

GLOBAL ENVIRONMENTAL SCIENCE
AT THE UNIVERSITY OF HAWAI'I AT MĀNOA

MAI UKA Ā KE KAI
"FROM THE MOUNTAIN TO THE SEA"

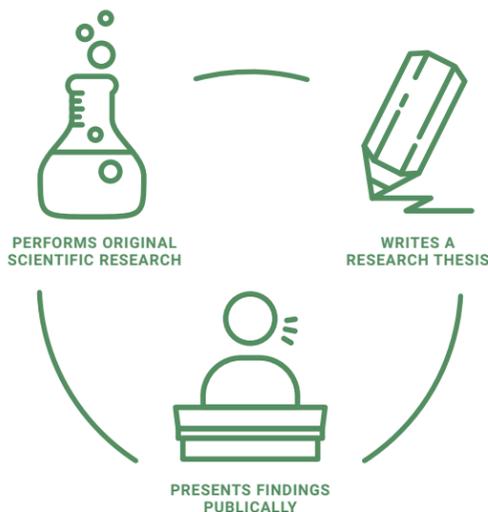
2016 - 2017
ANNUAL REPORT

GLOBAL ENVIRONMENTAL SCIENCE

AT THE DEPARTMENT OF OCEANOGRAPHY

PREPARING STUDENTS FOR THE FUTURE

The Global Environmental Science (GES) program at the UH Mānoa School of Ocean and Earth Science and Technology (SOEST) trains high-quality students to be knowledgeable in Earth-system science and think creatively about the challenges facing communities and natural resources now and in the future.



As a GES degree requirement, each student performs original scientific research, writes a research thesis and presents findings publically. Mentors include SOEST faculty—global leaders in the fields of ocean, earth and space science. Throughout the GES degree program, students are engaged in fieldwork, laboratory work and field trips, and have access to deep ocean and coastal research vessels, SOEST’s world-class Hawai’i Institute of Marine Biology and an active volcano.

The GES Program is designed to prepare students to achieve their goals. It is one of the most rigorous and involved undergraduate programs at the University of Hawai’i, requiring:

1. A UH faculty-mentored undergraduate research thesis experience;
2. Program specific one-on-one academic coursework and career advising;
3. Rigorous curriculum in science and math; and
4. Development of valuable and critical skills in computer programming, oral communication and presentation, technical writing, and independent research that translate to many fields and opportunities.

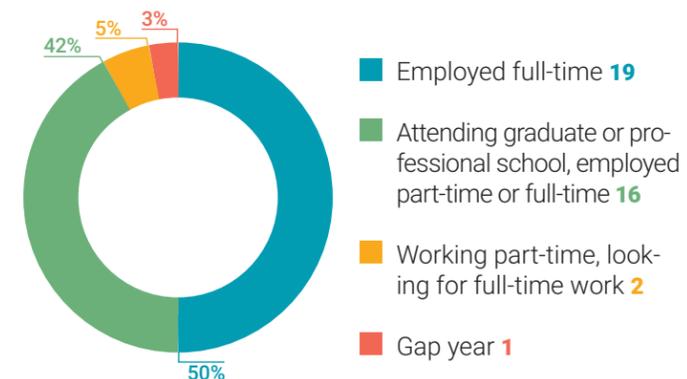
The GES program prepares students to excel in post-GES endeavors such as:

- Graduate studies in environment, sustainability, science, and engineering-related fields;
- Professional degree programs in environmental law and policy, environmental and public planning, public health administration, travel industry management, sustainability, etc.;
- Environmental Science-related positions in private industry (e.g., environmental consulting, non-governmental agencies, etc.);
- Environmental Science-related positions in local, state, and federal government agencies;
- Entering or returning to teaching with knowledge of how the Earth system works; and
- Entering the work force in another field as an educated person with the knowledge required to enable us to become wise environmental stewards of the planet.

ALUMNI EMPLOYMENT STATISTICS

As of 2017, employment 0-12 months after graduation for alumni who graduated from 2013-2017.

38 RESPONSES OUT OF 41 = 93% RESPONSE RATE



As of 2017, category of employment 0-12 months after graduation for alumni who graduated from 2013-2017.

38 RESPONSES OUT OF 41 = 93% RESPONSE RATE

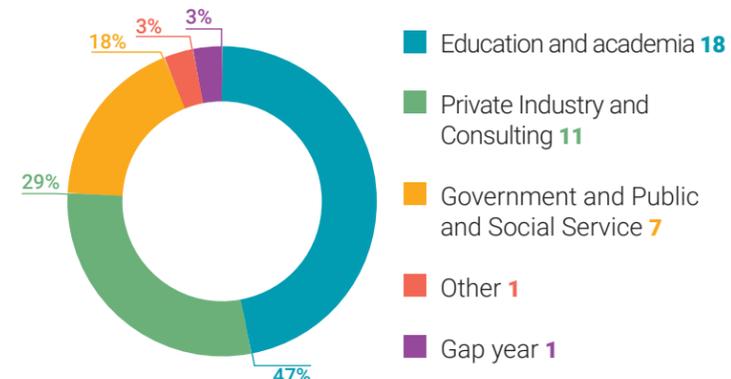


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MESSAGE FROM THE CHAIR



ALOHA GES 'OHANA:

As the program begins a new academic year, I am excited to share with you the program's first annual report! The purpose of the report is two-fold: (1) to celebrate student and program accomplishments from the previous academic year, and (2) to refresh our alumni's connections with the program. While there are far too many amazing happenings going on with GES to include every one in this report, I hope this small sampling excites and inspires you as much as it does me.

As GES students have done since day one, they continue to demonstrate exceptionalism in their academic performance and research pursuits. Examples from this past year include:

- One-third of GES students were on the Deans list (GPA > 3.5);
- One-third of GES student theses will be published in peer-reviewed journal publications; and
- A record number of student-authored, funded research proposals.

