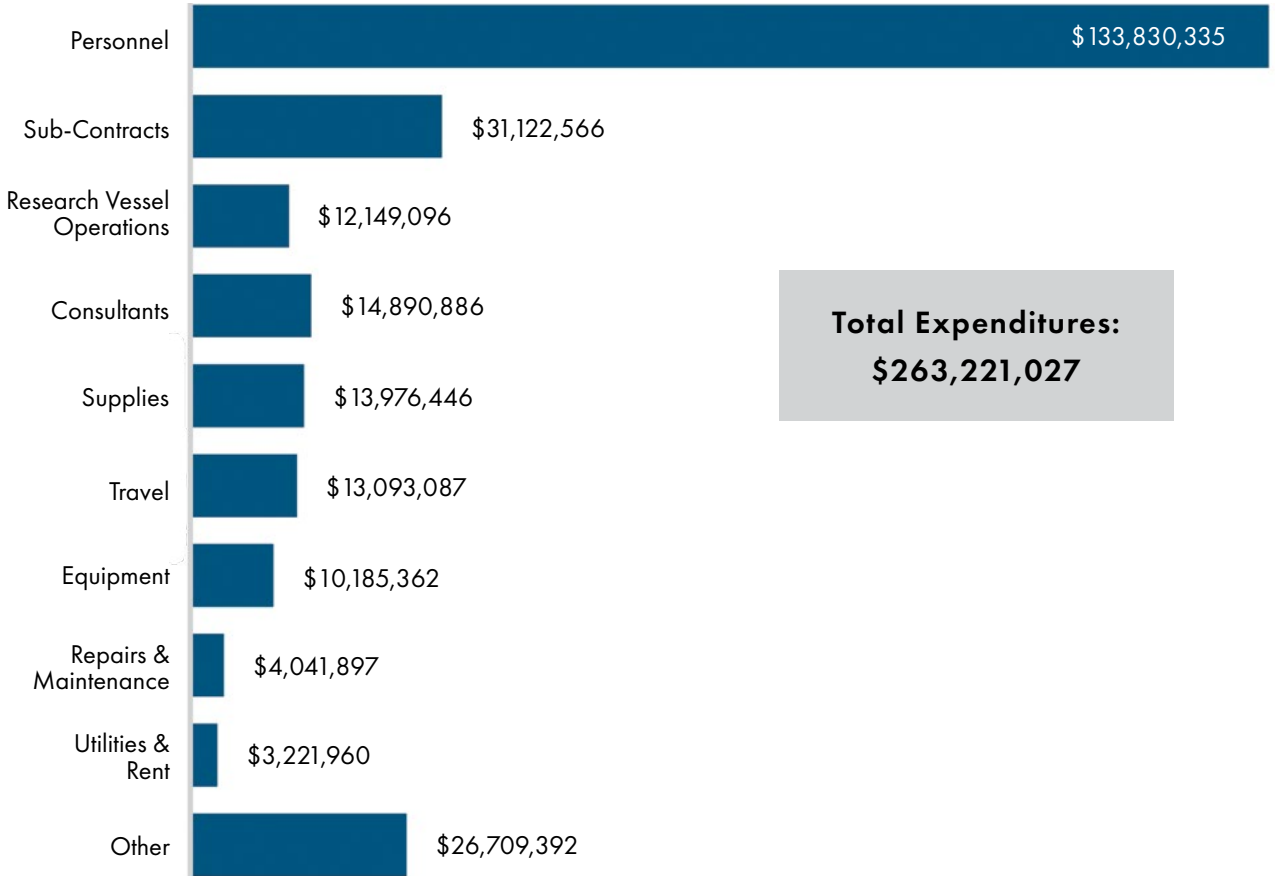


KAUA'I COUNTY
No. of projects: 12
No. of employees: 69
Vol. of business: $661,686

STATEWIDE
No. of projects: 6,432
No. of employees: 2,550
Vol. of business: $263,221,027

OTHER (Continental U.S. + International)
No. of employees: 91

FINANCIAL EXPENDITURES



Total Expenditures: $263,221,027

FY 19 TRANSACTIONS

TRANSACTIONS	NUMBER
Timesheets	55,612
Vendor payments	48,743
Non-PO payments	29,326
Purchase orders	14,919
Travel requests/completions	17,905
Cash receipts	10,313
W-2s issued*	3,429
Terminations	1,398
New hires	1,439

*Data based on calendar year as required by state (HIOSH) and federal (FMLA and IRS) regulations

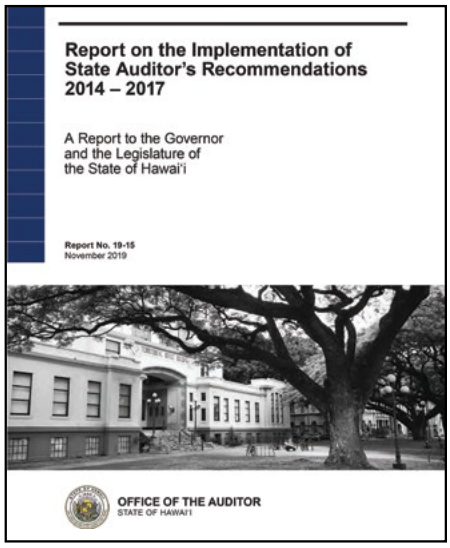
> *"RCUH's thorough and efficient financial and HR services enable our team to be more productive to meet our research and operations objectives. We could not help all of our varied stakeholders and partners without the support of RCUH."*
>
> - Melissa Iwamoto, PacIOOS Director

HIGHLIGHTS OF ACHIEVEMENTS

POSITIVE EXTERNAL EVALUATIONS

HAWAIʻI STATE AUDITOR

The *Report on the Implementation of State Auditor's Recommendations 2014–2017* was released in November 2019 and presented its follow-up reviews of State department and agencies' implementation of audit recommendations.



