Ho‘omau: Sustaining Communities & Ecosystems in our Changing Climate

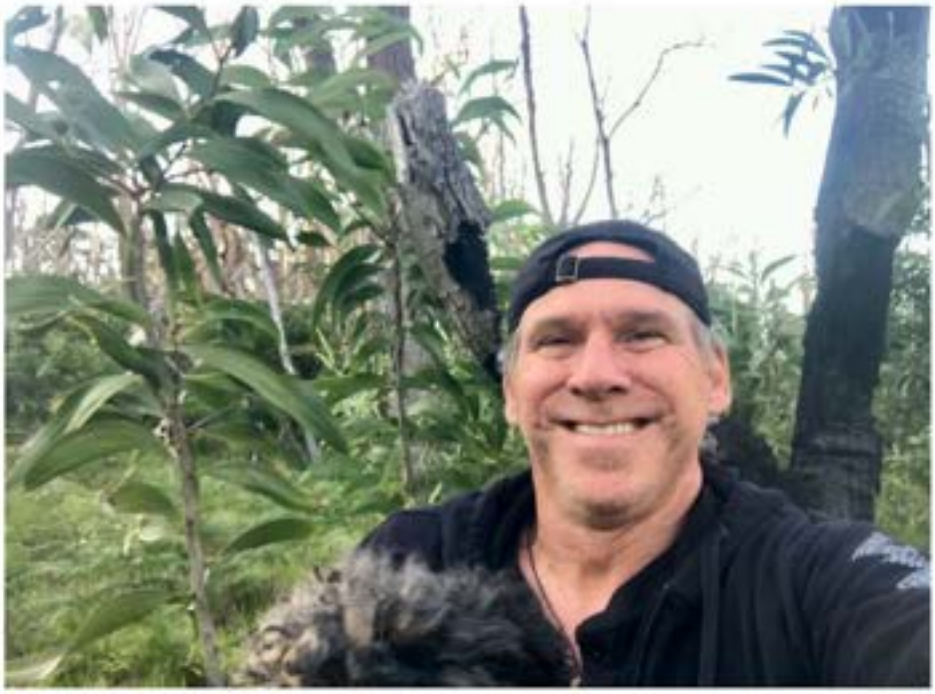
ANNUAL
TCBES SYMPOSIUM

Campus Center 301
University of Hawai'i at Hilo
April 11th & 12th
9am - 4:30 pm

University of Hawai'i at Hilo
Tropical Conservation Biology & Environmental Science

University of Hawai'i at Hilo
SAC
Student Activities Council

DREW KAPP



My story began through my Ukrainian ancestors in the foothills of the magical Karpaty, the Carpathian Mountains of Eastern Europe, and also in Germany, and continued in the cities and woodlands of Massachusetts and Connecticut where I grew up. I was a university student in Montréal in Canada, Firenze in Italy, and la Ciudad de México, and graduated from the University of Connecticut with degrees in Italian and Spanish. I worked for an international student exchange organization in Washington DC and at New York University's Institute of Fine Arts Library before moving to Honolulu to earn a degree in Geography at the University of Hawai'i at Mānoa. I spent many years working in university libraries, including in the Map Collection at UH-Mānoa and at Mookini Library in Hilo, and assisted with the Atlas of Hawai'i project with special attention to Hawaiian place names. I began teaching Geography at Hawai'i CC and UH Hilo in the late 1990s, and have since had the privilege of residing in the verdant, volcanic uplands of Puna, where Kea'au and Kahauale'a meet within the 'Ōma'olala Forest. While teaching, I helped to coordinate the new Keaholoa STEM Program at UH Hilo, supporting Native Hawaiian students in the sciences, and I also earned a degree in Hawaiian Studies from Hawai'i CC. I am a member of the Unukupukupu hula 'ohana, a product of the Uluākea faculty development program, an advocate of UH Hawai'i Papa O Ke Ao, of 'āina-based learning, of ahupua'a research, of pāmaomao exchanges with indigenous communities of Turtle Island and Oceania, and and serve as an Assistant Professor in Geography at Hawai'i CC. I support sustainability initiatives through my work on the Lā Honua Earth Day Committee, and academic sustainability committees, councils and certificate programs. I cherish the partnerships I have developed with community organizations from every moku of Hawai'i Kuauli, as they helped realize positively transformative learning experiences for my students. I am grateful to be involved in the well-being of our Hawai'i cultural-environmental communities in my role as a settler aloha 'āina, and inspired to be among people who are dedicated to learning and growing.

PELIKA ANDRADE

A native Hawaiian born and raised on the island of Kaua'i, Pelika Andrade is a founder and Executive Director of Na Maka Onaona, a Hawaii based non-profit, and an extension agent for the University of Hawaii Sea Grant College Program. She has a long history working with Hawaii communities throughout the archipelago as a community member, hoa'āina, and researcher. For the past 15 years, she has been developing alternate approaches to monitoring Hawai'i's watersheds and supporting implementation of management strategies that support 'Āina Momona: healthy, balanced and thriving communities

PhD Research: Pewa: A joining of our past into our future; a reconciliation of indigenous literacy and its role in Aina Momona explores the healing journey of Hawaii communities through the lens of Aina Momona (thriving and productive communities), while offering an analysis of impact from a collection of pewa (concepts and tools) that were created to support the healing of our people through reconciling narratives of indigenous literacy. This study examines an interpretation of 'Āina Momona, how that interpretation has contributed to recalibrations and resettings of other concepts and ideas that contribute to åina momona, how these recalibrations have led to the development of pewa (concepts and tools) that were created to support 'āina momona, how implementation of these pewa have in turn challenged the narrative of indigenous literacy, and finally an analysis of the impacts these pewa have on 'āina momona through this reconciliation of indigenous literacy.

THURSDAY APRIL 11TH

PRESENTER	TIME	PRESENTATION TITLE
Drew Kapp & Kukuena	**9:00 AM**	**Opening Protocol**
Introduction	**9:15 AM**	**Kathryn Besio**
Pelika Andrade	**9:30 AM**	**Keynote**
Break 10:30-10:45 AM		
Nikola Rodriguez	10:50 AM	Effects of climate change and fishing pressure on ciguatera prevalence in Hawaiian reef fishes
Ihilani Kamau	11:05 AM	Predicting sea level rise impacts to coastal wastewater infrastructure and water quality
Riley Nakasone	11:20 AM	Feeding trial using *Auriculella ambusta*, a tree snail native to Hawai'i; Comparison of an artificial diet, made with commercially available ingredients, to that using wild-collected vegetation
Mio Kamioka	11:35 AM	He wa'a he moku, he moku he wa'a: Indigenous sustainability of Oceania
Geneviève Blanchet	11:50 AM	Snail Extinction Prevention Program conservation rearing: Reflecting on the past seven years
Anna Ezzy	12:05 AM	Women-identifying agroforestry practitioners' experiences and access to government support for Conservation in Hawai'i
Lunch 12:20-1:05 PM		

THURSDAY APRIL 11TH

PRESENTER	TIME	PRESENTATION TITLE
Amy Durham	1:10 PM	He 'Io Au - A community project about 'Io (the hawks on your block)
Lauren Runnels	1:20 PM	Chemical analysis of *Chondria tumulosa* (Rhodophyta)
Krista Golgotiu	1:30 PM	Uniting indigenous knowledge and scientific inquiry: A cultural approach to understanding the Hawaiian environment through the use of ʻŌlelo Noʻeau
Brian Rule	1:40 PM	Agronomic effects of split fertilizer regime and harvest intervals on energycanes in Hawai'i
Break 2:00-2:15 PM		
Lorenzo Villela and Sophia Pierucci	2:20 PM	Navigating narratives: The cultural relevance of maps through history
Manuela Cortes	2:35 PM	Exploring the impact of micro-fragmentation size on coral growth rates
Emma Stierhoff	2:50 PM	Assessing the long-term impacts of chronic infection with avian malaria in Hawai'i 'amakihi
Tim Grabowski	3:05 PM	Using citizen science to model changes in occupancy and abundance of Hawaiian reef fishes
Closing Remarks 3:20 - 3:30 PM		
Poster Presentations	3:30 - 4:30 PM	

THURSDAY APRIL 11TH

POSTER PRESENTATIONS

3:20 - 4:20 PM

PRESENTER	PRESENTATION TITLE
Noah Hunt	Distance estimation based on maximum power level of recorded bird vocalizations in Hawai'i
Dominic Brown	Understanding the covering behavior of *Tripneustes gratilla*
Evelyn Grace Gardiner	Movement patterns of blue-lined Long-spine Urchins (*Diadema savignyi*) at Onekahakaha, Hilo, Hawai'i, USA
Karyne Hatch	Variations in emergent and cryptic invertebrate species throughout different tides and times of day at Onekahakaha, HI, USA
Abigail Lewine	Assessing fibropapillomatosis trends in Green Sea Turtles (*Chelonia mydas*) across Hawai'i Island
Keleni Kuualoha Faanunu	Use of molecular techniques such as edna in conservation efforts
Amy Durham	Intraspecific variation in home rage size, overlap, and movement behaviors of 'Io - the Hawaiian Hawk (*Buteo solitarius*)

FRIDAY APRIL 12TH

PRESENTER	TIME	PRESENTATION TITLE
Kaiameaola Club	**9 AM**	**Introduction**
Drew Kapp	**9:05 AM**	**Keynote**
Riley Sokol	10:05 AM	Comparative analysis of coral recruitment among reefs in the Big Island of Hawaii: Insights for conservation and management
Kelli Elliot	10:15 AM	Understanding the mutualistic relationship between invasive *Pennisetum clandestinum* (Kikuyu grass) and microplastic presence
Braxton Igne	10:25 AM	Novel bioacoustic methods allow estimation of fledging success of an endangered Hawaiian bird species
Annie Larson	10:35 AM	Pāku'iku'i puzzle: Untangling environmental and biological drivers of juvenile distribution of an imperiled reef fish
Christian Colo	10:45 AM	Linking the land and sea: Examining watershed nutrient sources and their riverine export under Hawai'i's changing climate
Noah Hunt	11:00 AM	An updated status of landbird populations in the National Park of American Samoa
Richard Masse	11:15 AM	Comparative life history and reproductive biology of five nearshore surgeonfish species around Hawai'i Island
Leecia Wade-Daniel	11:30 AM	Feeding ecology of sport fish in the Gulf of Alaska using gut contents and stable isotope
Sofia Ferrería	11:45 AM	Functional traits and 3D complexity explain reef fish assemblage at Kaloko-Honokohau Marine National Park
Lunch 12:00-12:45 PM		