Programmatically, GES continues to be on the cutting edge of providing innovative, student-centered opportunities. Some examples include:

- The new Environmental Monitorings Systems Lab and related new courses;
- The beginning of a five-year National Science Foundation-sponsored summer residential oceanography course for community college-attending Native Hawai'ian students; and
- Four new GES curricular tracks: Environmental Planning, Sustainable Tourism, Sustainability Science, & Environmental Health.

In summary, I sincerely hope you enjoy this first annual report. We specifically welcome your suggestions on content for next year's annual report (hint... hint... Alumni, please share your stories!) as well as your ideas for improving the GES program and experience.

ALOHA,

MICHAEL GUIDRY
UNDERGRADUATE CHAIR

ges@soest.hawaii.edu | 808-956-7633

MESSAGE FROM THE FUNDRAISER



TO THE GES 'OHANA OF FACULTY, STAFF, ALUMNI, DONORS, AND FRIENDS:

If you want to get a sense of the strength of an academic program, you look to the students. I looked to Global Environmental Sciences (GES) students this past year and came away incredibly impressed.

GES students, simply put, are receiving and producing the best the University of Hawai'i has to offer: prolonged field experiences in unparalleled environments; close mentorship with some of the most respected researchers in the field; and final projects that could easily be assumed to be the work of senior-level graduate students.

These final projects have taken students to places as close as the shores of O'ahu and as far away as the Western Arctic Peninsula. GES students are in one of the most rigorous programs at the university, and as such they benefit greatly from donor support.

Would you consider making a donation to GES to support our students via the gift form at the end of this report? Gifts to the Friends of Global Environmental Science fund (127-2170-4) go to support the needs of both the department and the students. As tuition and the need for environmentally-literate and environmentally-concerned graduates continue to rise, your gifts are needed and appreciated now more than ever.

Mahalo for all you do to support GES and its students. It is an honor to raise support for GES, and I look forward to finding new and exciting ways for us to partner together for the benefit of the program, the students, the State of Hawai'i, and the planet we call home.

Please feel free to reach out to me any time. I would love to hear from you.

BEST,

JANA LIGHT
ASSOCIATE DIRECTOR OF DEVELOPMENT

jana.light@uhfoundation.org | 808-956-9172

STUDENTS IN THE NEWS



Jennifer Wong-Ala works on the computer model ▲

EXPLORING REEF FISH SUSTAINABILITY OFF WEST HAWAI'I ISLAND

Jennifer Wong-Ala, a 2017 spring graduate from the University of Hawai'i at Mānoa's Global Environmental Science (GES) degree program, conducted original research to determine how biological and physical factors affect the number of fish surviving to sustain populations of reef fish off West Hawai'i Island.

Adult reef fish, like yellow tang, release eggs strategically—in places where the eggs can be swept into the open ocean to live out their free-floating larval stage and develop until they are ready to come back to the reef. This process of successfully returning home, termed recruitment, can be influenced by many physical factors including ocean currents, as well as biological strategies such as when and where fish larvae are born and how long the fish remain in the free-floating larval stage.

To explore the influence of these factors, Wong-Ala and her mentor, oceanography assistant professor Anna Neuheimer, developed a computer model that accounted for date of birth, location of birth, movement of larvae, duration of the free-floating larval stage, development, settlement and death of larval reef fish off of Hawai'i Island.

Their study found that recruitment changed depending on the fish's birth-date due to influences of the currents, eddies and moon phase (i.e. tides). Additionally, location of birth mattered, with individuals born in shallow and sheltered bays having higher rates of recruitment

compared to individuals born in unsheltered locations under certain conditions.

"This study provides a baseline understanding of how biophysical factors interact to impact recruitment in western Hawai'i Island," said Wong-Ala.

Waimānalo on O'ahu. "My favorite aspect of my thesis experience is the relationship that developed with my mentor. I have worked in her lab for three years and it has been an experience that has taught me so much. I hope to be a mentor like



I chose GES because it is an interdisciplinary major that allows us to learn about the changes in the environment, gain valuable computer skills, and focus on what we are truly interested [in].

JENNIFER WONG-ALA
2017 SPRING GRADUATE

The information can be used to explain species-specific variation in recruitment from year to year and predict possible changes in the future. Understanding the amount of fish that make it back to the reef is important for maintaining sustainable reef fish populations.

"I chose GES because it is an interdisciplinary major that allows us to learn about the changes in the environment, gain valuable computer skills, and focus on what we are truly interested [in]," said Wong-Ala, who was born and raised in

her in the future."

"Jenn has accomplished so many things. I am very proud of her and how she surmounted numerous obstacles and challenges to be such a promising young scientist," says GES Chair Michael Guidry. Wong-Ala is entering the next phase of her academic career and life this fall by attending the graduate program in Ocean, Earth and Atmospheric Sciences at Oregon State University. Good luck Jenn!

ADAPTED FROM SOURCE: UH NEWS



After graduation I plan to attend graduate school and hopefully continue my research career.

MIA DELANO
SENIOR

Mia Delano working at the Hawaii Institute of Marine Biology ▲

CAN CORALS ADAPT TO OCEAN ACIDIFICATION?

Mia Delano, currently a senior in the GES program, worked with mentors Rob Toonen and Chris Jury at the Hawaii Institute of Marine Biology to better understand coral growth rates and the potential for adaptation as ocean water becomes more acidic.

Climate change is leading to a more acidified ocean, changing the way calcifying creatures like corals grow. Because corals are the basis for vast, complex ecosystems, researchers are investigating how reefs might change and evolve in the future.