The post-audit of transactions, accounts, programs, and performance found that of the 13 units reviewed, RCUH was the only one in which 100% or all of the State Auditor's recommendations had been implemented. The 11 recommendations focused on the need for a strategic plan; performance reporting policies and procedures; a training program for board members; a more defined process to review, approve, and monitor projects; and other issues.

OFFICE OF NAVAL RESEARCH (ONR)

The Office of Naval Research, Department of the Navy, reviewed the adequacy of UH's contractor purchasing system to ensure federal compliance and to minimize risk to the federal government. RCUH is considered a significant part of the aforementioned system, as most of the UH's federally funded extramural projects are service-ordered to RCUH. The review determined that the UH's purchasing system, including RCUH's financial portal, is adequate and approved for operation through October 16, 2022.

SAFETY INSPECTION

The Hawai'i Occupational Safety & Health Division (HIOSH) of the Department of Labor and Industrial Relations conducted an unannounced inspection of RCUH offices at the Mānoa Innovation Center. After a review of its physical facilities, policies and procedures, emergency and training plans, and interviews with staff and the Executive Director, no citations were issued to RCUH.

FINANCIAL AUDIT

As in the previous six years, the external audit of RCUH's finances by certified public accountants indicated there were no findings of material weakness. See the last section of this report for the FY 2019 audit by Accuity LLP.

CLIENT EVALUATIONS

RCUH invited project principal investigators, coordinators, and fiscal administrators to participate in a confidential survey, to which over 365 individuals responded. Below are their responses to the following questions (choices were very satisfied, satisfied, fair, dissatisfied, and very dissatisfied):

How satisfied are you with RCUH as a whole?

- Very satisfied/satisfied: 80%

Would you recommend RCUH services to others?

- Yes: 89%

What three words would you use to describe RCUH? The most frequently mentioned words were:

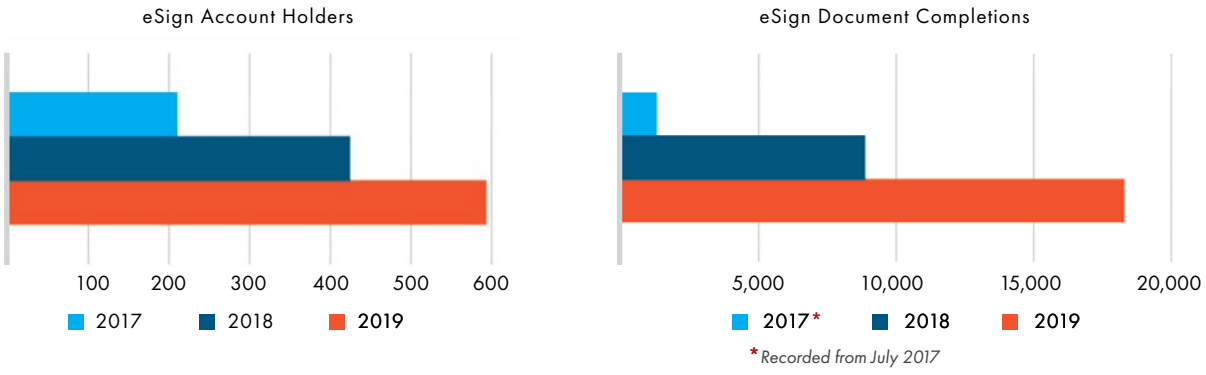
- Helpful, Efficient, Professional

ENHANCED SERVICES AND COMMUNICATIONS

eSIGN

The number of eSign account holders increased from 210 when the service was launched in 2017 to 594 two years later, a 183% increase. The number of transactions processed using eSign has also increased significantly during that period. Implemented in collaboration with the State of Hawai'i Office of Enterprise Technology Services, eSign allows users to route documents electronically, eliminating the need for printing/scanning/delivery of paper versions, which results in greater efficiency and time-savings. In 2019, 18,281 documents were eSigned and signatures were obtained on average in less than two hours.

Growth in eSign



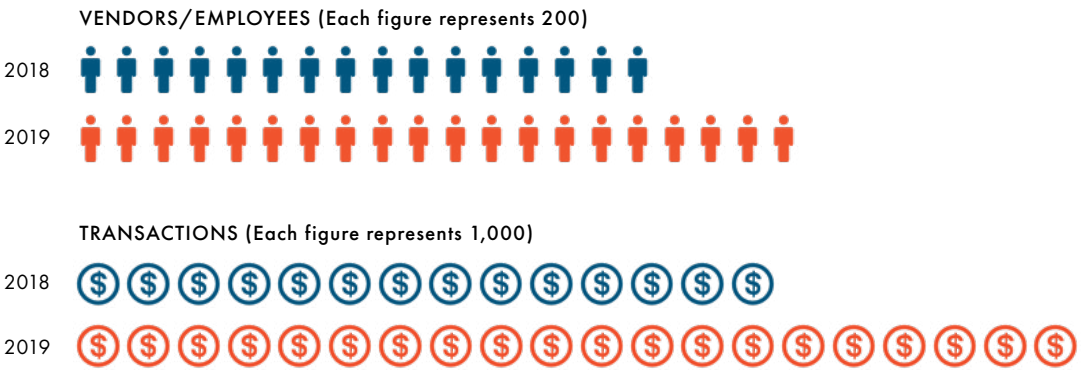
eTIMESHEETS

RCUH will switch from paper timesheets to an electronic system in early 2020, and actions are being taken to ensure a seamless transition. The eTimesheets will be pre-filled, function-rich, and logic-based. The system will be compliant with wage and hour laws and meet sponsor requirements. It will also be able to handle all personnel status changes and be accessible to employees throughout the world. Training sessions and pilot tests of the eTimesheets were conducted with the RCUH core staff and the staff of four pilot projects in late 2019. A user guide was developed and will be available on the launch dates and posted on the RCUH website.

ePAYMENTS

Electronic payments eliminate the printing and delivery of paper checks and reduce or remove the problems related to those transactions, such as lost checks. Implemented in 2018 with 3,154 vendors and employees, and 14,048 ePayment transactions, the program has grown to 3,964 vendors and employees, and19,537 transactions—increases of 26% and 39%, respectively.