FRIDAY APRIL 12TH

PRESENTER	TIME	PRESENTATION TITLE
Morgan Youngblood	12:50 PM	Investigating Environmental Health and Sustainable Wastewater Infrastructure in Kailua-Kona, Hawai'i
Rachael Pecoraro	1:05 PM	Assessing the population dynamics of Hawaiian Green Sea Turtles in coastal waters of Hawai'i Island
Aralyn Hacker	1:20 PM	Hollings preparation program: Coral species abundance and diversity dynamics in response to mass bleaching events in Lisianski Island from 2017, 2019 and 2021
Makoa Pascoe	1:35 PM	Temporal and habitual observations of *Octopus cyenea* using a stationary rotational live camera
Natalie Graham	1:50 PM	Molecular monitoring of introduced arthropods and biodiversity dynamics
Ty Shimabukuro	2:50 PM	Change in growth rate and form of *Montipora capitata* under light reflecting branching coral cultivation techniques
Break 2:20-2:25 PM		
Rebecca Cahill	2:30 PM	Morphological scaling and ontogeny of juvenile Blacktip Sharks (*Carcharhinus limbatus*) in Hilo Bay, Hawai'i, USA
Raunak Sen	2:45 PM	What are endemic Hawaiian crickets teaching us about evolutionary biology?
Kainalu Steward	3:00 PM	Re-birth of Lalo: Assessing atoll island resilience following a hurricane event in Papahānaumokuākea
Lauren Smith	3:15 PM	Using bioacoustics to assess the success of incompatible insect technique on Hawaiian forest bird population recovery
Sri Butz	3:25 PM	Analyzing the relationship between Pāku'iku'i age and sagittal otolith weight
Auction Winners, Award Ceremony, & Closing 3:35-4:00 PM		

ABSTRACTS

Nikola Rodriguez	**Effects of climate change and fishing pressure on ciguatera prevalence in Hawaiian reef fishes**

Ciguatera poisoning is caused by consuming reef fishes containing toxins produced by epiphytic dinoflagellates in the genus Gambierdiscus. Climate change and overfishing alter reefscapes, potentially increasing *Gambierdiscus spp.* habitat availability or altering how ciguatoxins (CTX) move through food webs. It is not clear how altered reefscapes influence the prevalence of ciguatoxic fishes posing a health risk to communities dependent on coral reef fisheries. Therefore, the objectives of this study are to evaluate the relationship between habitat and environmental characteristics at multiple spatial scales on the probability of fish testing positive for CTX and the concentration of CTX using a semi-quantitative in vitro neuro-2a cytotoxicity assay on two common species: Roi (Peacock Grouper) *Cephalopholis argus* and Kole (Goldring Bristletooth) *Ctenochaetus strigosus* sampled bi-annually across four sites along west Hawai'i Island. Both the probability of Roi testing positive and CTX concentration in Roi increased with fish length and decreased with the exposure to periods of high temperatures and fishing pressure. For Kole, the probability of testing positive for CTX and CTX concentration decreased with fish length, exposure to high temperature periods, effluent, fishing pressure. At small spatial scales, climate change and fishing pressure seem to be influencing the prevalence of ciguatoxic fishes, though not always in the ways expected. While most fishers likely take the risk of ciguatera in stride and have beliefs and practices to mitigate risk, these results suggest that those practices may lose effectiveness under altered conditions and necessitating better communication between researcher, managers, and stakeholders to adapt.

Ihiliani Kamau	**Predicting sea level rise impacts to coastal wastewater infrastructure and water quality**

Sea level is rising, suggesting that coastal onsite sewage disposal systems (OSDS) and other coastal wastewater infrastructures integrity could be compromised. The purpose of this project is to provide a baseline of the current water quality condition, determine which coastal OSDS and wastewater infrastructure could be affected by future sea level rise (SLR), and determine which OSDS should be prioritized for removal or conversion. To address these goals a multi-indicator approach was used and twelve stations were monitored along the shoreline from Kailua-Kona to Keauhou. This approach included monitoring the fecal indicator bacteria (*Enterococcus* spp. and *Clostridium perfringens*), pathogens (*Staphylococcus aureus* and Methicillin-resistant *S. aureus* (MRSA)), nutrient concentrations, Chlorophyll a, δ15N- and δ18O-NO3-, and the δ15N in macroalgae at all of the stations. This multi-indicator approach was used to accurately detect the presence of sewage in Kailua-Kona's nearshore waters. Preliminary results of this research shows that the average *Enterococcus* spp. concentrations exceed the Hawai'i Department of Health geometric mean water quality standard of 35 MPN/100 mL. The average *C. perfringens* was below the water quality standard of 5 CFU/100 mL recommended by Fujioka et al. (2015). Staphylococcus aureus was present along the Kailua-Kona shoreline, with counts ranging from 1.7-810 CFU/100 mL; however, no MRSA was detected. The water quality data from this study along with the SLR model we plan to make will be used to create a framework to evaluate the potential impacts of SLR on wastewater infrastructures to help implement adaptive plans in Kailua-Kona.

ABSTRACTS

Riley H. Nakasone
Geneviève Blanchet
David R. Sischo

Feeding trial using *Auriculella ambusta*, a tree snail native to Hawai'i; Comparison of an artificial diet, made with commercially available ingredients, to that using wild-collected vegetation

Hawaiian tree snails (kāhuli), in the family Achatinellidae, are highly threatened due to introduced predators, habitat loss, and climate change. Many species only persist in conservation rearing facilities like that of the Snail Extinction Prevention Program (SEPP). A major limitation to expanding rearing efforts is reliance on wild-collected native vegetation which is labor intensive to collect, risks the introduction of pathogens and parasites, and restricts the rearing of native snails to facilities in proximity to collect native leaves. The International Partula Program, a consortium of zoos and conservation facilities specializing in the captive propagation of critically-imperiled land snails in the South Pacific family Partulidae, has created an artificial diet made from commercially available ingredients. This has allowed Partulid rearing efforts to be expanded and distributed globally. We conducted a feeding trial using the Partula diet on Auriculella ambusta, a snail endemic to O'ahu in the Achatinellidae family. Snails were maintained in one of three treatments: 1) 'ōhi'a (*Metrosideros* spp.), 2) 'ōhi'a (*Metrosideros* spp.) with Partula diet, and 3) Ti (*Cordyline fruticosa*) with Partula diet. Data including survival, number of eggs laid, and the number of eggs hatched were collected. Preliminary findings demonstrate that survival and fecundity is significantly different between treatments, suggesting the Partula diet warrants further investigation as a possible diet alternative or supplement for conservation rearing of Achatinellids native to Hawai'i.

Mio Kamioka

He wa'a he moku, he moku he wa'a: Indigenous sustainability of Oceania

Multidisciplinary innovative solutions are understood as vital for addressing climate change, with Indigenous perspectives from Oceania sought to mitigate threats while enhancing community well-being and global standards of living.

However, dominant Western narratives of "sustainability," such as the United Nations Sustainable Development Goals, tend to assert authority over what constitutes sustainability. These dominant narratives further harm already threatened Indigenous place-based knowledge and skills of sustainable living and resilience by pushing them further to the margins.

Therefore, there is a need to promote Indigenous practices of sustainability in a manner that reflects the values and practices of the peoples of Oceania, providing a framework for sustainable development that is meaningful and attainable for us Pacific Islanders, by us Pacific Islanders.

ABSTRACTS

Geneviève Blanchet
Riley Nakasone
David Sischo

Snail Extinction Prevention Program conservation rearing: Reflecting on the past seven years

The Snail Extinction Prevention Program (SEPP), a partnership of state, federal, and private entities, was created to protect Hawai'i's imperiled land snail (kāhuli) fauna. Over 750 described species of terrestrial snails once occurred throughout the Hawaiian Islands, representing one of the most stunning examples of species radiations in the world. Aside from their esthetic appeal, cultural significance and historical role broadening our understanding of evolution and island biogeography, Hawai'i's snails once made up a significant portion of the terrestrial fauna of the islands. Sadly, it is estimated that over 60% of this diversity has been lost due to introduced predators, habitat loss, and climate change. Of those that remain, 100 additional species will likely go extinct this decade without swift intervention. To prepare for this onslaught, SEPP opened its captive rearing lab in 2016, initiating efforts with several colonies of tree snails previously reared in captivity at the University of Hawai'i. Now, seven years later, SEPP maintains around 40 species of rare and endangered snails from five islands, many of which are extinct in the wild or very close to being so. Since 2016, over 10,000 snails have been released back into predator-proof exclosures in partnership with the Bernice Pauahi Bishop Museum, Honolulu Zoo, and Army Natural Resources Program O'ahu (ANRPO). Here we present our current rearing techniques with a focus on lessons learned and success stories of the past seven years.