Delano studied eight species of Hawaiian corals that constitute more than 97 percent of reef cover in Hawaii for

their variability in tolerance to acidic water. Delano also investigated whether any of this variation in coral response could be based on genetics. During a six-week experiment, all species showed a reduced growth rate in more acidic water. And all species showed that much of the variation seen in coral response to acidic conditions is genetic and therefore can be passed on and lead to adaptation over generations.

"Three species in particular showed a high variability in growth rate between colonies, meaning that some colonies were significantly more tolerant to acidic environments than were others within these species," reported Delano. "Many scientists have previously predicted that corals won't adapt to acidification, and we could face a global extinction event. However, my research indicates that some adaptation has already occurred in some species, and that the

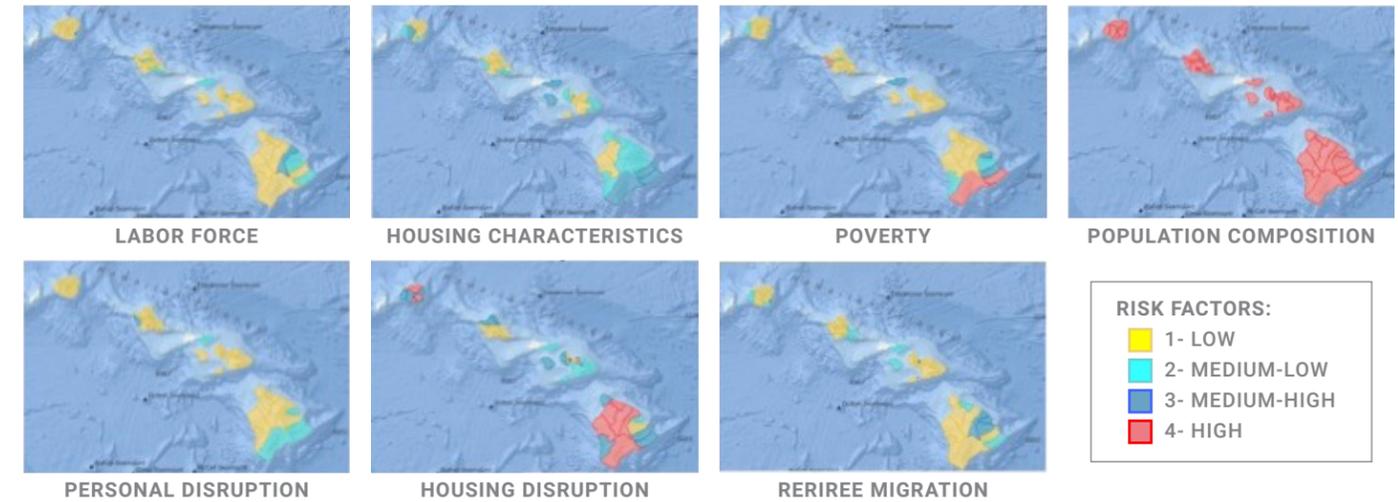
possibility of further adaptation across distinct species is also possible.

"My favorite aspect of the GES program has been participating in such groundbreaking research and becoming familiar with a topic that I am so curious and excited about," said Delano. "After graduation I plan to attend graduate school and hopefully continue my research career."

"Mia did a fantastic job on her research experience. She also completed her research thesis experience with Drs. Toonen and Jury with over a year remaining in her GES degree and is now interning with a local environmental consulting firm while completing her coursework requirements. She will be successful in whatever direction she goes in after graduation and I look forward to seeing her future accomplishments," says GES Chair Michael Guidry.

ADAPTED FROM SOURCE: UH NEWS

COMMUNITY SOCIAL VULNERABILITY INDICATORS



National Marine Fisheries Service, 2016 (Credit: Kaitlyn Nelson) ▲

ARE COASTAL COMMUNITIES IN HAWAII READY FOR SEA LEVEL RISE?

Kaitlyn Nelson, who graduated in December 2016 with a dual major in GES and ethnic studies from UH Mānoa, studied the relative vulnerability of communities in Hawaii to inundation from projected sea level rise in the next century.

Nelson and mentor Justin Hospital who leads the socioeconomic program for NOAA's Pacific Islands Fisheries Science Center, determined relative risk factors of inundation for each community in Hawaii to estimate physical hazard risk and estimated a community's adaptation capacity. By combining these two assessments, Nelson was able to determine which communities were most vulnerable as sea level rises.

Kekaha-Waimea area on Kauai and Honolulu on Oahu exhibited the highest risk of inundation to sea level rise.

"Interestingly, communities that exhibit higher inundation risk exhibit lower vulnerability scores on average, which suggests that communities that are at risk of inundation may have relatively high adaptation capacity," said Nelson. "However, the inundation risk of Honolulu is somewhat concerning because of its importance to the statewide marine economy."

By determining which communities experience relatively higher vulnerability, adaptation efforts could be prioritized for high-risk communities. "My favorite

aspect of my GES research project was extending my learning," said Nelson. "I was able to study something that was so different from my coursework but still required a lot of the background knowledge from my classes. It was exciting and challenging to work on a project that required a lot of independent thinking and problem-solving."

After graduating, Nelson is deciding whether to stay in Hawaii and work as a community youth coordinator or teach at a high school in San Francisco. "Kaitlyn is a force of nature. Simultaneously serving as an academic tutor and mentor to undergraduates, finishing coursework for two degrees, and completing a mentored thesis project is quite the undertaking. Her research demonstrates how many GES students are interested in the intersection of environmental and human dimension issues," says GES Chair Michael Guidry.

ADAPTED FROM SOURCE: UH NEWS



Kaitlyn Nelson ▲



It was exciting and challenging to work on a project that required a lot of independent thinking and problem-solving.

KAITLYN NELSON
2016 FALL GRADUATE

“I’m excited about continuing my research and academics with Assistant Professor Rosie Alegado’s lab and the Department of Oceanography.”