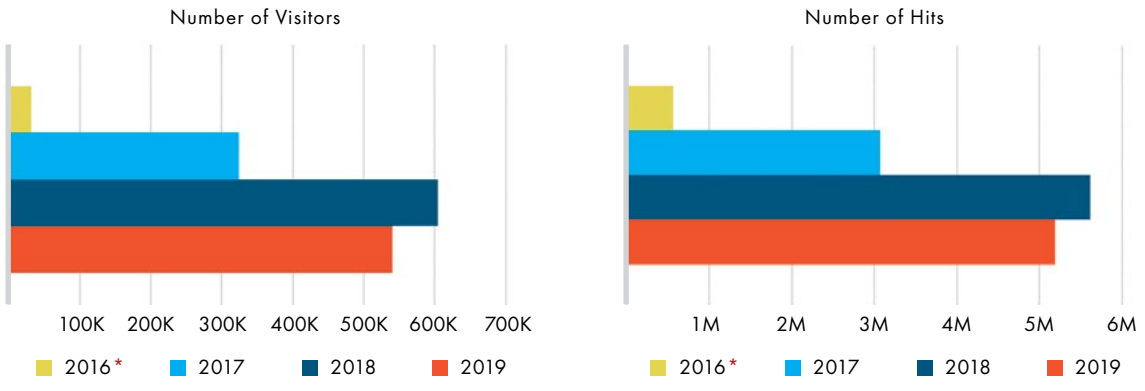
Growth in ePayments



WEBSITE

In 2016 when the RCUH website was redesigned, there were 31,209 visitors and 566,768 hits to the website. Although both declined in the past year, there were significant increases in both visitors (540,315) and hits (5.2 million) in 2019 compared to 2017.

Website Growth



Recorded from Oct. 2016

ANNUAL AWARDS LUNCHEON

More than 130 people gathered at the Waialae Country Club on October 28 to honor 29 outstanding employees from 11 projects at RCUH's annual awards luncheon. All nominees received $50 ($25 each for team nominees), first-place awardees received $1,000, and second-place awardees received $500 (team members shared the monetary awards equally). Videos of the nominees and their projects were shown at the awards luncheon and are posted on the RCUH website.

RCUH FORUM

The annual RCUH forum was held at UH Mānoa and live-streamed throughout Hawai'i. *View from the Hill: A Conversation with U.S. Senator Brian Schatz* provided valuable insights on Washington's evolving landscape and priorities, and the funding implications for Hawai'i and the University. A forum report was developed and is posted on the RCUH website. A smaller group of community members, UH administrators, and faculty of major contracts and grants met after the forum to participate in a discussion with panelists on *Federal Funding Priorities: Where Do I Fit In*?

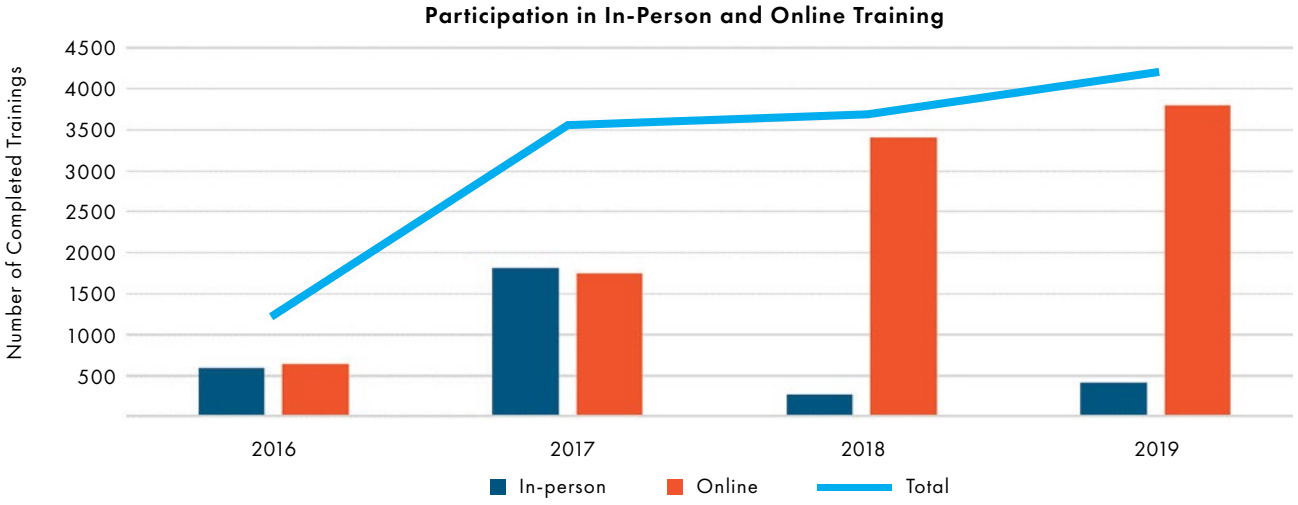




> ***"Sen. Brian Schatz provided information appropriate for a high-level discussion regarding federal funding priorities. The attendees were among the most engaged research administrators, which allowed for a productive conversation regarding federal funding."***
>
> - RCUH Forum Participant