Anna Ezzy

Women-identifying agroforestry practitioners' experiences and access to government support for conservation in Hawai'i

Equal access to programs which support agroforestry is important for food security as well as promoting conservation in agriculture. Women are underrepresented as primary decision makers on farms and face systemic barriers in the field of agriculture yet the existing literature on US farm women's experiences focuses heavily on white, heterosexual women. Hawai'i has a history of extensive Indigenous agroecosystems, including agroforestry, stewarded by Native Hawaiians but today requires systemic change to restore food security due to the effects of colonization and a plantation-structured agricultural economy. Today, Hawai'i ranks as one of the top five states in terms of the percentage of farms practicing agroforestry and also ranks fourth highest in the U.S. in the percentage of beginning farmers. Understanding the decision-making of women of diverse backgrounds cultivating land for agroforestry in Hawai'i as well as the utilization of government assistance for agroforestry supports more equitable access to land and resources, especially for beginning farmers. This study used semi-structured interviews to explore the following research questions: 1) How are woman-identifying agroforestry growers in Hawai'i making conservation decisions regarding land and resources? 2) What are women-identifying farmers' perceived barriers and/or successful avenues to gaining funding for conservation grants in Hawai'i?

ABSTRACTS

Amy Durham	He 'Io Au - A community project about 'Io (the hawks on your block)

Do you have a hawk on your block? ʻIo is our Hawaiʻi island's endemic hawk. Their story is linked to many aspects of our cultural and natural legacies. Since they are present in many of our daily lives, they are an ideal conduit for connecting to our native species - which is especially important in altered landscapes devoid of such interactions. Community-led conservation projects are invaluable resources for learning about and managing data-deficient species. Despite ʻio's importance, minimal research has been conducted on their utilization of our urban and agricultural neighborhoods. We want to change that by collaborating with you! Our group of ʻio enthusiasts aims to spotlight ʻio by introducing the upcoming "He ʻIo Au" community platform. Our objective is to keep all eyes on ʻio by (1) Utilizing the volunteer He ʻIo Au platform to gather data on ʻio's behavior in our neighborhoods, including details on population size, diet preferences, and breeding behavior (2) Highlighting the significance of 'io by sharing our ʻio stories through interviews and an online blog and (3) Engaging in community outreach to educate about 'io, raise awareness regarding intentional harm, and actively seek to share knowledge and collaborate on solutions.

Morgan Youngblood	Investigating environmental health and sustainable wastewater infrastructure in Kailua-Kona, Hawai'i

Sewage leaks from faulty wastewater infrastructure profoundly impact coastal water quality worldwide, jeopardizing human health and marine ecology. Noticeable environmental changes along the shoreline in West Hawaiʻi have led community members to request water quality monitoring assistance. Despite the nationwide ban on new cesspool installations, Hawaiʻi grapples with a unique predicament due to the substantial number of cesspools installed since statehood in 1959. Developers and residents struggle to find a pathway toward modern and sustainable wastewater management alternatives. Enterococcus faecialis, a fecal indicator bacterium (FIB), is used to assess water quality in areas where sewage pollution is suspected. A collaborative project through UH Hilo is underway with the County of Hawaiʻi, the Department of Land and Natural Resources, Waiwai Ola Waterkeepers Hawaiian Islands, and the Kahaluʻu Bay Education Center to pinpoint high-risk areas that require wastewater infrastructure upgrades. This independent research supported lab and fieldwork within the larger collaborative project and investigated the environmental impact of wastewater infrastructure by mapping Enterococcus concentrations along the shoreline. Influence of nearby cesspool density, sewer infrastructure, and freshwater inputs on concentrations of these bacteria were examined. Water samples were collected at 12 sites along the coast from September 2022 to September 2023. Sampling was conducted early in the morning when tide conditions were lowest to trace FIB from freshwater sources and minimize the effects of UV exposure on the bacteria sampled. Enterococcus concentrations were monitored using IDEXX testing methodology. FIB concentrations were not correlated with turbidity and salinity in this study. The lack of correlation with these freshwater indicators suggests that other sources of pollution near shore may be present in the area. The study finds Enterococcus concentrations temporarily exceed the state standard at Keauhou, Kahaluʻu, Nimalu Hulihe'e, and near the Royal Kona Resort.

ABSTRACTS

Krista Golgotiu

Uniting indigenous knowledge and scientific inquiry: A cultural approach to understanding the Hawaiian Environment through the use of ʻŌlelo Noʻeau

This research proposal aims to bridge indigenous knowledge from the Hawaiian people focusing on ʻŌlelo Noʻeau (traditional Hawaiian proverbs and sayings), with scientific methods to prove the observations of ancient Hawaiians and enhance conservation efforts in modern-day Hawaiʻi. Using a collaborative approach involving members of the community, cultural practitioners, and scientists alike, this project aims to identify and validate specific ʻŌlelo Noʻeau that reference the ocean, animals, plants, and weather patterns. By first identifying these specific ʻŌlelo Noʻeau, through the use of Hawaiian community engagement the accuracy of the interpretation and understanding of these traditional sayings will be ensured. After choosing the specific ʻŌlelo Noʻeau, selecting key areas around Hawaiʻi to conduct field studies is essential. Field studies will be conducted in the areas associated with the specific sayings, through observation and data collection. The use of any past recorded data in regards to weather, ocean, or plant and animal growth patterns will also be utilized. With the inclusion of the Hawaiian community through participation in field studies, traditional knowledge and new information regarding these patterns will be combined with any observations and data collected in the field. Then by utilizing statistical methods and ecological modeling an assessment on the alignment between what is observed and the knowledge embedded in the ʻŌlelo Noʻeau can be made. This process will aim to confirm the ecological accuracy of traditional wisdom passed down. Proving ʻŌlelo Noʻeau can provide insights on sustainable resource management for local communities, and inform modern practices on how to use limited natural resources more sustainably by tracking natural indicators. Scientifically affirming ʻŌlelo Noʻeau through this project, from the research and data collected, will validate the scientific relevance of traditional knowledge and the important need to include indigenous communities in science.

Brian Rule

Agronomic effects of split fertilizer regime and harvest intervals on energycanes in Hawaiʻi

The Net Zero Coalition agreed upon by the United Nations encourages research into areas that will decrease global greenhouse gas emissions to as close as possible to zero. The International Energy Agency (IEA) attributes aviation to 2% of global greenhouse gas emissions. Commercially available biofuels used for Sustainable Aviation Fuel (SAF) currently utilize lipid-based feedstocks of soybean oil and used cooking oils, which are limited in availability due to availability of feedstocks and supply chain issues. As processing technology advances, cellulosic biomass-based feedstocks have shown promise as an alternative source of SAF. Cultivars of Saccharum officinarum have been identified as promising candidates for cellulosic feedstock production due to inherent high yields and preferred tissue composition, and are termed energycanes. Liquid biofuels from energycane have a high energy density, making them ideal for producing aviation fuel. One concern regarding the use of SAF produced by cellulosic feedstock is the large amount of land needed to produce biomass. Therefore, the identification of agronomic practices that result in a maximum yield of biomass per area is warranted. This study compared factorial combinations of two energycane cultivars, two fertilization regimes, and three harvest frequencies of energycane in a field trial to determine the best agronomic practices for biomass production.

ABSTRACTS

Lorenzo Villela Sophia Pierucci	**Navigating narratives: The cultural relevance of maps through history**

The anthropology of cartography is a field that needs to be explored further. With the modern age, the gazillions of maps made have an influence on culture and the way that people think. Since the Babylonian Map of the World (oldest surviving map still in existence) was created, maps have advanced and changed forms to better reflect the peoples who made them, and function as a whole, to display information. The modern age of the computer has brought an explosion in popularity of maps and an extraordinary expansion in the use and function of maps. In this presentation, Sofia and myself look into some of the most culturally important maps that change how people think and most popular maps from pop-culture that influence people's behaviors today. We will also be looking into how maps have changed over time and have been portrayed in the media to stress the importance of maps.

Manuela Cortes	**Exploring the impact of micro-fragmentation size on coral growth rates**

Coral microfragmentation is commonly used to propagate corals in nurseries. The process involves breaking small pieces off of a parent colony and encouraging them to grow into independent colonies. This method has been shown to increase the rate of coral growth, potentially due to the difference in fragment size which affects the surface area available for the generation of new daughter polyps. I will be analyzing the relationship between coral fragment size and growth rate at the MOP Coral Nursery at the Pacific Aquaculture and Coastal Resource Center. My goal is to determine if there is an optimal size of coral fragment associated with higher growth and survivorship rates.

Emma Stierhoff	**Assessing the long-term impacts of chronic infection with avian malaria in Hawai'i 'amakihi**

The introduction of avian malaria (*Plasmodium relictum*) to Hawai'i has decimated native forest bird populations, driving many species to extinction, and threatening those that remain. However, the Hawai'i 'amakihi, a native honeycreeper, has shown resilience against acute infection with avian malaria. Hawai'i 'amakihi who survive the acute stage remain chronically infected with low parasitemia levels. Although immediate costs of acute malarial infection have been closely studied, the costs of chronic infection are poorly understood in this species. We assessed the impact of chronic infection on physiological condition of Hawai'i 'amakihi near 'Āinahou Ranch in Hawai'i Volcanoes National Park. During biweekly banding sessions from May 2022 to August 2023, Hawai'i 'amakihi were banded, measured, and weighed, and a blood sample was collected for each bird. Blood samples were used to measure hematocrit, triglycerides, and reactive oxygen metabolites (ROMs) and to determine disease status using qPCR. There were no detectable differences in size, hematocrit, triglycerides, or ROMs based on disease status. These results further demonstrate the resilience Hawai'i 'amakihi have against avian malaria and set the foundation for future research studying the factors facilitating this resilience and how that might be applied to protect more threatened honeycreeper populations.