AKA BEEBE
GRADUATE STUDENT

GES Alumni Aka Beebe – UH Mānoa Oceanography Graduate Student ▲

FISHPOND FOOD WEB DYNAMICS

A graduate of Kamehameha Schools Kapālama, Beebe is deeply committed to maintaining traditional cultural practices and utilizing more contemporary methods to understand how systems developed by our kūpuna (ancestors) function and should continue to function in the context of urbanization of Hawaiian watersheds.

This kuleana (responsibility) to care for and steward the ‘āina is inspired by his two young children. Beebe is investigating how restoration at He‘eia Fishpond on O‘ahu affects nutrient cycling

and productivity of the food web from microbes to fish within the master’s program in oceanography. Aka’s graduate research is an extension of his undergraduate GES thesis titled Ka Wai Ola o Kanewai: Characterizing the sediments, nutrients and microbial communities of an indigenous flooded agro-ecosystem.

One of the outcomes of the rigors of the GES program is that students often emerge highly competitive for important graduate student fellowships. In 2016, Aka was selected as a conservation fellow, a program funded by the Hau‘oli Mau Loa Foundation that provides two year graduate assistantships. Fellows were chosen because of their strong academic records as undergraduates,

their connections to and integration with the local conservation community, their passion for the ‘āina and keen interest in preserving and protecting shared and limited natural resources and their commitment to career and future efforts to preserve and sustain their local environment.

“I’m excited about continuing my research and academics with Assistant Professor Rosie Alegado’s lab and the Department of Oceanography. It is an honor to receive the HML Fellowship and I hope that this is something that is extended to the people of Hawai‘i in the future,” said Beebe.

ADAPTED FROM SOURCE: UH NEWS



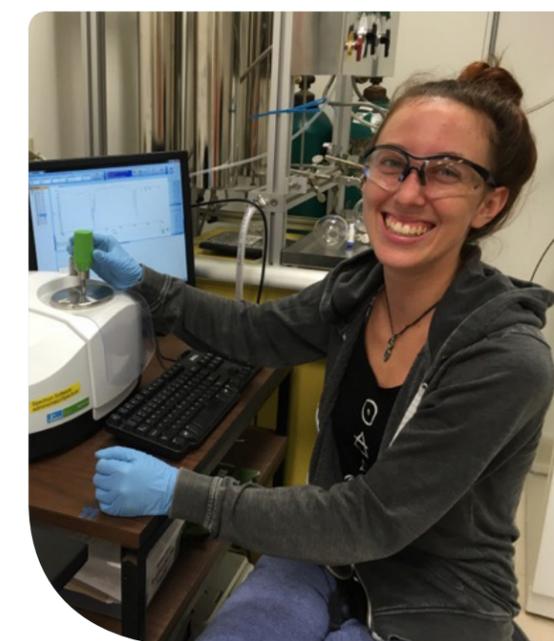
Kayla Brignac is first row, far left (Credit: P Wessel/ SOEST) ▲

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY-SPONSORED RESEARCH EXPERIENCE:

POLYMER IDENTIFICATION OF COASTAL MARINE DEBRIS PLASTICS IN THE MAIN HAWAIIAN ISLANDS BY FOURIER TRANSFORM INFRARED SPECTROSCOPY TO DETERMINE SOURCES

Kayla Brignac participated in the National Institute of Science and Technology (NIST) Summer Undergraduate Research Fellowship (or SURF) program under the mentorship of Dr. Jennifer Lynch studying ocean plastics. Plastic materials are a prevalent form of marine debris contributing to a growing environmental pollution crisis. Kayla collected coastal plastics throughout the main Hawaiian Islands for polymer identification using Fourier Transform Infrared Spectroscopy (FT-IR) analysis. Eight beaches were sampled in triplicate using systematic transects on four different islands, generating more than 3,000 pieces of macroplastics (> 1 cm). Kayla found that the primary polymer present was polyethylene, comprising approximately 60% of pieces and 50% of mass. She also found that polymer composition varied between beaches,

indicating differences in land- vs. ocean-based sources. These results supported her hypotheses: windward beaches have more plastic debris mass, and more from ocean sources, than leeward beaches; surrounding population density and land use explain some variability; and pieces from ocean-based sources show greater physical weathering which can be observed by an abundance of carbonyl groups present in the FT-IR spectra due to oxidation. This chemical technique can provide much needed information to policy makers to focus efforts on solutions to this pollution crisis. Although a ways off, Kayla plans on attending graduate school after graduating and earning a PhD in either environmental toxicology or materials chemistry with a focus on plastics.



Kayla Brignac ▲

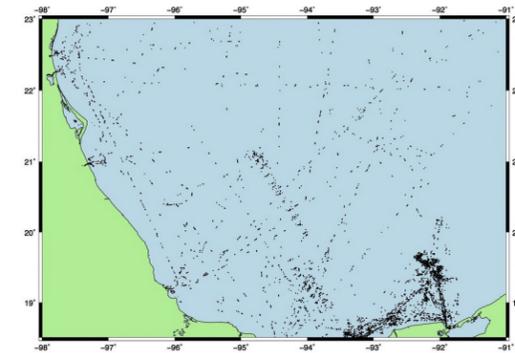


USING SPACE STATION DATA TO DETECT ILLEGAL FISHING

GES students Jay Chitnis (Fall 2016) and Nalu Ehman (Summer 2017) focused their respective thesis research efforts on detecting illegal fishing using data from the Space Station with mentor Dr. Margo Edwards from the Hawai'i Institute of Geophysics and Planetology (HIGP). Chitnis and Ehman used GLASS [Global AIS on the International Space Station (ISS)] which involved a consortium of private companies, Federal, State and Local stakeholders that tracks and monitors nearly all commercial ships on the world's ocean. Chitnis' and Ehman's collective objective was to

use the Automatic Identification System (AIS) to monitor and track vessel activity in an attempt to detect illegal fishing in parts of the Pacific Ocean and the Gulf of Mexico. Using statistical analyses the students helped the GLASS effort evaluate data quality and they also studied fishing patterns that could be used to aid enforcement personnel recognize illegal activities in near real-time.