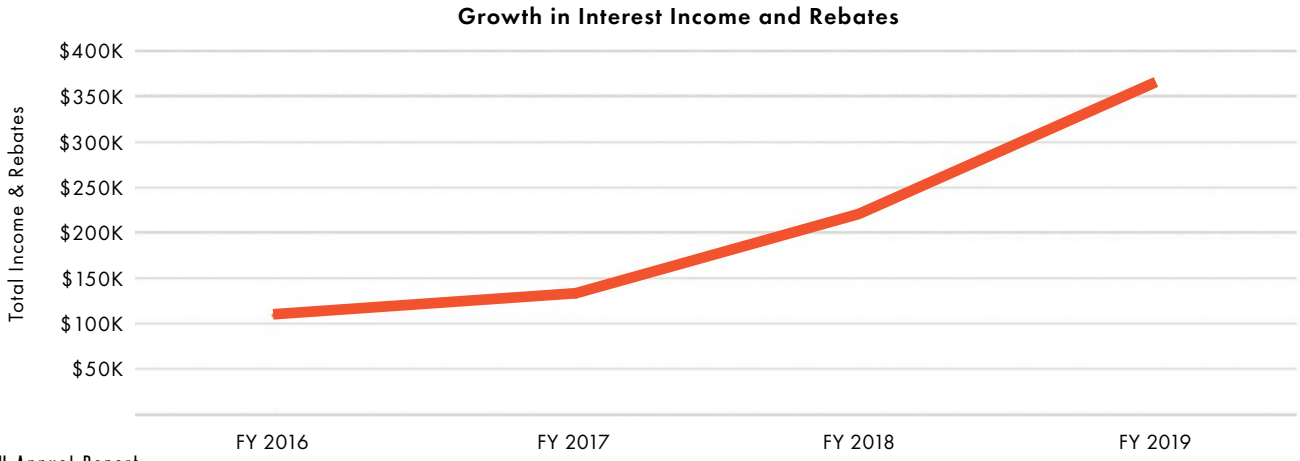
EXPANDED TRAINING OPPORTUNITIES

Four in-person trainings were provided to project staff: Active Shooter, Annual Performance Evaluations, Understanding and Coping with Cumulative Stress, and eTimesheets. Since 2016, RCUH has focused its efforts on online training to reach more employees cost-effectively, in geographically dispersed locations, and at times convenient to them. There are now 325 courses available in the training portal: 20 developed by RCUH and 305 commercially produced. As a result, the total number of people participating in RCUH training has increased substantially, from 1,240 in 2016 to 4,203 in 2019, an increase of 239%.



GROWTH IN REVENUE

RCUH does not receive any appropriated funds from the Hawai'i State Legislature. Its operations are supported from fees charged for services. While RCUH has a low risk tolerance for loss of invested funds, it seeks to maximize investment returns to the fullest extent possible on a year-to-year basis through cash equivalents and fixed income securities while maintaining liquidity to satisfy operating cash requirements, projects, and capital needs. It is vigilant in seeking revenue sources that meet the aforementioned requirement in order to meet budgetary requirements while keeping service fees low. Total interest and other income have shown steady growth since 2016.



PROJECT SPOTLIGHTS



MEC STUDIES ETHNIC DIFFERENCES IN CANCER

Between 1993 and 1996, the Multiethnic Cohort Study (MEC) recruited over 215,000 men and women from Hawai'i and California to create the most ethnically diverse epidemiologic study in the world that investigates the roles of lifestyle, diet, and genetics in cancer and other chronic diseases. Participants (aged 45–75 years) are primarily comprised of five ethnic groups: Japanese Americans, Native Hawaiians, African Americans, Latinos, and Caucasians.

The UH Cancer Center, in collaboration with the University of Southern California Keck School of Medicine, is conducting the study to examine diet and lifestyle factors among these five ethnic groups to identify why they have different risks of developing cancer. At the start of the study, individuals completed a 26-page questionnaire about their dietary habits and lifestyle, as well as their medical history. MEC followed the cohort over time for the incidence of cancer and every five years sends participants a follow-up questionnaire, which 70% of individuals complete. Using these updated responses, MEC researchers have published more than 650 scientific journal articles on various subjects, including the following:

- smoking and alcohol,
- diet and obesity,
- genetics and hormones,
- and many others.

Some of the findings are these:

- coffee may help us live longer,
- overconsumption of processed/grilled meat may be linked to higher risks of colorectal cancer,
- alcohol consumption, even in low amounts, increases breast cancer risk,
- the cancer risk associated with obesity varies among ethnic groups, and
- the risk of lung cancer due to smoking is greater in Native Hawaiians and African Americans compared to other ethnic groups.

Funded by the National Cancer Institute, MEC has brought more than $150 million in federal research funding to the University of Hawai'i. In September 2018, the UH Cancer Center celebrated MEC's 25th anniversary, which was an opportunity to thank participants for their long-term commitment to the study and for small-group discussions on a number of cancer-related issues.

Faye Nagamine, MEC research project manager, said, "After participating in the study for 25 years, it's apparent that the MEC participants share the same vision as MEC researchers in wanting to make a contribution to the goal of correcting cancer health disparities and preventing cancer and other chronic diseases."

Photo courtesy UH Cancer Center



SHARING THE SPIRIT OF DISCOVERY THROUGH ASTRONOMY



EAO operates the James Clerk Maxwell Telescope, the largest single-dish telescope operating in submillimeter wavelengths. Photo courtesy EAO/JCMT



ASIAA completed the Greenland Telescope in 2017 and joined the Event Horizon Telescope in April 2018. Photo courtesy ASIAA



Students learned from Hawaiian cultural practitioners during a two-day retreat for the A Hua He Inoa initiative. Photo courtesy ʻImiloa Astronomy Center

Ancient Hawaiians looked to the skies to navigate thousands of miles across the Pacific Ocean. They didn't rely on any man-made instruments or charts on these voyages, but rather the rising and setting points of stars along the horizon. The spirit of these early astronomers endures on the summits of Maunakea, Mauna Loa, and Haleakalā, where researchers continue to look to the heavens for answers.

RCUH works with several observatories on Hawai'i Island, including East Asian Observatory (EAO) and the Academia Sinica Institute of Astronomy & Astrophysics (ASIAA). These two institutions experienced a remarkable achievement in 2019 as members of the Event Horizon Telescope (EHT), an international consortium of telescopes that captured the first image of a black hole. To achieve this feat, 60 institutions and more than 200 researchers synchronized eight radio telescopes around the world and targeted a supermassive black hole 53 million light years away. Together, they effectively created a collection dish as large as the Earth itself with unprecedented sensitivity and resolution.