ABSTRACTS

Tim Grabowski	Using citizen science to model changes in occupancy and abundance of Hawaiian reef fishes

The heterogeneity of reef fish populations combined with the limitations of underwater visual surveys can produce highly uncertain abundance estimates. While citizen science offers a largely untapped data source for reef fish management, it is considered incompatible with existing standardized scientific surveys or lacking rigorous analysis frameworks. Our objective was to demonstrate how visual fish count survey data collected by citizen scientists can be combined with existing habitat and environmental datasets to estimate changes in patterns of occupancy and abundance of reef fishes. We constructed multi-state, multi-season occupancy models for five acanthurids, Pākuʻikuʻi,(Achilles Tang) Acanthurus achilles, Manini (Convict Tang) Acanthurus triostegus, Maʻiʻiʻi (Brown Surgeonfish) Acanthurus nigrofuscus, Whitecheek Surgeonfish Acanthurus nigricans, and Kole (Goldring Bristletooth) Ctenochaetus strigosus, across the Hawaiian Islands. The five species exhibited relatively high initial occupancy largely influenced by depth, wave energy, and substrate composition. In general, the probability of local extirpation from a site was low, but apart from Maʻiʻiʻi, the probability of an unoccupied site being colonized was also low. In the three species regularly targeted in fisheries, fishing pressure negatively effected the probability of a species remaining in an abundant state at a site. While the patterns predicted from citizen science data largely agreed with that from standardized surveys, the limitations of the available habitat and environmental data was apparent as the lack of regular collection of these data rendered many covariates as static values. Even so, citizen science seems to be a valuable management tool when an appropriate analysis framework is applied.

Riley Sokol	Comparative analysis of coral recruitment among reefs in the Big Island of Hawaii: Insights for conservation and management

This upcoming project focuses on coral recruitment in Hawai'i Island. Coral reefs are essential ecosystems that support biodiversity and provide coastal protection, and economic activities. However, reefs around the world, including Hawai'i Island face significant threats from climate change, pollution, and anthropogenic stressors. In order to protect and conserve these vital ecosystems, it is essential that we understand coral recruitment as recruitment plays a fundamental role in maintaining the health and resilience of coral reefs. This senior thesis will investigate and compare coral recruitment dynamics across different reefs in the Big Island of Hawaii. The project will utilize a combination of field surveys, 3D reef models, laboratory analysis, and statistical analysis to examine variations in larval settlement patterns, post settlement patterns, and community composition among reefs with varying environmental conditions. The findings will provide valuable information on the recruitment process and reef recovery potential of the chosen reefs. Additionally, this project will discuss the implications of the results for reef conservation and management strategies emphasizing the need for site-specific approaches tailored to the unique characteristics of each reef. This research will contribute to a better understanding of coral recruitment on Hawai'i Island and provide valuable insights for the conservation of these vital ecosystems.

ABSTRACTS

Kelli Elliot

Understanding the mutualistic relationship between invasive *Pennisetum clandestinum* (Kikuyu grass) and microplastic presence

Microplastics have been found to alter plant traits and soil communities and have been known to create soil legacies. Soil legacy is a lasting effect in the abiotic and biotic composition of the present soil that affects the current growth of plants within that community and is a common characteristic that many invasive plant species possess. *Pennisetum clandestinum* (Kikuyu grass) invasion coupled with plastic pollution poses a threat to native Hawaiian ecosystems and human health. Kikuyu grass is an invasive perennial grass commonly used as a pasture grass in Hawai'i and therefore is exposed to agricultural plastic pollution. Polyethylene is the most found plastic contaminant on earth as well as in agricultural soils. Varying shapes of microplastics are found to have adverse effects on soil pH, nutrient content, and water retention. There are few studies supporting the changes micro plastics are responsible for in soil ecosystems. The effects micro plastics have on soil has been controversial due to differing polymer types and additives that have varying outcomes on plants and soil. Also, studies have primarily focused on continental plants and have not accounted for effects micro plastics may have on island plants, more specifically invasive species that account for unique evolutionary adaptations. Therefore, this study aims to understand the relationship between varying polyethylene micro plastic shape (films, foams, and fragments) contamination and invasive Kikuyu grass in Hawai'i. Kikuyu grass will be acclimated with each plastic type as well as combined exposure of all shapes, since it is likely that all forms coexist in agroecosystems. After Kikuyu grass is exposed to microplastics by soil conditioning, physiology and growth of grass will be assessed by assessing leaf biomass, root growth and nutrient content. This research will provide the foundation for further understanding the link between micro plastics influencing soil legacy and invasive plant species victory.

Braxton Igne

Novel bioacoustic methods allow estimation of fledging success of an endangered Hawaiian bird species

Most Hawaiian forest birds, including many endangered species, are restricted to high elevation refugia in sensitive and oftentimes remote habitats. Passive acoustic monitoring (PAM) is a valuable tool for researchers and conservationists studying such species, and by leveraging machine learning algorithms, the vast acoustic datasets produced by PAM can be efficiently analyzed. The distinct juvenile vocalizations of many bird species present an opportunity for PAM and automated bioacoustic analysis to be used to assess nestling survivorship, however the potential for these tools to be employed for estimating fledgling success has yet to be assessed in Hawai'i. Here we present a case study testing the Google Perch bird classifier and a novel analytical method for estimating juvenile and adult call densities for ʻakiapōlāʻau (Hemignathus munroi) at several sites on Hawai'i Island. We demonstrate that differences in juvenile call rates between sites and over time can be estimated using these methods. We found a relationship between juvenile call rates and adult distribution, highlighting the potential applications of this method in monitoring populations and productivity of Hawaiian forest birds. Monitoring fledging success can aid in future work assessing the efficacy of conservation actions and serve as an early warning system for disease outbreaks in previously disease-free habitats.

ABSTRACTS

Annie Larson

Pāku'iku'i puzzle: Untangling environmental and biological drivers of juvenile distribution of an imperiled reef fish

Pāku'iku'i (Achilles Tang, *Acanthurus achilles*), is an herbivorous reef fish that has recently and mysteriously declined in west Hawai'i Island. To investigate the underlying causes, the Hawai'i Division of Aquatic Resources implemented a 2-year moratorium on all commercial and non-commercial fishing of Pāku'iku'i in the region. There are many knowledge gaps surrounding this species, most notably their early life history, which may be critical to the decline and hopeful rebound of this fish's population. Thus, we are examining the recruitment dynamics and relative connectivity of juvenile and adult habitats for this species in east Hawai'i Island, where Pāku'iku'i are relatively abundant. In situ behavioral observations show juvenile Pāku'iku'i paired or in small groups of adult conspecifics in shallower depths (12-14m) and of juvenile conspecifics in deeper areas (14-18m), grazing on turf algae and often near coral beds of Porites compressa. Juveniles appear relatively submissive to more territorial species, contrasting with the more aggressive and territorial behaviors characteristic of adult Pāku'iku'i. We are combining survey data of recruits and juveniles across a depth gradient with fine-scale habitat mapping and other environmental datasets to build a species distribution model that will enable us to predict habitats in West Hawai'i where juvenile Pāku'iku'i are likely to be present. Understanding the drivers of distribution and abundance of Pāku'iku'i throughout its development will directly inform the State's adaptive management plan for this imperiled species and improve the likelihood of its return to abundance in Hawaiian waters.

Christian Colo

Linking the land and sea: examining watershed nutrient sources and their riverine export under Hawai'i's changing climate

Hawai'i's tight coupling between land and sea exacerbates the increased nitrogen (N) and phosphorus (P) loading typically associated with land conversion, agriculture, urbanization, and invasive species spread. Moreover, projected changes in Hawai'i's climate and precipitation patterns are expected to further alter these nutrient fluxes. By analyzing the dissolved nutrient and particulate organic matter (POM) content of streamwater samples from the Wailuku River Watershed (WRW) in Hawai'i Island , this study quantifies seasonal and annual nutrient export in the WRW using USGS LoadEst software, determines the land based sources of riverine nutrient input through stable isotope analyses of nitrate and POM, and models changes in nutrient export under future precipitation projections. Preliminary analyses (n = 50) indicate that N-export is dominated by dissolved organic nitrogen (DON) across all river flow conditions, and $\delta 15N$-$\delta 18O$ analyses of nitrate indicate sewage and soil organic matter as the primary contributors to the N-pool. Dissolved organic phosphorus (DOP) dominates the dissolved P-pool, but total concentrations of dissolved P remain low relative to N. Using isotope source-partitioning models, the forthcoming analysis of 13C and 15N content of soil and vegetation samples collected throughout the watershed will elucidate N source regions and the role of invasive N-fixing species (*Falcataria moluccana, Ulex europaeus*) in riverine nutrient loading. Once data collection is complete in April 2024, the WRW's nutrient export dynamics will be modeled under six future precipitation projections. By analyzing these critical linkages between land and sea, the results of this study will help inform the ridge-to-reef conservation initiatives needed to adapt to Hawai'i's changing climate.

ABSTRACTS

Noah Hunt

An updated status of landbird populations in the National Park of American Samoa

The National Park of American Samoa protects some of the most intact tropical rainforest in the South Pacific. It is also prone to recurring, intense tropical cyclones, such as Gita in 2018, which, interacting with anthropogenic threats, have driven population declines of native seed dispersing birds. Long-term monitoring can measure post-cyclone recovery and help determine management effectiveness and potential needs. In 2011, 2018, and 2023, the islands of Tutuila and Taʻū were surveyed for forest birds following a point-transect distance sampling protocol. Detection probability models, which account for undetected birds, were fitted to species-specific count data to obtain density estimates by island, with variances calculated from bootstrap resampling. Based on two-sample z-tests, we report significant decreases in the Tutuila population of Tīʻotala (*Todiramphus sacer*). On Taʻū, populations of ʻIao (*Foulehaio carunculatus*) and Miti Vao (*Aplonis tabuensis*) declined since 2018 and the Fuia (*Aplonis atrifusca*) continued to decline since 2011. Formerly hunted nearly to extirpation, Lupe (*Ducula pacifica*) and Manutagi (*Ptilinopus porphyraceus*) significantly increased on Tutuila, suggesting efforts to protect these species from hunting is facilitating population growth and recovery. However, Manuma (*Ptilinopus perousii*) remained rare, with insufficient detections to model density, and the elusive Vai (*Zapornia tabuensis*) were detected only in 2018. Overall, populations have not recovered to pre-Gita levels. Decreased populations may signal that synergistic disturbance effects are exacerbating existent threats. These threats will likely perpetuate further population declines. More frequent surveys within and beyond the park confirming population trajectories could benefit management decisions to conserve declining, rare species.