"I think everybody really should care about illegal fishing. Every resource we have on earth is so limited and fish are limited too," said Jay Chitnis.



▲ Fishing vessel patterns in the Gulf of Mexico (Credit: Kainalu Ehman)



▲ The Okeanos Explorer's Mapping Team. From left to right: Jason Meyer, Dan Freitas, Sarah Rosenthal, Jay Chitnis, Mike White. (Credit: Jay Chitnis)

CAPSTONE TELEPRESENCE MAPPING IN PACIFIC MARINE PROTECTED AREAS: MISSION PLAN

Early in 2017, GES alum Jay Chitnis participated in a NOAA research cruise from Honolulu, Hawai'i, to Pago Pago, American Samoa. As part of the Okeanos Explorer's "Always Exploring" model, the deepwater mapping systems mapped the seafloor and fisheries on this cruise. Jay, as an "Explorer-in-Training", was responsible for monitoring data acquisition, data processing, and assisting with data management.

Jay has been accepted into the Navy's Officer Candidate School and starts the twelve week program in Fall 2017.

AWARDS AND SCHOLARSHIPS

DEANS LIST

Honour Booth, Kayla Brignac, Katy Christensen, Kelcey Ann Chung, Zoe Curley, Mia Delano, Kainalu Ehman, Cherrylle Heu, Caleb Hsu, Dalton Muchow, Kaitlyn Nelson, Alaina Smith, Alisha Summers, Kammie Dominique Tavares, Andrew Tokuda, Cuong Tran, Tiana Tran, Jakkob Wagenvoord, Eric Welch, Amanda Wong

HONORS PROGRAM

Katy Christensen, Mia Delano, Erin Dougherty, Noah Howins, Caleb Hsu, McKenna Lewis, Sophia Test, Andrew Tokuda, Amanda Wong

UNDERGRADUATE RESEARCH OPPORTUNITIES PROGRAM (UROP) AWARDEES

Honour Booth, Mia Delano, Elizabeth Dionne, Carla Mae Esquivel, Noah Howins, McKenna Lewis, Ariel Lorenzen, Eric Welch

SARP KAYAN SCHOLARSHIP

Honour Booth, Carla Mae Esquivel, Noah Howins, McKenna Lewis, Cuong Tran

FRANCES & EVELYN FOO SCHOLARSHIP

Katy Christensen, Caleb Hsu, McKenna Lewis, Noeau Machado, Cuong Tran, Eric Welch

UNIVERSITY OF HAWAI'I SCHOLARSHIPS

Caleb Hsu - UH Regents Scholar
Alisha Summers - UH Chancellor's Scholar
Amanda Wong - UH Chancellor's Scholar

GATES SCHOLAR

Maxim Irion

NOAA SCHOLARSHIPS

McKenna Lewis - Hollings Scholarship
Kammie Dominique Tavares - EPP/MSI Undergraduate Scholarship

MAKALAPUA NA'AUAO SCHOLARSHIP

Noeau Machado



▲ Caleb Hsu on the Research Vessel Falkor



▲ Mia Delano at awards ceremony

DONOR SPOTLIGHT



▲ Dr. Maggaard and GES students celebrate donation to GES Program

A LEGACY OF LEADERSHIP AND A LIFETIME OF GENEROSITY

Some donors give a single gift to exemplify their philanthropy. Other donors, like **Dr. Lorenz and Ursula Maggaard**, establish a charitable legacy through a long time of broad and generous support.

Lorenz and Ursula came to the University of Hawai'i at Mānoa in 1975 when Lorenz was hired as a professor of Oceanography. His calm, astute manner and his scientific mastery quickly brought him to leadership positions within the department, and he became a strong voice at the University of Hawai'i as it sought to establish itself as a premier academic institution in ocean and earth sciences. Part of this mission was the establishment of a new school within UH Mānoa, and Lorenz was instrumental in the formation of SOEST as an environmental- and sustainability-centered school within the University of Hawai'i at Mānoa.

Devoted to the ideals of high education and community service, Lorenz's impact didn't end with the school's establishment. Over their lifetime, Lorenz and Ursula have given over \$170,000 to support a variety of programs and efforts at the University of Hawai'i at Mānoa. Most notably, they recently provided a very generous gift (\$10,000) to support the GES Program. The Maggaard's generosity and service have meant a lot for the future of the GES Program and SOEST.

ADAPTED FROM KĀPILI WINTER 2016 NEWSLETTER

▲ Dr. Lorenz Maggaard

GES FACULTY

ROSIE ALEGADO

Marine microbial ecology, influence of bacteria on animal evolution

HARIHARASUBRAMANIAN ANNAMALAI

Diagnostic and modeling aspects of the Asian Summer Monsoon system, prediction and predictability of the Asian Summer Monsoon system, dynamical and physical link between Monsoon-ENSO

JANET M. BECKER

Geophysical fluid dynamics, waves and stability, coastal processes, general ocean circulation

DAVE BEILMAN

Long-term terrestrial ecology, paleoscience approaches to global change science, carbon cycling

ROBERT R. BIDIGARE

Bio-optical oceanography, pigment biochemistry, plankton metabolism

BARBARA BRUNO

Planetary geosciences, geoscience education

STEVEN BUSINGER

Evolution and structure of destructive atmospheric storms, including: frontal cyclones, hurricanes, and severe thunderstorms