ASIAA's Submillimeter Array (a joint project with the Smithsonian Institution) and EAO's James Clerk Maxwell Telescope contributed to this groundbreaking discovery and earned a share of the 2019 Breakthrough Prize in Fundamental Physics. The honor equates to the "Oscars of Science," and nearly 350 EHT researchers received a portion of the $3 million prize.

"That simple, doughnut-shaped image of M87 is a consequence of about 200 astronomers' efforts. There's no doubt that this announcement is the climax of our career," said Dr. Ming-Tang Chen, ASIAA's deputy director for Hawai'i Operations. ASIAA will be contributing to future EHT studies with its new Greenland Telescope. It is currently the only submillimeter wave astronomical observation station in the Arctic Circle and will substantially increase EHT's sensitivity.

Upon capturing the first image of a black hole, EAO deputy director Dr. Jessica Dempsey, along with other Maunakea astronomers, reached out to Dr. Larry Kimura, a Hawaiian language professor at the University of Hawai'i at Hilo, for help with a name. Dr. Kimura received national attention after christening it Pōwehi, "the adorned fathomless dark creation." He drew inspiration from the *Kumulipo*, a centuries-old Hawaiian chant about creation.

"To have the privilege of giving a Hawaiian name to the very first scientific confirmation of a black hole is very meaningful to me and my Hawaiian lineage that comes from pō, and I hope we are able to continue naming future black holes from Hawai'i astronomy according to the *Kumulipo*," Kimura said in a news release. Dr. Kimura also helped name 'Oumuamua, an interstellar visitor that was discovered by UH Mānoa's Institute for Astronomy (IfA) in 2017.

His desire for more Hawaiian naming opportunities has come to fruition thanks to his niece, Ka'iu Kimura, executive director of the 'Imiloa Astronomy Center. The connection between Hawaiian culture and astronomy is embraced at 'Imiloa, which brings together members of the Hawaiian and astronomy communities in the spirit of exploration. 'Imiloa recently launched a pilot project called A Hua He Inoa, meaning "to call forth a name." This project has garnered worldwide recognition for positioning Hawai'i as the first place in the world to weave traditional indigenous practices into the process of officially naming celestial objects.

In October 2018, the A Hua He Inoa initiative held a two-day retreat with Hawaiian immersion students, astronomers, and cultural practitioners to develop Hawaiian names for two locally discovered asteroids. Students dove into the world of scientific research, engaged in discussions with 'ōlelo Hawai'i experts, and examined the relationship between tradition and culture in modern science.

The innovative project culminated in the selection of two Hawaiian names for asteroids discovered by the Panoramic Survey Telescope and Rapid Response System (Pan-STARRS) operated by IfA. The students recommended the names Kamo'oalewa and Ka'epaoka'āwela to the International Astronomical Union, which approved the proposal. Kamo'oalewa was sourced from the *Kumulipo* and alludes to an oscillating celestial object, symbolizing the asteroid's path in the sky when viewed from Earth. Ka'epaoka'āwela means "the mischievous opposite-moving companion of Jupiter."

"As Hawai'i celebrates 35 years of revitalizing 'ōlelo Hawai'i, the capacity and relevance of 'ōlelo Hawai'i is shifting global paradigms," Ka'iu Kimura said. "These students helped us make history and learned that their voices are not only important, but necessary. They witnessed how we can use the traditions that built us to carry us forward, and how bold initiatives can truly change the world."

Photo courtesy NASA IRTF/Mike Connelley



RISING SEA LEVELS THREATEN NATIVE SEABIRDS



Native seabird populations are dwindling in Hawai'i, but the Maui Nui Seabird Recovery Project (MNSRP) is determined to save these threatened species. Since 2006, MNSRP has partnered with community groups, private businesses, and government agencies to promote seabird conservation through research, recovery, habitat management, and community outreach. In 2019, MNSRP banded and collected data from just over 1,200 birds across four colonies.

There are three native seabird species that are considered threatened or endangered in Hawai'i—Newell's shearwater, Hawaiian petrel, and the band-rumped storm-petrel. One of the greatest threats to native seabirds is habitat loss due to rising sea levels, which is forcing millions of seabirds in the Papahānaumokuākea Marine National Monument to find new colonies. In response to this threat, MNSRP has identified four potential breeding locations on Maui and one on Moloka'i and is also working to restore seabird colonies on Haleakalā by removing non-native predators and vegetation.

Another ongoing threat to seabirds is light pollution. Every fall, young fledglings leave their nests for the first time and, instead of following the natural light from the moon to find the ocean, many of them become distracted by artificial lights and fall to the ground due to exhaustion or injury. By educating island residents and visitors about the negative effects of light pollution, the project hopes to reduce the number of fallen birds each year.

"Through our partner agencies in the *Save Our Seabirds* program, the message is getting out to the community. Presentations we've given to local schools have resulted in birds rescued by students at lighted sporting events," Jay Penniman, project manager, said. He added that local communities are eager to get involved and he's already seen positive impacts from MNSRP's research and habitat restoration efforts. Penniman advised, "Compassion and commitment lead to real results in conservation. Even though increases may be small today, if we can keep up the momentum, we have faith that our efforts result in greater progress in the future."

"Getting to know seabirds up close and personal has enhanced our appreciation for what beautiful, graceful, and important beings they are."

- Jay Penniman, MNSRP Project Manager



Photo courtesy MNSRP

JIMAR MONITORS "MOTHERLOAD" ACROSS PACIFIC

When Hurricane Walaka devastated the French Frigate Shoals in 2018, its Category 5 winds washed away almost all 11 acres of East Island, one of the main nesting beaches for 96% of Hawaiian green sea turtles. Nearly 20% of the nests laid on East Island were lost due to the storm, and with Trig Island awash earlier that year, only three suitable nesting habitats remained.