Richard Masse

Comparative life history and reproductive biology of five nearshore surgeonfish species around Hawai'i Island

Herbivorous fishes, such as surgeon fishes (Family Acanthuridae) play an important role in maintaining coral reef health while also supporting important subsistence and recreational fisheries. Balancing these two fundamental roles requires a good understanding of basic biology and life history; however, this is understudied or lacking entirely for many reef fishes. In support of the development of herbivore management rules in Hawai'i, our objective was to compare the age structure, growth rates, and reproductive biology of five common surgeonfish species sympatric to nearshore habitats around Hawai'i Island. Four species: Pāku'iku'i,(Achilles Tang) *Acanthurus achilles*, Manini (Convict Tang) *Acanthurus triostegus*, Kole (Goldeye Bristletooth) *Ctenochaetus strigosus*, and Umamualei (Orangespine Unicornfish) *Naso lituratus* are commonly targeted by fishers, while Ma'i'i'i (Brown Surgeonfish) *Acanthurus nigrofuscus* is rarely targeted. Otoliths and gonads were removed from harvested individuals to estimate age and reproductive condition. The five species exhibited similar growth patterns with individuals reaching 60-80% of their maximum size within the first 1-2 years. Ages of Pāku'iku'i routinely exceeded 20 years while the other four species tended to be younger (10-12 years). Pāku'iku'i also lacked seasonality in their reproduction, with actively spawning individuals encountered year-round, whereas the other four species exhibited distinct reproductive seasons of differing lengths. There was evidence of minor, intraspecific differences in growth around Hawai'i Island, but these were likely inconsequential in a management context. Size limits may not prevent truncation of the age distribution of surgeonfish populations, but seasonal closures protecting spawning adults may be a viable strategy for some species.

ABSTRACTS

Leecia Wade-Daniel

Feeding ecology of sport fish in the Gulf of Alaska using gut contents and stable isotope

Feeding ecology is an important tool for studying marine food webs as it provides insights into how ecosystems function including a comprehensive understanding of their health and resilience. Two of the primary ways dietary patterns can be assessed are by examining stomach contents and with stable isotope analysis. Stomach contents provide short-term information on what the organism consumed, whereas stable isotopes offer insights into diets over a more extended period of time, providing a broader understanding of food web structure and energy flow in aquatic environments. While both methods have their pros and cons, when utilized together, can yield a more comprehensive depiction of food webs. The aim of this study was to examine the gut contents and analyze the stable isotopes of 10 sport fish species from the Gulf of Alaska including Quillback Rockfish (*Sebastes maliger*), Yelloweye Rockfish (*Sebastes ruberrimus*), Black Rockfish (*Sebastes melanops*), Pacific Halibut (*Hippoglossus stenolepis*), Pacific Cod (*Gadus macrocephalus*), Kelp Greenling (*Hexagrammos lagocephalus*), Lingcod (*Ophiodon elongatus*), King Salmon (*Oncorhynchus tshawytscha*), Silver Salmon (*Oncorhynchus kisutch*), and Pink Salmon (*Oncorhynchus gorbuscha*). Gastrointestinal tracts (n=159) and muscle tissue samples (n=100) were collected from donated carcasses provided by charter companies based in Homer, Alaska, and subsequently shipped to Hilo, Hawai'i for processing. Stomach contents were thawed, processed, and measured volumetrically, with prey items identified to the lowest taxonomic level, given their degree of digestion. Muscle tissues were analyzed for carbon and nitrogen stable isotopes. Approximately 65% of the gastrointestinal tracts collected contained identifiable contents. Results indicate that S. melanops primarily consume small fish species such as smelts and a variety of invertebrates including gastropods, crustaceans, and echinoderms, while, S. ruberrimus, typically found in deeper waters and larger in size, prefer larger fish and cephalopods as their main prey. G. macrocephalus diets varied widely with opportunistic feeding habits across different trophic levels including both invertebrates and fish. H. stenolepis diets however, varied with size class, as smaller individuals predominantly consumed invertebrates, mostly crustaceans, while medium-sized H. stenolepis had a mixed diet consisting of both invertebrates and fish, and larger individuals primarily consumed fish. H. lagocephalus mostly fed on benthic invertebrates such as gastropods and mollusks, indicating a reliance on resources lower in the food web, while O. elongatus, in contrast, preyed primarily on larger fish species, including salmonids but also fed on cephalopods, reflecting their higher position as apex predators. O. tshawytscha and O. kisutch fed predominantly upon small schooling fishes including capelin, smelts, and potentially other small fish species, indicating intermediate level interactions within the food web. By comparison, O. gorbuscha mostly consumed zooplankton, although occasionally supplementing their diet with small fishes. Results of carbon and nitrogen stable isotope analyses will also be discussed. These findings highlight the intricate nature of the food web and the potential for predator competition among species inhabiting the Gulf of Alaska, which is particularly significant due to fisheries in Alaska being one of the largest worldwide. Understanding the entirety of the food web is crucial for ensuring the continued sustainability of global fisheries operations.

ABSTRACTS

Sofia Ferrería

Functional traits and 3D complexity explain reef fish assemblage at Kaloko-Honokohau Marine National Park

Scleractinia corals produce complex structures that provide shelter, food, and reproduction sites for reef fish. While coral-fish associations have been a focus of coral reef ecology for decades, critical questions regarding how different fish interact with specific characteristics within the reef habitat remain unanswered. This study employed a multi-faceted approach to unravel the intricate relationships between coral traits, habitat complexity, and fish functional structure in Kona, Hawaii. Principal Coordinate Analysis (PCoA) coupled with hierarchical clustering identified Crypsis, Water Column Position, and Body Shape as highly influential traits in shaping the multidimensional fish functional space. Generalized Linear Mixed-Effects Models (GLMM) further revealed that habitat complexity and coral traits significantly explained the abundances of four out of seven fish functional clusters, with Vector Terrain Ruggedness (VRM) and the percent cover of mounding, knobby, and encrusting corals emerging as key drivers (GLMM $p < 0.05$). Moreover, the abundance of specific trait values related to trophic groups and behavioral fish traits were significantly influenced by coral traits, habitat complexity, or their interaction (GLMM $p < 0.05$). Multivariate generalized linear RQL models with fourth-corner coefficients uncovered significant interactions among fish traits and habitat characteristics, improving the prediction of species abundance (MGLM $p < 0.05$). Habitat complexity and coral traits are fundamental in structuring marine ecosystems, providing essential habitat, shelter, and resources for fish species. These findings underscore the importance of integrating coral morphological traits and habitat complexity metrics into conservation and management strategies to uphold diverse and resilient fish communities amidst ongoing environmental changes.

Lauren Runnels

Chemical analysis of *Chondria tumulosa* (Rhodophyta)

The macroalga, *Chondria tumulosa* (Phylum Rhodophyta), is found in the remote Northwestern Hawaiian Islands (NWHI). The NWHI are part of the Papahānaumokuākea Marine National Monument. The NWHI are mostly uninhabited, have minimal direct anthropogenic influence, and restricted fisheries. In 2016, National Ocean and Atmospheric Administration (NOAA) researchers noted an unusual red, turf-forming macroalga on Pearl and Hermes Atoll. After taxonomic and genetic analyses, the alga was identified as a new species, *Chondria tumulosa*. The red macroalga *C. tumulosa* covers the outer reef slopes in thick monospecific mats and has spread to Midway Atoll. In the benthic reef community in the NWHI, *C. tumulosa* shows typical invasive characteristics, e.g. fast growth, rapid reproduction, and high dispersal ability. Scientific divers noted a lack of herbivory on *C. tumulosa* which suggests that the alga may have secondary metabolites that deter the herbivores. *Chondria tumulosa* samples collected in 2021 and 2023 were frozen, shipped to O'ahu, flown to Hawai'i Island, cleaned, freeze-dried, and stored at 20°C until chemical extraction. Solvent extractions utilized methanol, dichloromethane/methanol (8:2), and hexane. Extractions were filtered followed by solvent removal. Twenty-six compounds were identified from the major peaks after manual inspection of the Liquid Chromatography Mass-Spectrometry (LC-MS) analysis of the methanol crude extract. Fractionation of the methanol crude extract was accomplished with column chromatography. The collected compounds and their bioactivities may contribute to the chemical ecology of this alga.

ABSTRACTS

Rachael Pecoraro

Assessing the population dynamics of Hawaiian green sea turtles in coastal waters of Hawai'i Island