GLENN S. CARTER

Physical oceanography, ocean mixing, internal tides, underwater ocean gliders

QI CHEN

Environmental changes (e.g. climate change, land use and land cover change, sea-level rise, habitat and biodiversity loss) and use of multiple tools (e.g. remote sensing, GIS, statistics, process-based models, and field observations) to address these issues

ANTHONY D. CLARKE

Physical and chemical properties of aerosol in remote troposphere, aircraft studies of aerosol in free troposphere

MICHAEL COONEY

High rate anaerobic digestion, bio-oil extraction from biomass, and the analytical characterization of chemical microenvironments surrounding immobilized enzymes

ERIC H. DE CARLO

Aquatic chemistry, metals and their anthropogenic inputs, transformations, fate and transport, sedimentary geochemistry, marine minerals

JONATHAN DEENIK

Soil fertility and soil quality, nitrogen and carbon cycling in agroecosystems, traditional agroecosystems, biochar and sustainable agriculture

EDWARD DELONG

Application of contemporary genomic technologies to understand the ecology, evolution and biogeochemistry of complete microbial assemblages

STEVEN J. DOLLAR

Biogeochemistry, nearshore processes and effects of human activity on the coastal zone

JEFFREY C. DRAZEN

Physiological ecology of marine fishes, energetics and trophodynamics, deep-sea biology, adaptations of fishes to the deep-sea

KYLE EDWARDS

Phytoplankton ecology, community ecology, ecological theory and statistics, benthic communities

MARGO EDWARDS

Marine geology and geophysics, remote sensing of the seafloor, Mid-Ocean Ridges, Arctic Basin

ALY EL-KADI

Hydrogeology, modeling groundwater systems

R. CENGIZ ERTEKIN

Hydrodynamics, computational methods, offshore and coastal engineering, oil-spill spreading, fishpond circulation, ocean renewable energy

ERIC FIRING

Ocean circulation and currents on all scales, with emphasis on observation and dynamics

PIERRE J. FLAMENT Surface ocean layer dynamics, mesoscale circulation structures of the ocean, remote sensing of the sea surface

CHARLES H. FLETCHER

Quaternary and coastal marine geology, sea-level history, coastal sedimentary processes (erosion), sea level rise

OCEANA FRANCIS

Storm-generated ocean waves, meteorological and ocean processes on coastal infrastructure, sustainable coastal infrastructure, water, and wastewater systems affected by climate change and water shortage

KIANA FRANK

Identifying environmental drivers of microbial dynamics and to characterize the impact of microorganisms on biogeochemical cycling in mineral-hosted ecosystems from mountain ridge to mid-ocean ridges

PATRICIA FRYER

Marine geology, petrology, tectonics

ERIC GAIDOS

Molecular evolution; microbiology of extreme environments; biosphere-climate feedbacks; critical intervals in Earth history; exobiology; biological networks

MICHAEL O. GARCIA

Volcanology, igneous petrology, geochemistry

THOMAS W. GIAMBELLUCA

Interactions between the atmosphere and the land surface, including influences of land use and land cover change on climate and surface hydrology and effects on global climate change on hydrologic processes and terrestrial ecology

BRIAN T. GLAZER

Biogeochemical processes in marine environments; use of molecular methods to characterize and understand synergy of geomicrobiology

CRAIG R. GLENN

Paleoceanography, marine geology, sedimentology, sediment diagenesis

ERICA GOETZE

Marine zooplankton ecology; dispersal and gene flow in marine plankton populations; evolution, behavioral ecology and systematics of marine calanoid copepods

E. GORDON GRAU

Environmental physiology and comparative endocrinology of fish

MICHAEL GUIDRY

Biogeochemical modeling, mineral precipitation/dissolution kinetics, K-12/university curriculum development

MICHAEL HAMNET

Coastal zone management, fisheries economics, disaster preparedness and mitigation

DAVID T. HO

Air-water gas exchange, tracer oceanography, carbon cycle, and environmental geochemistry

STEVEN HOWELL

Environmental aerosol research, aerosol chemistry

ANDEA JANI

Ecology of infectious diseases

CHRISTINA KARAMPERIDOU

ENSO dynamics and predictability, ENSO in past climate, response of mid-latitude atmospheric circulation to climate change and variability

DAVID KARL

Microbiological oceanography, oceanic productivity, biogeochemical fluxes

CHRISTOPHER KELLEY

Deepwater habitats, ecology and fisheries, seafloor mapping and GIS

PAUL KEMP

Growth, activity and diversity of marine microbes, biosensor applications in microbial oceanography, molecular ecology of marine bacteria

MAREK KIRS

Environmental microbiology, microbial source tracking, quantitative PCR, recreational water quality

DENISE EBY KONAN

International trade, microeconomics, computational economics

YUAN-HUI (TELU) LI

Geochemical cycles from solar nebula to human brain

KEM LOWRY

Design, planning and evaluation of ocean and coastal management programs. Experience in Hawai'i, Indonesia, Sri Lanka, Philippines and Thailand

ROGER LUKAS

Physical oceanography, interannual and decadal climate variability

DOUGLAS LUTHER

Tide dynamics and energy flow, mixing in the abyssal ocean, circulation and energy fluxes in the North Atlantic

FRED T. MACKENZIE

Geochemistry, biogeochemical cycling, global environmental change

STEPHEN J. MARTEL

Engineering and structural geology

MARGARET A. MCMANUS

Descriptive physical oceanography, coupled physical-biological numerical models; development of ocean observing systems

GARY M. MCMURTRY

Geochemistry, geology and geophysics

CHRISTOPHER MEASURES

Trace element geochemistry, hydrothermal systems, elemental mass balances

MARK D. MERLIN

Biogeography, natural history of the Pacific

MARK A. MERRIFIELD

Physical oceanography, coastal circulation, sea level variability, current flows and mixing in the vicinity of coral reefs, islands and seamounts