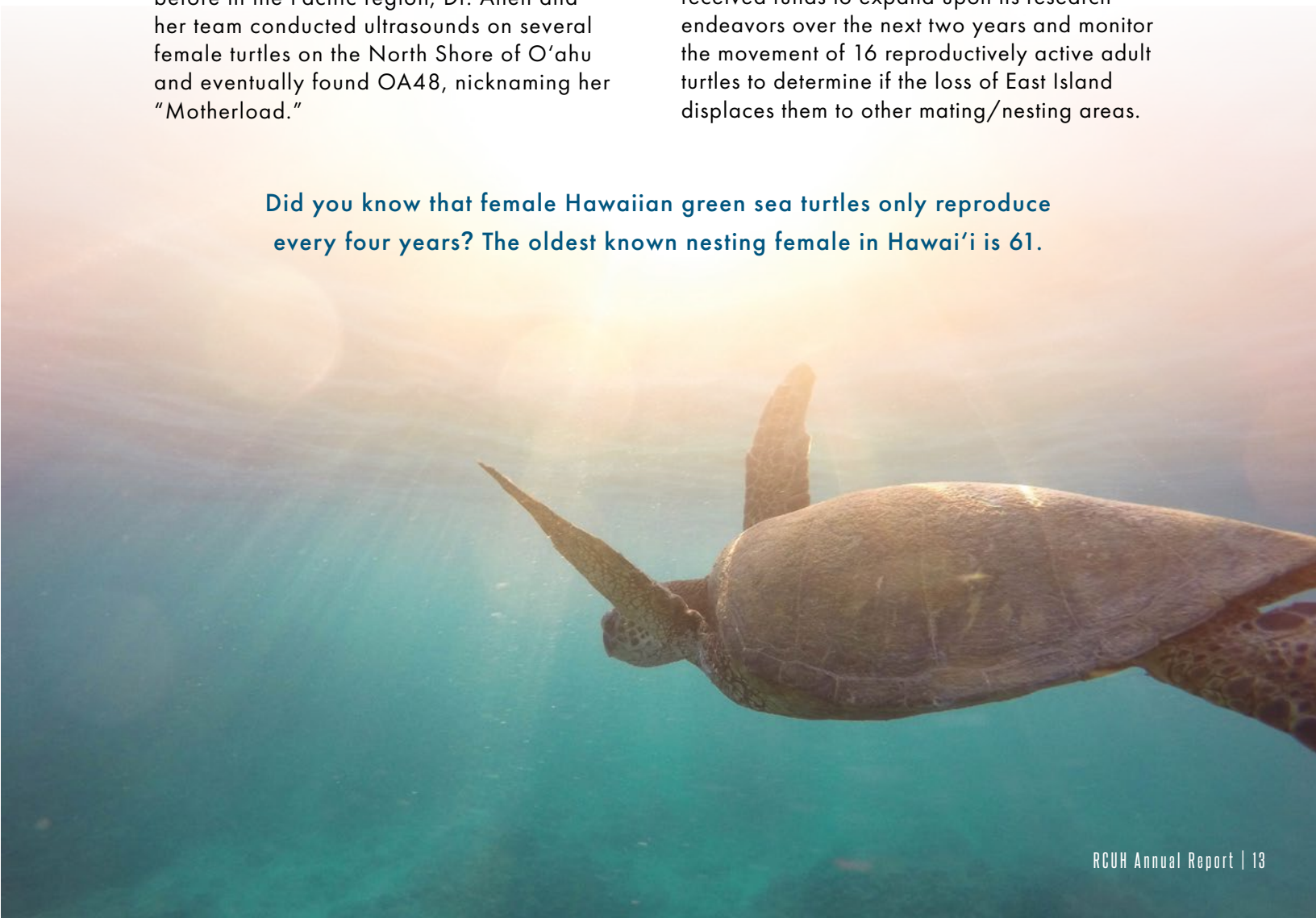
With the main Hawaiian green sea turtle nesting island now gone, researchers from NOAA's Marine Turtle Biology and Assessment Program were curious where female turtles would lay their eggs. Dr. Camryn Allen, the team's reproductive biologist, decided to track a fertile female turtle to find an answer. This first required having to find a female sea turtle that was "gravid," or ready to breed that season. Although this had never been done before in the Pacific region, Dr. Allen and her team conducted ultrasounds on several female turtles on the North Shore of O'ahu and eventually found OA48, nicknaming her "Motherload."

They attached a GPS satellite transmitter on her shell to monitor her migration from O'ahu. Two weeks later, the satellite track showed that "Motherload" swam nearly 620 miles in 2½ weeks to make it to her nesting habitat on Tern Island in the French Frigate Shoals.

NOAA's Marine Turtle Biology and Assessment Program, which participates in a cooperative agreement with UH's Joint Institute for Marine and Atmospheric Research, strives to better understand, assess, and monitor sea turtle populations in the Pacific. By collecting biological and ecological data and identifying human-caused threats, researchers hope that these endangered species will recover.

Since 1990, this project has rescued and released more than 1,000 turtles throughout the Hawaiian Islands. The project recently received funds to expand upon its research endeavors over the next two years and monitor the movement of 16 reproductively active adult turtles to determine if the loss of East Island displaces them to other mating/nesting areas.

Did you know that female Hawaiian green sea turtles only reproduce every four years? The oldest known nesting female in Hawai'i is 61.



MOHALA I KE AO FILLS GAP FOR CHILDREN'S LITERACY

"The Mohala I Ke Ao project has helped to align the teaching practices and strategies of Waimea Elementary School, resulting in consistent, rigorous instruction for all students."

- Scott Tamura, Principal, Waimea Elementary School

Research shows that children are considered to be in academic crisis if they're not proficient readers by Grade 3. This finding is especially concerning after a 2019 report by the National Assessment of Educational Progress found that only 34% of fourth-graders in the U.S., including the state of Hawai'i, are considered proficient readers.