Changes in populations of the widely prevalent Hawaiian green sea turtle (Chelonia mydas) found in the Hawaiian archipelago can lead to alterations in reef ecosystem ecology. Therefore, making population abundance estimates is important for conservation and proper management and the use of mark-recapture studies can provide crucial information to understand population trends. In 2023, Hawaiian green sea turtles were captured, tagged, and released at three locations on Hawai'i Island, USA (Punalu'u on March 31, n=15; Puako on April 17, n=12; and Hualalai Beach Resort on May 2, 2023, n=6) using a Dremel moto tool to etch unique ID numbers 1-2 mm deep on the lateral scutes of the carapace, and highlighted with a white non-toxic epoxy paint. Snorkel surveys were conducted bi-weekly, starting 5-7 days after the tagging event. Three replicate 30-minute in-water surveys were conducted, followed by three replicate 15 minute on-shore beach surveys to account for basking sea turtles. A GoPro 11 camera was used to photograph visible tags and document turtle size classes. Tag longevity was assessed using a visibility score ranking from 5 to 0, with a score of 5 being 100% visible, and a score of 0% visible representing complete algal overgrowth without carapace tags being identifiable. Aerial drone surveys with a DJI Air 2 drone were concurrently conducted at the Punalu'u and Puako sites. After 90 days, tag retention visibility scores across all three sites averaged 4.6 ±0.42, while after 270 days, tag retention scored an average of 1.15 ±0.90, and zero tags were still sighted at Hualalai. Of the primary study sites, tag retention was highest at Punalu'u, with a visibility score of 1.57 ±0.50 at 330 days. Results indicate a significant difference in the average number of sea turtle sightings per location with 12.75 ±5.19 at Punalu'u, 13.10 ±7.03 at Puako, and 0.70 ±1.11 at Hualalai per survey ($F = 32.47$, $p < 0.001$). There was also a significant difference in the number of tagged sea turtles identified at each location, with an average of 40.3% ±22.6 identified at Punalu'u, 17% ±21.2 at Puako, and 11.8% ±23.7 tagged turtles at Hualalai. Size classes of turtles per survey also differed significantly, with medium sized turtles making up the greatest proportion (8.77 ±5.83), significantly higher than both large (2.04 ±2.49) and smaller sized (0.43 ±0.94) turtles (F=44, p=0.065). Population abundance model estimates using the Lincoln-Peterson Index predicted a significantly higher resident population at Puako (146.17 ±63.26) compared to Punalu'u (52.08 ±17.73) and Hualalai (7.17 ±2.32). Finally, this study found an underestimate of almost 4 sea turtles per survey occurred when using drones (9.06 ± 3.34) as opposed to traditional snorkel surveys (13.03 ± 5.69). This study exemplifies the critical role of mark-recapture techniques and innovative technologies in understanding and conserving the Hawaiian green sea turtle population. These findings also provide valuable insights into sea turtle population dynamics and habitat use, emphasizing the need for continued monitoring and conservation efforts to protect these sentinel marine species and the ecosystems they inhabit.

Aralyn Hacker

Hollings preparation program: Coral species abundance and diversity synamics in response to mass bleaching events in Lisianski Island from 2017, 2019 and 2021

Understanding the impacts of mass bleaching events on coral reef ecosystems is crucial for their conservation and management. This study focuses on one survey site in the Northwestern Hawaiian Islands, specifically Lisianski Island. The reef was surveyed over three years using Structure from Motion Photogrammetry to assess coral species abundance and diversity before and after the 2014-2016 El Nino event. Through the tracing of corals using ArcGIS, species composition and diversity patterns were analyzed. Prior to the bleaching event, the site was a *Montipora flabellata* dominant reef. However, post-bleaching, this species was replaced by *Montipora capitata*. These findings highlight the resilience and adaptation potential of coral communities in response to environmental stressors and emphasize the importance of continued monitoring efforts in the face of climate change-induced disturbances.

ABSTRACTS

Makoa Pascoe

Temporal and habitual observations of *Octopus cyenea* using a stationary rotational live camera

Octopuses are known for their remarkable complexity and adaptability. They play a vital role in the global seafood industry and hold cultural significance for Pacific Islanders. Using the MEGA lab live feed camera, time of observation, exhibited habits, and interaction of *Octopus Cyanea* with other fish were recorded. This was done to gain a better understanding of the temporal and habitual patterns of *O. Cyanea* within the Hawaiian Islands. The number of observations were compared by month and Hawaiian moon phase. This showed a high number of observations of *O. Cyanea* within the months of January, August, and December. Analysis also shows that the moon phases, ʻOlepau, ʻOlekūkahi, and Hilo (Waxing Gibbous, Waxing Cresent, and new moon) had the most observations. Parupeneus multifasciatus was show to interact with *O. Cyanea* the most within this study. With the use of advanced technologies such as the MEGA Lab live feed camera help provide a better understanding of Octopus and the role they play within the marine ecosystem.

Natalie Graham

Molecular monitoring of introduced arthropods and biodiversity dynamics

The major pathways for the spread of introduced terrestrial species that cause environmental and economic damage are the shipment of goods and movement of people. There is currently no system available to rapidly identify and monitor introduced terrestrial arthropod species. Traditional arthropod monitoring is extremely time-consuming because of the challenges of sorting and identification. We are developing an Early Detection of Introduced Arthropods (EDIAs) monitoring system that uses field sampling and next generation sequencing (NGS) technology to speed the identification and tracking of introduced arthropod species in real-time. To test our approach we are conducting field studies on three different island chains in the Pacific (Hawaiian Islands, Mariana Islands, Okinawa) that differ in habitat types and patterns of biodiversity. Using DNA metabarcoding of arthropod communities from traditional sampling methods and environmental DNA (eDNA) surveys, we demonstrate major differences in community composition, and alpha and beta diversity among areas differing in anthropogenic impact. We also show that nativeness status can be predicted from DNA sequences even when species are not yet identified or in on-line genetic repositories. Our intent is to make our approach suitable for use by stakeholders for applications in biosecurity, conservation, agriculture, and human health.

Ty Shimabukuro

Change in growth rate and form of *Montipora capitata* under light reflecting branching coral cultivation techniques

The loss of coral reef habitats worldwide has increased the need for coral restoration techniques. Ex-situ growth of fragmented corals has been used to help coral restoration around the globe. However, due to the slow growth of Hawaiian corals, compared to corals from elsewhere in the tropics, the Hawaii Department of Aquatic Resources has developed a technique for cultivating the Antler coral, *Pocillopora grandis*. The corals are mounted on pillar structures with weighted bases surrounded by reflectors. This has been successful for quickly growing these branching corals for outplanting, however it has not been utilized for Hawaii's other coral species. The coral *Montipora capitata* was chosen to be grown under similar conditions for this project due to its hardy nature, local availability, and variable growth form. Five corals were collected and fragmented into eight pieces each. Four fragments of the same coral were mounted per concrete pillar and placed within a one-hundred-and-sixty-gallon tank at the Pacific Aquaculture and Coastal Resources Center. Pillars were split into a control group of five pillars without reflectors and a group of five pillars flanked by reflectors (n=10). Coral growth was measured bimonthly for overall increase in surface area and an increase in branching growth using Fiji: ImageJ mapping software. The null hypotheses for this experiment are that there will be no difference in growth rate or an increase in branching growth. At present, there has been no significant difference in growth rate or branching growth using a Kruskal-Wallis Test (p> 0.05). However, this project is currently only on its fourth bi-monthly growth rate check. By the time of the presentation, four more bi-monthly growth checks should be completed, giving a more accurate p-value. Final conclusions cannot be drawn yet, but as of now, there is no significant difference in the growth rate and growth form of Montipora capitata grown with and without reflectors.

ABSTRACTS

Rebecca Cahill

Morphological scaling and ontogeny of juvenile blacktip sharks (*Carcharhinus limbatus*) in Hilo Bay, Hawai'i, USA

Morphological scaling changes across ontogeny can influence the locomotion and behavioral strategies of an animal. Scaling in juvenile blacktip sharks can also be influenced by environmental conditions in their nursery habitat, such as salinity, temperature, and prey availability. Hilo Bay, Hawai'i, is a known nursery habitat for many marine species, including oceanic blacktip sharks (*Carcharhinus limbatus*), and previous studies have found that juvenile sharks reside inside the Bay for their first three years. Allometry of elasmobranchs, including *C. limbatus*, has been extensively studied, although very few studies have focused on juvenile blacktip sharks in the Pacific. The purpose of the present study was to evaluate morphometric data on juvenile oceanic blacktip sharks to determine whether: 1) There was a difference between field measurements and digital measurements using photogrammetry from field collected photos 2) Juvenile blacktip sharks scale isometrically or allometrically as they grow 3) If growth differences are sexually dimorphic in juvenile blacktip sharks. Sampling cruises were conducted within Hilo Bay, Hawai'i during May to July in 2016, 2022, and 2023, where sharks were caught, measured, weighed, tagged, and released. Ten linear body measurements were collected in the field, and photographs of the caudal, dorsal, and pectoral fins were taken for photogrammetry calculations of each fin's area. Results indicated that there was no statistically significant difference between in field and photogrammetry data collection across four field measurements (all p-values were < 0.05). Regression analysis revealed that pre-caudal length, dorsal fin width, mouth width, and girth measurements scale isometrically, meaning they scale at the same rate as the overall length of the body and maintained a constant proportionate size throughout development. While pectoral fin height, dorsal fin height, weight, mid-caudal length, and total length scale allometrically, meaning that they will have a positive or negative growth rate when compared to the rest of the body. All calculated fin areas (caudal, dorsal, pectoral) were compared to body length and scale allometrically as well. Principal component analysis (PCA) revealed differences in sharks among age classes, which were most likely driven by ontogenetic changes in body size and specific changes in body shape. PCA analysis also revealed that there is a high degree of variability in the length at birth for newborn juvenile blacktip sharks. Results from PCA also indicated that there was no sexual dimorphism in juvenile blacktip sharks. Similar studies have found that negative and positive allometric growth rates may allow for a better understanding of how juvenile sharks adapt to nursery habitats during their early life history. These results suggest adaptations in morphological scaling across the body and, especially in the pectoral, dorsal, and caudal fins, may be important factors in early development and relate to environmental conditions, locomotory needs between juvenile and adult sharks, and ultimately, whether juvenile sharks become effective predators or are potential prey for larger sharks.

ABSTRACTS

Raunak Sen	What are endemic Hawaiian crickets teaching us about evolutionary biology?

We are all curious about how so many species evolved on this earth. Studying how new species form is basically understanding how populations diverge and get reproductively isolated. Ecological speciation is a widely accepted theory, and it is believed that ecology almost always plays a role in speciation. But non-ecological modalities like genetic drift or divergent sexual selection are also important. The Hawaiian crickets of the genus Laupala is an exciting system to investigate how divergent sexual traits contribute to reproductive isolation. Species in this genus have different male songs and corresponding female preferences for the song and the genetic loci of song and preference are coupled. A lot of work has been done to show that divergent sexual traits play an important role for speciation in this group but the study of the ecology of these species has been lacking. To bridge this gap, I am investigating the role of ecology in the diversification of this group. I am studying the dietary, habitat, and temporal activity niches of two closely related species which occur in sympatry on the Big Island of Hawaii, and plan to calculate niche overlap/divergence between them. Habitat and temporal niche are calculated by field sampling methods whereas stable isotope analysis is used for understanding dietary niche. Documenting niche divergence will not automatically suggest that ecological speciation is at play. However, the opposite finding, that strongly reproductively isolated species show limited ecological niche divergence could indicate that ecological speciation is unlikely to have driven the evolution of reproductive isolation in this group. Preliminary data shows that they share the same habitat and eat the same food but sing at different times of the day. This is especially important for preventing acoustic interference, which reinforces the importance of sexual traits in this group. Our study shows that ecology probably has less to do with speciation in our genus and non-ecological speciation hypotheses should be perused more.