ANUPAM MISRA

Material science, remote sensing, remote Raman, micro Raman, High T_c Superconductor, stress strain sensors

TOMOAKI MIURA

Remote sensing of terrestrial vegetation, GIS

GREGORY MOORE

Marine geophysics, structural geology

MICHAEL J. MOTTL

Hydrothermal processes, geochemical cycles

PETER MOUGINIS-MARK

Volcanology from space, remote sensing of natural hazards

PETER K. MÜLLER

Ocean circulation, waves and turbulence

CRAIG NELSON

Structure and function of natural bacterial communities in aquatic habitats such as coral reefs, lakes, streams, and the open ocean

ANNA NEUHEIMER

Quantitative ecology of fish and aquatic invertebrate populations, with applications to evolutionary biology, physiology, ecosystem dynamics, resource management, and climate issues

ALISON NUGENT

Atmospheric Sciences
Mountain meteorology and cloud physics, orographic convection and precipitation, shallow cloud dynamics, cloud microphysics

BRIAN N. POPP

Isotope biogeochemistry, organic geochemistry

JOHN N. PORTER

Atmospheric science, use of satellites to study aerosol and cloud forcing, ship measurements of aerosol and cloud optical properties

JAMES POTEIRA

General ocean circulation and its relationship to climate, processes in the western equatorial Pacific and eastern Indian Ocean and their connection

BRIAN S. POWELL

Numerical modeling and variational data assimilation, ocean predictability, ocean circulation and ecosystem dynamics

BO QIU

Large-scale ocean circulation, ocean atmosphere interaction, satellite observations, and numerical modeling of ocean circulation

MICHAEL RAPPÉ

Ecology of marine microorganisms; genomics; coral-associated microorganisms; ecology of microorganisms in the deep subsurface

GREG RAVIZZA

Paleoceanography and environmental chemistry; geologic history of chemical weathering; geochemistry of recent and ancient metalliferous sediments; anthropogenic influences on the geochemical cycles of the platinum group elements; chemical signatures of extra-terrestrial matter in marine sediments; biogeochemistry of molybdenum in the marine environment

KELVIN RICHARDS

Observations and modeling of ocean processes, ocean dynamics, ocean atmosphere interaction, ecosystem dynamics

MARK A. RIDGLEY

Resource management and human-environment system analysis

JAMES ROUMASSET

Environmental economics and sustainable growth

OLIVIER ROUXEL

Co-evolution of life and Earth, sources and biogeochemical cycling of metals in the ocean, weathering processes, seafloor hydrothermal systems, marine mineral deposits, nontraditional stable isotope geochemistry

KEN RUBIN

Isotope geochemistry, chronology

KATHLEEN RUTTENBERG

Biochemistry of phosphorus and phosphorus cycling in the ocean, rivers, and lakes; nutrient limitation of aquatic primary productivity; effects of redox chemistry on nutrient cycling; early diagenesis in marine sediments with focus on authigenic mineral formation and organic matter mineralization

FRANCIS J. SANSONE

Suboxic/anoxic diagenesis in sediments, hydrothermal geochemistry, lava-seawater interactions, trace gas geochemistry

NIKLAS SCHNEIDER

Decadal climate variability, tropical air-sea interaction, coupled modeling

JANE SCHOONMAKER

Sedimentary geochemistry and diagenesis; paleoenvironment and paleoclimate sedimentary records

KAREN SELPH

Biological oceanography, microbial ecology, protistan grazer feeding dynamics, phytoplankton distributions, use of flow cytometry in ecological research

SHIV K. SHARMA

Atmospheric instrumentation and remote sensing; Lidar, Raman, and infrared spectrometry; and fiber-optic environmental sensors

CRAIG R. SMITH

Benthic and ecology, deep-sea biology, sediment geochemistry, climate-change effects on Antarctic ecosystems, marine conservation

GRIEG F. STEWARD

Aquatic microbial ecology, molecular ecology and diversity of viruses and bacteria

BRIAN TAYLOR

Plate tectonics, geology of ocean margin basins

ROBERT TOONEN

Dispersal and recruitment of invertebrate larvae, population genetics, evolution and ecology of marine invertebrates

BIN WANG

Atmospheric and climate dynamics

JOHN WILTSHIRE

Marine minerals, mine tailings, disposal and remediation and submersible engineering and operations

ROBERT WRIGHT

Hyperspectral imaging instrument development, remote sensing, infrared radiometry, volcanology

RICHARD ZEEBE

Global biogeochemical cycles, carbon dioxide system in seawater and interrelations with marine plankton, paleoceanography, stable isotope geochemistry

2016-2017 GRADUATES



▲ Fall 2016 graduates

▲ Spring 2017 graduates

FALL

JAY CHITNIS presented on the "Effects of the 2010 Deepwater Horizon Oil Spill on Fishing in the Gulf of Mexico" with Dr. Margo Edwards from HIGP.

MARSHALL CLARK presented on the "Environmental Changes at Station ALOHA from Earth System Simulations" with Drs. Pedro DiNezio from Oceanography and Jim Potemra from HIGP.

LAUREN MATHEWS presented on the "Nutrition & Elemental Stoichiometry of Microzooplankton Life Stages in a Changing Climate" with Drs. Craig Nelson and Carolyn Faithfull from Oceanography.

CASEY MOSS presented on the "Effects of Nutrient Loading, Elevated Temperature, and Ocean Acidification on Crustose Coralline Algae" with Drs. Rob Toonen and Chris Jury from Oceanography.

KAITLYN NELSON presented on the "Social and Physical Vulnerability of Communities Engaged in the Marine Economy to Inundation from Sea Level Rise" with Dr. Justin Hospital from NOAA's Pacific Island Fisheries Science Center.