In 2017, researchers at the Pacific Literacy Consortium (PLC) received a $2.8 million grant by the U.S. Department of Education to fund Mohala I Ke Ao (MIKA): a culturally responsive, multi-tiered support system for schools and communities with diverse learners. Led by PLC project director Dr. Hugh Dunn, this initiative is designed to improve children's early literacy skills by increasing teachers' application of evidence-based early reading instruction and increasing parent engagement at home.

"As a means to address the national trend of declining reading scores, many states have enacted research-informed policies intended to identify children at risk for reading difficulties and provide them with the necessary interventions; however, Hawai'i has not yet enacted policy or formal measures requiring such services across the state," Dr. Dunn said.

"Consequently, the MIKA project has helped schools establish enabling processes and a student progress-monitoring infrastructure to fill this gap and ensure that best practices in reading assessments and interventions are implemented early, consistently, and with fidelity."

In order to launch such a large-scale initiative, PLC, administered within UH Mānoa's Curriculum Research & Development Group, partnered with the state DOE's Office of Hawaiian Education. This joint-agency collaboration has focused on helping struggling readers in kindergarten through Grade 3 and providing high-quality professional development for educators to implement deep, sustainable change in their instructional practices.

In the 2018–2019 school year, MIKA has taken these important steps:

- Served more than 3,000 students in 12 schools across four islands,
- Designed and delivered four webinars and a 16-week online course for school librarians and school literacy support personnel,
- Disseminated 12,000 books to promote summer reading, and
- Launched the *Pacific Education Pulse* podcast.

Photo courtesy Pacific Literacy Consortium



UH CHEMISTS SIMULATE WATER SOURCE ON LUNAR SURFACE

"Our findings are of fundamental importance for explaining the origin of water on the Moon and for untangling the present distribution of water in our solar system."

- Excerpt from *Proceedings of the National Academy of Sciences*

In August 2018, researchers confirmed the existence of water ice on the surface of the Moon. This major discovery generated major questions within the astronomy community—how did it get there? And to what extent are these sources regenerative? According to NASA, with enough ice sitting on the surface, water would possibly be accessible as a resource, which fulfills one of the key requirements for permanent colonization of the Moon. In theory, lunar water could be used for fuel, energy generation, and drinking water.

Since the origin of water on the Moon is still unknown, Dr. Ralf Kaiser, a chemistry professor at UH Mānoa, decided to explore the topic further. Using a high-vacuum chamber at the University's W.M. Keck Research Laboratory in Astrochemistry to simulate conditions on the lunar surface, Dr. Kaiser and physical chemists collaborated with scientists from the Hawai'i Institute of Geophysics and Planetology (HIGP) to test if space weathering processes could produce water on airless bodies in deep space.

Dr. Kaiser and HIGP's Jeff Gillis Davis developed experiments to test the synergy between hydrogen protons from solar wind, lunar minerals, and micrometeorite impacts. After numerous tests that typically took 3–4 days to prepare and execute, researchers found that water can be efficiently generated and released through rapid energetic heating, like micrometeorite impacts into airless bodies. In layman's terms, if you add hydrogen to dry dust and bombard it with high-velocity micron-sized projectiles, you could create water on the moon.

"According to our studies, the synergic effect of solar wind implantation and micrometeorite impact may serve as a sustainable water source on the lunar surface since these processes occur every day," Dr. Kaiser said. "The next step will be investigating whether the texture, grain size, chemical composition, and temperature of the lunar soil have significant effects on water synthesis."

Their findings were published in a May 2019 paper that was lead-authored by postdoctoral fellow Cheng Zhu.



Photos courtesy NASA/JPL-Caltech

AWARDS & HONORS

2019 OUTSTANDING EMPLOYEE AWARDS

RESEARCHER/PROJECT MANAGER/PROFESSIONAL CATEGORY



1st Place: Ning Li, UH School of Ocean and Earth Science and Technology

As an ocean wave model systems specialist, Ning analyzes data from 15 buoys deployed around the Pacific and works closely with project partners like the National Weather Service to improve wave forecast models. Ning's work impacts a number of stakeholders where accurate predictions of ocean conditions are critical for daily living and safety.



2nd Place: Justin Hite, UH Pacific Cooperative Studies Unit

Justin has made saving the endangered 'akikiki and 'akeke'e his highest priority at the Kaua'i Forest Bird Recovery Project. Thanks to his tireless efforts, the project has safely collected eggs from 32 'akikiki and 10 'akeke'e nests, resulting in flocks of 45 and 10 birds, respectively. This technique also allowed KFBRP to study juvenile survival for the first time.

Honorable Mentions: Danielle Hull, UH School of Ocean and Earth Science and Technology; Crissy Kawamoto, UH Cancer Center; Kiaina Schubert, Subaru Telescope; Rob Weryk, UH Institute for Astronomy

TEAM CATEGORY



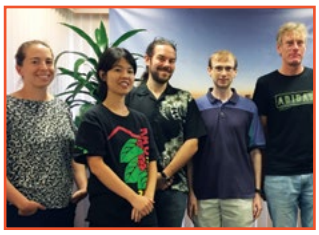
1st Place: UH Animal and Veterinary Services Program, *Jeff Hall, Tereso Dace, Bob Post, Diana Blanco, Ying Zhang*

The AVS team cares for up to 12,500 mice, 365 days a year, to ensure uninterrupted operations for animal biomedical research at the UH John A. Burns School of Medicine and UH Cancer Center. They service an average of 2,500 rodent cages every day.



2nd Place (tie): Academia Sinica Institute for Astronomy & Astrophysics, *Geoffrey Bower, Derek Kubo, Susan O'Neal, Peter Oshiro, Philippe Raffin*

ASIAA's Greenland Telescope joined the Event Horizon Telescope in 2018 and is currently the only submillimeter wave astronomical observation station in the Arctic Circle.