Kainalu Steward	Re-birth of Lalo: Assessing atoll island resilience following a hurricane event in Papahānaumokuākea

As climate change accelerates globally, improved understanding of exposure and vulnerability to climate induced impacts becomes increasingly vital in navigating the future of atoll island communities. Sea-level rise (SLR) is identified as the biggest threat to atolls due to their low-lying elevation. Future SLR estimates exceed the elevation of many atoll islands within the next 100-200 years. Lalo is an open atoll consisting of a large, crescent-shaped reef and multiple sandy islets located within the Papahānaumokuākea Marine National Monument (PMNM). In October 2018, a category 3 hurricane named Walaka swept through Lalo, devastating the terrestrial and marine habitats and nearly wiping out entire sandy islets. Many of the impacts (e.g. shoreline erosion, accretion, over wash, loss of reef, etc.) of extreme storms are similar to SLR but occur immediately rather than over long-time scales (50-100+ of years). Following this event, there was an urgent need to understand the future stability and natural resilience of Lalo. This study quantified the shoreline and island area recovery of sandy islets between October 2018-2021. Using high resolution satellite derived imagery and ArcGIS programs, this study identified the rate of erosion and accretion among Lalo as well as areas that show consistent stability. This study found that an islet that was nearly lost (95% in area) due to Walaka recovered by 56% in area within three years. These results, using a near instantaneous hurricane event, will help us better understand the long-term impacts of SLR to Lalo. The overarching goal of this project is to better understand these environmental pressures at short- and long-term timescales that will contribute to developing an action plan to include best management practices and strategies for the future of Lalo. Additionally, this project led by Native Hawaiian scientists, aimed to incorporate Indigenous values and knowledge within the overall research process.

ABSTRACTS

Lauren Smith

Using bioacoustics to assess the success of incompatible insect technique on Hawaiian forest bird population recovery

In Hawai'i, more than two-thirds of native forest bird species have gone extinct since the arrival of humans, largely driven by introduced avian diseases vectored by non-native southern house mosquitoes (*Culex quinquefasciatus*). On the island of Maui, the critically endangered kiwikiu (*Pseudonestor xanthrophrys*) and ʻākohekohe (*Palmeria dolei*) are likely facing extinction in as few as five years. To prevent extinctions and persistent declines in numerous species, conservation partners are employing the Incompatible Insect Technique (IIT) on a landscape scale to suppress mosquito populations and, in turn, decrease disease transmission. To monitor the response of the bird populations to IIT, we are deploying 80 autonomous recording units (ARUs) along transects inside and outside IIT treatment areas in The Nature Conservancy's Waikamoi Preserve and Haleakalā National Park's Kīpahulu Valley. We are processing these acoustic data using the machine learning classifier Perch, a new analytical method co-developed by the UH Hilo Listening Observatory for Hawaiian Ecosystems (LOHE) lab and Google Research. Perch identifies bird calls and calculates call densities, from which we estimated relative abundance and occupancy for six native species. We are also using begging call densities to estimate breeding success of each species. By comparing these data across breeding seasons, we expect to detect any changes in relative abundance, occupancy, productivity, and elevational shifts in range that may result from the suppression of mosquitoes and disease.

Sri Butz

Analyzing the relationship between Pāku'iku'i age and sagittal otolith weight

In recent years, the Pāku'iku'i (Achilles Tang, *Acanthurus achilles*), a species of surgeonfish (Acanthuridae), has experienced declines in its population in west Hawai'i Island. As reef herbivores, Pāku'iku'i play a vital role in the balance of the marine ecosystem in Hawai'i, and so their decline has concerned the State resource management agency, who placed a temporary ban on all fishing for this species in west Hawai'i Island. To fill critical knowledge gaps about this species' biology and life history, a recent study examined patterns of Pāku'iku'i age and growth, whereby age was visually estimated by counting annuli on sagittal otoliths. The present study sought to validate these age estimates by measuring the weight of the otoliths to the nearest thousandth of a gram and examining the relationship between otolith weight and estimated age. If a strong relationship were to exist, then weighing otoliths could be used as a quicker method of aging the fish than the relatively more time- and labor-intensive method of cutting, mounting, polishing, and visually estimating the age. We found that the otolith mass-age relationship in Pāku'iku'i was consistent with that of other surgeonfishes in the Pacific and Atlantic regions. However, collection site seemed to have a stronger influence on the relationship for Pāku'iku'i than what has been reported for other species. Sex of the fish did not meaningfully influence the relationship. Based on these findings, the otolith mass-age relationship in Pāku'iku'i is not likely to be a useful means of quickly and reliably estimating the age of this species. Future studies will continue to study the possible reasons for decline of Pāku'iku'i so that its population may make a recovery in West Hawai'i.

ABSTRACTS

Noah Hunt

Distance estimation based on maximum power level of recorded bird vocalizations in Hawai'i

Long-term monitoring is necessary to determine trends in animal populations, which inform management decisions. Currently, Hawaiian forest bird populations are surveyed using distance sampling, which accounts for undetected individuals, but assumes accurate distance estimation from human surveyors, who may estimate distances differently. We investigated whether unbiased, accurate distances to birds could be obtained from automated recording units (ARUs), using the maximum (MPL) or average (APL) power level of a recorded sound. We recorded bird vocalizations while simultaneously measuring their distances to an ARU using rangefinders, their orientation to the ARU, and weather conditions. We fit a linear mixed effect model to all bird vocalizations and generalized linear models to individual species by call types to predict distances from power level, accounting for orientation of the bird, rain intensity, and wind strength. Generally, distance was negatively correlated with MPL, with rain and wind significantly affecting this relationship. Vocalizations from only four species could be used to accurately predict distances. Song distances of 'Apapane (*Himatione sanguinea*) were best predicted by the frequency of greatest energy and MPL, 'I'iwi (*Drepanis coccinea*) call type II, and Yellow-fronted Canary (*Crithagra mozambica*) songs were best predicted by MPL alone; and Warbling White-eye (*Zosterops japonicus*) twitter calls were best predicted by APL and wind. Variability in sound transmission due to environmental factors not measured and bird modulation of their vocalization energy complicates distance estimation from single ARUs, suggesting that using a multi-ARU array and the time of arrival method may be more effective for improving distance estimation.

Amy Durham

Intraspecific variation in home range size, overlap, and movement behaviors of 'Io - the Hawaiian Hawk (Buteo solitarius)

'Io (*Buteo solitarius*) are the last remaining endemic hawk species across the Hawaiian archipelago. Their recent federal delisting, alongside their cultural and ecological significance, emphasizes the need for sustained long-term monitoring efforts. However, home range estimates for the species are outdated and research regarding their spatial behaviors is deficient. Understanding how intraspecific variations affect movement patterns, space-use requirements, and intraspecies interactions is crucial for population-level inferences yet largely unknown for 'io. This study used solar GPS-GSM devices and advanced movement analysis to compare home range sizes across sex/age groups, movement strategies, and between home range estimators. It also assessed space-use overlap to investigate pair-wise interactions and identify likely encounter locations. Tracking data revealed variations in movement strategies that significantly influenced home range size, with no discernible impact from sex and age. Despite high site fidelity among all individuals, resident birds meeting their foraging needs within their home range had smaller ranges than those commuting outside it. Additionally, an average of 10% shared utilization distribution was found across pair-wise overlaps and up to 97% was observed. Expected encounters primarily occurred along home range boundaries, but movement behaviors influenced high encounter probability even within core use areas, highlighting the likelihood for intraspecies interactions for this highly territorial species. This study emphasizes the critical role advanced technology and analytical tools has for effective species management and conservation and it encourages further research on habitat fragmentation and diet to better understand 'io's dependence on introduced species and human-altered landscapes in Hawai'i.

ABSTRACTS

Evelyn Grace Gardiner

Movement patterns of blue-lined long-spine urchins (*Diadema savignyi*) at Onekahakaha, Hilo, Hawai'i, USA

Diadema savignyi is the most widely distributed long-spine urchin species, ranging from the east coast of Africa to the Indo-Pacific, and have spread to many Pacific Islands. They are important bioeroders for reef ecosystems and aid in the overall health of coral reefs by limiting overgrowth of algae. Many *Diadema* spp. exhibit specific movement patterns and behaviors that appear to be related to diurnal cycles, including crevice fidelity, or individuals returning to the same crevice/shelter location after foraging at night. Few studies, however, regarding *D. savignyi* movements have been performed. The purpose of the present study was to track movement patterns of *D. savignyi* across diurnal and tidal cycles. A preliminary study was conducted to determine the most efficient method for tagging *D. savignyi* and to verify tag retention over a 24-hour period. A tag effects study was also completed in order to establish that tagging was not influencing movement patterns compared with untagged individuals. Eight, 24-hour trials were conducted where individuals (n=5) were located, identified, and had their position marked with a metal marker every 2 hours, and distance and direction were recorded (total n=40). Results show that *D. savignyi* travel almost 2 m farther and 1 m/h faster during nighttime, compared to daylight hours. Specifically, *D. savignyi* travel 0.415 ± 0.335 m during the day and 2.11 ± 0.923 m at night (t= -13.80, p=<0.001), and at speeds of 0.209 ± 0.168 m/h during the day and 1.00 ± 0.429 m/h at night (t=-13.94, p=<0.001). No relationship was found between the size of the urchins and the distances traveled. Crevice fidelity was observed in only 27.5% of *D. savignyi* sampled, likely due to the lack of predatory fish species in the area and presence of readily available crevices/shelter. Understanding the movement patterns of *D. savignyi*, and thus other *Diadema* spp., can provide insight on the interactions and processes that occur within coral reefs, allowing for further action to be taken to protect these biodiverse and crucial ecosystems. Results from this study were able to provide specific information on *D. savignyi* movement patterns, as well as the unique behaviors that influence those movements and establish them as ecologically important species.