ALAINA SMITH presented on the "Maintenance of Diversity through Multiple Timescales of Variation" with Dr. Kyle Edwards from Oceanography.

SPRING

KATY CHRISTENSEN presented on "The Upper Layer Variability of an Antarctic Glacio-marine Fjord: Andvord Bay, Western Antarctic Peninsula" with Dr. Mark Merrifield from Oceanography.

YAZHOU FU presented on the "Using Climate Variables and Airborne Lidar Derived Vegetation Structure for Accessing the Habitat of Breeding Birds: A Case Study in Minnesota" with Dr. Qi Chen from Geography.

MICHELLE MARCHANT presented on the "Application of Coastal Vulnerability Index (CVI) on the Island of Oahu" with Dr. Oceana Francis from Civil & Environmental Engineering & Yaprak Onat from Ocean Resources & Engineering.

DALTON MUCHOW presented on the "Standoff Categorization of Organics for Planetary Exploration" with Dr. Anupam Misra from Hawai'i Institute of Geophysics and Planetology.

JALINE SERUGE presented on the "Challenges with the Application of qPCR Based Tests for Enterococci as a Rapid Beach Management Tool in Hawai'i" with Dr. Marek Kirs from Water Resources Research Center.

ALISHA SUMMERS presented on the "Beach Loss, Seawall Construction, and Land-Use Patterns at Odds with Coastal Zone Policy – East Oahu, Hawai'i 1928-2015" with Dr. Charles Fletcher from Geology & Geophysics.

JENNIFER WONG-ALA presented on the "Disentangling Biophysical Factors Affecting Reef Fish Recruitment in West Hawai'i Island" with Dr. Anna Neuheimer from Oceanography.

SUMMER

RACHEL CHANG presented on "Using Satellite Images to Study Temporal Changes in the Mississippi Delta" with Dr. Peter Mougini-Mark from the Hawai'i Institute of Geophysics and Planetology.

KAINALU EHMAN presented on "An Analysis of Automatic Identification System Data in Detecting Fisheries Movements in the Gulf of Mexico from the International Space Station" with Dr. Margo Edwards from the Hawai'i Institute of Geophysics and Planetology.

CONNECTING WITH ALUMNI SERIES

In our hopes to bridge the gap between current GES students and the expanding alumni base, we offer this opportunity for GES graduates to visit the University of Hawai'i at Mānoa campus and interact in an informal environment with a small group of GES students. Alumni will visit our current GES students to share their experiences in the program and now the workforce.

FALL

LAUREN YASAKA is a 2006 GES graduate. She is currently a Staff Planner in the Office of Conservation & Coastal Lands in the Department of Land & Natural Resources.

SPRING

ALYSSA AGUSTIN is a 2013 GES graduate. She is currently in the Masters Program in Oceanography at the University of Hawai'i.

NATHANIEL HARMON is a 2016 GES graduate. He is currently in the Masters Program in Oceanography at the University of Hawai'i.

NATALIE KWA is a 2011 GES graduate. She is currently a Environmental Monitor at Stantec Consulting Ltd.

LAUREN YUMOL is a 2016 GES graduate. She is currently in the Masters Program in Oceanography at the University of Hawai'i.



Alyssa Agustin, '13 ▲



▲ Lauren Yumol, '16



Natalie Kwa, '11 ▲

MESSAGES FROM ALUMNI



Spring 2015 graduation ▲



I got my first job as an Algorithms Scientist within days of graduating from UH and the GES program because I had interned for the same company during my last year as a GES student. This internship, which was a large part of my Senior Thesis, was essential to getting my first job just after graduating.

MICHAEL DICHNER
2001 GRADUATE



GES was extremely applicable to my jobs immediately after graduation and in the interim until I returned to school in the medical field. I was teaching across a wide variety of science and environmental topics and the broad range of GES education was perfect.

GABRIEL WOFFORD
2006 GRADUATE



The GES program gave me the skills necessary to think critically and solve problems across a broad range of science fields. What I liked most about the GES program was the scope of study. I enjoy all fields of science, and it was great to be able to study everything from physics to environmental philosophy and calculus to biogeography.

JORDAN GUSS
2012 GRADUATE



[GES] has provided me with technical writing skills valuable in STEM fields and a broad foundation in core sciences and environmental sciences. Writing scientific/research term papers and doing a senior research project and thesis were beneficial for professional development. [The] lab classes were also helpful in terms of making connections to real world applications and hands-on experience.

EVERETT OMORI
2013 GRADUATE



My favorite aspect of my GES research project was extending my learning. I was able to study something that was so different from my coursework but still required a lot of the background knowledge from my classes. It was exciting and challenging to work on a project that required a lot of independent thinking and problem-solving.

KAITLYN NELSON
2016 GRADUATE



GIVING OPPORTUNITIES

We rely on the generous financial support of our alumni and friends. Your contributions, no matter what size, play a critical role in supporting academic achievement and research by students and faculty.

If you would like to make a contribution today, please remove and send in the below pledge form along with preferred payment. Thank you for your support of the Global Environmental Science program!

Gifts to the Friends of GES fund are tax-deductable.

Will you partner with us to support GES students? Contributions can help fund:

RESEARCH EXPERIENCE FUND

Awards will support faculty-mentored undergraduate research projects and experiences.

GES COMPUTER LOUNGE

The GES computer lounge is a valuable, yet outdated, resource for students. We are hoping to renovate the lounge with new computers, furniture, programs, lighting, etc.

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GLOBAL ENVIRONMENTAL SCIENCE

University of Hawai'i at Mānoa

Department of Oceanography

1000 Pope Road

MSB 205

Honolulu, HI 96822

808-956-7633