2nd Place (tie): East Asian Observatory, *Harriet Parsons, Izumi Mizuno, Steven Mairs, Graham Bell, Daniel Bintley*

The EAO team maintains and operates the James Clerk Maxwell Telescope, the largest single-dish radio telescope in the world. They used data from JCMT to help capture the first image of a black hole with the Event Horizon Telescope.

Honorable Mentions: Mauna Kahālāwai Watershed Partnership, Pacific Islands Deep Sea Coral and Sponge Initiative

UH EXCELLENCE IN RESEARCH AWARDS

In 2019, RCUH provided cash awards to recipients of the Regents Medal for Excellence in Research Award ($5,000 each for faculty members) and the Office of the Vice Chancellor for Research Student Excellence in Research Award ($500 each for students).

FACULTY RECIPIENTS



Tim Li



Craig Smith



Robert Toonen

STUDENT RECIPIENTS



Matthew Abplanalp



Daniel Coffey



Rachael Wade

RCUH FELLOWSHIP AWARDS

RCUH provides financial support to full-time doctoral students at the University of Hawai'i at Mānoa through an endowment fund established in 1986. The following Ph.D. students were presented with awards from the RCUH Graduate Fellowships Fund in 2019:

Mirza Baig, *Electrical Engineering*
Matthew Bond, *Botany*
Michelle Brown, *Political Science*
Luke Campillo, *Zoology*
Tracy Canonizado, *Nursing*
Deirdre Clyde, *Anthropology*
Michael Coe, *Botany*
Georgia Fredeluces, *Botany*
Vera Hanaoka, *East Asian Languages & Literature*
Jacob Henry, *Geography*
Joshua Hibit, *Botany*
Kelsea Hosoda, *Communication & Information Sciences*
Wenyi Ling, *Second Language Studies*
Emily Pesicka, *Political Science*
Terence Rose, *Communication & Information Sciences*
Benjamin Schrager, *Geography*
Daniel Strange, *Tropical Medicine, & Medical Microbiology & Pharmacology*
Nana Suzumura, *East Asian Languages & Literature*
Henryk Szadziewski, *Geography*
Laura Williams, *Geography*
Van Joshua Wishingrad, *Zoology*
Mei Xu, *History*
Irmak Yazici, *Political Science*

AUDITOR'S REPORT



Report of Independent Auditors

To the Board of Directors of
The Research Corporation of the University of Hawai'i

We have audited, in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in Government Auditing Standards, issued by the Comptroller General of the United States, the statements of net position of The Research Corporation of the University of Hawai'i, State of Hawai'i (the "Corporation") as of and for the years ended June 30, 2019 and 2018, and the related statements of revenues, expenses and changes in net position, and cash flows for the years then ended (not presented herein); and in our report dated November 4, 2019, we expressed an unmodified opinion on those financial statements.

In our opinion, the information set forth in the accompanying condensed financial statements is fairly stated, in all material respects, in relation to the financial statements from which it has been derived.



Honolulu, Hawai'i
November 4, 2019

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Honolulu, Hawaii 96813
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The Research Corporation of the University of Hawai'i
State of Hawai'i
Condensed Statements of Net Position
June 30, 2019 and 2018

	2019	2018
Current assets	$ 41,587,559	$ 38,381,867
Capital assets	3,216,587	3,144,704
Deferred outflow of resources	54,722	68,233
Total assets	$ 44,858,868	$ 41,594,804
Current liabilities	$ 30,395,699	$ 27,597,538
Noncurrent liabilities	4,407,694	4,727,464
Deferred inflow of resources	501,065	-
Total liabilities	35,304,458	32,325,002
Net position		
Invested in capital assets	3,216,587	3,144,704
Unrestricted	6,337,823	6,125,098
Total net position	9,554,410	9,269,802
Total liabilities and net position	$ 44,858,868	$ 41,594,804

The Research Corporation of the University of Hawai'i
State of Hawai'i
Condensed Statements of Revenues, Expenses and Changes in Net Position
Years Ended June 30, 2019 and 2018

	2019	2018
Operating revenues		
University of Hawai'i	$ 7,398,495	$ 6,970,732
Other sponsor agencies	794,121	681,275
Total operating revenues	8,192,616	7,652,007
Operating expenses		
Personnel costs	4,382,802	4,213,586
Data processing services	1,548,964	1,223,071
Depreciation	682,072	570,588
Project development	502,616	541,357
Insurance	421,271	407,314
Office and equipment rental	232,578	227,932
Professional and technical support	226,183	211,441
Other expenses	565,067	621,113
Total operating expenses	8,561,553	8,016,402
Operating loss	(368,937)	(364,395)
Nonoperating revenues		
Intergovernmental (Federal awards)		
Revenue	18,488	-
Expense	(18,488)	-
Interest income	653,545	331,853
Increase (decrease) in net position	284,608	(32,542)
Net position		
Beginning of year, as previously reported	9,269,802	10,407,865
Restatement due to change in accounting principle	-	(1,105,521)
Ending of year, as restated	$ 9,554,410	$ 9,269,802

The Research Corporation of the University of Hawai'i
State of Hawai'i
Condensed Statements of Cash Flows
Years Ended June 30, 2019 and 2018

	2019	2018
Operating activities		
Cash received from operations	$ 8,895,337	$ 7,410,407
Cash payments for operations	(7,852,458)	(7,341,636)
Project expenditures and reimbursements, net	5,145,869	8,084,230
Net cash provided by operating activities	6,188,748	8,153,001
Capital and related financing activities	(753,955)	(1,218,081)
Investing activities	8,533,247	(1,077,350)
Increase in cash	13,968,040	5,857,570
Cash		
Beginning of year	14,013,153	8,155,583
End of year	$ 27,981,193	$ 14,013,153

www.rcuh.com

Cover photo courtesy Event Horizon Telescope Collaboration