Dominic Brown

Understanding the covering behavior of *Tripneustes gratilla*

The collector sea urchin, *Tripneustes gratilla*, is a species found in warm shallow waters of the Indo-Pacific region. This urchin exhibits a unique behavior of 'covering' where it uses its podia to place a variety of materials over its body, which is hypothesized to be done for camouflage, sunscreen, and food storage . This study explores this behavior in relation to sunlight exposure to determine if *T. gratilla*'s exhibits preferences in covering material. Through observations conducted in both sunlit and shaded environments, this study examined the utilization of various materials for covering, including algae (*Padina* spp., *Ulva fasciata*, *Halymenia hawaiiana*) and plastics with differing opacities. Opacity, defined as the percentage of light blocked, served as a primary factor for material selection. The findings indicate that *T. gratilla* tends to cover itself with a greater quantity of materials when exposed to sunlight compared to when it is in a shaded environment (F = 8.08, p = <0.008). Furthermore, our observations reveal that *T. gratilla* exhibits a distinct preference for covering with *Padina* spp., followed by *Ulva fasciata* and opaque plastics, while *Halymenia hawaiiana* and translucent plastics are less favored. This preference suggests a relationship between sunlight exposure and covering behavior, highlighting *T. gratilla*'s ability to discern material opacity. This research aims to contribute to our understanding of the ecological strategies employed by *T. gratilla* for protection and adaptation to its environment.

ABSTRACTS

Abigail Lewine

Assessing Fibropapillomatosis Trends in Green Sea Turtles (Chelonia mydas) Across Hawai'i Island

Green sea turtles (*Chelonia mydas*) in Hawai'i are a threatened species protected by both state and federal regulations. Hawaiian green sea turtles face a wide variety of issues, including Fibropapillomatosis (FP). FP is a disease characterized by tumors affecting both external and internal organs, with the herpesvirus Chelonid herpesvirus 5 (ChHV5) identified as the likely causative agent. This study investigated spatial and temporal trends in FP among Hawaiian green turtles, focused on seven locations across Hawai'i Island with known coastal sea turtle populations including Onekahakaha Beach Park, Carlsmith Beach Park, Leleiwi Beach Park, Richardson Ocean Park, Punalu'u Beach, Hōnaunau Bay, and Puako Bay. Snorkel surveys were conducted from September to February in 2023-2024 (n=24). During each survey, data were collected on the number of turtles observed, size of each turtle observed, and the presence and severity of FP tumors using standardized protocols from previous studies. Replicate water samples (n=3) were collected at each survey location and temperature, dissolved oxygen, and salinity were measured for each sample. Water samples were then filtered and analyzed for levels of nitrate and nitrite. Sea turtle survey data were compared with historical data from snorkel surveys using the same methodology from 2007-2022 (n=194). Variations in tumor incidences across the various locations ($H = 18.575$, $p = 0.005$) were observed during this study. The highest average tumor score per survey was found at Leleiwi (2.17± 3.33), located on the East side of the Island, whereas Hōnaunau, located on the West side of the Island, exhibited the lowest average tumor score per survey (0.38± 0.74). This variation may be due to differences in environmental conditions and water quality parameters between locations. Historically, turtle abundance was greatest at Puako with 10.9 ± 7.0 turtles (mean ± SD) ($H = 55.740$, $p < 0.001$), and no significant difference was found among the presence of FP tumors and the size of the turtle. Preliminary results indicate a decrease in the presence of FP tumors over time from 2007 to 2024 ($H = 39.367$, $p < 0.001$) with 2007 having the highest number of FP incidences and 2019 having the lowest number of FP incidences. Throughout the years, a relatively steady decline was observed with the addition of relatively small spikes in 2010 and 2022. These results indicate that occurrences of FP throughout Hawai'i Island have decreased significantly over the past decade. Findings from this study provide valuable insight into the spatial and temporal patterns of FP in Hawaiian green sea turtles across Hawai'i that will be valuable for conservation and management efforts aimed at protecting this species.

ABSTRACTS

Keleni Kuualoha Faanunu

Use of molecular techniques such as edna in conservation efforts

With the growing environmental pressures such as climate change, the interconnectedness of human, animal, and environmental health becomes more prominent. Therefore we must adopt a holistic, one health approach as animal health impacts environmental health which influences human health and vice versa. Our area of interest is Kipuka Puaulu, which is considered a refuge for extinct or endangered species, from habitat fragmentation, direct exploitation, avian malaria, human disease, and vectors such as mosquitos. This environment contributes to the bird's health by providing a stable habitat, and an abundance of food and water. This study utilizes the innovative technique of environmental DNA (eDNA) to provide community data of existing bird, arthropod, and plant species. For instance, white eyes are known to now replace endemic pollinators so our data will show if this is true in the local area as well. It will also confirm the sightings of presumably extinct species such as the ʻŌʻū bird (*Psittirostra psittacea*) which is a native honey-creeper of the family Fringillidae known for its distinctive parrot-like bill and known to be a fruit-eating bird. We can even determine potential bird prey using invert primers. We will collect eDNA from washing the leaves and fruit of trees where the ʻōʻū might perch and from mosquito blood meals. Vegetation eDNA samples can be collected non-invasively by washing distilled water over a plant surface and then filtering that water over a 0.45 µm pore diameter filter membrane filter funnel. We will collect 6 samples along three 30 m transects, with paired sampling each 5 m. The transects will be sampling laid down across the 1.2 mi circular trail a minimum of 100 m apart, we will sample both sides of the trail (15 m in on each side of the trail). This will be a total of 36 samples for the vegetation sampling. We will collect blood-fed mosquitoes opportunistically using protocols for sampling *Culex quinquefasciatus* that have been developed at UH Hilo and USGS Pacific Island Ecosystems Research Center (PIERC). We will also use a dual-indexing PCR method and sequence to 30,000 reads on an Illumina MiSeq with V3 300 Paired End sequencing. The timeframe of this project is 2-6 months from collection (Days 1-2), Sample Preparation and Extraction (Days 3-10), Illumina Library Preparation and Sequencing (1 Month), Bioinformatics and Data Analysis (1 Month). Our community biodata at the national park will assist for future planning or policies that can be used to dedicate resources to conserve endemic species, and thwart invasive species. It can also influence plans for public engagement or educational opportunities especially in the national park's tourism sector. Other researchers can also use the data collected as a standard for similar studies.

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ABSTRACTS

Karyne Hatch

Variations in emergent and cryptic invertebrate species throughout different tides and times of day at Onekahakaha, HI, USA

Mobile benthic marine invertebrates are known to follow a circadian rhythm that allows them to anticipate numerous changes within their environments. Many different marine invertebrates have shown higher rates of emergence nocturnally, possibly due to the lack of visual predators present. Some of these invertebrates remain cryptic at night, however, and those emergent species are typically opportunistic detrivores that feed and recycle nutrients during nighttime hours. In this study, diurnal and nocturnal behaviors were examined across different times of day (day, night), tidal changes, (high tide, low tide), and water quality parameters (temperature, salinity, and D.O.). Snorkel surveys were conducted in an enclosed tidepool located at Onekahakaha, Hawai'i, USA. Replicate quadrats (1m2) were placed along a 20m transect line and used to calculate benthic cover as well as count individual invertebrate species. Animals were categorized as emergent or cryptic species depending upon their location within the quadrat. *Echinometra mathaei* (pale rock-boring urchin), *Plakobranchus ocellatus* (ringed sap-sucking sea slug), *Diadema paucispinum* (long-spined sea urchin), *Tripneustes gratilla* (collector urchin), *Euapta godeffroy* (lion's paw sea cucumber), and *Holothuris pervicax* (stubborn sea cucumber) were the six most commonly emergent species throughout this study. *Eurythoe complanate* (orange fireworm), *Ophiocoma brevipes* (mottled brittle star), and *Opohiocoma erinaceus* (spiny brittle star) were the most commonly cryptic species throughout this study. No statistically significant differences were found between species abundance across tidal changes ($t=-0.53$, $p=0.605$), or between daytime and night surveys ($t=-0.13$, $p=0.897$). Additionally, no statistically significant difference in species richness was identified between high and low tide ($t=0.82$, $p=0.425$), or diurnal and nocturnal activity ($t=0.91$, $p=0.368$). However, *P. ocellatus*, a photosynthetic sea slug, showed differences in emergence when comparing diurnal and nocturnal surveys, showing statistically higher rates of emergence during the day with complete absence of emergence at night. *H. pervicax* and *E. godeffroy*, both sea cucumbers known to feed upon plankton and detritus, showed differences in emergence between diurnal and nocturnal surveys, with significantly higher rates of emergence at night and complete absence of emergence during the day. The most commonly emergent nocturnal species surveyed were planktivores and detrivores, possibly due to the lack of visual predation at night within this tide pool ecosystem. Marine invertebrates sampled during this study showed a weak significant correlation between species richness and D.O., however, neither species richness nor species abundance showed any significant correlation with salinity or temperature. These results suggest that mobile benthic marine invertebrates within this coastal tidepool ecosystem may not be significantly influenced by monthly changes in water quality. Therefore, it is possible to assume that invertebrate assemblages within this ecosystem may be influenced more by food availability and the lack of visual predation at night. Further understanding how other organisms and their environments can influence daily invertebrate activity is crucial when understanding how a community is structured within tidepool ecosystems.

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